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Sir:

Transmitted herewith for filing is the patent application of

Inventor: Richard Tad Lepman

For: PROCESS FOR DETERMINING OBJECT LEVEL PROFITABILITY

Enclosed are:

- ☒ 14 sheets of drawing. (Formal)
☒ An Assignment of the invention to Berkeley * IEOR
☐ A certified copy of a _____ application.
☐ An associate power of attorney.
☒ A verified statement to establish small entity status under 37 CFR 1.9 and 37 CFR 1.27.

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Respectfully submitted,

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Serial or Patent No:

Filed or Issued: Concurrently

For: PROCESS FOR DETERMINING OBJECT LEVEL PROFITABILITY

VERIFIED STATEMENT (DECLARATION) CLAIMING
SMALL ENTITY STATUS (37 CFR 1.9(f) and 1.27(c))
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behalf of the concern identified below:

NAME OF CONCERN: Berkeley * IEOB

ADDRESS OF CONCERN: 687 Spruce Street
Berkeley, California 94707

I hereby declare that the above identified small business concern qualifies as a small business concern as defined in 13 CFR 121.3-18, and reproduced in 37 CFR 1.9(d), for purposes of paying reduced fees under Section 41(a) and (b) of Title 35, United States Code, in that the number of employees of the concern, including those of affiliates, does not exceed 500 persons. For purposes of this statement, (1) the number of employees of the business concern is the average over the previous fiscal year of the concern of the persons employed on a full-time, part-time, or temporary basis during each of the pay periods of the fiscal year, and (2) concerns are affiliates of each other when either, directly or indirectly, one concern controls or has the power to control the other, or a third party or parties controls or has the power to control both.

I hereby declare that rights under contract or law have been conveyed to and remain with the small business concern identified above with regard to the invention entitled: PROCESS FOR DETERMINING OBJECT LEVEL PROFITABILITY by Richard Tad Lepman described in

☒ the specification filed herewith

☐ Application Serial No. , filed

☐ Patent No. , issued

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TITLE OF PERSON OTHER THAN OWNER: President

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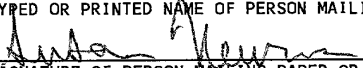
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APPLICATION

Of

RICHARD TAD LEPMAN

For

UNITED STATES LETTERS PATENT

On

PROCESS FOR DETERMINING OBJECT LEVEL PROFITABILITY

Docket No. BERK-37617

Sheets of Drawings: Fourteen

Attorneys

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PROCESS FOR DETERMINING OBJECT

LEVEL PROFITABILITY

RELATED APPLICATION

This application claims priority from provisional patent application Serial No. 60/128,769, filed April 9, 1999.

BACKGROUND OF THE INVENTION

The process of measuring profit is an important business activity. Profit measures are the primary basis for understanding financial performance and value creation in a business. Once a business is owned publicly, an independent review of a firm's financial position becomes a mandatory process well known as measuring profit according to "generally accepted accounting principals" (GAAP.) While these standards and regulations are adequate for an external view of a company's financial condition, the measurement of profit contribution amongst the business is required for proper management of the franchise. Internal financial performance measurement is especially complex for a multi-product, multi-location, and/or large customer based businesses. The use of internal financial performance measures drives most businesses planning processes, management incentive processes and control processes. Many businesses have found that internal profit measures can be consistent with the external financial statement measures. These businesses implement internal accounting processes consistent with external measures using common metrical units similar to a GAAP Financial Statement presentation - a consistent metric or "yard stick" (i.e. numerically the sum-of-the-profit-parts equals the whole company's profit according to GAAP.)

Many businesses today are struggling to accurately measure profit contribution at a level necessary to accurately measure profit contribution of individual customer interactions. The reason for dilemma is found in the manner in which generally accepted accounting principles are applied. Fundamental accounting theory takes lumpy cash flows that occur in the day-to-day management of a business conducted with its customers and transform them into smoothed income or expense items (known as accruals.) At the end of every profit reporting cycle these income and expense items are consolidated into a period end balance sheet and income statements. Reports on the state of the business can then be presented by accountants in formats necessary for the independence of ownership and management that is the basis of capital markets. Indeed, most businesses today would call its accounting process critical for survival. Unfortunately, the complexity of maintaining an accurate financial accounting process has obscured the measurement of profit contribution at a very detailed level. While the aggregate cash flows of a large company are relatively stable the individual customer-to-business cash flows are very volatile. Accounting practice to date has been comfortable with using aggregate cash flow information for the accrual accounting process. The accounting process based on aggregates has lead to blindness by businesses of incremental customer profit contribution measures necessary to implement customer level decision making, particularly in large businesses with many millions of customers.

General Ledgers (double entry book keeping systems) were early adapters of automated data processing solutions due to the match between computing capabilities of computers and the execution of the accounting process. The benefit, from reduced cost for accounting processes easily justified large expenditures in information processing technology, both in hardware and in software development. The complexity of today's general ledger applications and the age of these systems have retarded the innovation of new automated techniques taking advantage of technological advances in massively parallel computing capability.

References describing generally accepted accounting principals and procedures are listed below, and are incorporated by reference herein:

The money market /, Marcia Stigum. 3rd ed. Homewood, Ill. :
Dow Jones-Irwin, c1990.

Money market and bond calculations /, Marcia Stigum and
Franklin L. Robinson. Chicago : Irwin Professional Publ., c1996.

Money market calculations : yields, break-evens, and
arbitrage /, Marcia Stigum, in collaboration with John Mann. Homewood, Ill. :
Dow Jones-Irwin, c1981.

The money market : myth, reality, and practice /, Marcia
Stigum. Homewood, Ill. : Dow Jones-Irwin, c1978

Quantifying the market risk premium phenomenon for investment
decision making: September 26-27, 1989, New York, New York /, Keith P.
Ambachtsheer ... [et al.] ; edited by William F. Sharpe and Katrina F. Sherrerd
; sponsored by the Institute of Chartered Financial Analysts. Charlottesville,
VA : CFA : May be ordered from Association for Investment Management and
Research, c1990

Fundamentals of investments /, Gordon J.
Alexander, William F. Sharpe, Jeffery V. Bailey. 2nd ed. Englewood Cliffs,
N.J. : Prentice Hall, c1993.

Microeconomics /, Richard G. Lipsey . [et al.]. 9th ed. New York :
Harper & Row, c1990.

Economics of the firm : theory and practice /, Arthur A. Thompson, Jr.,
John P. Formby. 6th ed. Englewood Cliffs, N.J. : Prentice Hall, c1993.

The FASB conceptual framework project, 1973-1985 : an analysis /,
Pelham Gore. Manchester, UK ; New York : Manchester University Press ;
New York, NY, USA : Distributed exclusively in the USA and Canada by St.
Martin's Press, c1992.

Statement of financial accounting standards no. 5 : impact on corporate risk and insurance management / , Robert C. Goshay. Stamford, Conn. : Financial Accounting Standards Board of the Financial Accounting Foundation, 1978.

Common cents : the ABC performance breakthrough : how to succeed with activity-based costing / , Peter B.B. Turney. Hillsboro, OR : Cost Technology, 1991.

A guide to the SQL standard; a user's guide to the standard relational language SQL / , Date, C. J. : Addison-Wesley Pub. Co., 1987.

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Objectives and concepts underlying financial statements / United Nations, 1989.

Cost accounting for factory automation / National Association of Accountants, 1987.

Interest rate risk models :: theory and practice / : Glenlake Publ. Co. - Fitzroy Dearborn, 1997.

Economic analysis for management decisions, Elliott, Jan Walter: R. D. Irwin, 1973.

Microeconomic theory / , Ferguson, C. E. (Charles E.): 4th ed. R. D. Irwin, 1975.

Planning and measurement in your organization of the future / , Sink, D. Scott.: Industrial Engineering and Management Press, 1989.

Economics / , Paul A. Samuelson, William D. Nordhaus. 16th ed. Boston, Mass : Irwin/McGraw-Hill, c1998.

Setting intercorporate pricing policies /, Business International Corporation, New York : Business International Corporation, 1973.

Controversies on the theory of the firm, overhead allocation, and transfer pricing /, Murry C. Wells, editor. New York : Arno Press, 1980.

The transfer pricing problem : a theory for practice /, Robert G. Eccles. Lexington, Mass. : Lexington Books, 1985.

Transfer pricing /, Clive R. Emmanuel and Messaoud Mehafdi. London ; San Diego : Academic Press, 1994.

Internal transfer pricing of bank funds /, by Valerie Giardini. Rolling Meadows, Ill. : Bank Administration Institute, 1983.

Transfer pricing : economic, managerial, and accounting principles /, by Clark J. Chandler ... [et al.] Washington, D.C. : Tax Management, Inc., 1995.

International intracorporate pricing; non-American systems and views, Jeffrey S. Arpan. New York, Praeger Publishers, 1971.

There remains, however, a need to resolve profit measures at a detailed level without using analytical models or statistical extrapolation. Such a process should utilize rule driven and data base measurement processes which will give large scale businesses a lower cost of maintenance and a technologically scalable tool to measure profit at a level of precision or resolution not possible in prior financial performance measurement processes. The present invention fulfills this need and provides other related advantages.

SUMMARY OF THE INVENTION

Prior approaches to management's desire for an accurate measure of individual decisions (incremental or marginal) profit impact have been solved by automating the accounting process for implementing accounting methods. Cash flows are transformed into two parts, a debit part or credit part, according to an accounting rule. Other non-cash accounting rules are

implemented to create "accrual" debits and credits smoothing income and expenses and adjusting for future contingencies. (see Management Accounting Theory Book or any source of accounting theory, where the balance sheet equation and the consolidation process, the combination of flows and stocks of financial data, are developed.) The first large scale use of automated computing technology is frequently found to be the automation of the financial control or accounting processes, since it is easy to develop software to implement accountancy rules and there were large benefits in staff productivity easily observable. For businesses to observe marginal profit contributions it was necessary to use accounting information and make reasoned conclusion on how to apportion or extrapolate this information into incremental customer, product or organizational profit detail. (See Fig. 1)

What these methods of profit measurement lack are the adequate level of detail to measure an individual or incremental decision's impact on profit.

To gain this new level of profit resolution this invention is designed to use micro profit measurement rules applied at a granular level consistent with standard accounting practice using a combination of actuarial science and mathematical set theory. The invention is designed to utilize massively parallel computing operations using relational database management techniques enabling profit measurement at a level not available today in a large individual customer scale business. This invention does this through a consistent application of measures to a class of business entities which represent the smallest common component of profit measurement desired - the Profit Object.

The invention's method of apportionment of non-object related profit measures specifies a method which will not change the ordinal or cardinal profit contribution ranking when only marginal profit measures are counted.

This specification is what makes it possible to apply marginal measurement rules (see Micro-economic theory literature) with macro economic principals; namely the sum-of-the-parts equals the whole criterion which is the basis of financial accounting theory and practice.

The invention decomposes profit measurement analytical calculations into five classifications:

1. Marginal profit measures associated with use of the business' balance sheet resources;
2. Marginal measures of non-balance oriented revenues;
3. Marginal cost measures;
4. Marginal measures of expected costs or revenues; and,
5. Apportioned cost measures.

This classification provides for additive profit measures across the five components. The calculation process is designed to be independent across classes 1, 2, 3, & 4 above with the addition of class five to preserve sum-of-the-parts integrity without simultaneous calculations typically found in profit measurement processes. When all five profit measures are summed at the lowest level of profit detail, a consistent set of profit values for all types of aggregations are possible - all profit measurement then originates from the same point in a profit database. The simultaneous use of these five analytical frameworks makes possible a detailed level of profit calculation consistent with GAAP.

In particular, the present invention relates to a process for determining object level profitability. In its basic form the process includes the steps of:

1. Preparing information to be accessed electronically;
2. Establishing rules for processing the prepared information;
3. Calculating at least one marginal value of profit using established rules as applied to a selected set of prepared information;
4. Calculating a fully absorbed value of profit adjustment using established rules as applied to the selected set of prepared information; and,
5. Combining the at least one marginal value of profit and fully absorbed value of profit adjustment to create a measure for object level of profitability.

More specifically in the step of preparing information to be accessed electronically, the database is prepared, object attributes are extracted,

conditioned and loaded into the database, and financial statement attributes are extracted, conditioned and loaded into the database. If desired the step may also include extracting, conditioning and loading the event attributes into the database, and calculating funds transfer treatment rates.

In the step of establishing for processing the prepared information for rule establishment providing the information necessary to select objects and perform the correct profit calculus is accomplished. The step of calculating at least one marginal value of profit using established rules as applied to a selected set of prepared information includes calculating net interest, other revenue, direct expense, and/or provision for the selected set of prepared information. Net Interest (NI) is the summation of interest income, value of funds provided and earnings on equity funds used less the sum of interest expense and cost of funds used. Other Revenues (OR) is a measure of profit contribution from non-interest related sources. Direct Expense (DE) is the profit value reduction due to marginal resource consumption by the object. Provisioning (P) is the expected profit value adjustment for future outcomes related to the object.

The step of fully absorbed profit adjustment, Indirect Expense (IE), is an apportioned profit value adjustment for all non-object related resource consumption by the business.

In the step of combining the five profit values, $NI + OR - DE - P - IE$, may be adjusted for taxes and/or object economic value.

The foregoing elements of the invention, which have been explained at a micro elemental level can be advantageously employed in massive amounts and parallel process power. For example, in the macro perspective of the invention the basic steps can be utilized.

The present invention gives management profit measures tailored to its need for accurate decision oriented profit information required to manage a large organization based on profit measurement. This invention gives businesses the ability to resolve profit measures at a level of detail necessary for all types of application of profit oriented performance measurement.

Other features and advantages of the present invention will become apparent from the following more detailed description, taken in conjunction with the accompanying drawings which illustrated, by way of example, the principles of the invention.

BRIEF DESCRIPTION OF THE DRAWINGS

The accompanying drawings illustrate the invention. In such drawings:

FIGURE 1 shows existing profit calculation process flow.

FIGURE 2 shows analytical processing relationships.

FIGURE 3 shows the invention's information flow.

FIGURE 4 shows the invention's data relationships.

FIGURE 5 shows the invention's process flow.

FIGURE 6 shows the invention's database preparation process step detail.

FIGURE 7 shows the rule maintenance process.

FIGURE 8 shows the net interest measuring process

FIGURE 9 shows the other revenue measuring process.

FIGURE 10 shows the direct expense measuring process.

FIGURE 11 shows the provision measuring process.

FIGURE 12 shows the indirect expense measuring process.

FIGURE 13 shows the profit component aggregation and adjustment process.

FIGURE 14 shows a partial relational database schema for an airline industry example.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

As shown in the accompanying drawings for purposes of illustration, the present invention is concerned with a detail profit metric (DPM) designed to be a computer database application (i.e. software) for profitability measurement. DPM's profit measurement system is fundamentally different

from the common profit measurement system used by regulators and public accountancy - yet, it is consistent with generally accepted accounting principals. DPM is based on object level detail of cash flows, customer events and management allocations of profit arising from non-customer related events. DPM provides both marginally and fully absorbed profit measures, something traditional "general ledger" based profit accounting systems can not accomplish due to reliance on aggregate debit and credit amounts (see Figs. 2-4.)

The following is a definition of the inputs (attributes or measurement parameters), the method of processing and the output of the DPM process.

Definitions

Object Attributes

These are data about the object being measured. Different businesses have different objects of detailed profit measurement. Examples of profit measurement objects include an airline using "seat" as the profit object, an insurance company using a "policy" object or a bank use an "account" object - these objects represent the lowest level of detail required for consistent internal multi-dimensional internal profit analyses. Types of data attributes associated with these objects include: balances, rates (or interest accrued), product identification, exposures, expected loss frequency, and various dates (e.g., start, finish, rate reset, last payment, next payment, life, etc.)

Event Attributes

These data are about events (a resource consuming activity) related to the object being measured. Data found here include object identification, transaction amounts, quantities, event location, event time, counter-party identification, event type (e.g., payments, interest paid or earned, purchases, refunds, etc.) At least one of these attributes must relate the event to at least one Object.

Financial Statement Attributes

These are data about the company's financial statement. Data found here include balance sheet and profit statement amounts usually aggregated by the legal or management entities that own a group of objects being measured. These data will be current accounting period either actual or planned.

Profit Measurement Parameters

These data include parameter values necessary to perform the object or event level profit calculations. The major classifications of these data are:

- Funds valuing rates ("Treatment Rates") - DPM's funds transfer pricing method uses maturity opportunity rates used in valuing each object's marginal use or source of internal funds (balance sheet resources).
- Unit Costs - DPM's Direct Expense calculations require unit cost parameters. DPM can calculate unit costs, when unit cost data are not available; in these instances, if the total cost is provided a financial statement attribute and then unit cost is derived by dividing total cost by an appropriate attribute quantity amount.
- Allocated Amounts - In both Other Revenue and Indirect Expense calculations this amount is apportioned amongst all objects in a group.
- Miscellaneous Calculation Values - Some of DPM's calculations require non-system of record values. For example, number of days in profit measurement period or equity allocation weighting. These values are known as "modeling" parameters.
- Amortization Parameters - Interest amortization requires an interest rate and expected life attributes. Straight line and declining balance methods of amortization require expected life values.
- Expected Profit Adjustment Measurement Parameters - Provision calculations require appropriate attributes, such as: expected loss

rates, reserve percentages, exposure factors, recovery rates, default probabilities and collection costs.

- Tax Rates - Tax rates are required for after-tax profit calculation. DPM is designed to calculate pre-tax income on a taxable equivalent basis (where an single effective tax rate is all that is required to transform pre-tax income into after tax earnings.)

Profit Measurement Rule Specification

DPM's processing approach is to combine profit measurement techniques with (non-modeled) data and calculation parameters. Each application of this calculus is called a rule. DPM is designed to allow the user the freedom to associate a group of objects with a rule and to use object-level information in combination with rule parameters to calculate profit values. The DPM invention uses profit measurement rules separate from, but applied to, object data and the use of relational database concepts, giving the user a flexibility in both the assignment and depth of definition of measurement rules and measurement resolution. Use of this method is especially suited for massively parallel computing technology where linear scaleable capital investment in processing technology is possible vis-à-vis object and event count and rule complexity.

The types of calculation (Rule types) are:

- Funds Treatment - Every object with cash flows affecting a financial statement's balance sheet requires a method of valuing an object's use or source of funds. The common name for this approach to valuing is know as "Matched Maturity Funds Transfer Pricing." DPM uses a canonical representation an object's funding characteristics for computational performance. DPM's methodology requires effective yield adjustment to eliminate the allocation of interest payable / receivable required by GAAP. A value, based on effective yield adjusted market price (the yield curve),

is then determined by DPM for each instance that requires an interest rate transfer prices to calculate an object's marginal Net Interest (NI).

- Equity Allocation - In order for precise net interest revenue or economic value adjusting calculations the amount of equity funds required at an object level must be determined. DPM's equity allocation to the object level calculations may use any of the following methods: simple ratios; regulatory definitions; economic allocations based on econometric modeling (see book on Modern Portfolio Theory) methodologies; or, as statically defined allocations.
- Balance Sheet Allocations – Complete calculation of Net Interest may require an object level allocation of some financial statement balance sheet amounts.
- Apportionment - In both Other Revenue, Provision and Indirect Expense calculations are applied at the object level using Financial Statement Attributes which are not related directly to an object. These profit adjustments are made so that the sum of all object profit equals the whole enterprise's profit - an important property of DPM's output. Accountants refer to this profit measurement technique as "full allocation of profit." DPM's approach is to pool indirect costs and revenues and then apportion them. Apportionment rules specify how the pool is completely allocated to appropriate objects. DPM uses a specific closed form (mathematical formula that require only information known in the current period and no iterative computation) allocation rules.
- Amortization - Some types of income or expense are deferred or accrued over multiple periods including and subsequent to the current accounting period. This is common to accrual accounting methods used in financial statement profit presentation and give rise to timing differences between cash flows and their related profit as presented in a financial statement in any accounting period. Since DPM is designed to mirror a financial statement's profit measure it must support deferral and accrual accounting principals. Amortization methods are included in DPM to reflect these

GAAP concepts. DPM's amortization methods include: interest method of amortization (used for interest income and expense accruals and for deferral of fees that are in lieu of interest); and, straight line or declining balance amortization methods (used for cost or income deferrals and capitalized investment depreciation.)

- Other Revenue Pricing - In situations where object and event activity can be used to derive object level income or fees DPM provides for the calculation of these drivers of profitability in Other Revenue profit calculations. These calculations take the mathematical form of a linear combination of event or object values and modeled coefficients.
- Direct Expense - Calculation of object profit adjustment due to object related activity requires rules that take the form of linear combinations of event or object values and modeled coefficients.
- Indirect Expense - In situations where expense apportionment or amortization amounts are aggregated the user may want different rules applied depending on the path (or dimension) of aggregation. These rules allow for multiple profit calculations rules to be applied to derive multiple object level indirect expense amounts.
- Provision - Adjusting current profit for expected future value changes is known as "actuarial" profit provisioning. The technique is well known by the financial industry's accounting practice. DPM applies actuarial based methods in its object level profit calculations where the Provision pre-adjusts profit for contingent or known exposures to future profit.
- Taxable Equivalent Gross-up - Profit is usually an after-tax measure. Some events or portions of some object profit may be excluded from normal taxation. DPM's approach is to adjust these pre-tax values so that a singular tax rate can be used to convert pre-tax profit into after-tax values, known as taxable equivalent adjustment. For the purpose of the remaining detailed description all profit and loss profit measures are tax equivalent amounts (e.g., TEG * Amount.) These rules use object and

event attributes to drive an adjustment for each of the five classes of profit amounts to a taxable equivalent basis.

- Interest Yield Adjustments - Since DPM can derive profit for any length of accounting period from daily to annual, the adjustment of cash interest payments and the financial statement's accrual or smoothed representation of interest related Profit, DPM requires a method for converting cash interest amounts to financial statement accrual amounts. DPM implements the mathematical concept of "effective interest rate" conversion to accomplish this type of calculation.

Before the calculation rules can be applied at the object or event level a calculation rule must be associated with an object, designating the methods DPM will use to calculate components of profit at the object level. An object grouping is designed to associate objects having common and defined set of object attributes for similar processing (note that a group may consist of one object). The association of a group of objects with a calculation rule is referred here as a Rule Map.

Inheritance Functionality

In nature the concept of inheritance is where a descendant receives properties of its predecessors, in computer science inheritance is defined in "Object Oriented" software development theory as the ability to increase function without loss of function using the same data. In DPM the concept of inheritance is applied and in essence it means that an implementation can change Rules (change profit calculus) without losing any profit measurement capabilities of the preceding state(s). This feature allows DPM users a unique ability to apply techniques of differing levels of sophistication to different sets of objects according to the trade-off between the value of more accurate object-focused profit measures and the cost of obtaining and populating data and maintaining Rule Maps.

The DPM system is designed for Rules to be applied to any object without loss of integrity of output. This design feature allows the user to

incrementally migrate objects to increased measurement precision as justified. This valuable piecewise increase in functionality is possible due to DPM's combination of rules and data in a mathematical set theoretic framework. This approach allows for a relational database management system implementation. It is nearly impossible develop and maintain procedural based software with as much flexibility and with the capability to simultaneously support the number of calculation permutations required by DPM .

Restatement Functionality

Since DPM is a rule based system the ability to restate prior period's Profit calculations are systematically possible providing historical data exists. DPM's design of object level profit measurement enables a unique historical profit restatement capability. Three features of DPM's restatement capability are:

1. Produces a mathematically consistent time series (i.e. no measurement bias) of object level Profit. DPM restatement functionality is designed to apply the same Rules to all available historical object or event level data.
2. DPM's restatement functionality preserves accrual objecting integrity when the object history is restated for different length accounting periods. Implementations of daily, weekly, monthly, quarterly, semi-annual, or annual profit calculations and mixing different periodicity in historical data without loss of analytical integrity.
3. Capable of object's profit history restatement. If a DPM user changes Rules or Rule Maps and/or changes the way a subset of object's Profit are calculated and if the historical data is available per the new set of Rules then the user can restate historical profit measures for these subset of objects.

Processing (see Fig. 5)

1. Populate Database (see Fig. 6)

Perform standard database administration actions to initialize data for the required calculations:

1. Perform database Initialization
2. Extract, condition & load object attributes
3. Extract, condition & load event attributes
4. Extract, condition & load financial statement attributes
5. Calculate and populate NI treatment rate attributes

2. MAINTAIN OBJECT GROUPS AND RULE MAPS (SEE FIG. 7)

Populate or edit Rule parameters necessary to perform calculations. Rules definition is by association of specific, non-iterative calculation, as described below, with a set of object or event attributes defined as a data filter (see Relational Data Base Management System textbook). Rules have two pieces:

1. Parameters to drive the object selection or data filter for calculations; and,
2. Parameters specific to the appropriate calculation methodology.

An easy-to-use graphical user interface can be used to maintain these data.

Steps 3 through 6 perform object and event level profit calculations. Steps 3, 4, 5, and 6 can be processed independently, step 7 requires values derived in step 3, 4, 5, and 6 and therefore occurs sequentially.

3. Calculate Net Interest for All Objects (see Fig. 8)

Net Interest is:

$$NI = \text{Interest Income} - \text{Cost of Funds} + \text{Value of Funds} - \text{Interest Expense} + \text{Earning on Allocated Equity}$$

Correct interest rates for calculation of interest income or expense depend on the length of the profit measurement period. Using actuarial

mathematical techniques the bookkeeping required by GAAP for interest receivables and Payables can be avoided in NI calculus. A known technique (see M Stigum, Money Markets) to accomplish this adjustment for profit measurement according to GAAP (i.e. accruals) the following calculation is used to convert interest rates:

Let r_{new} = annualized rate with new compounding factor
 r = annualized rate with old compounding factor
 m = number of old compounding periods per year
 n = number of new compounding periods per year

Then
$$r_{\text{new}} = \left[\left(1 + \frac{r}{m} \right)^{m/n} - 1 \right] * n$$

NI CALCULATION RULE TYPE I

The object balance is either an asset or a liability amount for Type I calculation.

Let $AAB(o_i)$ = Average Asset Balance of the object o_i
 $ALB(o_i)$ = Average Liability Balance of the object o_i
 $rate_{\text{asset}}(o_i)$ = Effective interest rate for object o_i as an asset balance

$rate_{\text{liability}}(o_i)$ = Effective interest rate for object o_i as a liability balance

Rt = Treatment rate based on the identified treatment for the object's product attributes

$Int\ Inc(o_i)$ = Interest Income of object o_i

$COF(o_i)$ = Cost of funds used by object o_i

Int Exp (o_i) = Interest Expense for object o_i
 VOF (o_i) = Value of funds provided by object o_i

Then,

Int Inc (o_i) = AAB (o_i) * rate_{asset} (o_i)
{Compute only if object attribute doesn't exist}
 COF (o_i) = AAB (o_i) * Rt
 Int Exp (o_i) = ALB (o_i) * rate_{liability} (o_i)
{Compute only if object attribute doesn't exist}
 VOF (o_i) = ALB (o_i) * Rt

NI CALCULATION RULE TYPE II

Let AB_(c,t)(o_i) = Average Balances of the object o_i
 rate_(c,t)(o_i) = Effective interest rate for the corresponding balance
 asset or liability
 Rt(o) = Object o's product type/group as needed to identify
 treatment rate
 R_(c,t)(pt(o)) = Rate (treatment rate) for objects of this product
 type/group, given the balance class, and tier
 Int Inc(o_i) = Interest Income of object o_i
 COF (o_i) = Cost of funds used by object o_i
 Int Exp (o_i) = Interest Expense for object o_i
 VOF (o_i) = Value of funds provided by object o_i

Then, where summations are over the possible balance variables
 (class, tier) for the object,

$$\text{Int Inc}(o_i) = \sum_{\forall c, t} \text{AB}_{(\text{asset } c, t)}(o_i) * \text{rate}_{(\text{asset}, c, t)}(o_i)$$

{calculate only if object attribute doesn't

exist}

$$\text{COF}(o_i) = \sum_{\forall c, t} \text{AB}_{(\text{asset}, c, t)}(o_i) * R_{(\text{asset } c, t)} R_{(c, t)}(\text{pt}(o))$$

$$\text{Int Exp}(o_i) = \sum_{\forall c, t} \text{AB}_{(\text{liability } c, t)}(o_i) * \text{rate}_{(\text{liability } c, t)}(o_i)$$

{calculate only if object attribute doesn't

exist}

$$\text{VOF}(o_i) = \sum_{\forall c, t} \text{AB}_{(\text{liability } c, t)}(o_i) * R_{(\text{liability } c, t)} R_{(c, t)}(\text{pt}(o))$$

Allocated Balances

Let Total Amount = Balance Sheet amount to be allocated to object

Rule = Rule for allocating Amount

Then, DPM calculates the allocation to object o to determine the allocated balance:

$B(o_i)$ = Rule applied to (Total Amount)

= The Allocated Balance

Treat this balance as any one of the average balances associated with the object, where class is specified by users, tier is "allocated". Thus, $B_i(o_i)$ is one of the $\text{AB}_{(c, t)}(o_i)$ defined above.

NI CALCULATION RULE TYPE III

Let $\text{AB}_{(c, t)}(o_i)$ = Average Balances of the object o_i

$\text{rate}_{(c, t)}(o_i)$ = Effective interest rate for the corresponding

balance

$\text{Type}_{p, a}(o_i)$ = Object o_i 's product and object attributes as needed to identify treatment

$R_{(c, t)}(\text{type}_{p, a}(o_i))$ = Rate (treatment rate) for this object's product type, given the balance class, and tier/tenor

Int Inc (o_i)	= Interest Income of object o_i
COF (o_i)	= Cost of funds used by object o_i
Int Exp (o_i)	= Interest Expense for object o_i
VOF (o_i)	= Value of funds provided by object o_i

Then, where summations are over the possible balance attributes (state, tier) for the object,

$$\text{Int Inc } (o_i) = \sum_{\forall c, t} AB_{(\text{asset } c, t)}(o_i) * \text{rate}_{(\text{asset } c, t)}(o_i)$$

{calculate only if object attribute doesn't exist}

$$\text{COF } (o_i) = \sum_{\forall c, t} AB_{(\text{asset } c, t)}(o_i) * R_{(\text{asset } c, t)}(\text{type}_{p, a}(o_i))$$

$$\text{Int Exp}(o_i) = \sum_{\forall c, t} AB_{(\text{liability } c, t)}(o_i) * \text{rate}_{(\text{liability } c, t)}(o_i)$$

{calculate only if object attribute doesn't exist}

$$\text{VOF}(o_i) = \sum_{\forall c, t} AB_{(\text{liability } c, t)}(o_i) * R_{(c, t)}(\text{type}_{p, a}(o_i))$$

NI CALCULATION RULE TYPE IV

Let $AB_{(c, t)}(o_i)$	= Average Balances of the object
$\text{rate}_{(c, t)}(o_i)$	= Effective interest rate for the corresponding
balance amounts	
$\text{type}_{p, a, b}(o_i)$	= Object o_i 's product, object attribute, and
	behavior types as needed to identify treatment
	rate
$R_{(c, t)}(\text{type}_{p, a, b}(o_i))$	= Rate (treatment rate) for objects of this product
	type, balance class, and tier/tenor
Int Inc(o_i)	= Interest Income of object o_i
COF (o_i)	= Cost of funds used by object o_i
Int Exp (o_i)	= Interest Expense for object o_i
VOF (o_i)	= Value of funds provided by object o_i

Then, where summations are over the possible balance variables (state, tier) for the object,

$$\text{Int Inc}(o_i) = \sum AB_{(\text{asset c}, t)}(o_i) * \text{rate}_{(\text{asset c}, t)}(o_i)$$

{calculate only if object attribute doesn't exist}

$$\text{COF}(o_i) = \sum AB_{(\text{asset c}, t)}(o_i) * R_{(\text{asset}, t)}(\text{type}_{p,a,b}(o_i))$$

$$\text{Int Exp}(o_i) = \sum AB_{(\text{liability}, t)}(o_i) * \text{rate}_{(\text{liability}, t)}(o_i)$$

{calculate only if object attribute doesn't exist}

$$\text{VOF}(o_i) = \sum AB_{(\text{liability}, t)}(o_i) * R_{(\text{liability}, t)}(\text{type}_{p,a,b}(o_i))$$

NI CALCULATION RULE TYPE V

Any Net Interest calculation that is non-iterative, canonical, and represents the marginal GAAP valuation of an object's balance sheet resource related revenues or expenses for each (o_i).

Note that in firms that are highly leveraged, the use of COF/VOF separation leads to a significant and volatile piece of NI, the net difference between to sum of COF and the sum of VOF (after adjusting for EOAE per the following section) and the firm's total NI. This is known by a banker as "mismatch profits arising from the difference in tenors" (duration) of the assets and liabilities. If VOF and COF rates are based on matched maturity of objects then the difference between the firms total NI and the sum of the objects is the profit arising from the firm having different duration of balance sheet related objects. Since this profit is not related to a specific object, but the combination of objects in the enterprise, a separate profit measure is appropriate and possible using DPM's approach. The use of the rules above allow for a novel method of calculating funds transfer pricing, since the rules are based on sets, the processing can be preformed in parallel. Further, since the rules are canonical this approach leads to a computationally efficient method of calculating these types of profit values.

NI CALCULATIONS OF EOAE

Since GAAP financial statement's balance sheet is based on the balancing equation Assets equals Liabilities plus Equity, NI should be adjusted for the value of the Equity resource consumed by each Asset or Liability object. Calculating Earnings on Allocated Equity as part of an object's NI: Four exclusive options are provided for allocating equity to objects. DPM's options are as follows:

- Option 1 No calculation of EOAE.
- Option 2 EOAE calculation based on a simple equity ratio.
- Option 3 Equity allocation for all assets following regulatory standards.
- Option 4 Equity allocation using an economic allocation rule, based on object cohorts and modern portfolio theory's capital asset pricing model.

Option 1

$$EOAE(o_i) = 0$$

Option 2

Let $AB_{(asset, t)}(o_i)$ = Average Asset balances of the object o_i ,
including any allocated asset
balances

ER = Equity Ratio

R_{equity} = Treatment Rate for equity

$$\text{Then, } EOAE(o_i) = R_{equity} * ER * \sum AB_{(asset, t)}(o_i)$$

where the summation is taken over all asset
balances.

Option 3

Let $\text{Amount}(o_i)$ = Amount(s) associated with object 'a' This may be the average asset balances of the object ' o_i ' including any allocated asset balances, or may be an object parameter, etc.

$\text{Wt}(\text{type}(o_i))$ = Code needed to identify the weight for object o balances, at the object-type level

$\text{W}(\text{Wt}(\text{type}(o_i)))$ = determined by the weight code

Cap Ratio = An appropriate risk-weighted capital ratio

chosen

R_{equity} = Treatment Rate for equity

Then, $\text{EOAE}(o_i)$ = $R_{\text{equity}} * \sum [\text{Amount}(o_i) * \text{W}(\text{Wt}(o_i)) * \text{Cap Ratio}]$

where the summation is taken over all balances of o_i if there are multiple amounts.

Option 4

Let $\text{Amount}(o_i)$ = An amount or amounts related to the object, such as average balances of the object (denoted $\text{AB}_{(c,s,t)}(o_i)$)

$\text{Cohort}(o_i)$ = The cohort of objects in which object o is a member

$E_{\text{cohort}}(o_i)$ = The equity allocation rule for the cohort of object o. This is a linear (two-valued) function that operates on $\text{Amount}(o_i)$ of the form $\alpha + \beta * \text{Amount}(o)$.

R_{equity} = Treatment Rate(s) for equity for the $\text{Amount}(o_i)$ value(s)

$$\begin{aligned}\text{Then, } \text{EOAE}(o_i) &= \sum R_{\text{equity}} * E_{\text{cohort}}(o)(\text{Amount}(o_i)) \\ &= \sum R_{\text{equity}} * [\alpha + \beta * \text{Amount}(o_i)]\end{aligned}$$

where summation occurs if Amount(o_i) is a set of values (such as the object and allocated balances related to the object).

4. Calculate Other Revenue for All Objects (see Fig. 9)

OR Calculation Rule Type I

Let OR_i = Financial Statement Other Revenue attribute subset ,
 $OR_i(o_i)$ = The amount of OR_i apportioned to object o_i ,
 $O(OR_i)$ = the objects that map to OR_i .

Let M be an OR calculation method, where M is dependent upon the OR subset under consideration. We then have the following.

If $M(OR_i)$ = a "balance" attribute method.

Define

$M(OR_i)(o_i)$ = An average balance method for calculating o_i 's OR

$$\text{and } OR_i(o_i) = OR_i * \frac{\text{Balance}(o_i)}{\sum_j (\text{Balance}(o_j))}$$

where the summation is over all o_i in $O(OR_i)$.

If $M(OR_i)$ = A "count" method for calculating o_i 's OR

Define

$M(OR_i)(o_i)$ = 1

$$\text{and } OR_i(o_i) = OR_i * \frac{1}{(\text{count}(a_j) \text{ in } O(OR_i))}$$

where the count is over all o_i in $O(OR_i)$.

If $M(OR_i)$ = "event count," we can define

$M(OR_i)(o_i)$ = Count of events in profit measurement period for object o_i

$$\text{and } OR_i(o_i) = OR_i * \frac{\text{count of events for object } o_i}{\sum_j (\text{count of events for object } (o_j))}$$

where the summation is over all o_i in OR_i .

$$\text{If } M(OR_i) = \text{"event amount"}$$

$$\text{Define } M(OR_i)(o_i) = \sum_{\text{events over the period}} (\text{event amounts for } o_i)$$

$$\text{and } OR_i(o_i) = OR_i * \frac{\sum_{\text{events over the period}} (\text{event amounts for object } o_i)}{\sum_j \sum_{\text{events over the period}} (\text{event amounts for object } o_i)}$$

where the summation is over all events in o_i (OR_i),

and the events are restricted to a class of event type. Then, we have the total OR for object o given by the sum of these allocations for all sets for which a has an association:

$$OR(o_i) = \sum (OR_i(o_i)), \text{ summing over } i.$$

As a generalization, these formulas can be written in shorthand

where $M(OR)$ is the corresponding function of 'o' above, as:

$$OR_i(o_i) = OR_i * \frac{M(OR_i)(o_i)}{\sum_j M(OR_j)(o_i)}$$

and

$$OR(o_i) = \sum_i^{o_i \in O(OR_i)} [OR_i * \frac{M(OR_i)(o_i)}{\sum_j M(OR_j)(o_i)}]$$

OR Calculation Rule Type II

The formula for OR calculation is given as follows:

Let o_i = Object being considered

$OR_i(o_i)$ = OR apportioned to a (if any) from a set OR_i

$Event(t)(o_i)$ = The event reflecting the activity of object o_i in the period restricted to a given event type t .

$Amount(Event(o_i))$ = An event amount

$Rev(Evt_i(o_i))$ = The revenue amount associated with this event.

This is

assumed to be of the form

$$= \sum_{type} \sum_i \left[x_i * Count(Event(t)_i(o)) + \beta_i * Amt(Event(t)_i(o)) \right]$$

where α , β are pre-entered values.

$OR(o_i)$ = Total OR apportioned to object o_i

Then $OR(o_i)$ = $\sum_{type} \sum_i (Rev(Event(t)_i(a))$ summed over all the events of o_i

+ apportioned revenue as in the Type I case.

$$= \sum_{type} \sum_i \left[x_i * Count(Event(t)_i(a)) + \beta_i * Amt(Event(t)_i(a)) \right] +$$

$$\sum_i (OR_i(o_i))$$

OR Calculation Rule Type III

Let o_i = Object being considered

$OR_i(o_i)$ = OR apportioned to the object (if any) from a set OR_i

$Event(t)_i(o_i)$ = The events reflecting the activity of object o in the period

restricted to a given event type t

$Amount(Event(t)_i(o_i))$ = The event amount

$Rev(Event(t)_i(o_i))$ = The revenue amount associated with this event.

This is assumed to be of the form

$$= \sum_{type} \sum_i \left[x_i * Count(Event(t)_i(o)) + \beta_i * Amt(Event(t)_i(o)) \right] \text{ where } \alpha, \beta$$

are pre-entered values based on event type. For completeness, $\alpha = \beta = 0$ in the event amount is null.

AM = The method of amortization = cash, SL, DB, interest

$AM_k\{\text{amount}\}$ = Deferral on amount, using method AM, at time k (= 0 if $k > \text{life}$);

and life = 1 if cash basis is selected

$AM_{\text{now}}\{\text{amount}\}$ = Deferral on amount, using method M, at this period now; note

that this is at various points of life for various amounts

Let $OR(o_i)$ = Total OR apportioned to object o_i .

Then $OR(o_i)$ = Amortized amounts in their first amortization period
+ amortized amounts in their higher amortization

periods

+ amounts not amortized but apportioned from a pool

as in Type I

We take this step at a time. First, consider the amounts in their first amortization period. These are calculated as follows, using the formula generated in Type II:

Then $OR(o_i)$ = $\sum_{\text{type } t} \sum_i (\text{Rev}(\text{Event}(t)_i(o_i)))$ summed over all the

transactions of

+ apportioned revenue as in the Type I case.

$$= \sum_{\text{type } t} \sum_i [x_i * \text{Count}(\text{Event}(t)_i(o_i)) + \beta_i * \text{Amt}(\text{Event}(t)_i(o_i))]$$

$$+ \sum_i (OR_i(o_i))$$

where the AM_i methods vary with the event types. We can group the amounts being amortized by their amortization characteristics. For this purpose, let

$\text{Pool}_i(L, M)$ = the pools of amounts amortizing in this period for the first time

according to life L and amortization method M. The new amortizing amounts can be rewritten as follows:

$$\text{New amortized amounts} = \sum_{L,M} \text{Pool}_i(L, M)$$

Similarly, define

$\text{ool}_k(L, M)$ = the pools of amounts amortizing in this period for the k^{th} time according to life L and amortization method M , where $L \leq k$. N.B. any amortization calculation can be used if the calculation can be derived using known Object Attributes.

Then, the total OR for object o_i in this period is computed as follows:

$$\begin{aligned} \text{OR}(o_i) &= \sum_{\text{type } t} \sum_i [x_i * \text{Count}(\text{Event}(t)_i(o_i)) + \beta_i * \text{Amt}(\text{Event}(t)_i(o_i))] \\ &\quad + \sum_{k>1} \sum_{L,M} \text{Pool}_k(L, M) \\ &\quad + \sum_i (\text{OR}_i(o_i)) \\ &= \sum_k \sum_{L,M} \text{Pool}_k(L, M) + \sum_i (\text{OR}_i(o_i)) \end{aligned}$$

OR Calculation Rule Type IV

Foregone OR:

Let Actual OR for object $o_i = \text{OR}_{\text{actual}}(o_i)$ - CASH AMOUNTS

Let Expected OR for object $o_i = \text{OR}_{\text{expected}}(o_i)$

Then, Foregone OR for object $o_i = \text{OR}_{\text{foregone}}(o_i) = \text{OR}_{\text{expected}}(o_i) -$

$\text{OR}_{\text{actual}}(o_i)$ - CASH AMOUNTS

OR Calculation Rule Type V

Any Other Revenue calculation that is non-iterative, canonical, and represents the entire GGAP valuation of non-balance sheet resource related revenues or expenses.

5. Calculate Direct Expense for All Objects (see Fig. 10)

DE Calculation Rule Type I

None directly specified - use IE calculation rules (any type). For each IE rule used in this way, substitute $DE(o_i)$ for $IE(o_i)$ in any IE calculations used as DE.

DE Calculation Rule Type II

Direct expense will be a variable dependent upon the object and the event being costed. These determine the unit cost to be used and the calculation type, along with the multiplier rule being used if external amounts are needed. Thus, using subscripts to indicate variables used,

$$\begin{aligned} &DE_{\text{object, event-type}} \\ &= \text{unit cost}_{\text{event type}} * (\text{no. of events of this type in the period}) \\ &\quad + \text{amounts taken from an event file} \\ &\quad + \text{costs calculated as a} \\ &\quad \text{percentage of Event Amount Where the unit costs, and revenue} \\ &\quad \text{percentage by event type, are all entered by the user as pre-processing} \\ &\quad \text{inputs.} \end{aligned}$$

Then, $DE_{\text{object}} = \sum_{\text{event types}} DE_{\text{object, event-type}}$ where the summation is over event types.

DE Calculation Rule Type III

$$\begin{aligned} &DE_{\text{object, event-type, event-sub}} \\ &= \text{unit cost}_{\text{event type}} * (\text{no. of events of this type in the period}) \\ &\quad + \text{amounts taken from an event file} \\ &\quad + \text{costs calculated as a percentage of event amount} \end{aligned}$$

DE Calculation Rule Type IV

Two calculations are made, each one using the above calculations, processing two independent DE attributes for each object. DE is calculated

twice for each object, allowing for comparison of plan to actual values or standard to actual values or any scenario to scenario comparison.

DE Calculation Rule Type V

Any Direct Expense calculation that is non-iterative, canonical, and represents the entire GGAP valuation of costs related to object or sub-object level details.

6. Calculate Provision for All Objects (see Fig. 11)

P Calculation Rule Type I

The formula for calculating P of Object i is as follows, where $PG(o_i)$ denotes the P group in which o_i is a member:

$$P(o_i) = PG(o_i) * \frac{\text{Balance of } o_i}{\sum_{o_k \in RPG(o_i)} \text{Balance } o_k}.$$

P Calculation Rule Type II

The formula for calculating P of o_i is as follows, using the same symbols as above and $RF(o_i)$ denotes the expected adjustment factor for o_i :

$$P(o_i) = PG(o_i) * \frac{\text{Balance}(o_i) * RF(o_i)}{\sum_{o_k \in RPG(o_i)} [\text{Balance}(o_k) * RF(o_k)]}.$$

P Calculation Rule Type III

The formula for calculating P of object " o_i " is as follows, where $Pr(o_i)$ is a probability for object o_i .

$$P(o_i) = \text{Exposure}(o_i) * Pr(o_i) * \text{Expected Value Adjustment}(o_i) * \frac{1}{L}$$

Where L is the expected number of reporting periods during the life of o_i .

P Calculation Rule Type IV

The addition of any of the Type I, II or III P rules applicable to an object i.

$$P(o_i) = P(o_i)_{P \text{ Type I}} + P(o_i)_{P \text{ Type II}} + P(o_i)_{P \text{ Type III}} + P(o_i)_{P \text{ Type IV}}$$

P Calculation Rule Type V

Any Provision calculation that is non-iterative, canonical, and represents the entire GGAP valuation of expected costs related to future events, contingencies, timing effects.

7. Calculate Indirect Expense for All Objects (see Fig. 12)

Indirect expense, by its nature is not related directly to an Object, therefore apportionment techniques are used to allocate indirect expense to an Object. Any apportionment function is allowed as long as it is derivable at the object level using ratios of attributes available at the object level to the summation of this available attribute across all objects receiving the apportioned expense. Examples of this type of ratio calculation (the function "F" used in the IE calculation types) are:

- Ratio 1: Balance-based apportionment of IE.
Define Apportionment ratio using Current Balance of (o_i).

Thus, the allocation of Indirect Expense k becomes (function $F(IE_k)(o_i)$ in IE rules below):

$$IE_k * \frac{\text{Current Balance of } o_i}{\sum_j (\text{Current Balance of } o_j)}, \text{ summed over all objects in grouping } j.$$

- Ratio 2: Count-based apportionment of IE

Thus, the allocation of Indirect Expense k becomes (function $F(IE_k)(o_i)$ in IE rules below):

$$IE_k * \frac{1}{(\text{count of } o_j \text{ in } O(IE_k))}, \text{ for all objects in grouping } j.$$

- Ratio 3: Revenue-based apportionment of IE
Define $NI(o_i) + OR(o_i) = \text{Total Revenue (using NI \& OR rules above) for } (o_i)$.
Thus, the allocation of Indirect Expense k becomes (function $F(IE_k)(o_i)$ in IE rules below):

$$IE_k * \frac{NIR(o_i) + OR(o_i)}{\sum_j (NIR(o_j) + OR(o_j))}, \text{ summed over all objects in grouping } j$$

- Ratio 4: Event Count apportionment of IE
Count of events for (o_i) are restricted to an event type.

Thus, the allocation of Indirect Expense k becomes (function $F(IE_k)(o_i)$ in IE rules below):

$$IE_k * \frac{\text{count of event for object } o_i}{\sum_j (\text{count of event for object } (o_j))}$$

for some event type, summed over all objects in grouping j.

- Ratio 5: Transaction Amount apportionment of IE
Summation of event amounts for (o_i) , restricted to a event type.

Thus, the allocation of Indirect Expense k becomes (function $F(IE_k)(o_i)$ in IE rules below):

$$IE_k * \frac{\sum_{\text{event over the period}} (\text{event amounts for object } (o_i))}{\sum_j \sum_{\text{event over the period}} (\text{event amounts for object } (o_j))},$$

for some event type, summed over all objects in grouping j.

- Ratio 6: Direct Expense apportionment of IE
Using DE rules above for O_i .

Thus, the allocation of Indirect Expense k becomes (function $F(IE_k)(o_i)$ in IE rules below):

$$IE_k * \frac{DE(o_i)}{\sum_j (DE(o_j))}, \text{ summed over all objects in grouping } j.$$

- Ratio 7: Normalized (averaged) apportionment of IE

Thus, the allocation of Indirect Expense k becomes in IE rules below:

$$F(IE_k)(o_i) = [IE \text{ using Ratio 1 } F(IE_k)(o_i) + IE \text{ using Ratio 3 } F(IE_k)(o_i) + IE \text{ using Ratio 6 } F(IE_k)(o_i)] \div 3.$$

IE Calculation Rule Type I

Indirect expense is apportioned to accounts using one of the first three apportionment ratios above. Accordingly, using the nomenclatures above,

$$IE(o_i) = (\text{Total IE to be apportioned}) * \frac{F(IE_k)(o_i)}{\sum_k F(IE_k)(o_i)}$$

IE Calculation Rule Type II

The rules for partitioning IE and defining corresponding object groups are based on product and event attributes. The calculation of $IE(o_i)$ is exactly as described above, and is given by the following, where the F's are the given apportionment ratios (any of the seven apportionment ratios are permitted for any partition O or groupings of objects).

$$IE(o_i) = \sum_k^{o_i \in O(IE)} \left(IE_k * \frac{F(IE_k)(o_i)}{\sum_j^{o \in O(IE)} F(IE_k)(o_j)} \right)$$

IE Calculation Rule Type III

For Indirect Expense before deferral calculations, the process is similar to that as listed for the Type II Level, where:

$$\begin{aligned} IE(o_i) = & \text{New amounts in their first period of amortization} \\ & + \text{Amounts not being amortized (cash basis)} \\ & + \text{Amounts in their 2}^{nd} \text{ through last amortization period.} \end{aligned}$$

Since we include non-amortized amounts (cash basis) to be considered as amortized with only one period, this is re-written as follows:

$$\begin{aligned} IE(o_i) = & \text{New amounts in their first period of amortization (including} \\ & \text{cash-basis)} \\ & + \text{Amounts in their 2}^{nd} \text{ through last amortization period.} \end{aligned}$$

Note that non-amortized amounts are made to fit this equation by considering them to be an amortization of one profit reporting period only. Each IE set can have a different amortization type or period, though all objects receiving a specific apportionment will share the same amortization Rule. The new amounts to be deferred are computed, therefore, as the following:

$$\text{Before deferral } IE(o_i) = IE_k * \frac{F(IE_k)(o_i)}{\sum_{j \in O(IE)} F(IE_k)(o_j)} \text{ added over each set } IE_k \text{ to}$$

which o_i is related.

$$= \sum_{k \in O(IE)} \left(IE_k * \frac{F(IE_k)(o_i)}{\sum_{j \in O(IE)} F(IE_k)(o_j)} \right)$$

Each of these terms may be deferred over its amortization period according to any of the amortization rules (cash, straight line, declining balance, or interest amortization calculations). Since amortization methods may vary by set, we have the following, where $AM_1(L,R)$ is used to denote the amortization rule and its life:

$$IE(o_i) = \sum_{k \in O(IE)} AM_1(L,R) \left(IE_k * \frac{F(IE_k)(o_i)}{\sum_{j \in O(IE)} F(IE_k)(o_j)} \right)$$

To this is added the amounts with remaining amortization life for which amortization was begun in earlier periods.

IE Calculation Rule Type IV

Multiple combinations of the any of the above IE type rules I, II, or III are calculated per object.

IE Calculation Rule Type V

Any Indirect Expense apportionment calculation that is non-iterative, canonical, and represents the GAAP evaluation of indirect costs.

8. Calculate After-Tax Object Profit for All Objects (see Fig. 13)

$$\text{Profit}(o_i) = [\text{NIR}(o_i) + \text{OR}(o_i) - \text{DE}(o_i) - \text{IE}(o_i) - \text{P}(o_i)] * (1 - \text{EffectiveTaxRate})$$

where, for a two tier taxation system, Effective Tax Rate is calculated as:

$$\text{Effective Tax Rate} = (1 - \text{tax rate 2}) * (\text{tax rate 1}) + \text{tax rate 2}.$$

In the calculation of Effective Tax Rate, this formula assumes the two rates are effective rates which apply to the business conditions (not the nominal statutory rates), and that tax rate can be deducted from income in the calculation of tax rate. Then,

$$\text{Total Profit} = \sum_i [\text{Profit}(o_i)]$$

For those companies which use economic profit value calculations, the formula changes to:

$$\text{Profit}(o_i) = \{[\text{NIR}(o_i) + \text{OR}(o_i) - \text{DE}(o_i) - \text{IE}(o_i) - \text{P}(o_i)] * (1 - \text{EffectiveTaxRate})\} - \text{SVA}(o_i)$$

where

$$\text{SVA}(o_i) = \alpha(o_i) + \beta(o_i) * \text{Amount}(o_i)$$

and

$\alpha(o_i)$, $\beta(o_i)$ are functions for a cohort of objects in which o_i is a member, and $\text{Amount}(o_i)$ is given by a rule which maps o_i to a data value (such as balance, or allocated equity) also defined at the cohort level. (A cohort defined here represents a grouping of objects with similar risk characteristics, consistent with Modern Portfolio Theory and the Capital Asset Pricing Model.)

. Shareholder Value Add (SVA) is a method financial analysts use to adjust profit measures for risk. The idea is to subtract from the profit measure the cost of the equity required to support whatever is being measured. Companies use this risk adjustment measure essentially to burden the profit for risk being taken with the equity funds used by the object. These institutions will classify cohorts of risk and the risk cost equivalent as a percentage of account balance or allocated equity (i.e., "Hurdles").

DPM Example

In the airline industry a need for detailed customer profitability can be measured using DPM. Here the fundamental object is the seat, allowing consistent profitability values aggregated by route, aircraft type, as well as customer dimensions using data warehousing technology. The need for detailed customer profitability is being driven by the business impact analysis required to support loyalty and alliance strategic decisions. The following is a DPM profit calculation for a seat, with real profit measurement parameters simplified (not all aspects of true airline business is demonstrated) and where examples of each type of rule are utilized in DPM processing.

Flight: Air101

Date: 7/1/1998

From: London

To: New York

Equipment: Boeing 747-400

Classes: First (20 Seats); Business (80 Seats); Economy(300 seats)

DETAILED PROFIT METRIC PROCESSING

Step 1: Populate Database – assuming a relational database management system and terminology.

- Initialize database;

Extract, Condition, and Load the following tables: Planes, Flights, Customers, Employees, Locations; The net balances in the Planes entity can be maintained by use of DPM amortization IE calculation from the prior period.

- Extract, Condition, and Load the following tables: Financial Transactions, Events; Manifest (occupant, seat, flight, date attributes);
- Extract, Condition, and Load the Financial Statement table;
- Calculate and populate Rate table;

Figure 14 shows a partial relational database schema showing the entities and attributes used in the example's processing.

Step 2: Maintain Object Groups and Rule Maps – a database processing routine is run creating the following groupings:
Class to Seat

- Flight to Locations
- Seat to Plane

For ease in understanding the rule the specifications used to populate the database with rule parameters the processing instructions are shown below in the Rules. Also, most rules group by plane – the rule discussion below assumes this grouping without reference.

Step 3: Calculate Net Interest for Seat – Four types of NIR rules are processed - type I, II, III, IV for each seat. Interest rates are matched to plane purchase date for initial plane investments, and interest rates for plane net capitalizable improvements are funded with a 5 year pool of rates. Plane asset balances are kept in the Plane table maintained in Step 1.2 above.

NIR Type I: Carry cost of plane asset by seat is determined.

Rule

Populated in Step 2 are:

- The AAB(seat) parameter is Plane: $\text{net\_orig\_bal} * (1/\text{total seats on plane})$
- The rt parameter is Treatment_rts: 25_yr_rate (maintained for each plane) There is no need for liability rates.

Calculate $\text{COF}(\text{seat}) = \text{AAB}(\text{seat}) * \text{rt}$ for all seats on flight.

All other attributes are NI Type I calculations results are null. No grouping.

NIR Type II : Allocate net receivable/payable to seat for carry cost profit adjustment. This adjusts profitability for the impact of cash flows vs. accounting flows. This airline wants to apportion this cost across all revenue seats based on class_wt, a modelling parameter. Total weighted seats (tws) for the accounting period is a modelling parameter. Where the seat factor is determined as a ratio of seat footprint to class portion of the plane's seat revenue space. (e.g. 1st = 15%, 2nd = 25% & 3rd = 60% of plane's seat revenue space with each seat evenly apportioned in class – 1/20, 1/80, 1/300 respectively, in this case.)

Rule

Populated in Step 2 are:

- The AB(seat) parameter is Financial: $\text{net\_recv'ble} * (1 / \text{tws})$
- The rt parameter is Treatment_rts: pool (for null plane row)
There is no need for liability rates.

Calculate $\text{COF}(\text{seat}) = \text{AB}(\text{seat}) * \text{rt} * \text{class\_wt}$

Grouped by class all seats, so no_seats??? is no_seats1st value in the plane entity for first class seats on this plane, and so on for 2nd & 3rd class seat groups. The net recv'ble column is

derived from the difference between sum of period_amts for the receivables minus sum of payable rows for this profit period.

All other attributes and NI Type II calculations results are null.

NIR Type III : Calculate the NI value of the customer mileage benefit payable for each seat.

Rule

Populated in Step 2 are:

- The AB(seat) parameter is Customer: bene_miles * loyalty factor

- The rt parameter is Treatment_rts: pool (for null plane row)

There is no need for an asset rate.

Calculate $\text{COF}(\text{seat}) = \text{AB}(\text{seat}) * \text{rt}$

Since a customer can only occupy one seat, no groupings are used in this rule map.

All other attributes and NI Type III calculations results are null.

NIR Type IV : Calculate the NI impact of the plane's improvements for each seat. Upper classes interior, customer electronics and seating are improved faster during the life of the plane. Management strategy is for these improvements to be loyalty program related; they are amortized quicker and hence shorter funding requirement with less certain life. Management wants the loyal customers to pay proportionately more of the funding costs of improvement assets.

Rule

Populated in Step 2 are:

- The AB(seat) parameter is Plane:imp_net_bal * (1/tsw)
- The rt parameter is Treatment_rts: pool (for plane row) *

Customer: loyalty_rtng

There is no need for a liability rate.

Calculate $\text{COF}(\text{seat}) = \text{AB}(\text{seat}) * \text{rt} * \text{class\_fac}$

The unique class_fac values sum to 1. The rule map is grouped by classes (or class_fac).

All other attributes and NI Type IV calculations results are null.

NI EOAE- Option 4: Allocate equity based on mileage benefit and have it reduce NI by the weighted average cost of capital for the airline.

Rule

Populated in Step2 are:

- The Amount(seat) parameter is Customer:bene_miles
- The equity rate is 9.75%

Calculate EOAE(seat) = Amount(seat) * equity rate * cohort_wt

The cohort is based groups of each instance of loyalty_rtnng and class of seat paired. Cohort_wt is "beta" and no "alpha."

All other attributes and EOAE calculations results are null.

Step 4: Calculate Other Revenues for each Seat – Revenue arises from ticket fares, duty free sales on board aircraft, excess baggage penalties collected, alliance code sharing license and multiple leg customer trips.

OR Type I : Apportion revenue from code sharing with alliance.

Apportion revenue by seat allocated to alliance passenger.

Rule

Populated in Step 2 are:

- Flight:period_amt is alliance revenue per flight plus the sum of all flight/date alliance financial transactions.

Calculate OR(seat) = sum of Flight:period_amt *

(1/ no alliance seats available on flight)

Only for seats occupied by an alliance customer or a seat that is empty.

OR Type II: Use Transaction table to find direct passenger revenue by seat.

Rule

Populated in Step 2 are:

- Transaction:* (amounts, seats, flight, date, transaction type)
are populated for events, financial or non-financial.

Calculate $OR(seat) = \text{sum of Transaction:trn\_amt}$

where type = "passenger_payment" for each seat.

No seat grouping in rule map.

OR Type III: Apportion flight freight revenue amongst all seats,
weighted by class_wt.

Rule

Calculate $OR(seat) = \text{sum of Transaction:trn\_amt} * \text{class\_wt} * \frac{1}{(\text{no\_seats???)}}$

where type "freight" for each seat.

Group seats by class (??? Is 1st, 2nd, 3rd.) Class_wt is a
normalized weight for apportioning revenue amongst classes.

OR Type IV: Calculate the loyalty mileage benefit by seat.

Rule

Calculate Forgone $OR(seat) = \text{Flight: ???\_fare} - \text{sum of Transactions:trn\_amt}$ where type = "passenger_payment" for each seat.

Group by class for loyalty passenger occupied seats only.

Step 5: Calculate Direct Expenses for each Seat –

Compute the direct cost of using the seat. This is true for both occupied and unoccupied seats. Fuel and flight deck crew are costs of all seats, while cost of duty free goods sold and meals are a function of occupied seats. Some costs are a function of the plane taking off, no matter the duration of the flight (e.g., maintenance.) Some costs are a function of class, such as cabin crew expense and customer consumables.

DE Type I: Show direct cost of non-food materials consumed in flight.

Rule

Populated in Step 2 are:

- Transactions:* is populated based on these direct costs.

Calculate DE(seat) = Transactions:trn_amt for all flight and date rows where type = direct_exp for each seat.

No grouping in rule map.

DE Type II: Show direct cost duty free goods sold by seat.

Rule

Populated in Step 2 are:

- Transactions:* are populated based on these direct costs.

Calculate DE(seat) = Transactions:trn_amt for all flight and date rows where type = duty_free for each seat.

No grouping in rule map.

DE Type III: Show direct cost of food and beverage consumed.

Rule

Populated in Step 2 are:

- Transactions:* are populated based on these direct costs
- Loading is calculated as the ratio of occupied to total class seats by class (cl_load) using manifest table and plane configuration values.

Calculate DE(seat) = Flight: catering_cost * class_wt * cl_load for each seat.

Grouped by class in rule map.

DE Type IV: The staffing of each cabin has a maximum count with a minimum of 1 per 50 passengers. The air deck crew must fly the plane

even if there are no passengers. Calculate DE twice, once for based on a labor cost per seat based on total crew cost and total seats; and calculate DE a second time with actual staff apportioned to actual passengers.

Rule

Populated in Step 2 are:

- Total crew cost (tcc1) parameter is derived using the employee entity for all crew on flight. $Tcc = Employee:salary + bene * (Flight:schd\_hours + 1.5) / 110$
- Total crew cost (tcc2) parameter is derived using the employee entity for all crew on flight by class. $Tcc??? = Employee:salary + bene * (Flight:schd\_hours + 1.5) / 110$

Note: $tcc = tcc1st + tcc2nd + tcc3rd$

Calculate $DE1(seat) = tcc * (1 / (total\ no.\ of\ seats\ on\ plane))$

Calculate $DE2(seat) = tcc?? * (1 / (no.\ of\ seats\ occupied\ in\ class))$

for each seat.

Grouped by class in rule map.

Step 6: Calculate Provisions for each Seat – The cost of expected future events are measured here. The airline self insures property, casualty and miscellaneous insurance premiums on a per flight basis. And a provision for future loyalty benefit, a function of loyalty rating, claimed is made in step 6.

P Type I: - The cost of the flight's insurance premium is apportioned to each seat.

Rule

Populated in Step 2 are:

- Insurance premium is maintained in the flight entity (total PG)

Calculate $P(seat) = Flight:ins\_prem * 1 / (total\ no.\ seats\ on\ plane)$

No grouping in rule map.

P Type II: Provision for unusual maintenance cost is made on a function of the inverse of flight time and takeoffs in the last 12 months.

Rule

Populated in Step 2 are:

- Financial:period_amt is maintained in the financial entity by equipment type.
- Total flight hours and last 12 months take-offs are accumulated each month, their product is to_hrs parameter.

Calculate $P(\text{seat}) = \text{Financial:period\_amt} * 1/(\text{total no. of seats on plane}) * (\text{Plane:to\_last12} * \text{Flight:schd\_hrs}) / \text{to\_hrs}$

No seat grouping in rule map.

P Type III: Providing for future loyalty benefit.

Rule

Populated in Step 2 are:

- Customer:bene_miles is maintained using prior periods provision for benefit miles by loyalty customer
- A parameter estimating the usage rate by loyalty cohort called burn factor

Calculate $P(\text{seat}) = \text{Flight:distance} * \text{burn}(\text{loyalty\_rating})$

Grouping by loyalty rating in rule map.

P Type IV: Future order cancellation reserve.

Rule

Populated in Step 2 are:

- Future airplane order cancellation penalty (pen) and order size (fut_planes) is maintained in the financial entity
- Last 12 months loading is calculated by plane

Calculate $P(\text{seat}) = \text{pen} * (\text{Plane:orig\_bal} / \text{fut\_planes}) * 1 / (\text{total no. seats on plane}) * 1/24$. where last 12 months loading less than 75%.

Only seats on where last 12 months loading less than 75%.

Step 7: Calculate Indirect Expenses for each Seat – The calculation of indirect expense is the final step of detailed level profit calculation. Here remaining cost measures that are not differentiable by seat are measured. Fuel and oil, ground costs, regular aircraft maintenance, overheads, and general marketing expenses are apportioned in IE. The airline also wants to view customer profitability loaded with the cost of unoccupied seats.

IE Type I: General and administrative costs are apportioned to a seat in this rule.

Rule

Populated in Step 2 are:

- The periods financial entity is populated with all of the airlines G&A expenses (e.g., type of G&A are passenger services, navigation licenses, rentals, miscellaneous costs, premises and property taxes.) Allocate these costs based on seat revenue (NI + OR.)

Calculate $IE(\text{seat}) = \frac{\text{sum}(\text{Financial:trn\_amt})}{(\text{sum}(\text{NI}(\text{seat})) + \text{sum}(\text{OR}(\text{seat})))} * (\text{Total OR} + \text{NI for period})$

No seat grouping in rule map for all Financial:type = "G&A".

IE Type II: Ground location costs, airport specific and gate expenses are apportioned by flight.

Rule

Populated in Step 2 are:

- Populate all of these expenses for the period Transactions:trn_amt with the type being the three letter international airport identifier.

- Calculate the number of seats flown to the flight airports during the profit period (tfc)

$$\text{Calculate IE(seat) = sum of Transactions:trn\_amt} * \\ (1 / \text{tfc}) / 2$$

Group transactions by pair of airports in flight row for rule map, where only these types of expenses are included in the tuple.

IE Type III: Fixed asset depreciation is allocated to a seat.

Rule

Populated in Step 2 are:

- The net plane balances (Plane:net_orig_bal & Plane:imp_net_bal) are updated for last period's amortization or write-off.
- The amortization factor (function of amortization) given age of asset (for both original investment and improvements) is amfo and amfi for each plane.
- The tax planning estimate for taxable equivalent gross-up, due to accelerated tax amortization, is .8 = teg (less than 1 since a tax credit)

$$\text{Calculate IE(seat) = ((Plane:net\_orig\_bal - Plane:orig\_bal)} \\ * \text{amfo) + (Plane:imp\_org\_bal - Plane: imp\_org\_bal) * amfi)) * teg} * \\ (1 / (\text{total no. seats on plane})) * (\text{Flight:schd\_hrs} / \\ \text{Plane:hrs\_last\_12} / 12)$$

No grouping of seats in rule map.

IE Type IV: Indirect marketing expenses are apportioned by loyalty class for customer profit aggregations and by seat for other aggregations.

Rule

Populated in Step 2 are:

- Indirect marketing expense per loyalty tier per flight is parameterized as mef???, where ??? is 1st, 2nd, 3rd class.

Calculate $IE(\text{seat}) = \text{mef} \cdot (1 / (\text{no. of occupied seats in } ???))$

Group seats by class in rule map.

IE Type V: For loyalty investment analysis, allocate all DE for empty seats to occupied seats equally.

- Populated, after all prior steps are calculated, are the total DE less OR for each flight during the period, idef.

Calculate $IE(\text{seat}) = \text{idef} / (\text{total no. of occupied seats})$

Only calculate for occupied seats.

Step 8: Calculate After-tax Seat Profit – The

After-tax Profit:

Rule

Populated in Step 2 are:

- The effective tax rate (etr) for the airline is maintained in the database.

Calculate $\text{Profit}(\text{seat}) = \text{sum}(\text{NI}(\text{seat}) + \text{OR}(\text{seat}) + \text{DE}(\text{seat}) + \text{IE}(\text{seat}) + \text{P}(\text{seat})) \cdot (1 - \text{etr})$

Each seat is calculated individually, no grouping is used.

Shareholder Value-add: The airline has determined that some routes have a greater risk of loss due to the volatility of loading factors. Therefore each route is given a risk factor based on the last 12 months standard deviation of loading.

Rule

Populated in Step 2 are:

- Flight:risk_factor is maintained here
- Economic equity per average seat parameter (Flight:risk_factor) per route
- Cost of capital rate is parameterized (eqrt)

Calculate $\text{SHV}(\text{seat}) = \text{Profit}(\text{seat}) - (\text{Flight:risk\_factor} \cdot \text{eqrt})$

Each seat is calculated.

From the foregoing, it will be appreciated that DPM provides a metric of profit measurement consistent with GAAP at a level of detail that has not been accomplished using the traditional General Ledger based data with analytical and/or sample survey based information.

This new ability to resolve profit measures at a detailed level without using analytical models or statistical extrapolation is a capability needed throughout industries that find their ability to determine a marginal decision's profit impact inadequate for optimization of ownership value. The use of rule driven and database measurement processes will give large scale businesses a lower cost of maintenance and technologically scaleable tool to measure profit at a level of precision or resolution not possible in prior financial performance measurement processes.

Although a particular embodiment of the invention has been described in detail for purposes of illustration, various modifications may be made without departing from the spirit and scope of the invention. Accordingly, the invention is not to be limited, except as by the appended claims.

WHAT IS CLAIMED IS:

1. A process for determining object level profitability in a relational database management system, comprising the steps of:

preparing information to be accessed electronically through the relational database management system;

establishing, in the relational database, rules for processing the prepared information;

calculating independently at least one marginal value of profit for each object being measured using the established rules as applied to a selected set of prepared information;

calculating a fully absorbed profit adjustment value for each object being measured; and

combining the at least one marginal value of profit and the fully absorbed profit adjustment value to create a measure for object level profitability.

2. The process of claim 1, wherein the relational database comprises a structured query language (SQL).

3. The process of claim 1, wherein the preparing step includes the step of extracting, conditioning and loading object attribute values into the database.

4. The process of claim 1, wherein the preparing step includes the steps of extracting, conditioning and loading financial statement attribute values into the database.

5. The process of claim 1, wherein the preparing step includes the steps of extracting, conditioning and loading event attribute values into the database.

6. The process of claim 1, wherein the preparing step further includes the step of calculating opportunity values of funds used or supplied by each object being measured.

7. The process of claim 1, wherein the establishing step includes the steps of providing the information necessary to select objects, and performing the correct profit calculus.

8. The process of claim 1, wherein the step of calculating at least one marginal value of profit includes the steps of calculating net interest (NI), other revenue (OR) and direct expense (DE), wherein net interest (NI) is the summation of interest income, value of funds provided and earnings on equity funds used less the sum of interest expense and costs of funds used, other revenue (OR) is a measure of profit contribution from non-interest related sources, and direct expense (DE) is the profit value reduction due to marginal resource consumption by the object.

9. The process of claim 1, wherein the step of calculating at least one marginal value of profit includes the step of provisioning (P) for the selected set of prepared information, provisioning being the expected profit value adjustment for future outcomes related to the object.

10. The process of claim 9, wherein the step of calculating at least one marginal value of profit includes the steps of calculating net interest (NI), other revenue (OR) and direct expense (DE), wherein net interest (NI) is the summation of interest income, value of funds provided and earnings on equity funds used less the sum of interest expense and costs of funds used, other revenue (OR) is a measure of profit contribution from non-interest related sources, and direct expense (DE) is the profit value reduction due to marginal resource consumption by the object.

11. The process of claim 10, wherein the step of calculating a fully absorbed profit adjustment value includes the step of calculating the value for indirect expense (IE) which is an apportioned profit value adjustment for all non-object related resource consumption.

12. The process of claim 11, wherein the combining step includes the steps of adding net interest (NI) and other revenues (OR), and subtracting therefrom direct expense (DE), provisioning (P) and indirect expense (IE).

13. The process of claim 12, including the step of adjusting the measure for object level profitability for taxes and/or object economic value.

14. The process of claim 1, wherein the at least one marginal value of profit is calculated in parallel.

15. The process of claim 1, wherein the fully absorbed profit adjustment value is calculated utilizing the calculated at least one marginal value of profit.

16. A process for determining object level profitability in a relational database management system, comprising the steps of:

receiving information to be accessed electronically through the relational database management system;

establishing, in the relational database, rules for processing the prepared information;

calculating independently at least one marginal value of profit for each object being measured using the established rules as applied to a selected set of prepared information;

calculating a fully absorbed profit adjustment value including value adjustments for taxes and/or object economic value; and

combining the at least one marginal value of profit and the fully absorbed profit adjustment value to create a measure for object level profitability.

17. The process of claim 16, wherein the relational database comprises a structured query language (SQL).

18. The process of claim 16, wherein the preparing step includes the step of extracting, conditioning and loading object attribute values into the database.

19. The process of claim 18, wherein the preparing step includes the steps of extracting, conditioning and loading financial statement attribute values into the database.

20. The process of claim 19, wherein the preparing step includes the steps of extracting, conditioning and loading event attribute values into the database.

21. The process of claim 20, wherein the preparing step further includes the step of calculating opportunity values of funds used or supplied by each object being measured.

22. The process of claim 16, wherein the establishing step includes the steps of providing the information necessary to select objects, and performing the correct profit calculus.

23. The process of claim 16, wherein the step of calculating at least one marginal value of profit includes the steps of calculating net interest (NI), other revenue (OR) and direct expense (DE), wherein net interest (NI) is the summation of interest income, value of funds provided and earnings on equity

funds used less the sum of interest expense and costs of funds used, other revenue (OR) is a measure of profit contribution from non-interest related sources, and direct expense (DE) is the profit value reduction due to marginal resource consumption by the object.

24. The process of claim 16, wherein the step of calculating at least one marginal value of profit includes the step of provisioning (P) for the selected set of prepared information, provisioning being the expected profit value adjustment for future outcomes related to the object.

25. The process of claim 24, wherein the step of calculating at least one marginal value of profit includes the steps of calculating net interest (NI), other revenue (OR) and direct expense (DE), wherein net interest (NI) is the summation of interest income, value of funds provided and earnings on equity funds used less the sum of interest expense and costs of funds used, other revenue (OR) is a measure of profit contribution from non-interest related sources, and direct expense (DE) is the profit value reduction due to marginal resource consumption by the object.

26. The process of claim 25, wherein the step of calculating a fully absorbed profit adjustment value includes the step of calculating the value for indirect expense (IE) which is an apportioned profit value adjustment for all non-object related resource consumption.

27. The process of claim 26, wherein the combining step includes the steps of adding net interest (NI) and other revenues (OR), and subtracting therefrom direct expense (DE), provisioning (P) and indirect expense (IE).

28. The process of claim 16, wherein the at least one marginal value of profit is calculated in parallel.

29. The process of claim 16, wherein the fully absorbed profit adjustment value is calculated utilizing the calculated at least one marginal value of profit.

30. A process for determining object level profitability in a relational database management system, comprising the steps of:

preparing information to be accessed electronically through the relational database management system, including the step of calculating opportunity values of funds used or supplied by each object being measured;

establishing, in the relational database, rules for processing the prepared information;

calculating independently at least one marginal value of profit for each object being measured using the established rules as applied to a selected set of prepared information;

calculating a fully absorbed profit adjustment value for each object being measured; and

combining the at least one marginal value of profit and the fully absorbed profit adjustment value to create a measure for object level profitability.

31. The process of claim 30, wherein the relational database comprises a structured query language (SQL).

32. The process of claim 30, wherein the preparing step includes the step of extracting, conditioning and loading object attribute values into the database.

33. The process of claim 32, wherein the preparing step includes the steps of extracting, conditioning and loading financial statement attribute values into the database.

34. The process of claim 33, wherein the preparing step includes the steps of extracting, conditioning and loading event attribute values into the database.

35. The process of claim 30, wherein the establishing step includes the steps of providing the information necessary to select objects, and performing the correct profit calculus.

36. The process of claim 30, wherein the step of calculating at least one marginal value of profit includes the steps of calculating net interest (NI), other revenue (OR) and direct expense (DE), wherein net interest (NI) is the summation of interest income, value of funds provided and earnings on equity funds used less the sum of interest expense and costs of funds used, other revenue (OR) is a measure of profit contribution from non-interest related sources, and direct expense (DE) is the profit value reduction due to marginal resource consumption by the object.

37. The process of claim 30, wherein the step of calculating at least one marginal value of profit includes the step of provisioning (P) for the selected set of prepared information, provisioning being the expected profit value adjustment for future outcomes related to the object.

38. The process of claim 37, wherein the step of calculating at least one marginal value of profit includes the steps of calculating net interest (NI), other revenue (OR) and direct expense (DE), wherein net interest (NI) is the summation of interest income, value of funds provided and earnings on equity funds used less the sum of interest expense and costs of funds used, other revenue (OR) is a measure of profit contribution from non-interest related sources, and direct expense (DE) is the profit value reduction due to marginal resource consumption by the object.

39. The process of claim 38, wherein the step of calculating a fully absorbed profit adjustment value includes the step of calculating the value for indirect expense (IE) which is an apportioned profit value adjustment for all non-object related resource consumption.

40. The process of claim 39, wherein the combining step includes the steps of adding net interest (NI) and other revenues (OR), and subtracting therefrom direct expense (DE), provisioning (P) and indirect expense (IE).

41. The process of claim 40, including the step of adjusting the measure for object level profitability for taxes and/or object economic value.

42. The process of claim 30, wherein the at least one marginal value of profit is calculated in parallel.

43. The process of claim 30, wherein the fully absorbed profit adjustment value is calculated utilizing the calculated at least one marginal value of profit.

ABSTRACT OF THE DISCLOSURE

TERADATA, Ex. 1015, p. 63

FORMAL DRAWINGS

STAMP ONLY IN TOP MARGIN

Sheets/Docket: BERK-37617

Inventor: Richard Tad Lepman

002070-8294960

0020710 62547500

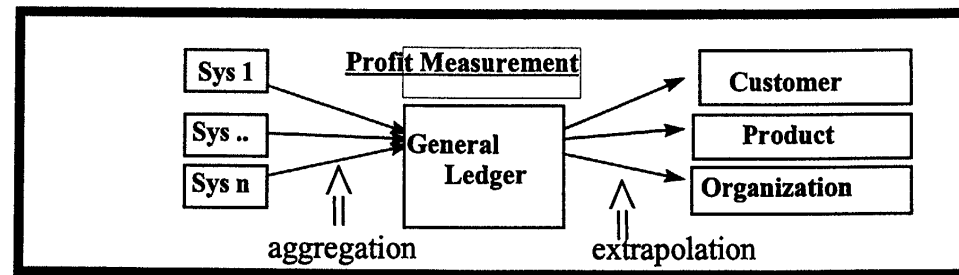
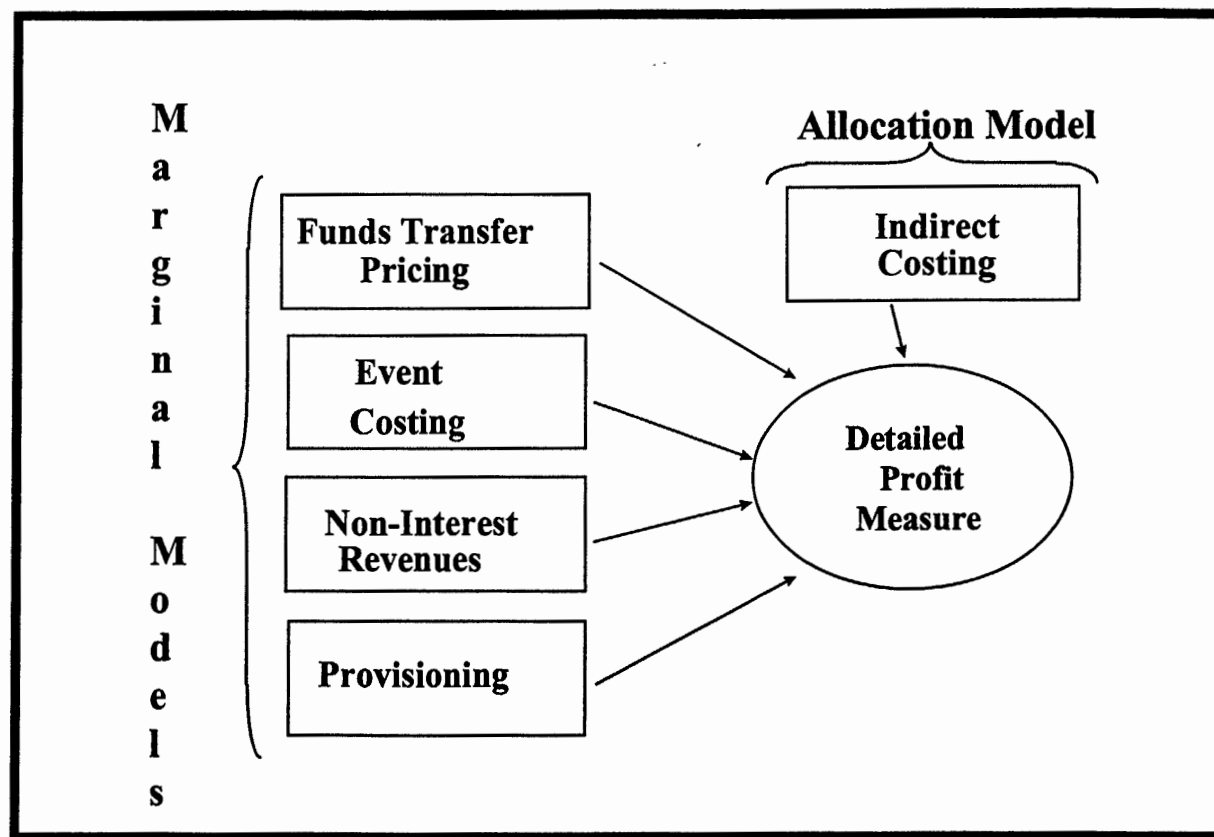


Fig. 1



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Fig. 2

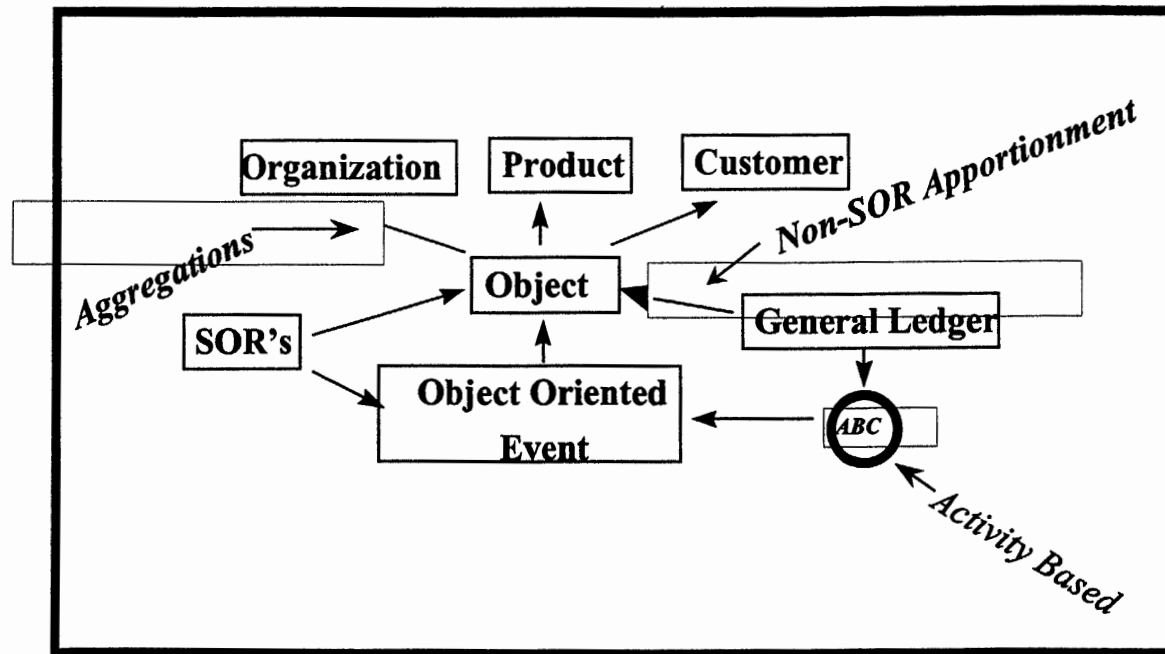


Fig. 3

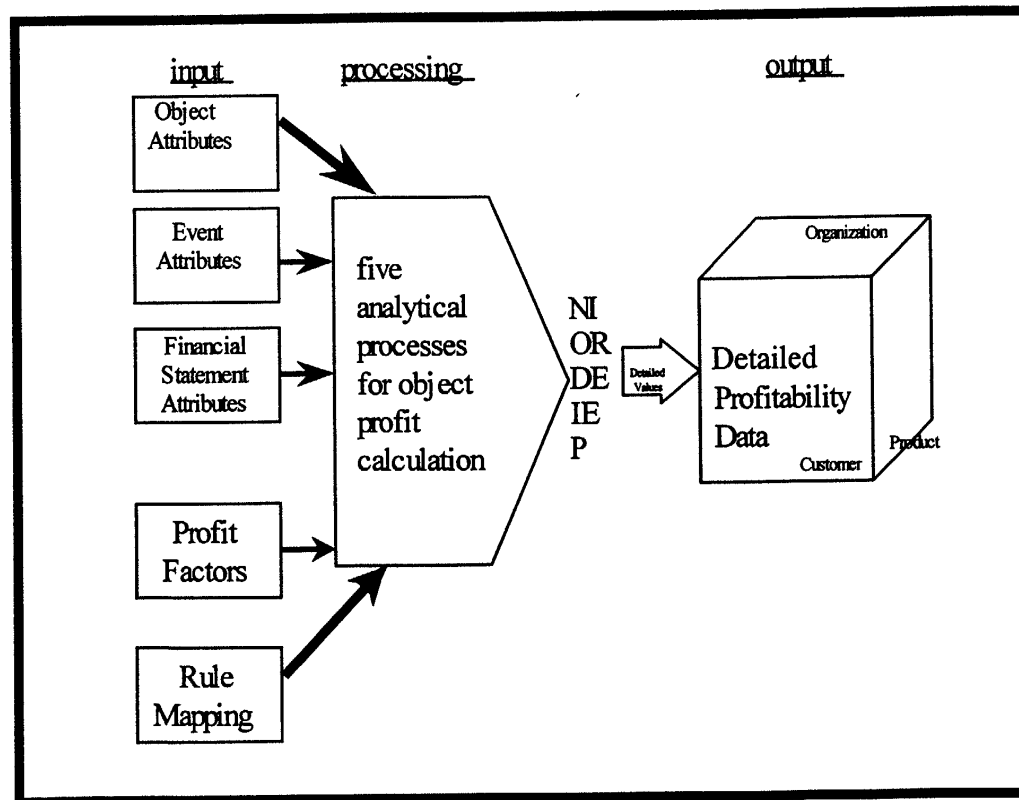
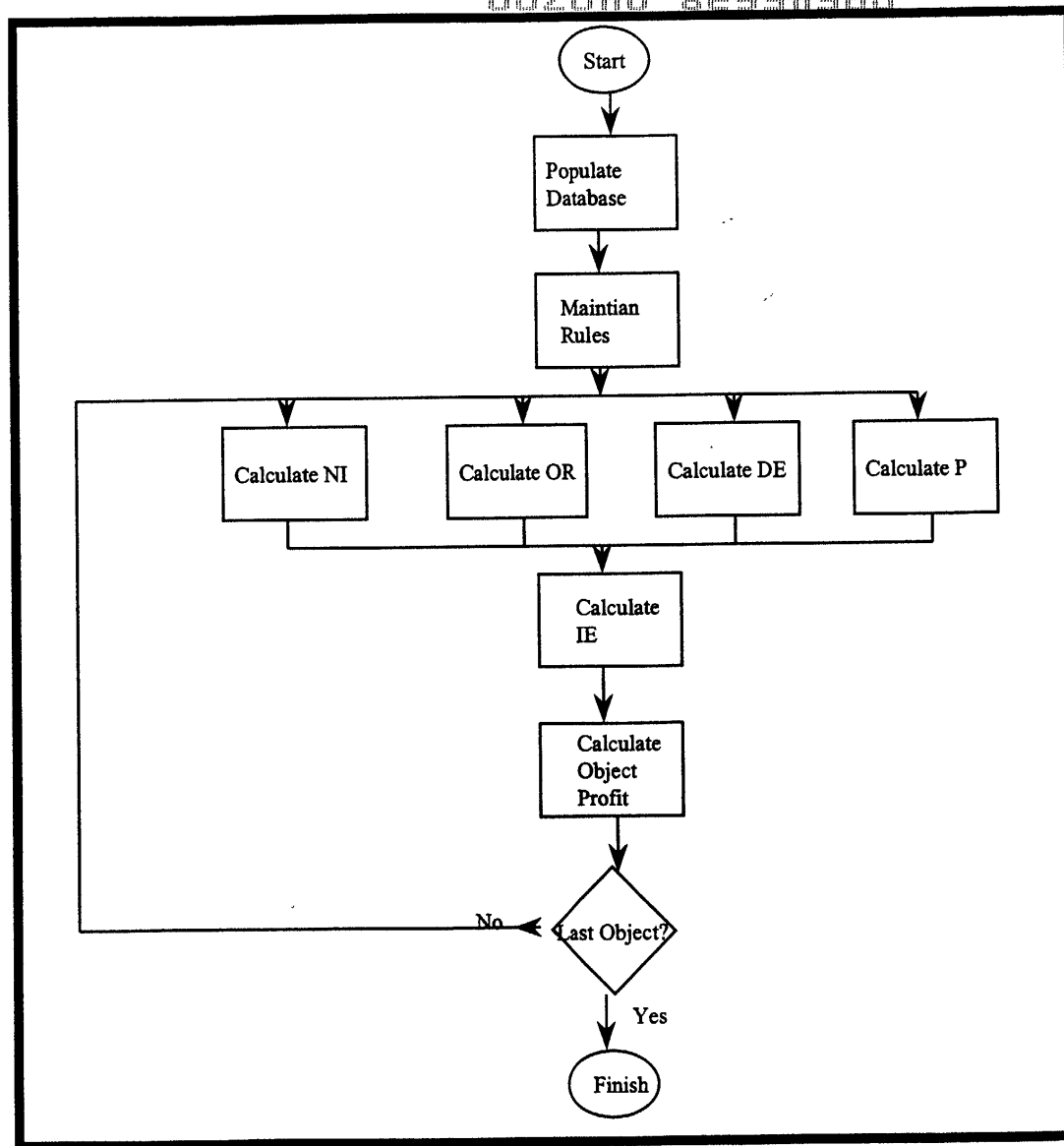


Fig. 4



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Fig. 5

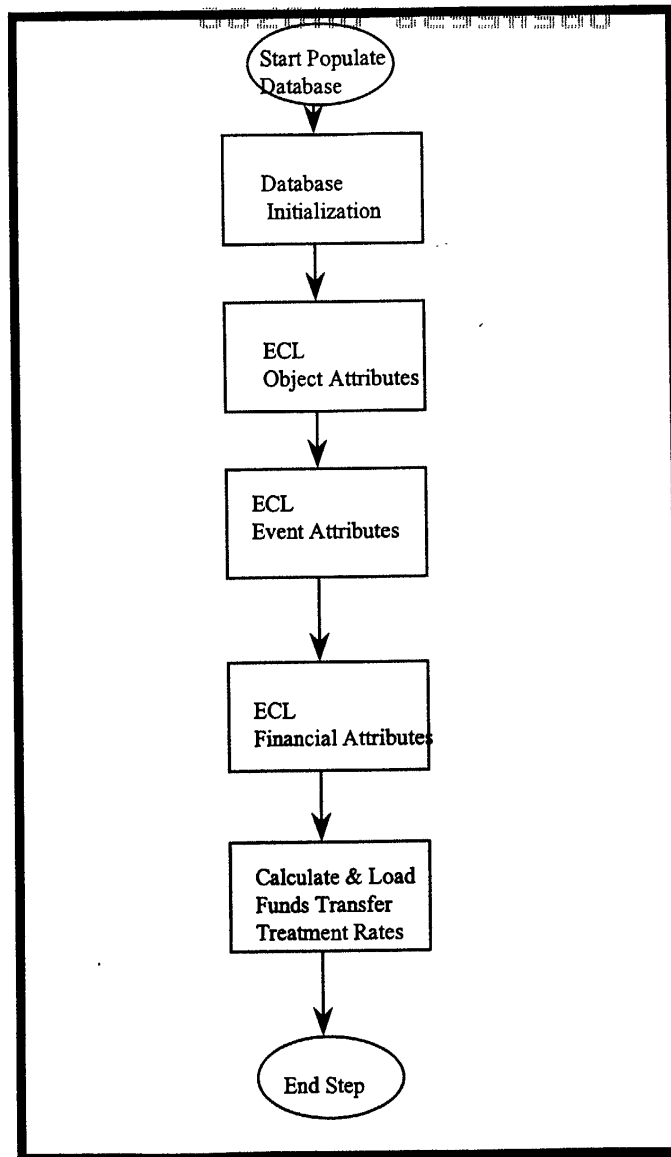
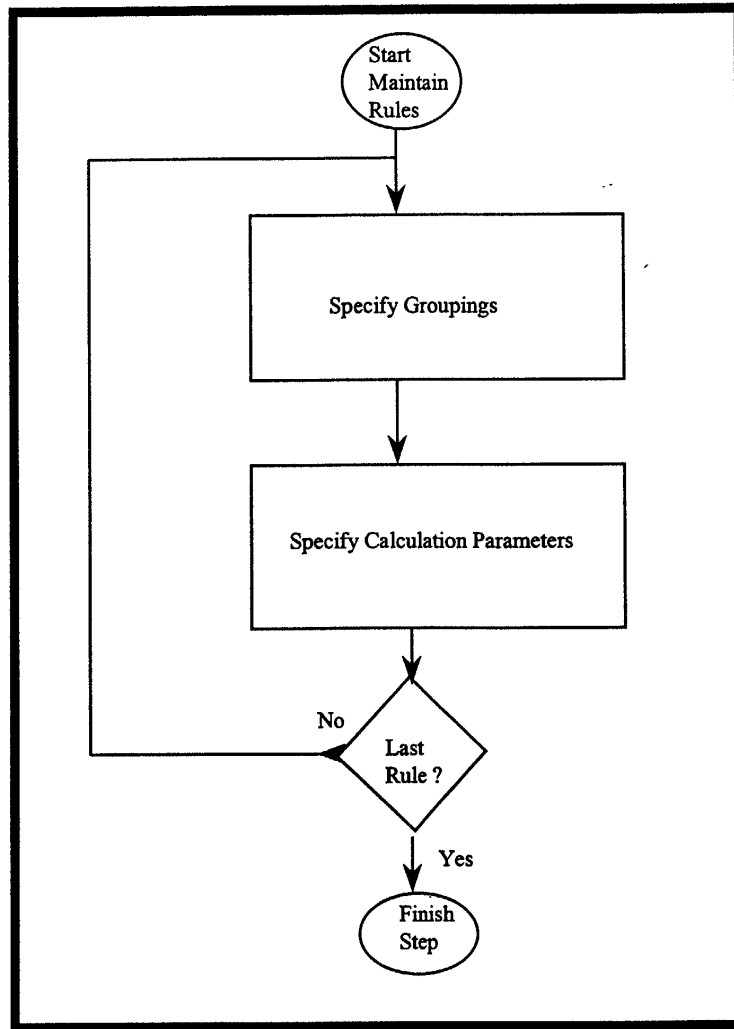
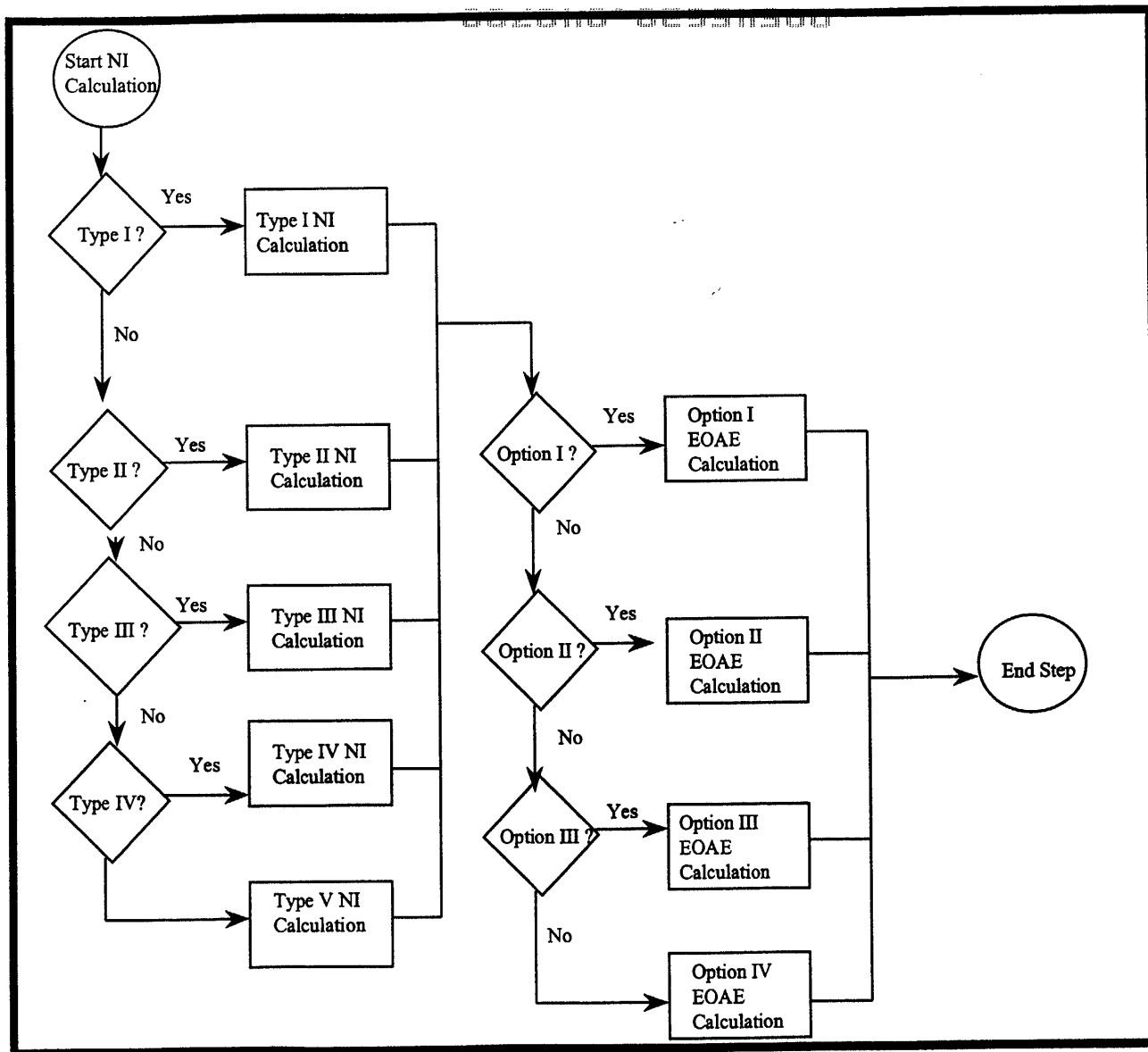


Fig. 6



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Fig. 7



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Fig. 8

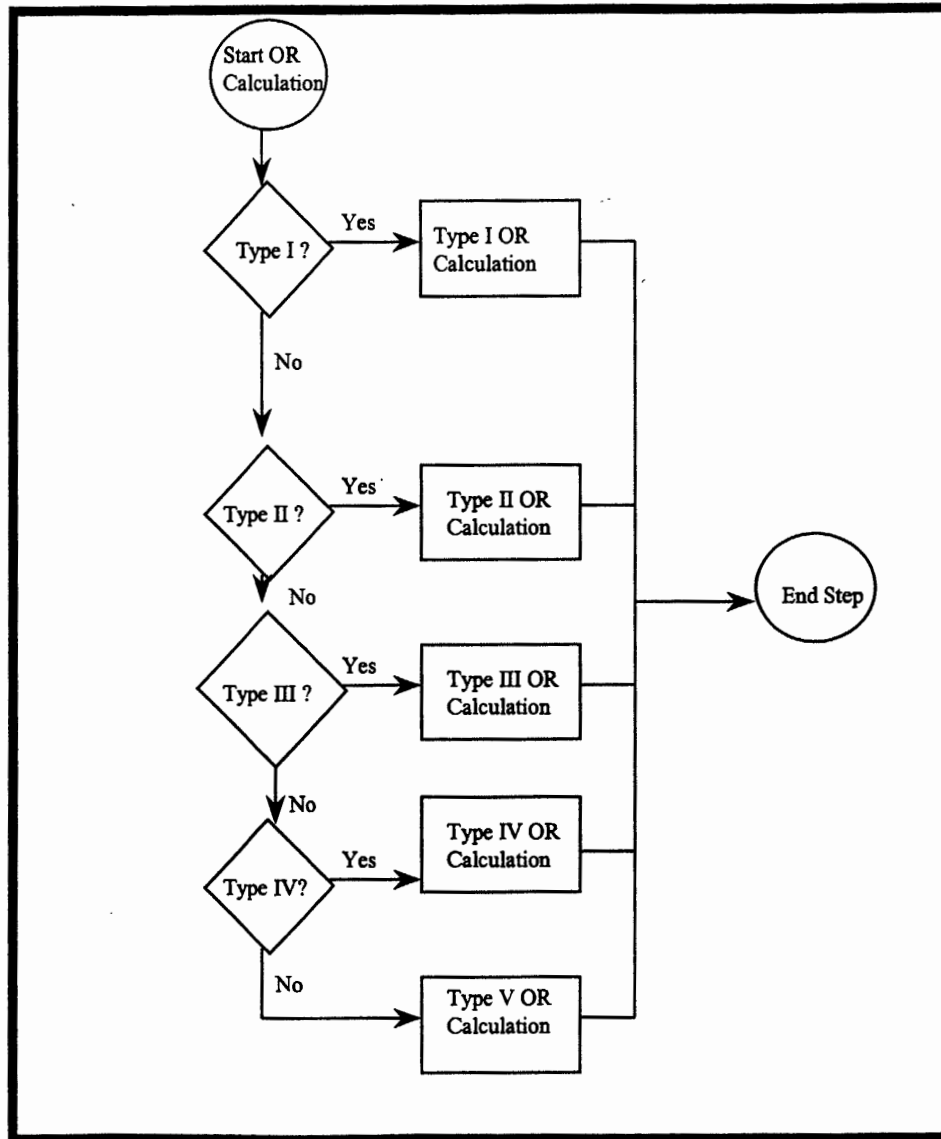


Fig. 9

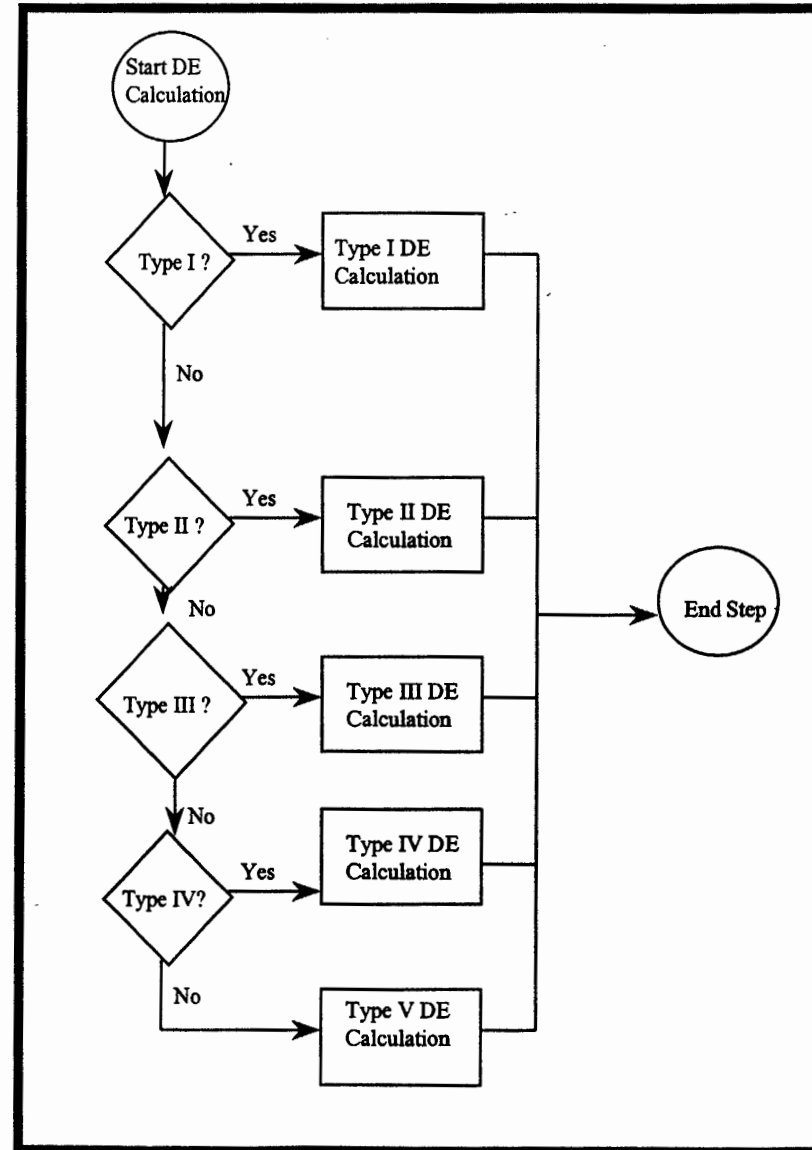


Fig. 10

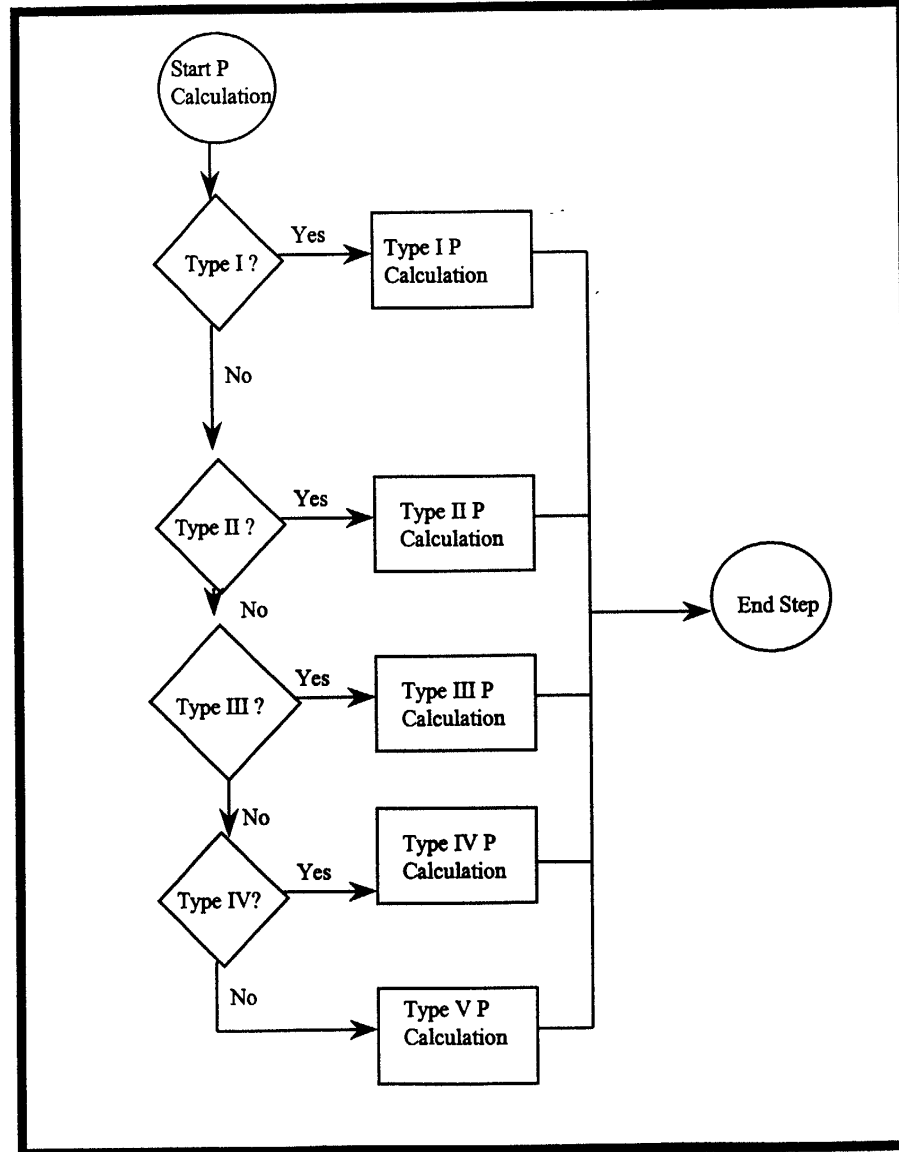


Fig. 11

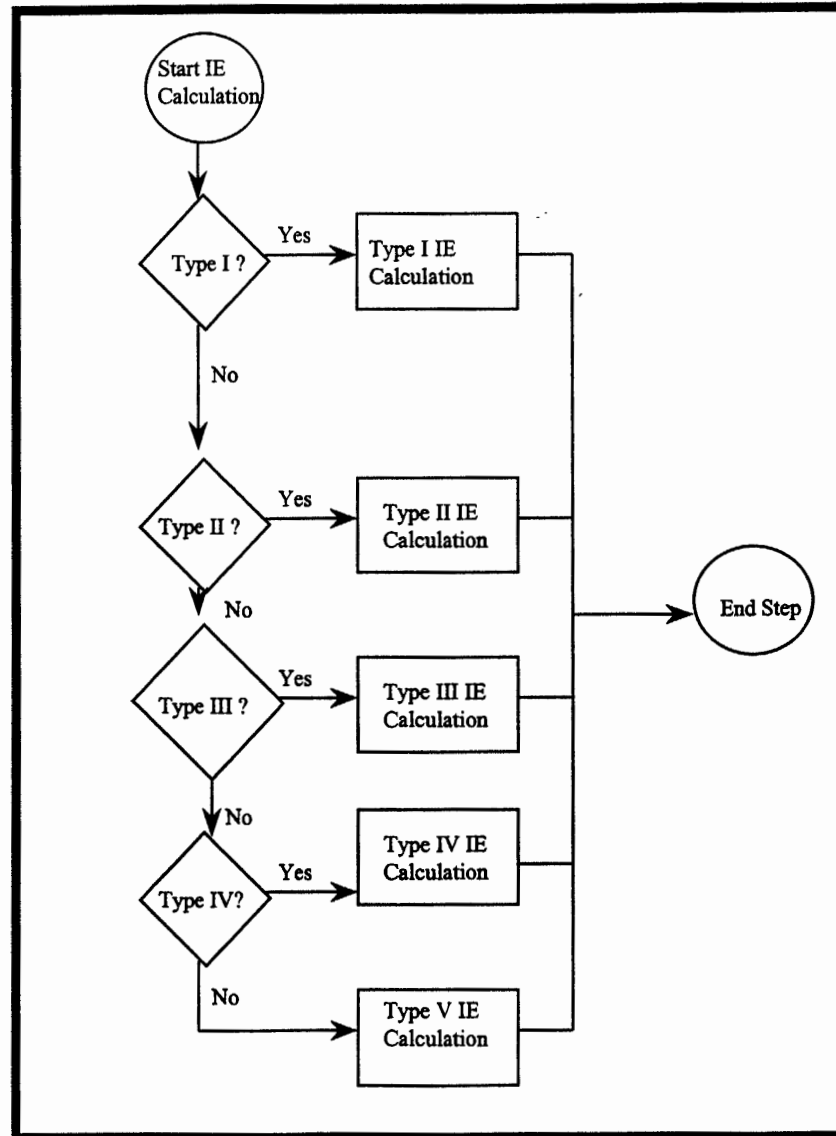


Fig. 12

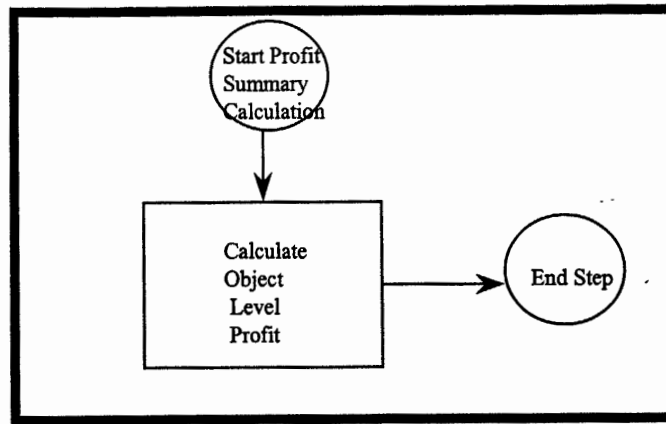


Fig. 13

Airline
Database
Schema

Attributes
==>>>>

DPM Example

Entity

Plane	row_id	orig_bal	et_orig_bal	p_orig_b	mp_net_bal	to_last_12	rs_last_1	no_seats1	no_seats2	no_seats3	teg	...
	plane_id											

Flight	row_id	t_origination	pt_landing	1st_fare	2nd_fare	3rd_fare	schd_hours	distance	liance_re	ins_fac	risk_factor	...
	flt_id											

Customer	row_id	loyalty_rtn	ene_miles	or_score	alliance	...
	cust_id					

Employee	row_id	salary&be	...
	emp_id		

Financial	row_id	period_am	fin_name	period	type	...
	finan_id					

Transactions	row_id	tm_amt	seat	flt	date	type	...
	tran_id						

Treatment_rts	row_id	25_yr_rate	pool_rt	...
	treatment_id			

grouping tables:

emp_to_flight	row_id	emp_id	flt_id

cust_to_tran	row_id	cust_id	tran_id

cust_to_seat	row_id	cust_id	seat_id	flt_id

plane_to_flight	row_id	plane_id	flt_id	date

loc_to_gnd_est	row_id	loc_id	finan_id

Fig. 14

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prior application and the national or PCT International filing date of this application.

<u>60/128,769</u>	<u>April 9, 1999</u>	<u>Pending</u>
Appln. Ser. No.	Filing Date	Status

PROCESS FOR DETERMINING

<u>OBJECT LEVEL PROFITABILITY</u>	<u>BERK-37617</u>
Title	Attorney Docket No.

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

I hereby appoint the following attorneys to prosecute this application and to transact all business in the Patent and Trademark Office connected therewith: Scott W. Kelley, Registration No. 30,762; Stuart O. Lowry, Registration No. 26,563; John D. Bauersfeld, Registration No. 24,496; John E. Kelly, Registration No. 24,269; Kamran Fattahi, Registration No. 35,758; and Aaron T. Borrowman, Registration No. 42,348.

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6320 Canoga Avenue, Suite 1650
Woodland Hills, California 91367

- 3 -

Full name of sole inventor: Richard Tad Legman

Inventor's signature:

Date:

Richard Tad Legman
April 7 2000

Residence: London, United Kingdom

Citizenship: UNITED STATES OF AMERICA

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London W8 OTJ
United Kingdom

002040-82991500

ISSUE CLASSIFICATION	
Class	Subclass

O.I.P.E. SCANNED Q.A.	PATENT DATE

APPLICATION NO. 09/545628	CONT/PRIOR D	CLASS 705	SUBCLASS = 35	ART UNIT 3629 ~~2762~~	EXAMINER Ms. D. [Signature]

APPLICANTS

Example

PTO-2040
12/89[illegible]

☐ TERMINAL DISCLAIMER	DRAWINGS		CLAIMS ALLOWED	
	Sheets Drwg.	Figs. Drwg.	Print Fig.	Total Claims
☐ The term of this patent subsequent to _____ (date) has been disclaimed.	_____ (Assistant Examiner)		NOTICE OF ALLOWANCE MAILED	
☐ The term of this patent shall not extend beyond the expiration date of U.S Patent. No. _____ _____ _____	_____ (Primary Examiner)		ISSUE FEE	
			Amount Due	Date Paid
☐ The terminal ____months of this patent have been disclaimed.	_____ (Legal Instruments Examiner)		ISSUE BATCH NUMBER	

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SEARCHED			
Class	Sub.	Date	Exmr.
705	35	7/29/03	ASR
Have Search Updated		1/11/04	ASR

SEARCH NOTES (INCLUDING SEARCH STRATEGY)		
	Date	Exmr.
East search - attached	7/24/03	AE

INTERFERENCE SEARCHED			
Class	Sub.	Date	Exmr.

A dark, vertical, textured strip, possibly a book binding or a piece of fabric, with a rough, frayed edge on the left side. The texture is grainy and uneven, with some lighter areas visible along the left edge.

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ISSUE SLIP STAPLE AREA (for additional cross references)

POSITION	INITIALS	ID NO.	DATE
FEE DETERMINATION	PA	70385	
O.I.P.E. CLASSIFIER		49	4/25/00
FORMALITY REVIEW		6/1/00	6/1/00
RESPONSE FORMALITY REVIEW			

INDEX OF CLAIMS

✓ Rejected N Non-elected
 = ... Allowed I Interference
 - (Through numeral)... Canceled A Appeal
 + ... Restricted O Objected

Claim	Date
Final	
Original	
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041-10-00

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Date: April 7, 2000

Attorney D cket No. BERK-37617

ASSISTANT COMMISSIONER FOR PATENTS
Washington, D.C. 20231

Sir:

Transmitted herewith for filing is the patent application of

Inventor: Richard Tad Lepman

For: PROCESS FOR DETERMINING OBJECT LEVEL PROFITABILITY

Enclosed are:

- ☒ 14 sheets of drawing. (Formal)
- ☒ An Assignment of the invention to Berkeley * IEOR
- ☐ A certified copy of a _____ application.
- ☐ An associate power of attorney.
- ☒ A verified statement to establish small entity status under 37 CFR 1.9 and 37 CFR 1.27.

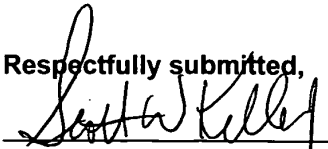
The filing fee has been calculated as shown below:

					SMALL ENTITY			OTHER THAN A SMALL ENTITY		
FOR:	NO. FILED			NO. EXTRA		RATE	FEE		RATE	FEE
TOTAL	43	-	20	= * 23	x	9	= \$207.00		18	= \$
INDEP.	3	-	3	= * -0-	x	39	= \$		78	= \$
BASIC FEE					+	345	= \$345.00		690	= \$
MULTIPLE DEPENDENT CLAIM PRESENTED					+	130	= \$		260	= \$
ASSIGNMENT					+	40	= \$ 40.00		40	= \$
Total Additional Fee							\$592.00			\$

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☒ A check in the amount of \$ 592.00 to cover the filing fee is enclosed

KELLY BAUERSFELD LOWRY & KELLEY, LLP
6320 Canoga Avenue, Suite 1650
Woodland Hills, California 91367
(818) 347-7900
SWK:sbn

Respectfully submitted,

Name: Scott W. Kelley
Reg. No. 30,762

FORMAL DRAWINGS

STAMP ONLY IN TOP MARGIN

Sheets/Docket: BERK-37617

Inventor: Richard Tad Lepman

002010-2251500

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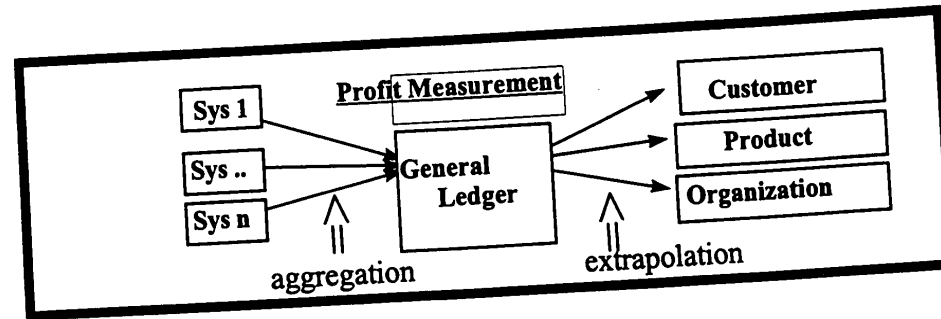
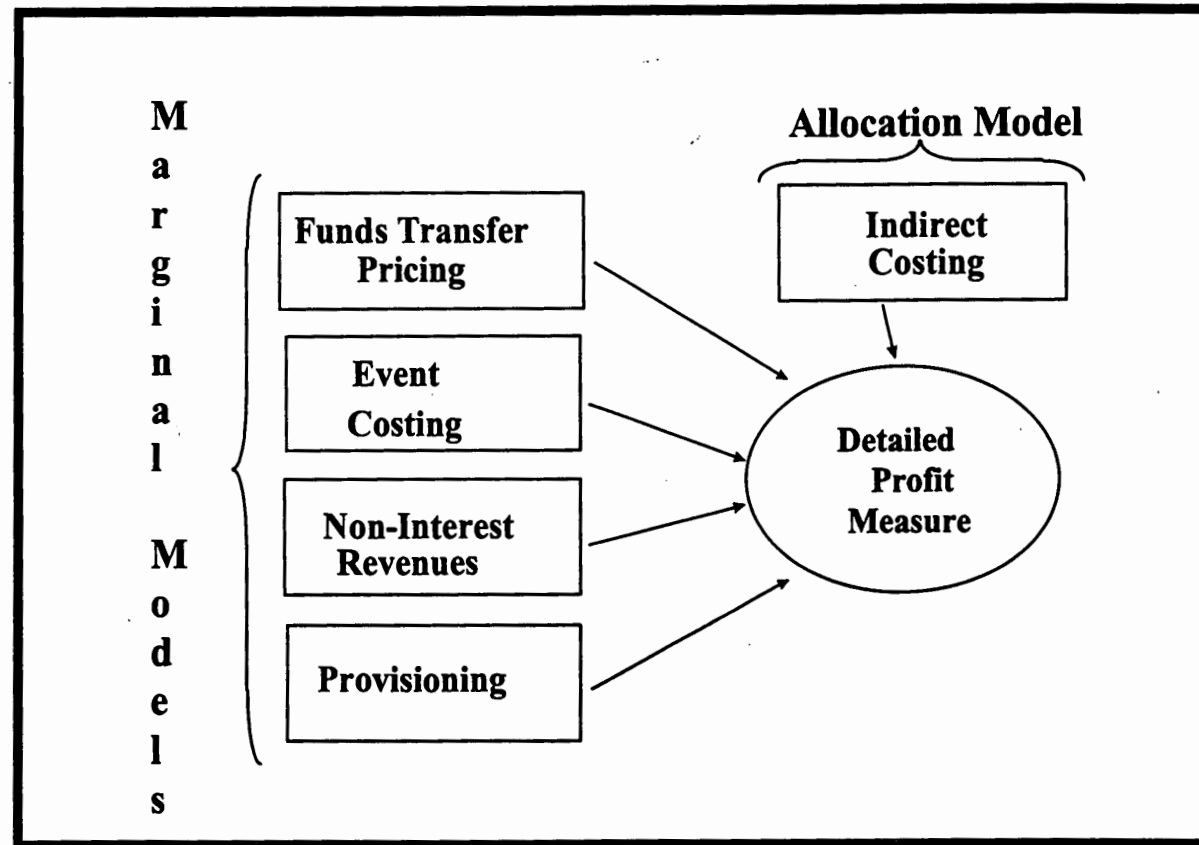


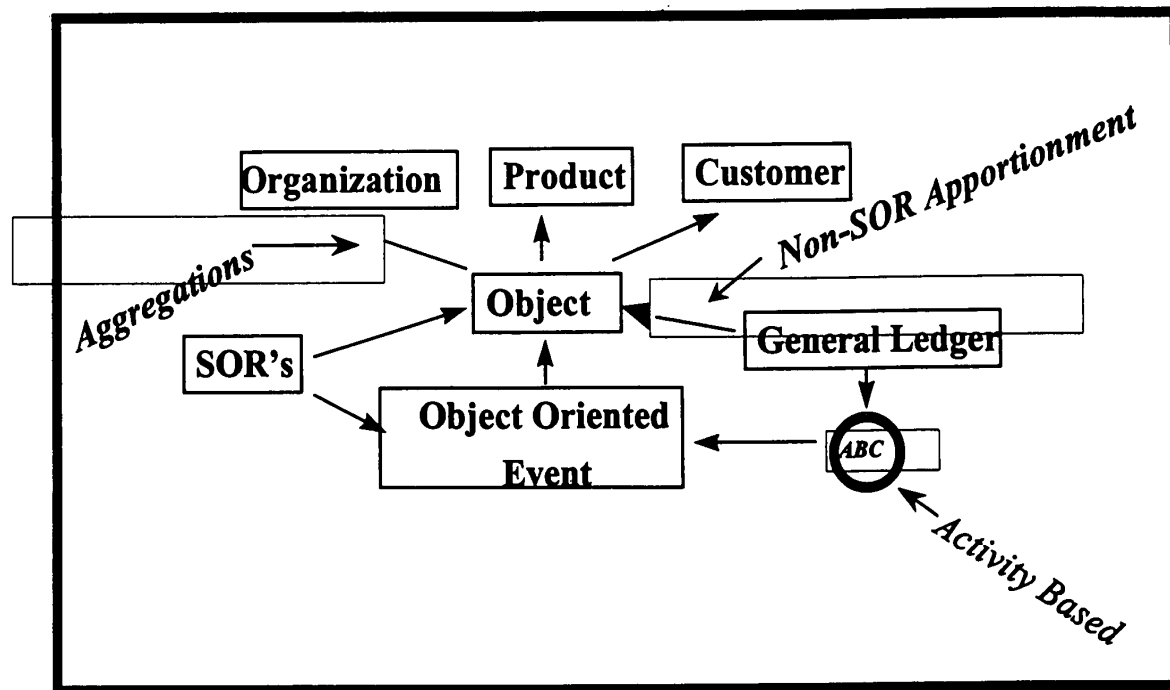
Fig. 1



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Fig. 2

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Fig. 3

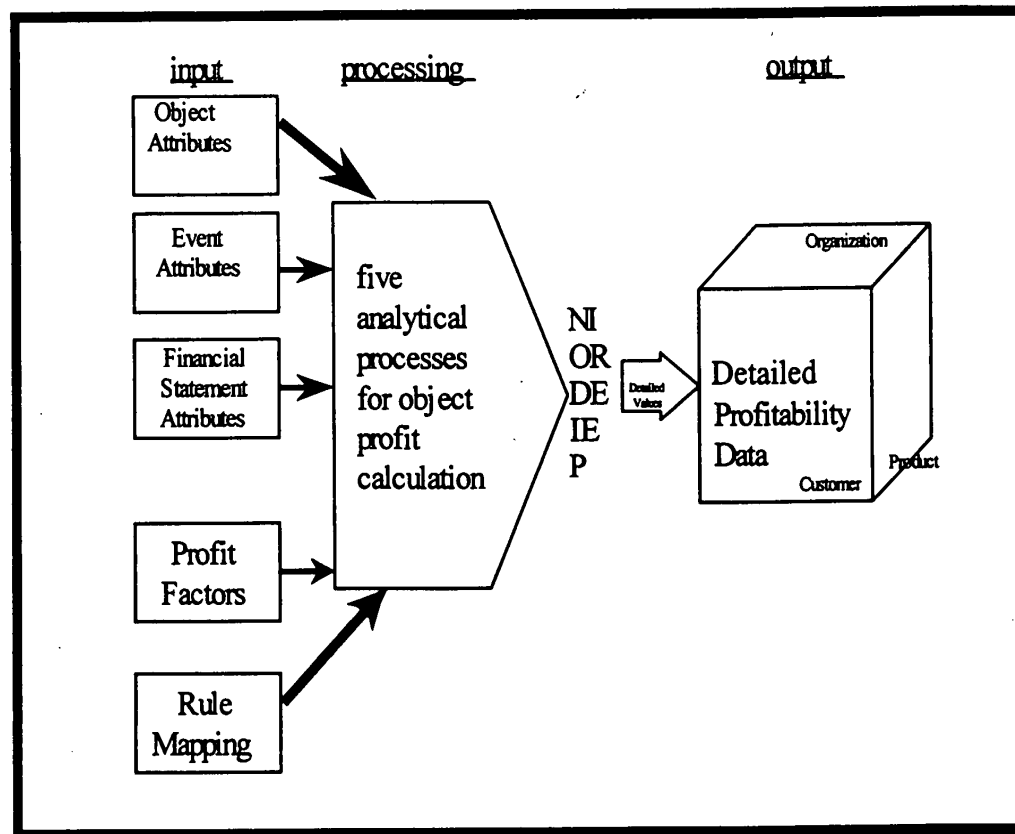
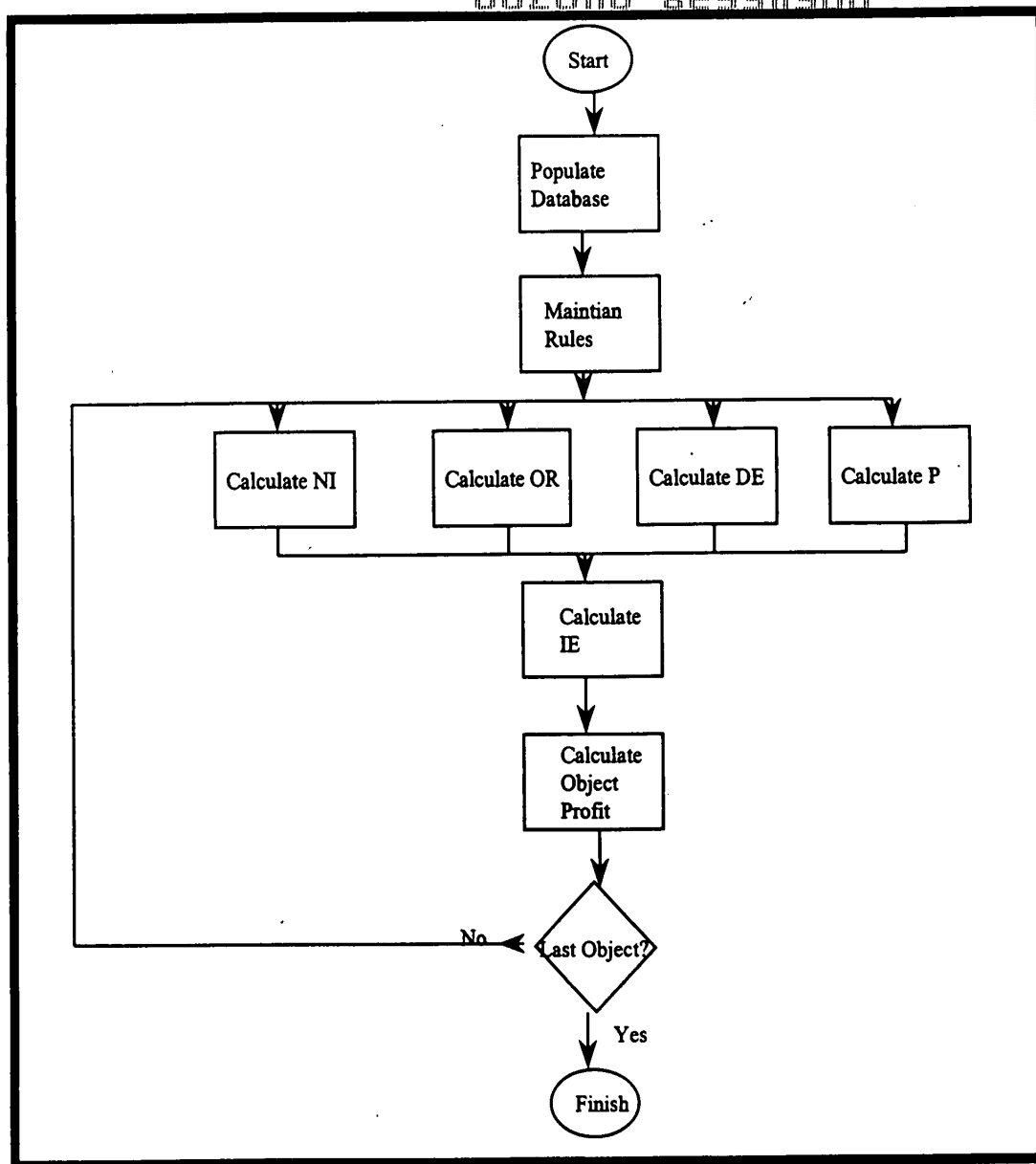
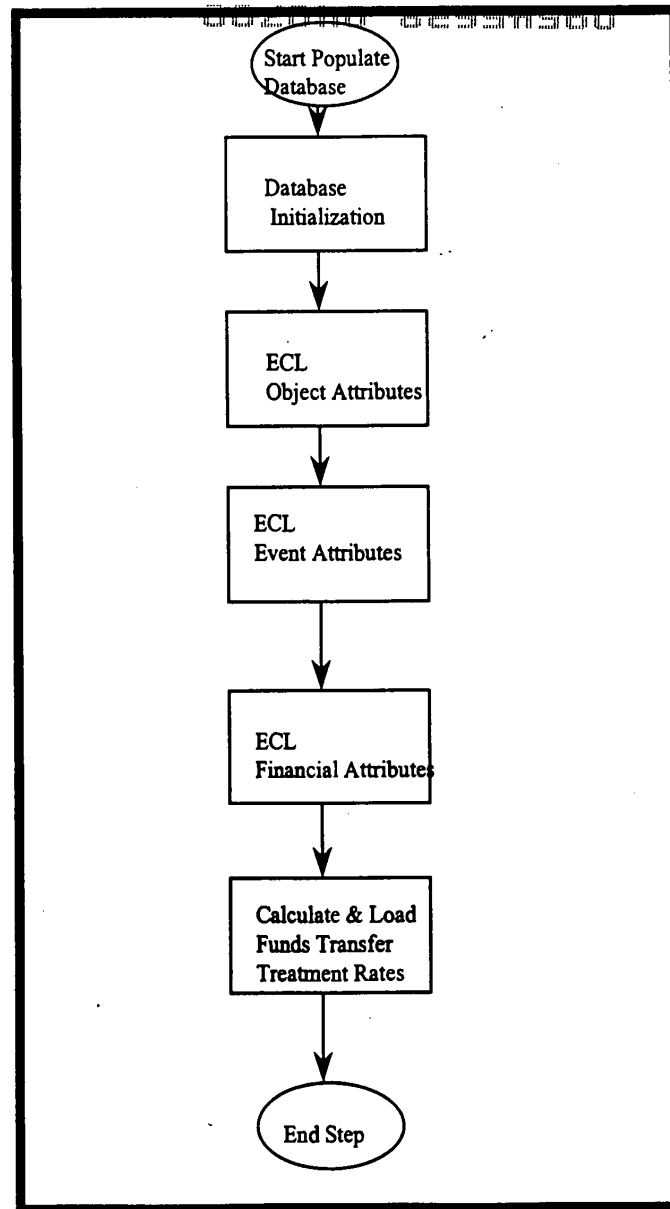


Fig. 4



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Fig. 5



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Fig. 6

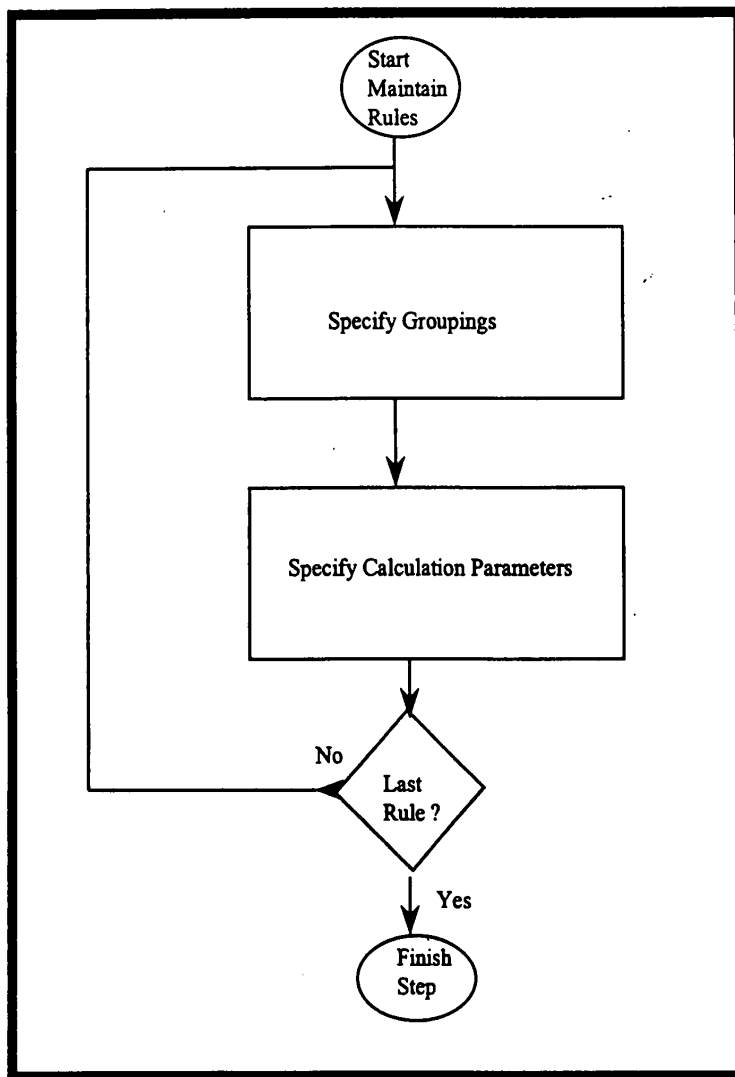
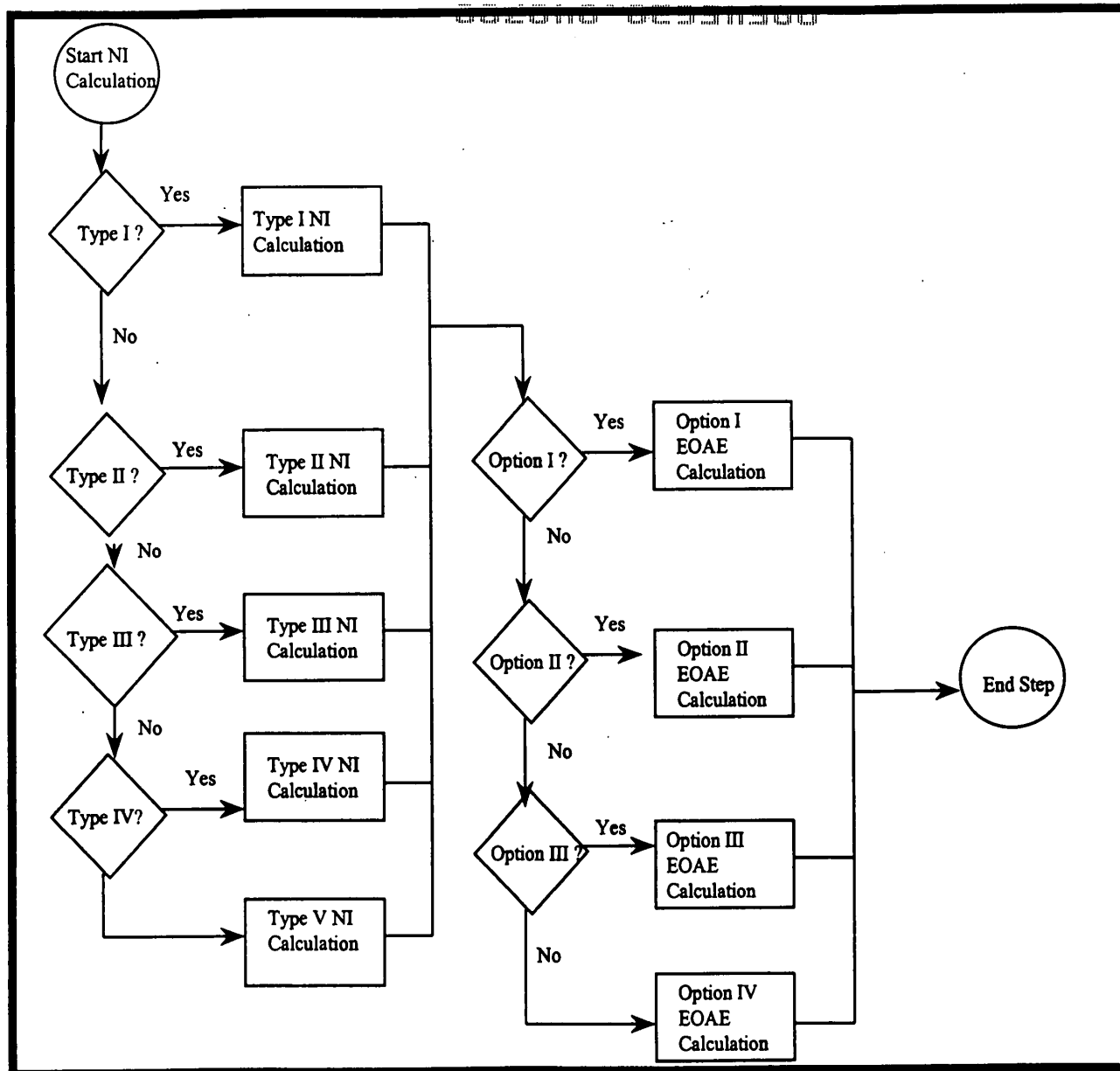


Fig. 7



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Fig. 8

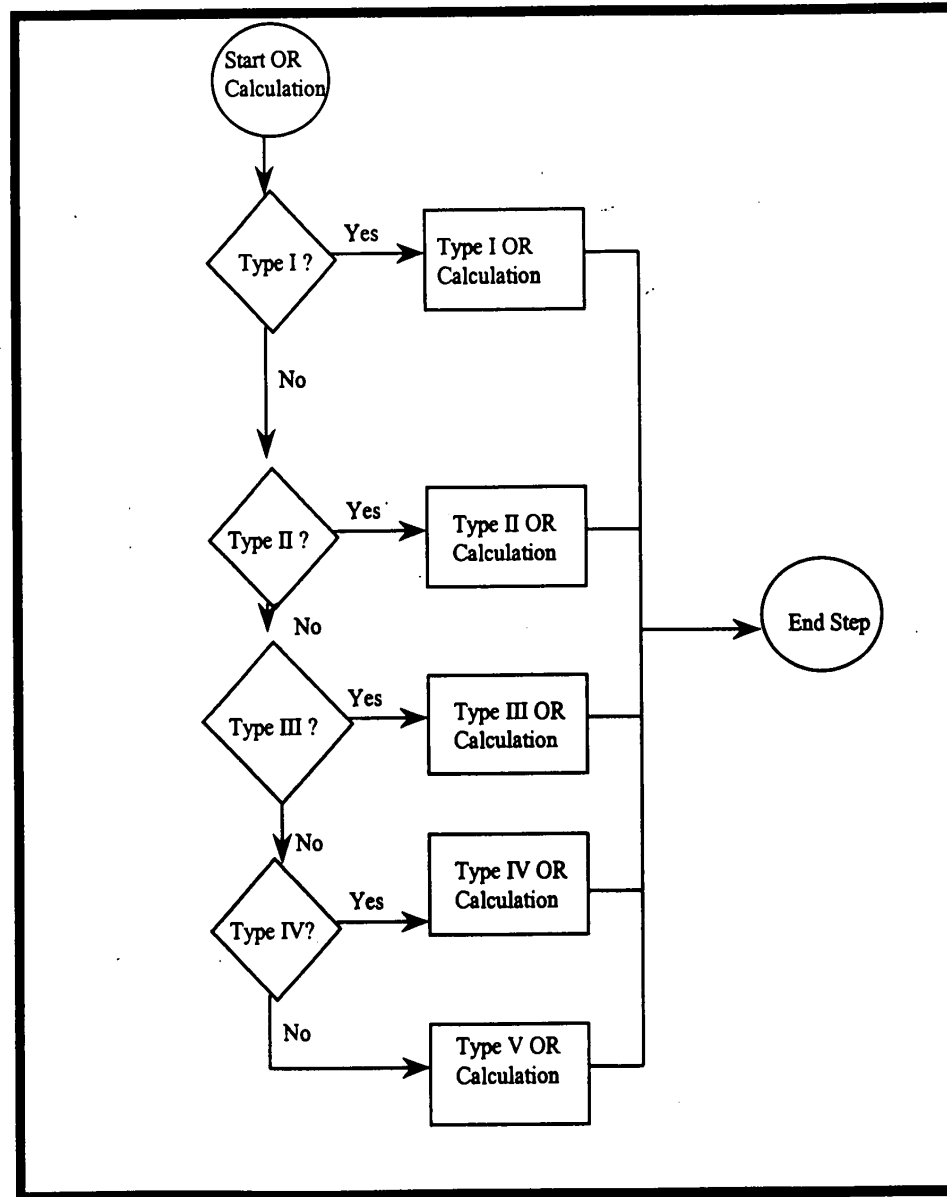


Fig. 9

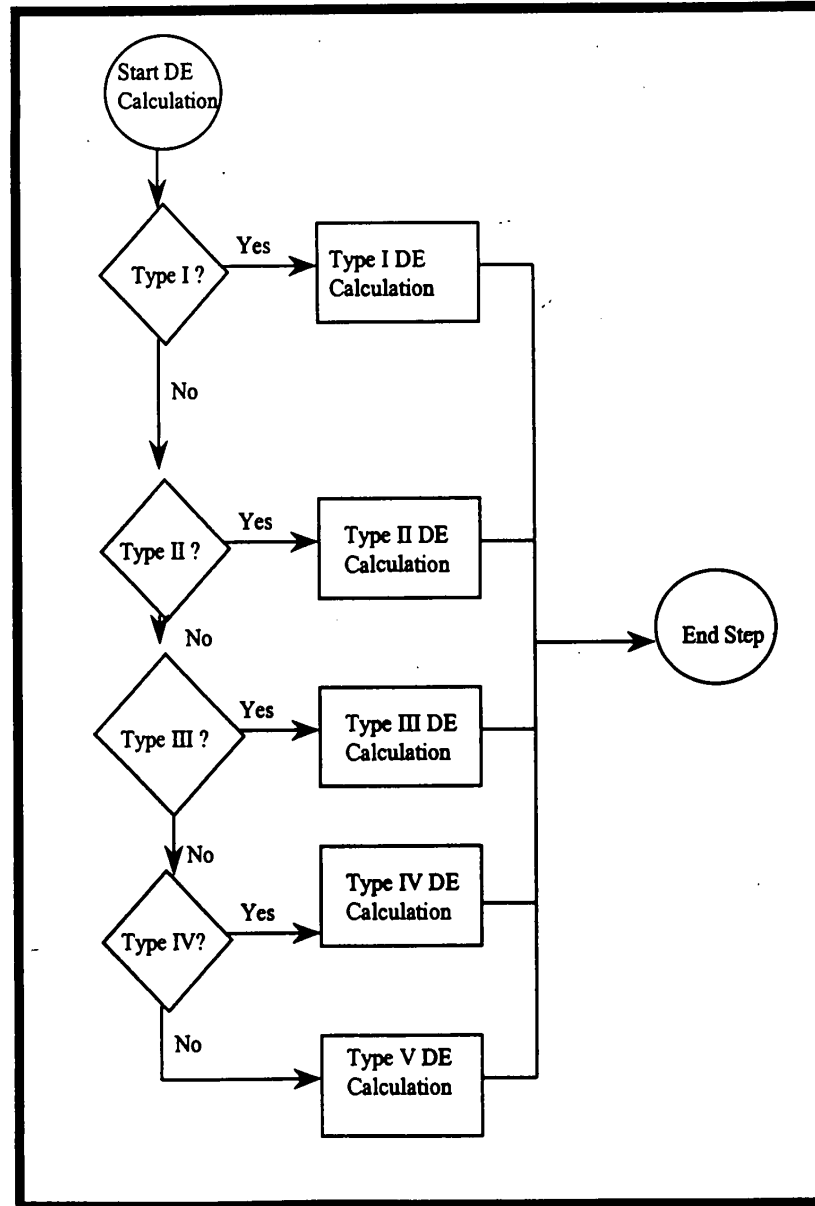


Fig. 10

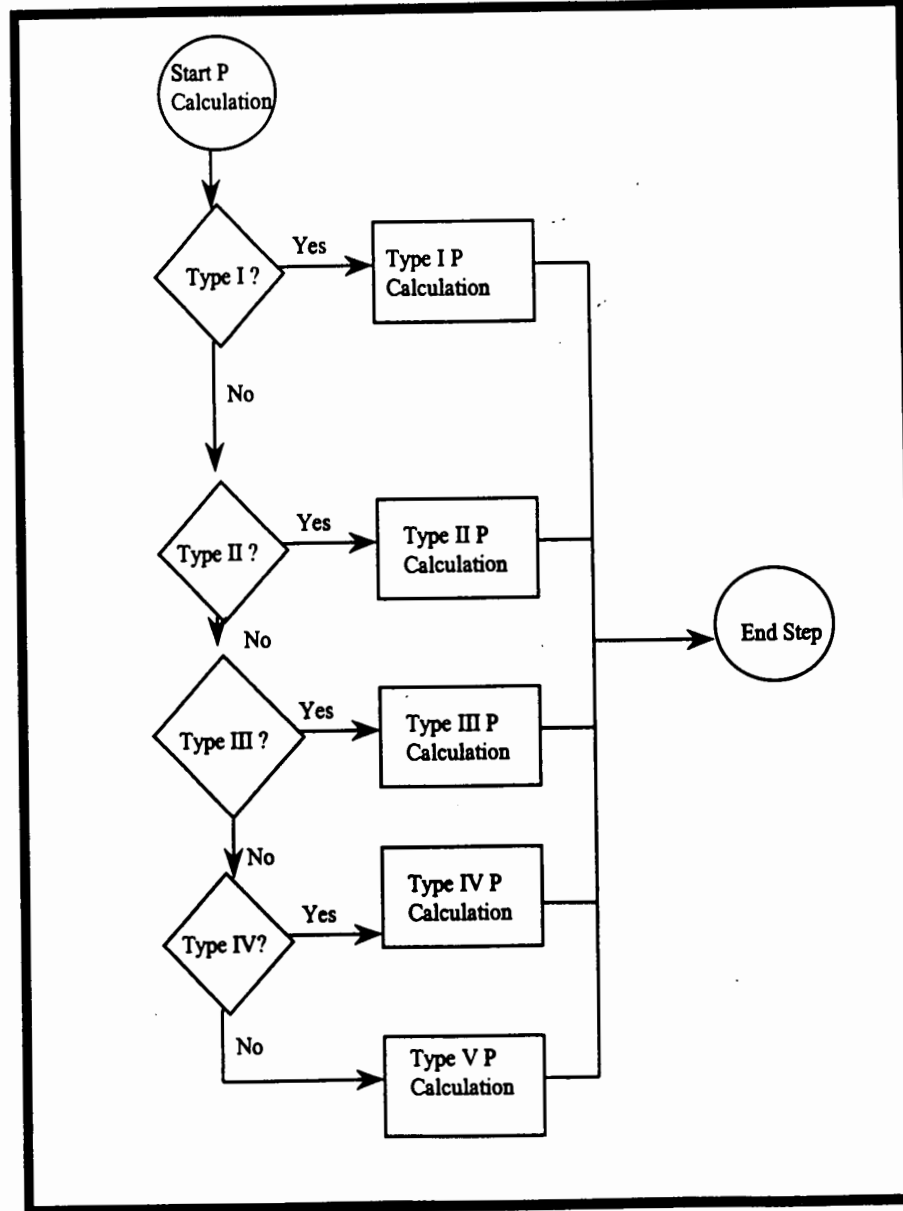
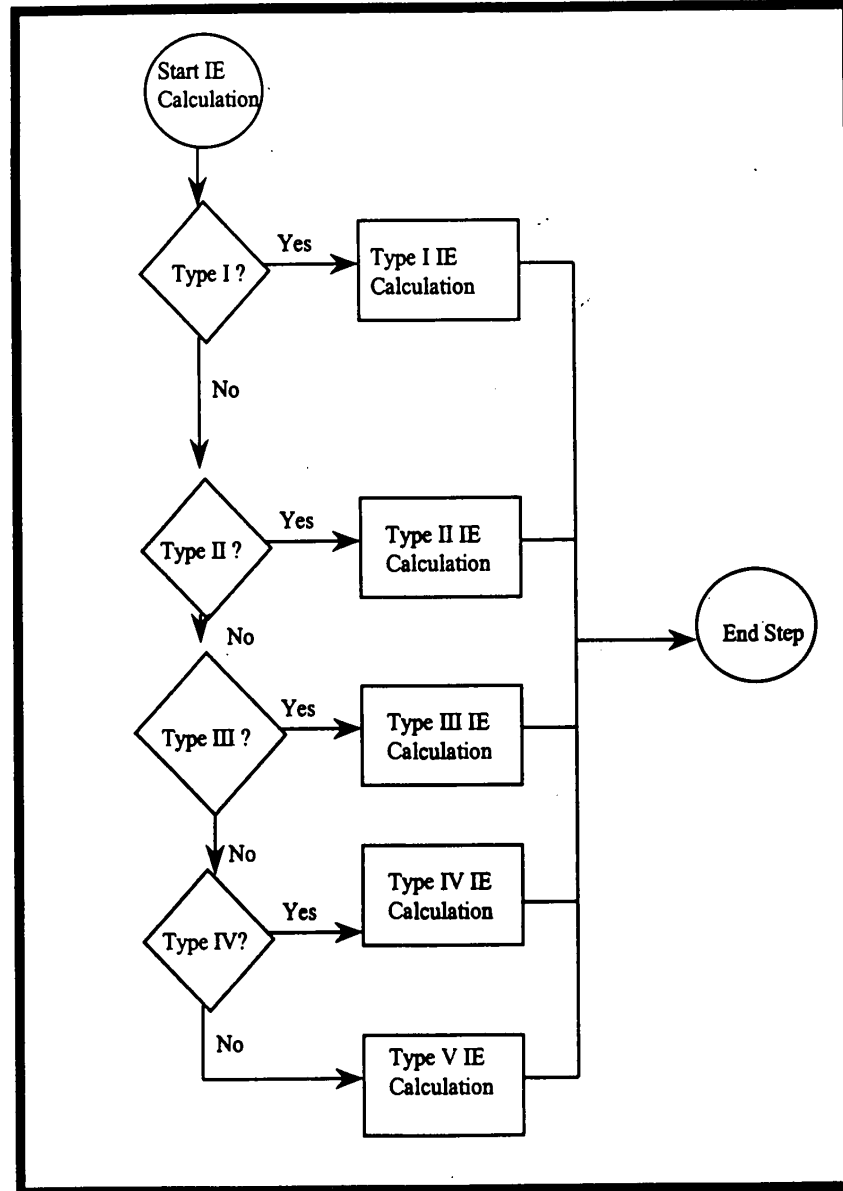


Fig. 11



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Fig. 12

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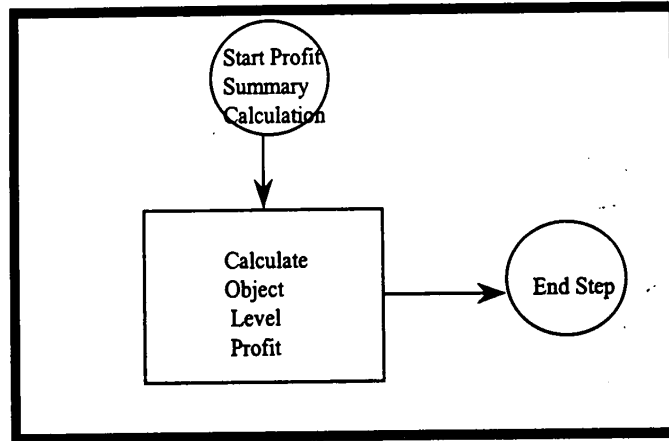


Fig. 13

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Airline
Database
Schema

Attributes
====>>>>

DPM Example

Entity

Plane	row_id	orig_bal	et_orig_bal	p_orig_b	mp_net_bal	to_last_12	rs_last_1	no_seats1	no_seats2	no_seats3	teg	...
	plane_id											

Flight	row_id	t_origination	pt_landing	1st_fare	2nd_fare	3rd_fare	schd_hours	distance	liance_re	ins_fac	risk_factor	...
	flt_id											

Customer	row_id	loyalty_rtn	ene_miles	or_score	alliance	...
	cust_id					

Employee	row_id	salary&be	...
	emp_id		

Financial	row_id	period_am	fin_name	period	type	...
	finan_id					

Transactions	row_id	trn_amt	seat	flt	date	type	...
	tran_id						

Treatment_rts	row_id	25_yr_rate	pool_rt	...
	treatment_id			

grouping tables:

emp_to_flight	row_id	emp_id	flt_id

cust_to_tran	row_id	cust_id	tran_id

cust_to_seat	row_id	cust_id	seat_id	flt_id

plane_to_flight	row_id	plane_id	flt_id	date

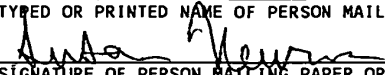
loc_to_gnd_est	row_id	loc_id	finan_id

Fig. 14

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Susan Newman
TYPED OR PRINTED NAME OF PERSON MAILING PAPER OR FEE

SIGNATURE OF PERSON MAILING PAPER OR FEE

APPLICATION

Of

RICHARD TAD LEPMAN

For

UNITED STATES LETTERS PATENT

On

PROCESS FOR DETERMINING OBJECT LEVEL PROFITABILITY

Docket No. BERK-37617

Sheets of Drawings: Fourteen

Attorneys

KELLY BAUERSFELD LOWRY & KELLEY, LLP
6320 Canoga Avenue, Suite 1650
Woodland Hills, California 91367

PROCESS FOR DETERMINING OBJECT

LEVEL PROFITABILITY

RELATED APPLICATION

This application claims priority from provisional patent application Serial No. 60/128,769, filed April 9, 1999.

BACKGROUND OF THE INVENTION

The process of measuring profit is an important business activity. Profit measures are the primary basis for understanding financial performance and value creation in a business. Once a business is owned publicly, an independent review of a firm's financial position becomes a mandatory process well known as measuring profit according to "generally accepted accounting principals" (GAAP.) While these standards and regulations are adequate for an external view of a company's financial condition, the measurement of profit contribution amongst the business is required for proper management of the franchise. Internal financial performance measurement is especially complex for a multi-product, multi-location, and/or large customer based businesses. The use of internal financial performance measures drives most businesses planning processes, management incentive processes and control processes. Many businesses have found that internal profit measures can be consistent with the external financial statement measures. These businesses implement internal accounting processes consistent with external measures using common metrical units similar to a GAAP Financial Statement presentation - a consistent metric or "yard stick" (i.e. numerically the sum-of-the-profit-parts equals the whole company's profit according to GAAP.)

Many businesses today are struggling to accurately measure profit contribution at a level necessary to accurately measure profit contribution of individual customer interactions. The reason for dilemma is found in the manner in which generally accepted accounting principles are applied. Fundamental accounting theory takes lumpy cash flows that occur in the day-to-day management of a business conducted with its customers and transform them into smoothed income or expense items (known as accruals.) At the end of every profit reporting cycle these income and expense items are consolidated into a period end balance sheet and income statements. Reports on the state of the business can then be presented by accountants in formats necessary for the independence of ownership and management that is the basis of capital markets. Indeed, most businesses today would call its accounting process critical for survival. Unfortunately, the complexity of maintaining an accurate financial accounting process has obscured the measurement of profit contribution at a very detailed level. While the aggregate cash flows of a large company are relatively stable the individual customer-to-business cash flows are very volatile. Accounting practice to date has been comfortable with using aggregate cash flow information for the accrual accounting process. The accounting process based on aggregates has lead to blindness by businesses of incremental customer profit contribution measures necessary to implement customer level decision making, particularly in large businesses with many millions of customers.

General Ledgers (double entry book keeping systems) were early adapters of automated data processing solutions due to the match between computing capabilities of computers and the execution of the accounting process. The benefit, from reduced cost for accounting processes easily justified large expenditures in information processing technology, both in hardware and in software development. The complexity of today's general ledger applications and the age of these systems have retarded the innovation of new automated techniques taking advantage of technological advances in massively parallel computing capability.

References describing generally accepted accounting principals and procedures are listed below, and are incorporated by reference herein:

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Money market and bond calculations /, Marcia Stigum and
Franklin L. Robinson. Chicago : Irwin Professional Publ., c1996.

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There remains, however, a need to resolve profit measures at a detailed level without using analytical models or statistical extrapolation. Such a process should utilize rule driven and data base measurement processes which will give large scale businesses a lower cost of maintenance and a technologically scalable tool to measure profit at a level of precision or resolution not possible in prior financial performance measurement processes. The present invention fulfills this need and provides other related advantages.

SUMMARY OF THE INVENTION

Prior approaches to management's desire for an accurate measure of individual decisions (incremental or marginal) profit impact have been solved by automating the accounting process for implementing accounting methods. Cash flows are transformed into two parts, a debit part or credit part, according to an accounting rule. Other non-cash accounting rules are

implemented to create "accrual" debits and credits smoothing income and expenses and adjusting for future contingencies. (see Management Accounting Theory Book or any source of accounting theory, where the balance sheet equation and the consolidation process, the combination of flows and stocks of financial data, are developed.) The first large scale use of automated computing technology is frequently found to be the automation of the financial control or accounting processes, since it is easy to develop software to implement accountancy rules and there were large benefits in staff productivity easily observable. For businesses to observe marginal profit contributions it was necessary to use accounting information and make reasoned conclusion on how to apportion or extrapolate this information into incremental customer, product or organizational profit detail. (See Fig. 1)

What these methods of profit measurement lack are the adequate level of detail to measure an individual or incremental decision's impact on profit.

To gain this new level of profit resolution this invention is designed to use micro profit measurement rules applied at a granular level consistent with standard accounting practice using a combination of actuarial science and mathematical set theory. The invention is designed to utilize massively parallel computing operations using relational database management techniques enabling profit measurement at a level not available today in a large individual customer scale business. This invention does this through a consistent application of measures to a class of business entities which represent the smallest common component of profit measurement desired - the Profit Object.

The invention's method of apportionment of non-object related profit measures specifies a method which will not change the ordinal or cardinal profit contribution ranking when only marginal profit measures are counted.

This specification is what makes it possible to apply marginal measurement rules (see Micro-economic theory literature) with macro economic principals; namely the sum-of-the-parts equals the whole criterion which is the basis of financial accounting theory and practice.

The invention decomposes profit measurement analytical calculations into five classifications:

1. Marginal profit measures associated with use of the business' balance sheet resources;
2. Marginal measures of non-balance oriented revenues;
3. Marginal cost measures;
4. Marginal measures of expected costs or revenues; and,
5. Apportioned cost measures.

This classification provides for additive profit measures across the five components. The calculation process is designed to be independent across classes 1, 2, 3, & 4 above with the addition of class five to preserve sum-of-the-parts integrity without simultaneous calculations typically found in profit measurement processes. When all five profit measures are summed at the lowest level of profit detail, a consistent set of profit values for all types of aggregations are possible - all profit measurement then originates from the same point in a profit database. The simultaneous use of these five analytical frameworks makes possible a detailed level of profit calculation consistent with GAAP.

In particular, the present invention relates to a process for determining object level profitability. In its basic form the process includes the steps of:

1. Preparing information to be accessed electronically;
2. Establishing rules for processing the prepared information;
3. Calculating at least one marginal value of profit using established rules as applied to a selected set of prepared information;
4. Calculating a fully absorbed value of profit adjustment using established rules as applied to the selected set of prepared information; and,
5. Combining the at least one marginal value of profit and fully absorbed value of profit adjustment to create a measure for object level of profitability.

More specifically in the step of preparing information to be accessed electronically, the database is prepared, object attributes are extracted,

conditioned and loaded into the database, and financial statement attributes are extracted, conditioned and loaded into the database. If desired the step may also include extracting, conditioning and loading the event attributes into the database, and calculating funds transfer treatment rates.

In the step of establishing for processing the prepared information for rule establishment providing the information necessary to select objects and perform the correct profit calculus is accomplished. The step of calculating at least one marginal value of profit using established rules as applied to a selected set of prepared information includes calculating net interest, other revenue, direct expense, and/or provision for the selected set of prepared information. Net Interest (NI) is the summation of interest income, value of funds provided and earnings on equity funds used less the sum of interest expense and cost of funds used. Other Revenues (OR) is a measure of profit contribution from non-interest related sources. Direct Expense (DE) is the profit value reduction due to marginal resource consumption by the object. Provisioning (P) is the expected profit value adjustment for future outcomes related to the object.

The step of fully absorbed profit adjustment, Indirect Expense (IE), is an apportioned profit value adjustment for all non-object related resource consumption by the business.

In the step of combining the five profit values, $NI + OR - DE - P - IE$, may be adjusted for taxes and/or object economic value.

The foregoing elements of the invention, which have been explained at a micro elemental level can be advantageously employed in massive amounts and parallel process power. For example, in the macro perspective of the invention the basic steps can be utilized.

The present invention gives management profit measures tailored to its need for accurate decision oriented profit information required to manage a large organization based on profit measurement. This invention gives businesses the ability to resolve profit measures at a level of detail necessary for all types of application of profit oriented performance measurement.

Other features and advantages of the present invention will become apparent from the following more detailed description, taken in conjunction with the accompanying drawings which illustrated, by way of example, the principles of the invention.

BRIEF DESCRIPTION OF THE DRAWINGS

The accompanying drawings illustrate the invention. In such drawings:

FIGURE 1 shows existing profit calculation process flow.

FIGURE 2 shows analytical processing relationships.

FIGURE 3 shows the invention's information flow.

FIGURE 4 shows the invention's data relationships.

FIGURE 5 shows the invention's process flow.

FIGURE 6 shows the invention's database preparation process step detail.

FIGURE 7 shows the rule maintenance process.

FIGURE 8 shows the net interest measuring process

FIGURE 9 shows the other revenue measuring process.

FIGURE 10 shows the direct expense measuring process.

FIGURE 11 shows the provision measuring process.

FIGURE 12 shows the indirect expense measuring process.

FIGURE 13 shows the profit component aggregation and adjustment process.

FIGURE 14 shows a partial relational database schema for an airline industry example.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

As shown in the accompanying drawings for purposes of illustration, the present invention is concerned with a detail profit metric (DPM) designed to be a computer database application (i.e. software) for profitability measurement. DPM's profit measurement system is fundamentally different

from the common profit measurement system used by regulators and public accountancy - yet, it is consistent with generally accepted accounting principals. DPM is based on object level detail of cash flows, customer events and management allocations of profit arising from non-customer related events. DPM provides both marginally and fully absorbed profit measures, something traditional "general ledger" based profit accounting systems can not accomplish due to reliance on aggregate debit and credit amounts (see Figs. 2-4.)

The following is a definition of the inputs (attributes or measurement parameters), the method of processing and the output of the DPM process.

Definitions

Object Attributes

These are data about the object being measured. Different businesses have different objects of detailed profit measurement. Examples of profit measurement objects include an airline using "seat" as the profit object, an insurance company using a "policy" object or a bank use an "account" object - these objects represent the lowest level of detail required for consistent internal multi-dimensional internal profit analyses. Types of data attributes associated with these objects include: balances, rates (or interest accrued), product identification, exposures, expected loss frequency, and various dates (e.g., start, finish, rate reset, last payment, next payment, life, etc.)

Event Attributes

These data are about events (a resource consuming activity) related to the object being measured. Data found here include object identification, transaction amounts, quantities, event location, event time, counter-party identification; event type (e.g., payments, interest paid or earned, purchases, refunds, etc.) At least one of these attributes must relate the event to at least one Object.

Financial Statement Attributes

These are data about the company's financial statement. Data found here include balance sheet and profit statement amounts usually aggregated by the legal or management entities that own a group of objects being measured. These data will be current accounting period either actual or planned.

Profit Measurement Parameters

These data include parameter values necessary to perform the object or event level profit calculations. The major classifications of these data are:

- Funds valuing rates ("Treatment Rates") - DPM's funds transfer pricing method uses maturity opportunity rates used in valuing each object's marginal use or source of internal funds (balance sheet resources).
- Unit Costs - DPM's Direct Expense calculations require unit cost parameters. DPM can calculate unit costs, when unit cost data are not available; in these instances, if the total cost is provided a financial statement attribute and then unit cost is derived by dividing total cost by an appropriate attribute quantity amount.
- Allocated Amounts - In both Other Revenue and Indirect Expense calculations this amount is apportioned amongst all objects in a group.
- Miscellaneous Calculation Values - Some of DPM's calculations require non-system of record values. For example, number of days in profit measurement period or equity allocation weighting. These values are known as "modeling" parameters.
- Amortization Parameters - Interest amortization requires an interest rate and expected life attributes. Straight line and declining balance methods of amortization require expected life values.
- Expected Profit Adjustment Measurement Parameters - Provision calculations require appropriate attributes, such as: expected loss

rates, reserve percentages, exposure factors, recovery rates, default probabilities and collection costs.

- Tax Rates - Tax rates are required for after-tax profit calculation. DPM is designed to calculate pre-tax income on a taxable equivalent basis (where a single effective tax rate is all that is required to transform pre-tax income into after tax earnings.)

Profit Measurement Rule Specification

DPM's processing approach is to combine profit measurement techniques with (non-modeled) data and calculation parameters. Each application of this calculus is called a rule. DPM is designed to allow the user the freedom to associate a group of objects with a rule and to use object-level information in combination with rule parameters to calculate profit values. The DPM invention uses profit measurement rules separate from, but applied to, object data and the use of relational database concepts, giving the user a flexibility in both the assignment and depth of definition of measurement rules and measurement resolution. Use of this method is especially suited for massively parallel computing technology where linear scaleable capital investment in processing technology is possible vis-à-vis object and event count and rule complexity.

The types of calculation (Rule types) are:

- Funds Treatment - Every object with cash flows affecting a financial statement's balance sheet requires a method of valuing an object's use or source of funds. The common name for this approach to valuing is known as "Matched Maturity Funds Transfer Pricing." DPM uses a canonical representation of an object's funding characteristics for computational performance. DPM's methodology requires effective yield adjustment to eliminate the allocation of interest payable / receivable required by GAAP. A value, based on effective yield adjusted market price (the yield curve),

is then determined by DPM for each instance that requires an interest rate transfer prices to calculate an object's marginal Net Interest (NI).

- **Equity Allocation** - In order for precise net interest revenue or economic value adjusting calculations the amount of equity funds required at an object level must be determined. DPM's equity allocation to the object level calculations may use any of the following methods: simple ratios; regulatory definitions; economic allocations based on econometric modeling (see book on Modern Portfolio Theory) methodologies; or, as statically defined allocations.
- **Balance Sheet Allocations** – Complete calculation of Net Interest may require an object level allocation of some financial statement balance sheet amounts.
- **Apportionment** - In both Other Revenue, Provision and Indirect Expense calculations are applied at the object level using Financial Statement Attributes which are not related directly to an object. These profit adjustments are made so that the sum of all object profit equals the whole enterprise's profit - an important property of DPM's output. Accountants refer to this profit measurement technique as "full allocation of profit." DPM's approach is to pool indirect costs and revenues and then apportion them. Apportionment rules specify how the pool is completely allocated to appropriate objects. DPM uses a specific closed form (mathematical formula that require only information known in the current period and no iterative computation) allocation rules.
- **Amortization** - Some types of income or expense are deferred or accrued over multiple periods including and subsequent to the current accounting period. This is common to accrual accounting methods used in financial statement profit presentation and give rise to timing differences between cash flows and their related profit as presented in a financial statement in any accounting period. Since DPM is designed to mirror a financial statement's profit measure it must support deferral and accrual accounting principals. Amortization methods are included in DPM to reflect these

GAAP concepts. DPM's amortization methods include: interest method of amortization (used for interest income and expense accruals and for deferral of fees that are in lieu of interest); and, straight line or declining balance amortization methods (used for cost or income deferrals and capitalized investment depreciation.)

- Other Revenue Pricing - In situations where object and event activity can be used to derive object level income or fees DPM provides for the calculation of these drivers of profitability in Other Revenue profit calculations. These calculations take the mathematical form of a linear combination of event or object values and modeled coefficients.
- Direct Expense - Calculation of object profit adjustment due to object related activity requires rules that take the form of linear combinations of event or object values and modeled coefficients.
- Indirect Expense - In situations where expense apportionment or amortization amounts are aggregated the user may want different rules applied depending on the path (or dimension) of aggregation. These rules allow for multiple profit calculations rules to be applied to derive multiple object level indirect expense amounts.
- Provision - Adjusting current profit for expected future value changes is known as "actuarial" profit provisioning. The technique is well known by the financial industry's accounting practice. DPM applies actuarial based methods in its object level profit calculations where the Provision pre-adjusts profit for contingent or known exposures to future profit.
- Taxable Equivalent Gross-up - Profit is usually an after-tax measure. Some events or portions of some object profit may be excluded from normal taxation. DPM's approach is to adjust these pre-tax values so that a singular tax rate can be used to convert pre-tax profit into after-tax values, known as taxable equivalent adjustment. For the purpose of the remaining detailed description all profit and loss profit measures are tax equivalent amounts (e.g., $TEG * Amount$.) These rules use object and

event attributes to drive an adjustment for each of the five classes of profit amounts to a taxable equivalent basis.

- Interest Yield Adjustments - Since DPM can derive profit for any length of accounting period from daily to annual, the adjustment of cash interest payments and the financial statement's accrual or smoothed representation of interest related Profit, DPM requires a method for converting cash interest amounts to financial statement accrual amounts. DPM implements the mathematical concept of "effective interest rate" conversion to accomplish this type of calculation.

Before the calculation rules can be applied at the object or event level a calculation rule must be associated with an object, designating the methods DPM will use to calculate components of profit at the object level. An object grouping is designed to associate objects having common and defined set of object attributes for similar processing (note that a group may consist of one object). The association of a group of objects with a calculation rule is referred here as a Rule Map.

Inheritance Functionality

In nature the concept of inheritance is where a descendant receives properties of its predecessors, in computer science inheritance is defined in "Object Oriented" software development theory as the ability to increase function without loss of function using the same data. In DPM the concept of inheritance is applied and in essence it means that an implementation can change Rules (change profit calculus) without losing any profit measurement capabilities of the preceding state(s). This feature allows DPM users a unique ability to apply techniques of differing levels of sophistication to different sets of objects according to the trade-off between the value of more accurate object-focused profit measures and the cost of obtaining and populating data and maintaining Rule Maps.

The DPM system is designed for Rules to be applied to any object without loss of integrity of output. This design feature allows the user to

incrementally migrate objects to increased measurement precision as justified. This valuable piecewise increase in functionality is possible due to DPM's combination of rules and data in a mathematical set theoretic framework. This approach allows for a relational database management system implementation. It is nearly impossible develop and maintain procedural based software with as much flexibility and with the capability to simultaneously support the number of calculation permutations required by DPM .

Restatement Functionality

Since DPM is a rule based system the ability to restate prior period's Profit calculations are systematically possible providing historical data exists. DPM's design of object level profit measurement enables a unique historical profit restatement capability. Three features of DPM's restatement capability are:

1. Produces a mathematically consistent time series (i.e. no measurement bias) of object level Profit. DPM restatement functionality is designed to apply the same Rules to all available historical object or event level data.
2. DPM's restatement functionality preserves accrual objecting integrity when the object history is restated for different length accounting periods. Implementations of daily, weekly, monthly, quarterly, semi-annual, or annual profit calculations and mixing different periodicity in historical data without loss of analytical integrity.
3. Capable of object's profit history restatement. If a DPM user changes Rules or Rule Maps and/or changes the way a subset of object's Profit are calculated and if the historical data is available per the new set of Rules then the user can restate historical profit measures for these subset of objects.

Processing (see Fig. 5)

1. Populate Database (see Fig. 6)

Perform standard database administration actions to initialize data for the required calculations:

1. Perform database Initialization
2. Extract, condition & load object attributes
3. Extract, condition & load event attributes
4. Extract, condition & load financial statement attributes
5. Calculate and populate NI treatment rate attributes

2. MAINTAIN OBJECT GROUPS AND RULE MAPS (SEE FIG. 7)

Populate or edit Rule parameters necessary to perform calculations. Rules definition is by association of specific, non-iterative calculation, as described below, with a set of object or event attributes defined as a data filter (see Relational Data Base Management System textbook). Rules have two pieces:

1. Parameters to drive the object selection or data filter for calculations; and,
2. Parameters specific to the appropriate calculation methodology.

An easy-to-use graphical user interface can be used to maintain these data.

Steps 3 through 6 perform object and event level profit calculations. Steps 3, 4, 5, and 6 can be processed independently, step 7 requires values derived in step 3, 4, 5, and 6 and therefore occurs sequentially.

3. Calculate Net Interest for All Objects (see Fig. 8)

Net Interest is:

$$NI = \text{Interest Income} - \text{Cost of Funds} + \text{Value of Funds} - \text{Interest Expense} + \text{Earning on Allocated Equity}$$

Correct interest rates for calculation of interest income or expense depend on the length of the profit measurement period. Using actuarial

mathematical techniques the bookkeeping required by GAAP for interest receivables and Payables can be avoided in NI calculus. A known technique (see M Stigum, Money Markets) to accomplish this adjustment for profit measurement according to GAAP (i.e. accruals) the following calculation is used to convert interest rates:

Let r_{new} = annualized rate with new compounding factor

r = annualized rate with old compounding factor

m = number of old compounding periods per year

n = number of new compounding periods per year

Then
$$r_{\text{new}} = \left[\left(1 + \frac{r}{m} \right)^{m/r} - 1 \right] * n$$

NI CALCULATION RULE TYPE I

The object balance is either an asset or a liability amount for Type I calculation.

Let $AAB(o_i)$ = Average Asset Balance of the object o_i

$ALB(o_i)$ = Average Liability Balance of the object o_i

$\text{rate}_{\text{asset}}(o_i)$ = Effective interest rate for object o_i as an asset balance

$\text{rate}_{\text{liability}}(o_i)$ = Effective interest rate for object o_i as a liability balance

Rt = Treatment rate based on the identified treatment for the object's product attributes

$\text{Int Inc}(o_i)$ = Interest Income of object o_i

$\text{COF}(o_i)$ = Cost of funds used by object o_i

Int Exp (o_i) = Interest Expense for object o_i

VOF (o_i) = Value of funds provided by object o_i

Then,

Int Inc (o_i) = AAB (o_i) * rate_{asset} (o_i)

{Compute only if object attribute doesn't exist}

COF (o_i) = AAB (o_i) * Rt

Int Exp (o_i) = ALB (o_i) * rate_{liability} (o_i)

{Compute only if object attribute doesn't exist}

VOF (o_i) = ALB (o_i) * Rt

NI CALCULATION RULE TYPE II

Let AB_(c,t)(o_i) = Average Balances of the object o_i

rate_(c,t)(o_i) = Effective interest rate for the corresponding balance

asset or liability

Rt(o) = Object o 's product type/group as needed to identify

treatment rate

R_(c,t)(pt(o)) = Rate (treatment rate) for objects of this product
type/group, given the balance class, and tier

Int Inc(o_i) = Interest Income of object o_i

COF (o_i) = Cost of funds used by object o_i

Int Exp (o_i) = Interest Expense for object o_i

VOF (o_i) = Value of funds provided by object o_i

Then, where summations are over the possible balance variables
(class, tier) for the object,

$$\text{Int Inc}(o_i) = \sum_{\forall c, t} \text{AB}_{(\text{asset } c, t)}(o_i) * \text{rate}_{(\text{asset}, c, t)}(o_i)$$

{calculate only if object attribute doesn't

exist}

$$\text{COF}(o_i) = \sum_{\forall c, t} \text{AB}_{(\text{asset}, c, t)}(o_i) * R_{(\text{asset } c, t)} R_{(c, t)}(\text{pt}(o))$$

$$\text{Int Exp}(o_i) = \sum_{\forall c, t} \text{AB}_{(\text{liability } c, t)}(o_i) * \text{rate}_{(\text{liability } c, t)}(o_i)$$

{calculate only if object attribute doesn't

exist}

$$\text{VOF}(o_i) = \sum_{\forall c, t} \text{AB}_{(\text{liability } c, t)}(o_i) * R_{(\text{liability } c, t)} R_{(c, t)}(\text{pt}(o))$$

Allocated Balances

Let Total Amount = Balance Sheet amount to be allocated to object

Rule = Rule for allocating Amount

Then, DPM calculates the allocation to object o to determine the allocated balance:

$B(o_i)$ = Rule applied to (Total Amount)

= The Allocated Balance

Treat this balance as any one of the average balances associated with the object, where class is specified by users, tier is "allocated". Thus, $B_i(o_i)$ is one of the $\text{AB}_{(c, t)}(o_i)$ defined above.

NI CALCULATION RULE TYPE III

Let $\text{AB}_{(c, t)}(o_i)$ = Average Balances of the object o_i

$\text{rate}_{(c, t)}(o_i)$ = Effective interest rate for the corresponding

balance

$\text{Type}_{p, a}(o_i)$ = Object o_i 's product and object attributes as needed to identify treatment

$R_{(c, t)}(\text{type}_{p, a}(o_i))$ = Rate (treatment rate) for this object's product type, given the balance class, and tier/tenor

Int Inc (o _i)	= Interest Income of object o _i
COF (o _i)	= Cost of funds used by object o _i
Int Exp (o _i)	= Interest Expense for object o _i
VOF (o _i)	= Value of funds provided by object o _i

Then, where summations are over the possible balance attributes (state, tier) for the object,

$$\text{Int Inc (o}_i\text{)} = \sum_{\forall c,t} \text{AB}_{(\text{asset } c, t)}(\text{o}_i) * \text{rate}_{(\text{asset } c, t)}(\text{o}_i)$$

{calculate only if object attribute doesn't exist}

$$\text{COF (o}_i\text{)} = \sum_{\forall c,t} \text{AB}_{(\text{asset } c, t)}(\text{o}_i) * \text{R}_{(\text{asset } c, t)}(\text{type}_{p,a}(\text{o}_i))$$

$$\text{Int Exp(o}_i\text{)} = \sum_{\forall c,t} \text{AB}_{(\text{liability } c, t)}(\text{o}_i) * \text{rate}_{(\text{liability } c, t)}(\text{o}_i)$$

{calculate only if object attribute doesn't exist}

$$\text{VOF(o}_i\text{)} = \sum_{\forall c,t} \text{AB}_{(\text{liability } c, t)}(\text{o}_i) * \text{R}_{(c,t)}(\text{type}_{p,a}(\text{o}_i))$$

NI CALCULATION RULE TYPE IV

Let AB _(c,t) (o _i)	= Average Balances of the object
rate _(c,t) (o _i)	= Effective interest rate for the corresponding
balance amounts	
type _{p,a,b} (o _i)	= Object o _i 's product, object attribute, and behavior types as needed to identify treatment rate
R _(c,t) (type _{p,a,b} (o _i))	= Rate (treatment rate) for objects of this product type, balance class, and tier/tenor
Int Inc(o _i)	= Interest Income of object o _i
COF (o _i)	= Cost of funds used by object o _i
Int Exp (o _i)	= Interest Expense for object o _i
VOF (o _i)	= Value of funds provided by object o _i

Then, where summations are over the possible balance variables (state, tier) for the object,

$$\text{Int Inc}(o_i) = \sum \text{AB}_{(\text{asset c}, t)}(o_i) * \text{rate}_{(\text{asset c}, t)}(o_i)$$

{calculate only if object attribute doesn't exist}

$$\text{COF}(o_i) = \sum \text{AB}_{(\text{asset c}, t)}(o_i) * R_{(\text{asset}, t)}(\text{type}_{p,a,b}(o_i))$$

$$\text{Int Exp}(o_i) = \sum \text{AB}_{(\text{liability}, t)}(o_i) * \text{rate}_{(\text{liability}, t)}(o_i)$$

{calculate only if object attribute doesn't exist}

$$\text{VOF}(o_i) = \sum \text{AB}_{(\text{liability}, t)}(o_i) * R_{(\text{liability}, t)}(\text{type}_{p,a,b}(o_i))$$

NI CALCULATION RULE TYPE V

Any Net Interest calculation that is non-iterative, canonical, and represents the marginal GAAP valuation of an object's balance sheet resource related revenues or expenses for each (o_i).

Note that in firms that are highly leveraged, the use of COF/VOF separation leads to a significant and volatile piece of NI, the net difference between to sum of COF and the sum of VOF (after adjusting for EOAE per the following section) and the firm's total NI. This is known by a banker as "mismatch profits arising from the difference in tenors" (duration) of the assets and liabilities. If VOF and COF rates are based on matched maturity of objects then the difference between the firms total NI and the sum of the objects is the profit arising from the firm having different duration of balance sheet related objects. Since this profit is not related to a specific object, but the combination of objects in the enterprise, a separate profit measure is appropriate and possible using DPM's approach. The use of the rules above allow for a novel method of calculating funds transfer pricing, since the rules are based on sets, the processing can be preformed in parallel. Further, since the rules are canonical this approach leads to a computationally efficient method of calculating these types of profit values.

NI CALCULATIONS OF EOAE

Since GAAP financial statement's balance sheet is based on the balancing equation Assets equals Liabilities plus Equity, NI should be adjusted for the value of the Equity resource consumed by each Asset or Liability object. Calculating Earnings on Allocated Equity as part of an object's NI: Four exclusive options are provided for allocating equity to objects. DPM's options are as follows:

- Option 1 No calculation of EOAE.
- Option 2 EOAE calculation based on a simple equity ratio.
- Option 3 Equity allocation for all assets following regulatory standards.
- Option 4 Equity allocation using an economic allocation rule, based on object cohorts and modern portfolio theory's capital asset pricing model.

Option 1

$$EOAE(o_i) = 0$$

Option 2

Let $AB_{(asset, t)}(o_i)$ = Average Asset balances of the object o_i ,
including any allocated asset
balances

ER = Equity Ratio

R_{equity} = Treatment Rate for equity

$$\text{Then, } EOAE(o_i) = R_{equity} * ER * \sum AB_{(asset, t)}(o_i)$$

where the summation is taken over all asset
balances.

Option 3

Let $\text{Amount}(o_i)$ = Amount(s) associated with object 'a' This may be the average asset balances of the object ' o_i ' including any allocated asset balances, or may be an object parameter, etc.

$\text{Wt}(\text{type}(o_i))$ = Code needed to identify the weight for object o balances, at the object-type level

$\text{W}(\text{Wt}(\text{type}(o_i)))$ = determined by the weight code

Cap Ratio = An appropriate risk-weighted capital ratio

chosen

R_{equity} = Treatment Rate for equity

Then, $\text{EOAE}(o_i)$ = $R_{\text{equity}} * \sum [\text{Amount}(o_i) * \text{W}(\text{Wt}(o_i)) * \text{Cap Ratio}]$

where the summation is taken over all balances of o_i if there are multiple amounts.

Option 4

Let $\text{Amount}(o_i)$ = An amount or amounts related to the object, such as average balances of the object (denoted $\text{AB}_{(c,s,t)}(o_i)$)

$\text{Cohort}(o_i)$ = The cohort of objects in which object o is a member

$E_{\text{cohort}}(o_i)$ = The equity allocation rule for the cohort of object o. This is a linear (two-valued) function that operates on $\text{Amount}(o_i)$ of the form $\alpha + \beta * \text{Amount}(o)$.

R_{equity} = Treatment Rate(s) for equity for the $\text{Amount}(o_i)$ value(s)

$$\begin{aligned}\text{Then, } EOA E(o_i) &= \sum R_{\text{equity}} * E_{\text{cohort}}(o)(\text{Amount}(o_i)) \\ &= \sum R_{\text{equity}} * [\alpha + \beta * \text{Amount}(o_i)]\end{aligned}$$

where summation occurs if $\text{Amount}(o_i)$ is a set of values (such as the object and allocated balances related to the object).

4. Calculate Other Revenue for All Objects (see Fig. 9)

OR Calculation Rule Type I

Let OR_i = Financial Statement Other Revenue attribute subset ,
 $OR_i(o_i)$ = The amount of OR_i apportioned to object o_i ,
 $O(OR_i)$ = the objects that map to OR_i .

Let M be an OR calculation method, where M is dependent upon the OR subset under consideration. We then have the following.

If $M(OR_i)$ = a "balance" attribute method.

Define

$M(OR_i)(o_i)$ = An average balance method for calculating o_i 's OR

$$\text{and } OR_i(o_i) = OR_i * \frac{\text{Balance}(o_i)}{\sum_j (\text{Balance}(o_j))}$$

where the summation is over all o_i in $O(OR_i)$.

If $M(OR_i)$ = A "count" method for calculating o_i 's OR

Define

$M(OR_i)(o_i)$ = 1

$$\text{and } OR_i(o_i) = OR_i * \frac{1}{(\text{count}(a_j) \text{ in } O(OR_i))}$$

where the count is over all o_i in $O(OR_i)$.

If $M(OR_i)$ = "event count," we can define

$M(OR_i)(o_i)$ = Count of events in profit measurement period for

object o_i

$$\text{and } OR_i(o_i) = OR_i * \frac{\text{count of events for object } o_i}{\sum_j (\text{count of events for object } (o_j))}$$

where the summation is over all o_i in $o_i(OR_i)$.

$$\text{If } M(OR_i) = \text{"event amount"}$$

$$\text{Define } M(OR_i)(o_i) = \sum_{\text{events over the period}} (\text{event amounts for } o_i)$$

$$\text{and } OR_i(o_i) = OR_i * \frac{\sum_{\text{events over the period}} (\text{event amounts for object } o_i)}{\sum_j \sum_{\text{events over the period}} (\text{event amounts for object } o_i)}$$

where the summation is over all events in $o_i(OR_i)$,

and the events are restricted to a class of event type. Then, we have the total OR for object o given by the sum of these allocations for all sets for which a has an association:

$$OR(o_i) = \sum (OR_i(o_i)), \text{ summing over } i.$$

As a generalization, these formulas can be written in shorthand where $M(OR)$ is the corresponding function of ' o ' above, as:

$$OR_i(o_i) = OR_i * \frac{M(OR_i)(o_i)}{\sum_j M(OR_i)(o_i)}$$

and

$$OR(o_i) = \sum_i^{o_i \in O(OR_i)} [OR_i * \frac{M(OR_i)(o_i)}{\sum_j M(OR_i)(o_i)}]$$

OR Calculation Rule Type II

The formula for OR calculation is given as follows:

Let o_i = Object being considered

$OR_i(o_i)$ = OR apportioned to a (if any) from a set OR_i

$Event(t)(o_i)$ = The event reflecting the activity of object o_i in the period restricted to a given event type t .

$Amount(Event(o_i))$ = An event amount

assumed to be of the form

$$\text{Then } OR(o_i) = \sum_{\text{type } t} \sum_i (\text{Rev}(\text{Event}(t)_i(a))) \text{ summed over all the events of } o_i$$

$$\sum_i (\text{OR}_i(o_i))$$

$\text{Event}(t)_i(o_i)$ = The events reflecting the activity of object o in the

This is assumed to be of the form

TERADATA, Ex. 1015, p. 128

AM = The method of amortization = cash, SL, DB, interest

$AM_k\{\text{amount}\}$ = Deferral on amount, using method AM, at time k (= 0 if $k > \text{life}$);

and $\text{life} = 1$ if cash basis is selected

$AM_{\text{now}}\{\text{amount}\}$ = Deferral on amount, using method M, at this period now; note

that this is at various points of life for various amounts

Let $OR(o_i)$ = Total OR apportioned to object o_i .

Then $OR(o_i)$ = Amortized amounts in their first amortization period
+ amortized amounts in their higher amortization

periods

+ amounts not amortized but apportioned from a pool

as in Type I

We take this step at a time. First, consider the amounts in their first amortization period. These are calculated as follows, using the formula generated in Type II:

Then $OR(o_i)$ = $\sum_{\text{type } t} \sum_i (\text{Rev}(\text{Event}(t)_i(o_i)))$ summed over all the transactions of

+ apportioned revenue as in the Type I case.

$$= \sum_{\text{type } t} \sum_i [x_i * \text{Count}(\text{Event}(t)_i(o_i)) + \beta_i * \text{Amt}(\text{Event}(t)_i(o_i))]$$

$$+ \sum_i (OR_i(o_i))$$

where the AM_1 methods vary with the event types. We can group the amounts being amortized by their amortization characteristics. For this purpose, let

$\text{Pool}_1(L, M)$ = the pools of amounts amortizing in this period for the first time

according to life L and amortization method M. The new amortizing amounts can be rewritten as follows:

$$\text{New amortized amounts} = \sum_{L,M} \text{Pool}_i(L, M)$$

Similarly, define

$\text{ool}_k(L, M)$ = the pools of amounts amortizing in this period for the k^{th} time according to life L and amortization method M , where $L \leq k$. N.B. any amortization calculation can be used if the calculation can be derived using known Object Attributes.

Then, the total OR for object o_i in this period is computed as follows:

$$\begin{aligned} \text{OR}(o_i) &= \sum_{\text{type } i} \sum_i \left[x_i * \text{Count}(\text{Event}(t)_i(o_i)) + \beta_i * \text{Amt}(\text{Event}(t)_i(o_i)) \right] \\ &\quad + \sum_{k>1} \sum_{L,M} \text{Pool}_k(L, M) \\ &\quad + \sum_i (\text{OR}_i(o_i)) \\ &= \sum_k \sum_{L,M} \text{Pool}_k(L, M) + \sum_i (\text{OR}_i(o_i)) \end{aligned}$$

OR Calculation Rule Type IV

Foregone OR:

Let Actual OR for object $o_i = \text{OR}_{\text{actual}}(o_i)$ - CASH AMOUNTS

Let Expected OR for object $o_i = \text{OR}_{\text{expected}}(o_i)$

Then, Foregone OR for object $o_i = \text{OR}_{\text{foregone}}(o_i) = \text{OR}_{\text{expected}}(o_i) -$

$\text{OR}_{\text{actual}}(o_i)$ - CASH AMOUNTS

OR Calculation Rule Type V

Any Other Revenue calculation that is non-iterative, canonical, and represents the entire GGAP valuation of non-balance sheet resource related revenues or expenses.

5. Calculate Direct Expense for All Objects (see Fig. 10)

DE Calculation Rule Type I

None directly specified - use IE calculation rules (any type). For each IE rule used in this way, substitute $DE(o_i)$ for $IE(o_i)$ in any IE calculations used as DE.

DE Calculation Rule Type II

Direct expense will be a variable dependent upon the object and the event being costed. These determine the unit cost to be used and the calculation type, along with the multiplier rule being used if external amounts are needed. Thus, using subscripts to indicate variables used,

$$\begin{aligned} &DE_{\text{object, event-type}} \\ &= \text{unit cost}_{\text{event type}} * (\text{no. of events of this type in the period}) \\ &\quad + \text{amounts taken from an event file} \\ &\quad + \text{costs calculated as a} \\ &\quad \text{percentage of Event Amount Where the unit costs, and revenue} \\ &\quad \text{percentage by event type, are all entered by the user as pre-processing} \\ &\quad \text{inputs.} \end{aligned}$$

Then, $DE_{\text{object}} = \sum_{\text{event types}} DE_{\text{object, event-type}}$ where the summation is over event types.

DE Calculation Rule Type III

$$\begin{aligned} &DE_{\text{object, event-type, event-sub}} \\ &= \text{unit cost}_{\text{event type}} * (\text{no. of events of this type in the period}) \\ &\quad + \text{amounts taken from an event file} \\ &\quad + \text{costs calculated as a percentage of event amount} \end{aligned}$$

DE Calculation Rule Type IV

Two calculations are made, each one using the above calculations, processing two independent DE attributes for each object. DE is calculated

twice for each object, allowing for comparison of plan to actual values or standard to actual values or any scenario to scenario comparison.

DE Calculation Rule Type V

Any Direct Expense calculation that is non-iterative, canonical, and represents the entire GGAP valuation of costs related to object or sub-object level details.

6. Calculate Provision for All Objects (see Fig. 11)

P Calculation Rule Type I

The formula for calculating P of Object i is as follows, where PG(o_i) denotes the P group in which o_i is a member:

$$P(o_i) = PG(o_i) * \frac{\text{Balance of } o_i}{\sum_{o_k \in \text{RPG}(o_i)} \text{Balance } o_k}.$$

P Calculation Rule Type II

The formula for calculating P of o_i is as follows, using the same symbols as above and RF(o_i) denotes the expected adjustment factor for o_i:

$$P(o_i) = PG(o_i) * \frac{\text{Balance}(o_i) * \text{RF}(o_i)}{\sum_{o_k \in \text{RPG}(o_i)} [\text{Balance}(o_k) * \text{RF}(o_k)]}.$$

P Calculation Rule Type III

The formula for calculating P of object "o_i" is as follows, where Pr(o_i) is a probability for object o_i.

$$P(o_i) = \text{Exposure}(o_i) * \text{Pr}(o_i) * \text{Expected Value Adjustment}(o_i) * \frac{1}{L_i}$$

Where L is the expected number of reporting periods during the life of o_i.

P Calculation Rule Type IV

The addition of any of the Type I, II or III P rules applicable to an object i.

$$P(o_i) = P(o_i)_{P \text{ Type I}} + P(o_i)_{P \text{ Type II}} + P(o_i)_{P \text{ Type III}} + P(o_i)_{P \text{ Type IV}}$$

P Calculation Rule Type V

Any Provision calculation that is non-iterative, canonical, and represents the entire GGAP valuation of expected costs related to future events, contingencies, timing effects.

7. Calculate Indirect Expense for All Objects (see Fig. 12)

Indirect expense, by its nature is not related directly to an Object, therefore apportionment techniques are used to allocate indirect expense to an Object. Any apportionment function is allowed as long as it is derivable at the object level using ratios of attributes available at the object level to the summation of this available attribute across all objects receiving the apportioned expense. Examples of this type of ratio calculation (the function "F" used in the IE calculation types) are:

- Ratio 1: Balance-based apportionment of IE.
Define Apportionment ratio using Current Balance of (o_i).

Thus, the allocation of Indirect Expense k becomes (function $F(IE_k)(o_i)$ in IE rules below):

$$IE_k * \frac{\text{Current Balance of } o_i}{\sum_j (\text{Current Balance of } o_j)}, \text{ summed over all objects in grouping } j.$$

- Ratio 2: Count-based apportionment of IE

Thus, the allocation of Indirect Expense k becomes (function $F(IE_k)(o_i)$ in IE rules below):

$$IE_k * \frac{1}{(\text{count of } o_j \text{ in } O(IE_k))}, \text{ for all objects in grouping } j.$$

- Ratio 3: Revenue-based apportionment of IE
Define $NI(o_i) + OR(o_i) = \text{Total Revenue (using NI \& OR rules above) for } (o_i).$

Thus, the allocation of Indirect Expense k becomes (function $F(IE_k)(o_i)$ in IE rules below):

$$IE_k * \frac{NIR(o_i) + OR(o_i)}{\sum_j (NIR(o_j) + OR(o_j))}, \text{ summed over all objects in grouping } j$$

- Ratio 4: Event Count apportionment of IE
Count of events for (o_i) are restricted to an event type.

Thus, the allocation of Indirect Expense k becomes (function $F(IE_k)(o_i)$ in IE rules below):

$$IE_k * \frac{\text{count of event for object } o_i}{\sum_j (\text{count of event for object } (o_j))}$$

for some event type, summed over all objects in grouping j.

- Ratio 5: Transaction Amount apportionment of IE
Summation of event amounts for (o_i) , restricted to a event type.

Thus, the allocation of Indirect Expense k becomes (function $F(IE_k)(o_i)$ in IE rules below):

$$IE_k * \frac{\sum_j (\text{event amounts for object } (o_i))}{\sum_j \sum_{\text{event over the period}} (\text{event amounts for object } (o_j))},$$

for some event type, summed over all objects in grouping j.

- Ratio 6: Direct Expense apportionment of IE
Using DE rules above for O_i .

Thus, the allocation of Indirect Expense k becomes (function $F(IE_k)(o_i)$ in IE rules below):

$$IE_k * \frac{DE(o_i)}{\sum_j (DE(o_j))}, \text{ summed over all objects in grouping } j.$$

- Ratio 7: Normalized (averaged) apportionment of IE

Thus, the allocation of Indirect Expense k becomes in IE rules below:

$$F(IE_k)(o_i) = [IE \text{ using Ratio 1 } F(IE_k)(o_i) + IE \text{ using Ratio 3 } F(IE_k)(o_i) + IE \text{ using Ratio 6 } F(IE_k)(o_i)] \div 3.$$

IE Calculation Rule Type I

Indirect expense is apportioned to accounts using one of the first three apportionment ratios above. Accordingly, using the nomenclatures above,

$$IE(o_i) = (\text{Total IE to be apportioned}) * \frac{F(IE_k)(o_i)}{\sum_k F(IE_k)(o_i)}$$

IE Calculation Rule Type II

The rules for partitioning IE and defining corresponding object groups are based on product and event attributes. The calculation of $IE(o_i)$ is exactly as described above, and is given by the following, where the F's are the given apportionment ratios (any of the seven apportionment ratios are permitted for any partition O or groupings of objects).

$$IE(o_i) = \sum_k^{o_i \in O(IE)} \left(IE_k * \frac{F(IE_k)(o_i)}{\sum_j^{o \in O(IE)} F(IE_k)(o_j)} \right)$$

IE Calculation Rule Type III

For Indirect Expense before deferral calculations, the process is similar to that as listed for the Type II Level, where:

$IE(o_i) =$ New amounts in their first period of amortization
 + Amounts not being amortized (cash basis)
 + Amounts in their 2nd through last amortization period.

Since we include non-amortized amounts (cash basis) to be considered as amortized with only one period, this is re-written as follows:

$IE(o_i) =$ New amounts in their first period of amortization (including cash-basis)
 + Amounts in their 2nd through last amortization period.

Note that non-amortized amounts are made to fit this equation by considering them to be an amortization of one profit reporting period only. Each IE set can have a different amortization type or period, though all objects receiving a specific apportionment will share the same amortization Rule. The new amounts to be deferred are computed, therefore, as the following:

Before deferral $IE(o_i) = IE_k * \frac{F(IE_k)(o_i)}{\sum_j F(IE_k)(o_j)}$ added over each set IE_k to

which o_i is related.

$$= \sum_k^{o_i \in O(IE)} \left(IE_k * \frac{F(IE_k)(o_i)}{\sum_j F(IE_k)(o_j)} \right)$$

Each of these terms may be deferred over its amortization period according to any of the amortization rules (cash, straight line, declining balance, or interest amortization calculations). Since amortization methods may vary by set, we have the following, where $AM_1(L,R)$ is used to denote the amortization rule and its life:

$$IE(o_i) = \sum_k^{o_i \in O(IE)} AM_1(L,R) \left(IE_k * \frac{F(IE_k)(o_i)}{\sum_j F(IE_k)(o_j)} \right)$$

To this is added the amounts with remaining amortization life for which amortization was begun in earlier periods.

IE Calculation Rule Type IV

Multiple combinations of the any of the above IE type rules I, II, or III are calculated per object.

IE Calculation Rule Type V

Any Indirect Expense apportionment calculation that is non-iterative, canonical, and represents the GAAP evaluation of indirect costs.

8. Calculate After-Tax Object Profit for All Objects (see Fig. 13)

$$\text{Profit}(o_i) = [\text{NIR}(o_i) + \text{OR}(o_i) - \text{DE}(o_i) - \text{IE}(o_i) - \text{P}(o_i)] * (1 - \text{EffectiveTaxRate})$$

where, for a two tier taxation system, Effective Tax Rate is calculated as:

$$\text{Effective Tax Rate} = (1 - \text{tax rate 2}) * (\text{tax rate 1}) + \text{tax rate 2}.$$

In the calculation of Effective Tax Rate, this formula assumes the two rates are effective rates which apply to the business conditions (not the nominal statutory rates), and that tax rate can be deducted from income in the calculation of tax rate. Then,

$$\text{Total Profit} = \sum_i [\text{Profit}(o_i)]$$

For those companies which use economic profit value calculations, the formula changes to:

$$\text{Profit}(o_i) = \{[\text{NIR}(o_i) + \text{OR}(o_i) - \text{DE}(o_i) - \text{IE}(o_i) - \text{P}(o_i)] * (1 - \text{EffectiveTaxRate})\} - \text{SVA}(o_i)$$

where

$$\text{SVA}(o_i) = \alpha(o_i) + \beta(o_i) * \text{Amount}(o_i)$$

and

$\alpha(o_i)$, $\beta(o_i)$ are functions for a cohort of objects in which o_i is a member, and $\text{Amount}(o_i)$ is given by a rule which maps o_i to a data value (such as balance, or allocated equity) also defined at the cohort level. (A cohort defined here represents a grouping of objects with similar risk characteristics, consistent with Modern Portfolio Theory and the Capital Asset Pricing Model.)

Shareholder Value Add (SVA) is a method financial analysts use to adjust profit measures for risk. The idea is to subtract from the profit measure the cost of the equity required to support whatever is being measured. Companies use this risk adjustment measure essentially to burden the profit for risk being taken with the equity funds used by the object. These institutions will classify cohorts of risk and the risk cost equivalent as a percentage of account balance or allocated equity (i.e., "Hurdles").

DPM Example

In the airline industry a need for detailed customer profitability can be measured using DPM. Here the fundamental object is the seat, allowing consistent profitability values aggregated by route, aircraft type, as well as customer dimensions using data warehousing technology. The need for detailed customer profitability is being driven by the business impact analysis required to support loyalty and alliance strategic decisions. The following is a DPM profit calculation for a seat, with real profit measurement parameters simplified (not all aspects of true airline business is demonstrated) and where examples of each type of rule are utilized in DPM processing.

Flight: Air101

Date: 7/1/1998

From: London

To: New York

Equipment: Boeing 747-400

Classes: First (20 Seats); Business (80 Seats); Economy(300 seats)

DETAILED PROFIT METRIC PROCESSING

Step 1: Populate Database – assuming a relational database management system and terminology.

- Initialize database;

Extract, Condition, and Load the following tables: Planes, Flights, Customers, Employees, Locations; The net balances in the Planes entity can be maintained by use of DPM amortization IE calculation from the prior period.

- Extract, Condition, and Load the following tables: Financial Transactions, Events; Manifest (occupant, seat, flight, date attributes);
- Extract, Condition, and Load the Financial Statement table;
- Calculate and populate Rate table;

Figure 14 shows a partial relational database schema showing the entities and attributes used in the example's processing.

Step 2: Maintain Object Groups and Rule Maps – a database processing routine is run creating the following groupings:
Class to Seat

- Flight to Locations
- Seat to Plane

For ease in understanding the rule the specifications used to populate the database with rule parameters the processing instructions are shown below in the Rules. Also, most rules group by plane – the rule discussion below assumes this grouping without reference.

Step 3: Calculate Net Interest for Seat – Four types of NIR rules are processed - type I, II, III, IV for each seat. Interest rates are matched to plane purchase date for initial plane investments, and interest rates for plane net capitalizable improvements are funded with a 5 year pool of rates. Plane asset balances are kept in the Plane table maintained in Step 1.2 above.

NIR Type I: Carry cost of plane asset by seat is determined.

Rule

Populated in Step 2 are:

- The AAB(seat) parameter is Plane: $\text{net\_orig\_bal} * (1/\text{total seats on plane})$
- The rt parameter is Treatment_rts: 25_yr_rate (maintained for each plane) There is no need for liability rates.

Calculate $\text{COF}(\text{seat}) = \text{AAB}(\text{seat}) * \text{rt}$ for all seats on flight.

All other attributes are NI Type I calculations results are null. No grouping.

NIR Type II : Allocate net receivable/payable to seat for carry cost profit adjustment. This adjusts profitability for the impact of cash flows vs. accounting flows. This airline wants to apportion this cost across all revenue seats based on class_wt, a modelling parameter. Total weighted seats (tw_s) for the accounting period is a modelling parameter. Where the seat factor is determined as a ratio of seat footprint to class portion of the plane's seat revenue space. (e.g. 1st = 15%, 2nd = 25% & 3rd = 60% of plane's seat revenue space with each seat evenly apportioned in class – 1/20, 1/80, 1/300 respectively, in this case.)

Rule

Populated in Step 2 are:

- The AB(seat) parameter is Financial: $\text{net\_recv'ble} * (1 / \text{tw_s})$
- The rt parameter is Treatment_rts: pool (for null plane row)
There is no need for liability rates.

Calculate $\text{COF}(\text{seat}) = \text{AB}(\text{seat}) * \text{rt} * \text{class\_wt}$

Grouped by class all seats, so no_seats??? is no_seats1st value in the plane entity for first class seats on this plane, and so on for 2nd & 3rd class seat groups. The net recv'ble column is

derived from the difference between sum of period_amts for the receivables minus sum of payable rows for this profit period.

All other attributes and NI Type II calculations results are null.

NIR Type III : Calculate the NI value of the customer mileage benefit payable for each seat.

Rule

Populated in Step 2 are:

- The AB(seat) parameter is Customer: bene_miles * loyalty factor
- The rt parameter is Treatment_rts: pool (for null plane row)
There is no need for an asset rate.

Calculate $COF(seat) = AB(seat) * rt$

Since a customer can only occupy one seat, no groupings are used in this rule map.

All other attributes and NI Type III calculations results are null.

NIR Type IV : Calculate the NI impact of the plane's improvements for each seat. Upper classes interior, customer electronics and seating are improved faster during the life of the plane. Management strategy is for these improvements to be loyalty program related; they are amortized quicker and hence shorter funding requirement with less certain life. Management wants the loyal customers to pay proportionately more of the funding costs of improvement assets.

Rule

Populated in Step 2 are:

- The AB(seat) parameter is Plane:imp_net_bal * (1/tsw)
- The rt parameter is Treatment_rts: pool (for plane row) *
Customer: loyalty_rtng

There is no need for a liability rate.

Calculate $COF(seat) = AB(seat) * rt * class\_fac$

The unique class_fac values sum to 1. The rule map is grouped by classes (or class_fac).

All other attributes and NI Type IV calculations results are null.

NI EOAE- Option 4: Allocate equity based on mileage benefit and have it reduce NI by the weighted average cost of capital for the airline.

Rule

Populated in Step2 are:

- The Amount(seat) parameter is Customer:bene_miles
- The equity rate is 9.75%

Calculate EOAE(seat) = Amount(seat) * equity rate * cohort_wt

The cohort is based groups of each instance of loyalty_rtn and class of seat paired. Cohort_wt is "beta" and no "alpha."

All other attributes and EOAE calculations results are null.

Step 4: Calculate Other Revenues for each Seat – Revenue arises from ticket fares, duty free sales on board aircraft, excess baggage penalties collected, alliance code sharing license and multiple leg customer trips.

OR Type I : Apportion revenue from code sharing with alliance.

Apportion revenue by seat allocated to alliance passenger.

Rule

Populated in Step 2 are:

- Flight:period_amt is alliance revenue per flight plus the sum of all flight/date alliance financial transactions.

Calculate OR(seat) = sum of Flight:period_amt *

(1/ no alliance seats available on flight)

Only for seats occupied by an alliance customer or a seat that is empty.

OR Type II: Use Transaction table to find direct passenger revenue by seat.

Rule

Populated in Step 2 are:

- Transaction:* (amounts, seats, flight, date, transaction type)
are populated for events, financial or non-financial.

Calculate OR(seat) = sum of Transaction:trn_amt

where type = "passenger_payment" for each seat.

No seat grouping in rule map.

OR Type III: Apportion flight freight revenue amongst all seats,
weighted by class_wt.

Rule

Calculate OR(seat) = sum of Transaction:trn_amt * class_wt *
(1 /
(no_seats???)

where type "freight" for each seat.

Group seats by class (??? Is 1st,2nd,3rd.) Class_wt is a
normalized weight for apportioning revenue amongst classes.

OR Type IV: Calculate the loyalty mileage benefit by seat.

Rule

Calculate Forgone OR(seat) = Flight: ???_fare – sum of
Transactions:trn_amt where type = "passenger_payment" for each seat.

Group by class for loyalty passenger occupied seats only.

Step 5: Calculate Direct Expenses for each Seat –

Compute the direct cost of using the seat. This is true for both occupied and unoccupied seats. Fuel and flight deck crew are costs of all seats, while cost of duty free goods sold and meals are a function of occupied seats. Some costs are a function of the plane taking off, no matter the duration of the flight (e.g., maintenance.) Some costs are a function of class, such as cabin crew expense and customer consumables.

DE Type I: Show direct cost of non-food materials consumed in flight.

Rule

Populated in Step 2 are:

- Transactions:* is populated based on these direct costs.

Calculate DE(seat) = Transactions:trn_amt for all flight and date rows where type = direct_exp for each seat.

No grouping in rule map.

DE Type II: Show direct cost duty free goods sold by seat.

Rule

Populated in Step 2 are:

- Transactions:* are populated based on these direct costs.

Calculate DE(seat) = Transactions:trn_amt for all flight and date rows where type = duty_free for each seat.

No grouping in rule map.

DE Type III: Show direct cost of food and beverage consumed.

Rule

Populated in Step 2 are:

- Transactions:* are populated based on these direct costs
- Loading is calculated as the ratio of occupied to total class seats by class (cl_load) using manifest table and plane configuration values.

Calculate DE(seat) = Flight: catering_cost * class_wt * cl_load for each seat.

Grouped by class in rule map.

DE Type IV: The staffing of each cabin has a maximum count with a minimum of 1 per 50 passengers. The air deck crew must fly the plane

even if there are no passengers. Calculate DE twice, once for based on a labor cost per seat based on total crew cost and total seats; and calculate DE a second time with actual staff apportioned to actual passengers.

Rule

Populated in Step 2 are:

- Total crew cost (tcc1) parameter is derived using the employee entity for all crew on flight. $Tcc = Employee:salary + bene * (Flight:schd\_hours + 1.5) / 110$
- Total crew cost (tcc2) parameter is derived using the employee entity for all crew on flight by class. $Tcc??? = Employee:salary + bene * (Flight:schd\_hours + 1.5) / 110$

Note: $tcc = tcc1st + tcc2nd + tcc3rd$

Calculate $DE1(seat) = tcc * (1 / (total\ no.\ of\ seats\ on\ plane))$

Calculate $DE2(seat) = tcc?? * (1 / (no.\ of\ seats\ occupied\ in\ class))$

for each seat.

Grouped by class in rule map.

Step 6: Calculate Provisions for each Seat – The cost of expected future events are measured here. The airline self insures property, casualty and miscellaneous insurance premiums on a per flight basis. And a provision for future loyalty benefit, a function of loyalty rating, claimed is made in step 6.

P Type I: - The cost of the flight's insurance premium is apportioned to each seat.

Rule

Populated in Step 2 are:

- Insurance premium is maintained in the flight entity (total PG)

Calculate $P(seat) = Flight:ins\_prem * 1 / (total\ no.\ seats\ on\ plane)$

No grouping in rule map.

P Type II: Provision for unusual maintenance cost is made on a function of the inverse of flight time and takeoffs in the last 12 months.

Rule

Populated in Step 2 are:

- Financial:period_amt is maintained in the financial entity by equipment type.
- Total flight hours and last 12 months take-offs are accumulated each month, their product is to_hrs parameter.

Calculate $P(\text{seat}) = \text{Financial:period\_amt} * 1/(\text{total no. of seats on plane}) * (\text{Plane:to\_last12} * \text{Flight:schd\_hrs}) / \text{to\_hrs}$

No seat grouping in rule map.

P Type III: Providing for future loyalty benefit.

Rule

Populated in Step 2 are:

- Customer:bene_miles is maintained using prior periods provision for benefit miles by loyalty customer
- A parameter estimating the usage rate by loyalty cohort called burn factor

Calculate $P(\text{seat}) = \text{Flight:distance} * \text{burn}(\text{loyalty\_rating})$

Grouping by loyalty rating in rule map.

P Type IV: Future order cancellation reserve.

Rule

Populated in Step 2 are:

- Future airplane order cancellation penalty (pen) and order size (fut_planes) is maintained in the financial entity
- Last 12 months loading is calculated by plane

Calculate $P(\text{seat}) = \text{pen} * (\text{Plane:orig\_bal} / \text{fut\_planes}) * 1 / (\text{total no. seats on plane}) * 1/24$. where last 12 months loading less than 75%.

Only seats on where last 12 months loading less than 75%.

Step 7: Calculate Indirect Expenses for each Seat – The calculation of indirect expense is the final step of detailed level profit calculation. Here remaining cost measures that are not differentiable by seat are measured. Fuel and oil, ground costs, regular aircraft maintenance, overheads, and general marketing expenses are apportioned in IE. The airline also wants to view customer profitability loaded with the cost of unoccupied seats.

IE Type I: General and administrative costs are apportioned to a seat in this rule.

Rule

Populated in Step 2 are:

- The periods financial entity is populated with all of the airlines G&A expenses (e.g., type of G&A are passenger services, navigation licenses, rentals, miscellaneous costs, premises and property taxes.) Allocate these costs based on seat revenue (NI + OR.)

Calculate $IE(\text{seat}) = \text{sum}(\text{Financial:trn\_amt}) * (\text{sum}(\text{NI}(\text{seat})) + \text{sum}(\text{OR}(\text{seat}))) / (\text{Total OR} + \text{NI for period})$

No seat grouping in rule map for all Financial:type = "G&A".

IE Type II: Ground location costs, airport specific and gate expenses are apportioned by flight.

Rule

Populated in Step 2 are:

- Populate all of these expenses for the period Transactions:trn_amt with the type being the three letter international airport identifier.

- Calculate the number of seats flown to the flight airports during the profit period (tfc)

$$\text{Calculate IE(seat) = sum of Transactions:trn\_amt} * (1 / \text{tfc}) / 2$$

Group transactions by pair of airports in flight row for rule map, where only these types of expenses are included in the tuple.

IE Type III: Fixed asset depreciation is allocated to a seat.

Rule

Populated in Step 2 are:

- The net plane balances (Plane:net_orig_bal & Plane:imp_net_bal) are updated for last period's amortization or write-off.
- The amortization factor (function of amortization) given age of asset (for both original investment and improvements) is amfo and amfi for each plane.
- The tax planning estimate for taxable equivalent gross-up, due to accelerated tax amortization, is .8 = teg (less than 1 since a tax credit)

$$\begin{aligned} \text{Calculate IE(seat) = } & ((\text{Plane:net\_orig\_bal} - \text{Plane:orig\_bal}) \\ & * \text{amfo}) + (\text{Plane:imp\_org\_bal} - \text{Plane:imp\_org\_bal}) * \text{amfi} * \text{teg} * \\ & (1 / (\text{total no. seats on plane})) * (\text{Flight:schd\_hrs} / \\ & \text{Plane:hrs\_last\_12} / 12) \end{aligned}$$

No grouping of seats in rule map.

IE Type IV: Indirect marketing expenses are apportioned by loyalty class for customer profit aggregations and by seat for other aggregations.

Rule

Populated in Step 2 are:

- Indirect marketing expense per loyalty tier per flight is parameterized as mef???, where ??? is 1st, 2nd, 3rd class.

Calculate IE(seat) = mef??? * (1 / (no. of occupied seats in ???))

Group seats by class in rule map.

IE Type V: For loyalty investment analysis, allocate all DE for empty seats to occupied seats equally.

- Populated, after all prior steps are calculated, are the total DE less OR for each flight during the period, idenf.

Calculate IE(seat) = idenf / (total no. of occupied seats)

Only calculate for occupied seats.

Step 8: Calculate After-tax Seat Profit – The

After-tax Profit:

Rule

Populated in Step 2 are:

- The effective tax rate (etr) for the airline is maintained in the database.

Calculate Profit(seat) = sum(NI(seat) + OR(seat) + DE(seat) + IE(seat) + P(seat)) * (1-etr)

Each seat is calculated individually, no grouping is used.

Shareholder Value-add: The airline has determined that some routes have a greater risk of loss due to the volatility of loading factors. Therefore each route is given a risk factor based on the last 12 months standard deviation of loading.

Rule

Populated in Step 2 are:

- Flight:risk_factor is maintained here
- Economic equity per average seat parameter (Flight:risk_factor) per route
- Cost of capital rate is parameterized (eqrt)

Calculate SHV(seat) = Profit(seat) – (Flight:risk_factor * eqrt)

Each seat is calculated.

This new ability to resolve profit measures at a detailed level without using analytical models or statistical extrapolation is a capability needed throughout industries that find their ability to determine a marginal decision's profit impact inadequate for optimization of ownership value. The use of rule driven and database measurement processes will give large scale businesses a lower cost of maintenance and technologically scaleable tool to measure profit at a level of precision or resolution not possible in prior financial performance measurement processes.

TERADATA, Ex. 1015, p. 150

WHAT IS CLAIMED IS:

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1. A process for determining object level profitability in a relational database management system, comprising the steps of:

preparing information to be accessed electronically through the relational database management system;

establishing, in the relational database, rules for processing the prepared information;

calculating independently at least one marginal value of profit for each object being measured using the established rules as applied to a selected set of prepared information;

calculating a fully absorbed profit adjustment value for each object being measured; and

combining the at least one marginal value of profit and the fully absorbed profit adjustment value to create a measure for object level profitability.

2. The process of claim 1, wherein the relational database comprises a structured query language (SQL).

3. The process of claim 1, wherein the preparing step includes the step of extracting, conditioning and loading object attribute values into the database.

4. The process of claim 1, wherein the preparing step includes the steps of extracting, conditioning and loading financial statement attribute values into the database.

5. The process of claim 1, wherein the preparing step includes the steps of extracting, conditioning and loading event attribute values into the database.

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6. The process of claim 1, wherein the preparing step further includes the step of calculating opportunity values of funds used or supplied by each object being measured.

7. The process of claim 1, wherein the establishing step includes the steps of providing the information necessary to select objects, and performing the correct profit calculus.

8. The process of claim 1, wherein the step of calculating at least one marginal value of profit includes the steps of calculating net interest (NI), other revenue (OR) and direct expense (DE), wherein net interest (NI) is the summation of interest income, value of funds provided and earnings on equity funds used less the sum of interest expense and costs of funds used, other revenue (OR) is a measure of profit contribution from non-interest related sources, and direct expense (DE) is the profit value reduction due to marginal resource consumption by the object.

9. The process of claim 1, wherein the step of calculating at least one marginal value of profit includes the step of provisioning (P) for the selected set of prepared information, provisioning being the expected profit value adjustment for future outcomes related to the object.

10. The process of claim 9, wherein the step of calculating at least one marginal value of profit includes the steps of calculating net interest (NI), other revenue (OR) and direct expense (DE), wherein net interest (NI) is the summation of interest income, value of funds provided and earnings on equity funds used less the sum of interest expense and costs of funds used, other revenue (OR) is a measure of profit contribution from non-interest related sources, and direct expense (DE) is the profit value reduction due to marginal resource consumption by the object.

11. The process of claim 10, wherein the step of calculating a fully absorbed profit adjustment value includes the step of calculating the value for indirect expense (IE) which is an apportioned profit value adjustment for all non-object related resource consumption.

12. The process of claim 11, wherein the combining step includes the steps of adding net interest (NI) and other revenues (OR), and subtracting therefrom direct expense (DE), provisioning (P) and indirect expense (IE).

13. The process of claim 12, including the step of adjusting the measure for object level profitability for taxes and/or object economic value.

14. The process of claim 1, wherein the at least one marginal value of profit is calculated in parallel.

15. The process of claim 1, wherein the fully absorbed profit adjustment value is calculated utilizing the calculated at least one marginal value of profit.

16. A process for determining object level profitability in a relational database management system, comprising the steps of:

receiving information to be accessed electronically through the relational database management system;

establishing, in the relational database, rules for processing the prepared information;

calculating independently at least one marginal value of profit for each object being measured using the established rules as applied to a selected set of prepared information;

calculating a fully absorbed profit adjustment value including value adjustments for taxes and/or object economic value; and

[illegible]

[illegible]

the sum of interest expense and costs of funds (IF) as a measure of profit contribution from non-financial activity. Direct expense (DE) is the profit value reduction resulting from resource consumption by the object.

process of claim 16, wherein the step of calculating the value of profit includes the step of providing the prepared information, provisioning being the step of accounting for future outcomes related to the object.

process of claim 24, wherein the step of calculating the value of profit includes the steps of calculating net interest (NI) and direct expense (DE), wherein net interest (NI) is the sum of interest income, value of funds provided and earnings (E), and the sum of interest expense and costs of funds (IF) as a measure of profit contribution from non-financial activity. Direct expense (DE) is the profit value reduction resulting from resource consumption by the object.

process of claim 25, wherein the step of calculating the adjustment value includes the step of calculating the indirect expense (IE) which is an apportioned profit value reduction resulting from resource consumption.

process of claim 26, wherein the combining step includes combining net interest (NI) and other revenues (OR), net interest (NI), direct expense (DE), provisioning (P) and indirect expense (IE).

process of claim 16, wherein the at least one step is implemented in parallel.

the sum of interest expense and costs of funds (IF) as a measure of profit contribution from non-financial activity. Direct expense (DE) is the profit value reduction resulting from resource consumption by the object.

process of claim 16, wherein the step of calculating the value of profit includes the step of providing the prepared information, provisioning being the step of accounting for future outcomes related to the object.

process of claim 24, wherein the step of calculating the value of profit includes the steps of calculating net interest (NI) and direct expense (DE), wherein net interest (NI) is the sum of interest income, value of funds provided and earnings from other activities, and the sum of interest expense and costs of funds (IF) as a measure of profit contribution from non-financial activity. Direct expense (DE) is the profit value reduction resulting from resource consumption by the object.

process of claim 25, wherein the step of calculating the adjustment value includes the step of calculating the net interest (IE) which is an apportioned profit value after accounting for direct resource consumption.

process of claim 26, wherein the combining step includes combining net interest (NI) and other revenues (OR), net interest (NI), direct expense (DE), provisioning (P) and indirect expense (IE).

process of claim 16, wherein the at least one step is implemented in parallel.

the sum of interest expense and costs of funds (IF) as a measure of profit contribution from non-financial activity, direct expense (DE) is the profit value reduction resulting from resource consumption by the object.

process of claim 16, wherein the step of calculating the value of profit includes the step of providing the prepared information, provisioning being the step of accounting for future outcomes related to the object.

process of claim 24, wherein the step of calculating the value of profit includes the steps of calculating net interest (NI) and direct expense (DE), wherein net interest (NI) is the sum of interest income, value of funds provided and earnings, and the sum of interest expense and costs of funds (IF) as a measure of profit contribution from non-financial activity, direct expense (DE) is the profit value reduction resulting from resource consumption by the object.

process of claim 25, wherein the step of calculating the adjusted value includes the step of calculating the adjusted value (IE) which is an apportioned profit value after accounting for resource consumption.

process of claim 26, wherein the combining step includes combining net interest (NI) and other revenues (OR), net interest (NI), direct expense (DE), provisioning (P) and indirect expense (IE).

process of claim 16, wherein the at least one step is performed in parallel.

the sum of interest expense and costs of funds (IF) as a measure of profit contribution from non-financial activity, direct expense (DE) is the profit value reduction resulting from resource consumption by the object.

process of claim 16, wherein the step of calculating the value of profit includes the step of providing the prepared information, provisioning being the step of accounting for future outcomes related to the object.

process of claim 24, wherein the step of calculating the value of profit includes the steps of calculating net interest (NI) and direct expense (DE), wherein net interest (NI) is the sum of interest income, value of funds provided and earnings, and the sum of interest expense and costs of funds (IF) as a measure of profit contribution from non-financial activity, direct expense (DE) is the profit value reduction resulting from resource consumption by the object.

process of claim 25, wherein the step of calculating the adjusted value includes the step of calculating the adjusted value (IE) which is an apportioned profit value after accounting for resource consumption.

process of claim 26, wherein the combining step includes combining net interest (NI) and other revenues (OR), net interest (NI), direct expense (DE), provisioning (P) and indirect expense (IE).

process of claim 16, wherein the at least one step is performed in parallel.



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35. The process of claim 30, wherein the establishing step includes the steps of providing the information necessary to select objects, and performing the correct profit calculus.

36. The process of claim 30, wherein the step of calculating at least one marginal value of profit includes the steps of calculating net interest (NI), other revenue (OR) and direct expense (DE), wherein net interest (NI) is the summation of interest income, value of funds provided and earnings on equity funds used less the sum of interest expense and costs of funds used, other revenue (OR) is a measure of profit contribution from non-interest related sources, and direct expense (DE) is the profit value reduction due to marginal resource consumption by the object.

37. The process of claim 30, wherein the step of calculating at least one marginal value of profit includes the step of provisioning (P) for the selected set of prepared information, provisioning being the expected profit value adjustment for future outcomes related to the object.

38. The process of claim 37, wherein the step of calculating at least one marginal value of profit includes the steps of calculating net interest (NI), other revenue (OR) and direct expense (DE), wherein net interest (NI) is the summation of interest income, value of funds provided and earnings on equity funds used less the sum of interest expense and costs of funds used, other revenue (OR) is a measure of profit contribution from non-interest related sources, and direct expense (DE) is the profit value reduction due to marginal resource consumption by the object.

39. The process of claim 38, wherein the step of calculating a fully absorbed profit adjustment value includes the step of calculating the value for indirect expense (IE) which is an apportioned profit value adjustment for all non-object related resource consumption.

40. The process of claim 39, wherein the combining step includes the steps of adding net interest (NI) and other revenues (OR), and subtracting therefrom direct expense (DE), provisioning (P) and indirect expense (IE).

41. The process of claim 40, including the step of adjusting the measure for object level profitability for taxes and/or object economic value.

42. The process of claim 30, wherein the at least one marginal value of profit is calculated in parallel.

43. The process of claim 30, wherein the fully absorbed profit adjustment value is calculated utilizing the calculated at least one marginal value of profit.

ABSTRACT OF THE DISCLOSURE

A process for determining object level profitability includes the steps of (1) preparing information to be accessed electronically, (2) establishing rules for processing the prepared information, (3) calculating at least one marginal value of profit using established rules as applied to a selected set of prepared information, (4) calculating a fully absorbed value of profit adjustment using established rules as applied to the selected set of prepared information, and (5) combining the at least one marginal value of profit and fully absorbed value of profit adjustment to create a measure for object level profitability. The inventive process gives management profit measures tailored to its need for accurate decision oriented profit information required to manage a large organization based on profit measurement.

002070-825450



My residence, post office address and citizenship are as stated below next to my name,

I believe I am the original, first and sole inventor of the subject matter which is claimed and for which a patent is sought on the invention entitled **PROCESS FOR DETERMINING OBJECT LEVEL PROFITABILITY** the specification of which (check one)

 X is attached hereto
 was filed on _____
 Application Serial No. _____
 and was amended on (or amended through _____)
 (if applicable)

I hereby state that I have reviewed and understand the contents of the above-identified specification, including the claims, as amended by any amendment(s) referred to above.

I acknowledge the duty to disclose information which is material to the examination of this application in accordance with Title 37, Code of Federal Regulations, Sec. 1.56(a).

I hereby claim the benefit under Title 35, United States Code, Sec. 120 of any United States application(s) listed below and, insofar as the subject matter of each of the claims of this application is not disclosed in the prior United States application in the manner provided by the first paragraph of Title 35, United States Code, Sec. 112, I acknowledge the duty to disclose material information as defined in Title 37, Code of Federal Regulations, Sec. 1.56(a) which occurred between the filing date of the

prior application and the national or PCT International filing date of this application.

<u>60/128,769</u>	<u>April 9, 1999</u>	<u>Pending</u>
Appln. Ser. No.	Filing Date	Status

<u>PROCESS FOR DETERMINING</u>	
<u>OBJECT LEVEL PROFITABILITY</u>	<u>BERK-37617</u>
Title	Attorney Docket No.

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

I hereby appoint the following attorneys to prosecute this application and to transact all business in the Patent and Trademark Office connected therewith: Scott W. Kelley, Registration No. 30,762; Stuart O. Lowry, Registration No. 26,563; John D. Bauersfeld, Registration No. 24,496; John E. Kelly, Registration No. 24,269; Kamran Fattahi, Registration No. 35,758; and Aaron T. Borrowman, Registration No. 42,348.

Direct all telephone calls to Scott W. Kelley, Esq. at telephone No. (818) 347-7900.

Address all correspondence to:

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6320 Canoga Avenue, Suite 1650
Woodland Hills, California 91367

Inventor's signature:

Residence: London, United Kingdom

**Post Office Address: Park House
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United Kingdom**

Applicant or Patentee: Richard Tad Lepman

Serial or Patent No:

Filed or Issued: Concurrently

For: PROCESS FOR DETERMINING OBJECT LEVEL PROFITABILITY

VERIFIED STATEMENT (DECLARATION) CLAIMING
SMALL ENTITY STATUS (37 CFR 1.9(f) and 1.27(c))
SMALL BUSINESS CONCERN

I hereby declare that I am

- ☐ the owner of the small business concern identified below
☒ an official of the small business concern empowered to act on
behalf of the concern identified below:

NAME OF CONCERN: Berkeley * IEOB

ADDRESS OF CONCERN: 687 Spruce Street

Berkeley, California 94707

I hereby declare that the above identified small business concern qualifies as a small business concern as defined in 13 CFR 121.3-18, and reproduced in 37 CFR 1.9(d), for purposes of paying reduced fees under Section 41(a) and (b) of Title 35, United States Code, in that the number of employees of the concern, including those of affiliates, does not exceed 500 persons. For purposes of this statement, (1) the number of employees of the business concern is the average over the previous fiscal year of the concern of the persons employed on a full-time, part-time, or temporary basis during each of the pay periods of the fiscal year, and (2) concerns are affiliates of each other when either, directly or indirectly, one concern controls or has the power to control the other, or a third party or parties controls or has the power to control both.

I hereby declare that rights under contract or law have been conveyed to and remain with the small business concern identified above with regard to the invention entitled: PROCESS FOR DETERMINING OBJECT LEVEL PROFITABILITY by Richard Tad Lepman described in

☒ the specification filed herewith

☐ Application Serial No. , filed

☐ Patent No. , issued

If the rights held by the above identified small business concern are not exclusive, each individual, concern or organization having rights to the invention is listed below* and no rights to the invention are held by any person, other than the inventor, who could not qualify as a small business concern under 37 CFR 1.9(d) or by any concern which would not qualify as a small business concern under 37 CFR 1.9(d) or a nonprofit organization under 37 CFR 1.9(e).

*Note: Separate verified statements are required for each named person, concern, or organization having rights to the invention averring to their status as small entities. (37 CFR 1.27)

FULL NAME: None

ADDRESS:

☐ Individual ☐ Small Business Concern

☐ Nonprofit organization

I acknowledge the duty to file, in this application or patent, notification of any change in status resulting in loss of entitlement to small entity status prior to paying, or at the time of paying, the earliest of the issue fee or any maintenance fee due after the date on which status as a small entity is no longer appropriate. (37 CFR 1.28(b))

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to

be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code, and that such willful false statements may jeopardize the validity of the application, any patent issuing thereon, or any patent to which this verified statement is directed.

NAME OF PERSON SIGNING: Richard Tad Lepman

TITLE OF PERSON OTHER THAN OWNER: President

ADDRESS OF PERSON SIGNING: 687 Spruce Street

Berkeley, California 94707

SIGNATURE

DATE:

Richard Tad Lepman, President
7, 2000

PATENT APPLICATION FEE DETERMINATION RECORD Effective December 29, 1999				Application or Docket Number	
CLAIMS AS FILED - PART I					
(Column 1)		(Column 2)			
FOR	NUMBER FILED	NUMBER EXTRA			
BASIC FEE					
TOTAL CLAIMS	43 minus 20 = 23				
INDEPENDENT CLAIMS	3 minus 3 = 0				
MULTIPLE DEPENDENT CLAIM PRESENT					
* If the difference in column 1 is less than zero, enter "0" in column 2					
CLAIMS AS AMENDED - PART II					
(Column 1)		(Column 2)		(Column 3)	
AMENDMENT A	CLAIMS REMAINING AFTER AMENDMENT		HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA	
	Total	43	Minus	43 =	
	Independent	3	Minus	3 =	
	FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM				
AMENDMENT B	CLAIMS REMAINING AFTER AMENDMENT		HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA	
	Total	43	Minus	43 =	
	Independent	3	Minus	3 =	
	FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM				
AMENDMENT C	CLAIMS REMAINING AFTER AMENDMENT		HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA	
	Total		Minus	=	
	Independent		Minus	=	
	FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM				
* If the entry in column 1 is less than the entry in column 2, write "0" in column 3. ** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, enter "20." *** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 3, enter "3." The "Highest Number Previously Paid For" (Total or Independent) is the highest number found in the appropriate box in column 1.					

SMALL ENTITY TYPE: ☒		OR	OTHER THAN SMALL ENTITY	
RATE	FEE		RATE	FEE
	345.00	OR		690.00
X\$ 9=	2010	OR	X\$18=	
X39=		OR	X78=	
+130=		OR	+260=	
TOTAL 552.00		OR	TOTAL	

SMALL ENTITY TYPE: ☒		OR	OTHER THAN SMALL ENTITY	
RATE	ADDITIONAL FEE		RATE	ADDITIONAL FEE
X\$ 9=		OR	X\$18=	
X39=		OR	X78=	
+130=		OR	+260=	
TOTAL ADDIT. FEE		OR	TOTAL ADDIT. FEE	

SMALL ENTITY TYPE: ☒		OR	OTHER THAN SMALL ENTITY	
RATE	ADDITIONAL FEE		RATE	ADDITIONAL FEE
X\$ 9=		OR	X\$18=	
X39=		OR	X78=	
+130=		OR	+260=	
TOTAL ADDIT. FEE		OR	TOTAL ADDIT. FEE	

PATENT APPLICATION SERIAL NO. _____

U.S. DEPARTMENT OF COMMERCE
PATENT AND TRADEMARK OFFICE
FEE RECORD SHEET

04/19/2000 BAILEY 00000013 09545628

01 FC:201	345.00 OP
02 FC:203	207.00 OP

PTO-1556
(5/87)

*U.S. GPO: 1999-459-082/19144



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/545,628	04/07/2000	Richard Tad Lepman	Berk-37617	2145

7590

04/16/2003

Scott W Kelley
Kelly Bauersfeld Lowry & Kelly LLP
6320 Canoga Avenue
Suite 1650
Woodland Hills, CA 91367

EXAMINER

RUDY, ANDREW J

ART UNIT

PAPER NUMBER

3627

DATE MAILED: 04/16/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

8X

Office Action Summary	Application No. 09/545,628		Applicant(s) LEPMAN, RICHARD TAD	
	Examiner Andrew Joseph Rudy		Art Unit 3627	
	-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --			

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 1 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1) ☐ Responsive to communication(s) filed on ____.

2a) ☐ This action is **FINAL**. 2b) ☐ This action is non-final.

3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4) ☒ Claim(s) 1-30 is/are pending in the application.

4a) Of the above claim(s) ____ is/are withdrawn from consideration.

5) ☐ Claim(s) ____ is/are allowed.

6) ☐ Claim(s) ____ is/are rejected.

7) ☐ Claim(s) ____ is/are objected to.

8) ☒ Claim(s) 1-30 are subject to restriction and/or election requirement.

Application Papers

9) ☐ The specification is objected to by the Examiner.

10) ☐ The drawing(s) filed on ____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
 Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11) ☐ The proposed drawing correction filed on ____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
 If approved, corrected drawings are required in reply to this Office action.

12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
 a) ☐ All b) ☐ Some * c) ☐ None of:
 1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. ____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
 * See the attached detailed Office action for a list of the certified copies not received.

14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
 a) ☐ The translation of the foreign language provisional application has been received.

15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)	4) ☐ Interview Summary (PTO-413) Paper No(s). ____
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)	5) ☐ Notice of Informal Patent Application (PTO-152)
3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) ____	6) ☐ Other: _____

1. This application contains claims directed to the following patentably distinct species of the claimed invention: A process for determining object level profitability in a relational database management system including: preparing information and calculating a fully absorbed profit adjustment value (claim 1); and including value adjustments for taxes and/or object economic value (claim 16); and calculating opportunity value of funds (claim 30).

Applicant is required under 35 U.S.C. 121 to elect a single disclosed species for prosecution on the merits to which the claims shall be restricted if no generic claim is finally held to be allowable. Currently, no claim is generic.

Applicant is advised that a reply to this requirement must include an identification of the species that is elected consonant with this requirement, and a listing of all claims readable thereon, including any claims subsequently added. An argument that a claim is allowable or that all claims are generic is considered nonresponsive unless accompanied by an election.

Upon the allowance of a generic claim, applicant will be entitled to consideration of claims to additional species which are written in dependent form or otherwise include all the limitations of an allowed generic claim as provided by 37 CFR 1.141. If claims are added after the election, applicant must indicate which are readable upon the elected species. MPEP § 809.02(a).

Should applicant traverse on the ground that the species are not patentably distinct, applicant should submit evidence or identify such evidence now of record showing the species to be obvious variants or clearly admit on the record that this is the case. In either instance, if the examiner finds one of the inventions unpatentable over the prior art, the evidence or admission may be used in a rejection under 35 U.S.C. 103(a) of the other invention.

2. A telephone call was made to Mr. Scott W. Kelley on or about April 8, 2003 to request an oral election to the above restriction requirement, but did not result in an election being made.

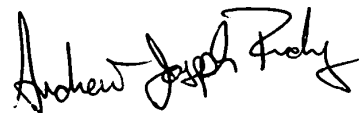
Applicant is advised that the reply to this requirement to be complete must include an election of the invention to be examined even though the requirement be traversed (37 CFR 1.143).

3. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Andrew Joseph Rudy whose telephone number is 703-308-7808. The examiner can normally be reached on Tuesday thru Friday, 7:30 a.m until 6 p.m.

The fax phone numbers for the organization where this application or proceeding is assigned are 703-305-7687 for regular communications and 703-305-7687 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-305-3900.

April 15, 2003

A handwritten signature in black ink, reading "Andrew Joseph Rudy". The signature is written in a cursive, flowing style.

I hereby certify that this correspondence is being deposited with the United States Postal Service as first class mail in an envelope addressed to MS-AMENDMENTFEE, Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450 May 22, 2003.

Scott W. Kelley, Reg. No. 30,762 May 22, 2003
Date



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JUN 02 2003
GROUP 3600 PATENT

6/6/03
Lee
W. H. H.

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of	)	Group Art Unit: 3627
	)	
Richard Tad Lepman	)	Examiner:
	)	Andrew Rudy
Serial No. 09/545,628	)	
	)	
Filed: April 7, 2000	)	Docket No. BERK-37617
	)	
For: PROCESS FOR DETERMINING	)	
OBJECT LEVEL PROFITABILITY	)	

RESPONSE TO RESTRICTION REQUIREMENT
AND PRELIMINARY AMENDMENT

MS: Amendment - Fee
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Dear Sir:

In response to an Office Action dated April 16, 2003, in connection with the above-identified application, the following is submitted:

ELECTION OF SPECIES

Applicant elects the first species including "preparing information and calculating a fully absorbed profit adjustment value" (claim 1). Claims

readable on the species are claims 1-15. Contrary to the statement to the contrary in the Office Action, independent claim 1 is generic.

Amendments to the Claims are reflected in the listing of claims which begins on page 3 of this paper.

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

1. (Original) A process for determining object level profitability in a relational database management system, comprising the steps of:

preparing information to be accessed electronically through the relational database management system;

establishing, in the relational database, rules for processing the prepared information;

calculating independently at least one marginal value of profit for each object being measured using the established rules as applied to a selected set of prepared information;

calculating a fully absorbed profit adjustment value for each object being measured; and

combining the at least one marginal value of profit and the fully absorbed profit adjustment value to create a measure for object level profitability.

2. (Original) The process of claim 1, wherein the relational database comprises a structured query language (SQL).

3. (Original) The process of claim 1, wherein the preparing step includes the step of extracting, conditioning and loading object attribute values into the database.

4. (Original) The process of claim 1, wherein the preparing step includes the steps of extracting, conditioning and loading financial statement attribute values into the database.

5. (Original) The process of claim 1, wherein the preparing step includes the steps of extracting, conditioning and loading event attribute values into the database.

6. (Original) The process of claim 1, wherein the preparing step further includes the step of calculating opportunity values of funds used or supplied by each object being measured.

7. (Original) The process of claim 1, wherein the establishing step includes the steps of providing the information necessary to select objects, and performing the correct profit calculus.



8. (Original) The process of claim 1, wherein the step of calculating at least one marginal value of profit includes the steps of calculating net interest (NI), other revenue (OR) and direct expense (DE), wherein net interest (NI) is the summation of interest income, value of funds provided and earnings on equity funds used less the sum of interest expense and costs of funds used, other revenue (OR) is a measure of profit contribution from non-interest related sources, and direct expense (DE) is the profit value reduction due to marginal resource consumption by the object.

9. (Original) The process of claim 1, wherein the step of calculating at least one marginal value of profit includes the step of provisioning (P) for the selected set of prepared information, provisioning being the expected profit value adjustment for future outcomes related to the object.

10. (Original) The process of claim 9, wherein the step of calculating at least one marginal value of profit includes the steps of calculating net interest (NI), other revenue (OR) and direct expense (DE), wherein net interest (NI) is the summation of interest income, value of funds provided and earnings on equity funds used less the sum of interest expense and costs of funds used, other revenue (OR) is a measure of profit contribution from non-

interest related sources, and direct expense (DE) is the profit value reduction due to marginal resource consumption by the object.

11. (Original) The process of claim 10, wherein the step of calculating a fully absorbed profit adjustment value includes the step of calculating the value for indirect expense (IE) which is an apportioned profit value adjustment for all non-object related resource consumption.

12. (Original) The process of claim 11, wherein the combining step includes the steps of adding net interest (NI) and other revenues (OR), and subtracting therefrom direct expense (DE), provisioning (P) and indirect expense (IE).

13. (Original) The process of claim 12, including the step of adjusting the measure for object level profitability for taxes and/or object economic value.

14. (Original) The process of claim 1, wherein the at least one marginal value of profit is calculated in parallel.

15. (Original) The process of claim 1, wherein the fully absorbed profit adjustment value is calculated utilizing the calculated at least one marginal value of profit.

16. (Currently amended) A process for determining object level profitability in a relational database management system, comprising the steps of:

~~repairing~~ preparing information to be accessed electronically through the relational database management system;

establishing, in the relational database, rules for processing the prepared information;

calculating independently at least one marginal value of profit for each object being measured using the established rules as applied to a selected set of prepared information;

calculating a fully absorbed profit adjust value for each object being measured, including value adjustments for taxes and/or object economic value; and

combining the at least one marginal value of profit and the fully absorbed profit adjustment value to create a measure for object level profitability.

17. (Original) The process of claim 16, wherein the relational database comprises a structured query language (SQL).

18. (Original) The process of claim 16, wherein the preparing step includes the step of extracting, conditioning and loading object attribute values into the database.

19. (Original) The process of claim 18, wherein the preparing step includes the steps of extracting, conditioning and loading financial statement attribute values into the database.

20. (Original) The process of claim 19, wherein the preparing step includes the steps of extracting, conditioning and loading event attribute values into the database.

21. (Original) The process of claim 20, wherein the preparing step further includes the step of calculating opportunity values of funds used or supplied by each object being measured.

22. (Original) The process of claim 16, wherein the establishing step includes the steps of providing the information necessary to select objects, and performing the correct profit calculus.

23. (Original) The process of claim 16, wherein the step of calculating at least one marginal value of profit includes the steps of calculating net interest (NI), other revenue (OR) and direct expense (DE), wherein net interest (NI) is the summation of interest income, value of funds provided and earnings on equity funds used less the sum of interest expense and costs of funds used, other revenue (OR) is a measure of profit contribution from non-interest related sources, and direct expense (DE) is the profit value reduction due to marginal resource consumption by the object.



24. (Original) The process of claim 16, wherein the step of calculating at least one marginal value of profit includes the step of provisioning (P) for the selected set of prepared information, provisioning being the expected profit value adjustment for future outcomes related to the object.

25. (Original) The process of claim 24, wherein the step of calculating at least one marginal value of profit includes the steps of calculating net interest (NI), other revenue (OR) and direct expense (DE), wherein net interest (NI) is the summation of interest income, value of funds provided and earnings on equity funds used less the sum of interest expense and costs of funds used, other revenue (OR) is a measure of profit contribution from non-interest related sources, and direct expense (DE) is the profit value reduction due to marginal resource consumption by the object.

26. (Original) The process of claim 25, wherein the step of calculating a fully absorbed profit adjustment value includes the step of calculating the value for indirect expense (IE) which is an apportioned profit value adjustment for all non-object related resource consumption.

27. (Original) The process of claim 26, wherein the combining step includes the steps of adding net interest (NI) and other revenues (OR), and subtracting therefrom direct expense (DE), provisioning (P) and indirect expense (IE).

28. (Original) The process of claim 16, wherein the at least one marginal value of profit is calculated in parallel.

29. (Original) The process of claim 16, wherein the fully absorbed profit adjustment value is calculated utilizing the calculated at least one marginal value of profit.

30. (Original) A process for determining object level profitability in a relational database management system, comprising the steps of:

preparing information to be accessed electronically through the relational database management system, including the step of calculating opportunity values of funds used or supplied by each object being measured;

establishing, in the relational database, rules for processing the prepared information;

calculating independently at least one marginal value of profit for each object being measured using the established rules as applied to a selected set of prepared information;

calculating a fully absorbed profit adjustment value for each object being measured; and

combining the at least one marginal value of profit and the fully absorbed profit adjustment value to create a measure for object level profitability.

31. (Original) The process of claim 30, wherein the relational database comprises a structured query language (SQL).

32. (Original) The process of claim 30, wherein the preparing step includes the step of extracting, conditioning and loading object attribute values into the database.

33. (Original) The process of claim 32, wherein the preparing step includes the steps of extracting, conditioning and loading financial statement attribute values into the database.

34. (Original) The process of claim 33, wherein the preparing step includes the steps of extracting, conditioning and loading event attribute values into the database.

35. (Original) The process of claim 30, wherein the establishing step includes the steps of providing the information necessary to select objects, and performing the correct profit calculus.



36. (Original) The process of claim 30, wherein the step of calculating at least one marginal value of profit includes the steps of calculating net interest (NI), other revenue (OR) and direct expense (DE), wherein net interest (NI) is the summation of interest income, value of funds provided and earnings on equity funds used less the sum of interest expense and costs of funds used, other revenue (OR) is a measure of profit contribution from non-interest related sources, and direct expense (DE) is the profit value reduction due to marginal resource consumption by the object.

37. (Original) The process of claim 30, wherein the step of calculating at least one marginal value of profit includes the step of provisioning (P) for the selected set of prepared information, provisioning being the expected profit value adjustment for future outcomes related to the object.

38. (Original) The process of claim 37, wherein the step of calculating at least one marginal value of profit includes the steps of calculating net interest (NI), other revenue (OR) and direct expense (DE), wherein net interest (NI) is the summation of interest income, value of funds provided and earnings on equity funds used less the sum of interest expense and costs of funds used, other revenue (OR) is a measure of profit

contribution from non-interest related sources, and direct expense (DE) is the profit value reduction due to marginal resource consumption by the object.

39. (Original) The process of claim 38, wherein the step of calculating a fully absorbed profit adjustment value includes the step of calculating the value for indirect expense (IE) which is an apportioned profit value adjustment for all non-object related resource consumption.

40. (Original) The process of claim 39, wherein the combining step includes the steps of adding net interest (NI) and other revenues (OR), and subtracting therefrom direct expense (DE), provisioning (P) and indirect expense (IE).

41. (Original) The process of claim 40, including the step of adjusting the measure for object level profitability for taxes and/or object economic value:

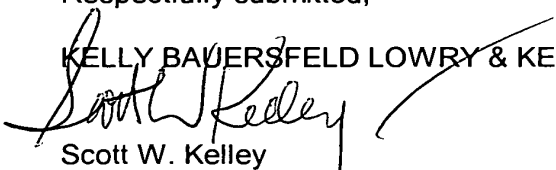
42. (Original) The process of claim 30, wherein the at least one marginal value of profit is calculated in parallel.

43. (Original) The process of claim 30, wherein the fully absorbed profit adjustment value is calculated utilizing the calculated at least one marginal value of profit.

TIME EXTENSION REQUEST

Enclosed herewith is a Petition for a One-Month Time Extension Request, together with required fee.

Respectfully submitted,


KELLY BAUERSFELD LOWRY & KELLEY, LLP

Scott W. Kelley
Registration No. 30,762

SWK/kr
6320 Canoga Avenue, Suite 1650
Woodland Hills, California 91367
(818) 347-7900



3627

PTO/SB/21 (03-03)
Approved for use through 04/30/2003. OMB 0651-0031
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
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TRANSMITTAL FORM (to be used for all correspondence after initial filing)	Application Number	09/545,628
	Filing Date	April 7, 2000
	First Named Inventor	Richard Tad Lepman
	Art Unit	3627
	Examiner Name	Andrew Rudy
Total Number of Pages in This Submission	Attorney Docket Number	BERK-37617

ENCLOSURES (Check all that apply)		
☒ Fee Transmittal Form	☐ Drawing(s)	☐ After Allowance Communication to a Technology Center (TC)
☒ Fee Attached	☐ Licensing-related Papers	☐ Appeal Communication to Board of Appeals and Interferences
☒ Amendment/Reply	☐ Petition	☐ Appeal Communication to TC (Appeal Notice, Brief, Reply Brief)
☐ After Final	☐ Petition to Convert to a Provisional Application	☐ Proprietary Information
☐ Affidavits/declaration(s)	☐ Power of Attorney, Revocation	☐ Status Letter
☒ Extension of Time Request	☐ Change of Correspondence Address	☒ Other Enclosure(s) (please identify below):
☐ Express Abandonment Request	☐ Terminal Disclaimer	
☐ Information Disclosure Statement	☐ Request for Refund	
☐ Certified Copy of Priority Document(s)	☐ CD, Number of CD(s) _____	
☐ Response to Missing Parts/Incomplete Application	Remarks	
☐ Response to Missing Parts under 37 CFR 1.52 or 1.53	CHECK RETURN POSTCARD	

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JUN 02 2003
GROUP 3600

SIGNATURE OF APPLICANT, ATTORNEY, OR AGENT	
Firm or Individual	Scott W. Kelley Kelly Bauersfeld Lowry & Kelley, LLP
Signature	
Date	May 22, 2003

CERTIFICATE OF TRANSMISSION/MAILING	
I hereby certify that this correspondence is being facsimile transmitted to the USPTO or deposited with the United States Postal Service with sufficient postage as first class mail in an envelope addressed to: Commissioner for Patents, Washington, DC 20231 on this date: 5/22/2003	
Typed or printed	Scott W. Kelley
Signature	
Date	5/22/2003

This collection of information is required by 37 CFR 1.5. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, Washington, DC 20231. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, Washington, DC 20231.

If you need assistance in completing the form, call 1-800-PTO-9199 (1-800-786-9199) and select option 2.

Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

**FEE TRANSMITTAL
for FY 2003**

Effective 01/01/2003. Patent fees are subject to annual revision.

☒ Applicant claims small entity status. See 37 CFR 1.27**TOTAL AMOUNT OF PAYMENT**

(\$)

Complete if Known

Application Number	09/545,628
Filing Date	04/07/2000
First Named Inventor	Richard Tad Lepman
Examiner Name	Rudy
Art Unit	3627
Attorney Docket No.	BERK-37617

METHOD OF PAYMENT (check all that apply)☒ Check ☐ Credit card ☐ Money Order ☐ Other ☐ None☐ Deposit Account:

Deposit Account Number	
Deposit Account Name	

The Director is authorized to: (check all that apply)

☐ Charge fee(s) indicated below ☐ Credit any overpayments
☐ Charge any additional fee(s) during the pendency of this application
☐ Charge fee(s) indicated below, except for the filing fee to the above-identified deposit account.
FEE CALCULATION**1. BASIC FILING FEE**

Large Entity Fee Code (\$)	Small Entity Fee Code (\$)	Fee Description	Fee Paid
1001 750	2001 375	Utility filing fee	
1002 330	2002 165	Design filing fee	
1003 520	2003 260	Plant filing fee	
1004 750	2004 375	Reissue filing fee	
1005 160	2005 80	Provisional filing fee	
SUBTOTAL (1)			(\$)

2. EXTRA CLAIM FEES FOR UTILITY AND REISSUE

Total Claims	Extra Claims	Fee from below	Fee Paid
Independent Claims	-20** =	X	
Multiple Dependent	-3** =	X	

Large Entity Fee Code (\$)	Small Entity Fee Code (\$)	Fee Description
1202 18	2202 9	Claims in excess of 20
1201 84	2201 42	Independent claims in excess of 3
1203 280	2203 140	Multiple dependent claim, if not paid
1204 84	2204 42	** Reissue independent claims over original patent
1205 18	2205 9	** Reissue claims in excess of 20 and over original patent
SUBTOTAL (2)		(\$)

**or number previously paid, if greater; For Reissues, see above

FEE CALCULATION (continued)**3. ADDITIONAL FEES**

Large Entity Small Entity

Fee Code (\$)	Fee Code (\$)	Fee Description	Fee Paid
1051 130	2051 65	Surcharge - late filing fee or oath	
1052 50	2052 25	Surcharge - late provisional filing fee or cover sheet	
1053 130	1053 130	Non-English specification	
1812 2,520	1812 2,520	For filing a request for <i>ex parte</i> reexamination	
1804 920*	1804 920*	Requesting publication of SIR prior to Examiner action	
1805 1,840*	1805 1,840*	Requesting publication of SIR after Examiner action	
1251 110	2251 55	Extension for reply within first month	55.00
1252 410	2252 205	Extension for reply within second month	
1253 930	2253 465	Extension for reply within third month	
1254 1,450	2254 725	Extension for reply within fourth month	
1255 1,970	2255 985	Extension for reply within fifth month	
1401 320	2401 160	Notice of Appeal	
1402 320	2402 160	Filing a brief in support of an appeal	
1403 280	2403 140	Request for oral hearing	
1451 1,510	1451 1,510	Petition to institute a public use proceeding	
1452 110	2452 55	Petition to revive - unavoidable	
1453 1,300	2453 650	Petition to revive - unintentional	
1501 1,300	2501 650	Utility issue fee (or reissue)	
1502 470	2502 235	Design issue fee	
1503 630	2503 315	Plant issue fee	
1460 130	1460 130	Petitions to the Commissioner	
1807 50	1807 50	Processing fee under 37 CFR 1.17(q)	
1806 180	1806 180	Submission of Information Disclosure Stmt	
8021 40	8021 40	Recording each patent assignment per property (times number of properties)	
1809 750	2809 375	Filing a submission after final rejection (37 CFR 1.129(a))	
1810 750	2810 375	For each additional invention to be examined (37 CFR 1.129(b))	
1801 750	2801 375	Request for Continued Examination (RCE)	
1802 900	1802 900	Request for expedited examination of a design application	

Other fee (specify)

*Reduced by Basic Filing Fee Paid

SUBTOTAL (3) (\$ 55.00)**SUBMITTED BY**

Name (Print/Type)	Scott W. Kelley	Registration No. (Attorney/Agent)	30,762	Telephone	818-347-7900
Signature	<i>Scott W. Kelley</i>	Date	5/22/2003		

(Complete if applicable)

WARNING: Information on this form may become public. Credit card information should not be included on this form. Provide credit card information and authorization on PTO-2038.

This collection of information is required by 37 CFR 1.17 and 1.27. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.

If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.

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May 22, 2003

Scott W. Kelley
Scott W. Kelley, Reg. No. 30,762
May 22, 2003
Date



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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of	)	Group Art Unit: 3627
	)	
Richard Tad Lepman	)	Examiner:
	)	Andrew Rudy
Serial No. 09/545,628	)	
	)	
Filed: April 7, 2000	)	Docket No. BERK-37617
	)	
For: PROCESS FOR DETERMINING	)	
OBJECT LEVEL PROFITABILITY	)	

RECEIVED
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GROUP 3600

REQUEST FOR EXTENSION OF TIME

MS: Amendment - Fee
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

Applicant respectfully petitions for a One-month extension of time to file a Response to the Office Action dated April 16, 2003. A check for \$55.00, as prescribed in 37 C.F.R. §1.136(a) is submitted herewith.

05/29/2003 MBIZUNES 00000022 09545628

01 FC:2251

55.00 0P

Respectfully submitted,

KELLY BAUERSFELD LOWRY & KELLEY, LLP

By

Scott W. Kelley
Scott W. Kelley, Reg. No. 30,762
Attorney for Applicant

SWK/kr
6320 Canoga Avenue
Suite 1650
Woodland Hills, CA 91367
(818) 347-7900

	Type	Hits	Search Text	DBs	Time Stamp	Commissions	Errors
			09/545,628				
1	BRS	1271	database and (electronic or electronically) and (profit or profitability)	USPAT	2003/07/28 22:57		0
2	BRS	0	database and (electronic or electronically) and ((profit or profitability) near object)	USPAT	2003/07/28 20:58		0
3	BRS	941	database and (electronic or electronically) and (profit or profitability) and object	USPAT	2003/07/28 20:59		0
4	BRS	33	database and (electronic or electronically) and (profit or profitability) and (object near attribute)	USPAT	2003/07/28 20:59		0
5	BRS	158	database and (electronic or electronically) and (profit or profitability) and sql	USPAT	2003/07/28 21:33		0
6	BRS	119	rule and (relational adj database) and (electronic or electronically) and (profit or profitability)	USPAT	2003/07/28 23:39		0
7	BRS	12	electronic and database and (calculate or calculating) near (profit or profitability)	USPAT	2003/07/29 09:53		0

All hits from searches 4-7 reviewed.

ASR 7/29/03



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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/545,628	04/07/2000	Richard Tad Lepman	Berk-37617	2145

7590

08/04/2003

Scott W Kelley
Kelly Bauersfeld Lowry & Kelly LLP
6320 Canoga Avenue
Suite 1650
Woodland Hills, CA 91367

EXAMINER

RUDY, ANDREW J

ART UNIT

PAPER NUMBER

3627

DATE MAILED: 08/04/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

8

Office Action Summary	Application No.	Applicant(s)	
	09/545,628	LEPMAN, RICHARD TAD	
	Examiner	Art Unit	
	Andrew Joseph Rudy	3627	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1) ☒ Responsive to communication(s) filed on 28 May 2003.

2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.

3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4) ☒ Claim(s) 1-43 is/are pending in the application.

4a) Of the above claim(s) 16-43 is/are withdrawn from consideration.

5) ☐ Claim(s) _____ is/are allowed.

6) ☒ Claim(s) 1-15 is/are rejected.

7) ☐ Claim(s) _____ is/are objected to.

8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9) ☐ The specification is objected to by the Examiner.

10) ☒ The drawing(s) filed on 07 April 2003 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a) ☐ All b) ☐ Some * c) ☐ None of:

1. ☐ Certified copies of the priority documents have been received.

2. ☐ Certified copies of the priority documents have been received in Application No. _____.

3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

a) ☐ The translation of the foreign language provisional application has been received.

15) ☒ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)	4) ☐ Interview Summary (PTO-413) Paper No(s). _____
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)	5) ☐ Notice of Informal Patent Application (PTO-152)
3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____	6) ☐ Other: _____

DETAILED ACTION

1. Claims 16-43 are withdrawn from further consideration pursuant to 37 CFR 1.142(b) as being drawn to a nonelected species, there being no allowable generic or linking claim. Election was made **without** traverse in Paper No. 5 received May 28, 2003. It is noted that the PTO-326 inadvertently only listed claims 1-30 as being subject to election requirement. Clearly, claims 1-43 were subject to this requirement. It is noted that Applicant did not explicitly elect without traverse, but the nature of the election reasonably conveyed such to the examiner.

Claim Rejections - 35 USC § 103

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

3. Claims 1-15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Curley "Royal Bank unearths profitability solution".

Curley discloses a method of performing financial processing for an account using software for a computer measuring profit based on the factors of net interest revenue, other revenues, direct expenses, indirect expenses and risk, all set up to take advantage of flexible business rules.

To have provided the business rules to calculate known variations of one of the factors, e.g. calculating value of funds, would have been obvious to one of ordinary skill in the art. Doing such would incorporate known data designed to used along with the software disclosed by Curley. Further, to have calculated well-known marginal value of profit and a fully absorbed profit adjustment and combine them to measure an object level profitability for Curley would have been obvious to one of ordinary skill in the art. Doing such would implement well known mechanisms for measuring profit with the computer system disclosed by Curley. Also, to use well known database to comprise a structured query language (SQL) or preparing to include extracting, conditioning and loading a financial statement in a financial computing system for Curley would have been obvious to one of ordinary skill in the art. Doing such would implement well-known database language and processing used in computing financial analysis systems.

4. Further pertinent references are noted on the attached Notices of References Cited, PTO-892.

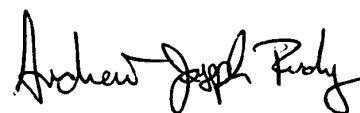
Drawings

5. The drawings are objected to under 37 CFR 1.83(a) because they fail to describe Figs. 2-5 as described in the specification. Also, Fig. 7 does not describe steps 3-6 as detailed from page 17 of the present Application. Further, Fig. 1 apparently is disclosed as prior art from page 9 of the specification, but it is not labeled as such. Any structural detail that is essential for a proper understanding of the disclosed invention should be shown in the drawing. MPEP § 608.02(d). A proposed drawing correction or corrected drawings are required in reply to the Office action to avoid abandonment of the application. The objection to the drawings will not be held in abeyance.

6. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Andrew Joseph Rudy whose telephone number is 703-308-7808.

The fax phone numbers for the organization where this application or proceeding is assigned are 703-305-7687 for regular communications and 703-305-7687 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-305-3900.

A handwritten signature in black ink, reading "Andrew Joseph Rudy". The signature is written in a cursive, flowing style.

Notice of References Cited	Application/Control No. 09/545,628	Applicant(s)/Patent Under Reexamination LEPMAN, RICHARD TAD	
	Examiner Andrew Joseph Rudy	Art Unit 3627	Page 1 of 1

U.S. PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Name	Classification
	A	US-5,615,109	03-1997	Eder, Jeff	705/8
	B	US-5,712,987	01-1998	Waits et al.	705/10
	C	US-5,721,831	02-1998	Waits et al.	705/10
	D	US-5,721,903	02-1998	Anand et al.	707/5
	E	US-5,712,987	01-1998	Waits et al.	705/10
	F	US-6,026,382	02-2000	Kalthoff, Nancy Yvonne	705/35
	G	US-6,092,064	07-2000	Aggarwal et al.	707/6
	H	US-6,154,731	11-2000	Monks et al.	705/35
	I	US-6,360,210	03-2002	Wallman, Steven M. H.	705/36
	J	US-			
	K	US-			
	L	US-			
	M	US-			

FOREIGN PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Country	Name	Classification
	N					
	O					
	P					
	Q					
	R					
	S					
	T					

NON-PATENT DOCUMENTS

*		Include as applicable: Author, Title Date, Publisher, Edition or Volume, Pertinent Pages)
	U	
	V	
	W	
	X	

*A copy of this reference is not being furnished with this Office action. (See MPEP § 707.05(a).)
Dates in MM-YYYY format are publication dates. Classifications may be US or foreign.

I hereby certify that this correspondence is being deposited with the United States Postal Service as first class mail in an envelope addressed to MS-BOX AMENDMENT, Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450 on December 3, 2003.

Scott W. Kelley, Reg. No. 30,762

December 3, 2003
Date



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DEC 17 2003 12/30/03
GROUP 3600

PATENT

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Draws.

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of	)	Group Art Unit: 3627
	)	
Richard Tad Lepman	)	Examiner: Andrew
	)	Rudy
Serial No. 09/545,628	)	
	)	
Filed: April 7, 2000	)	
	)	Docket No. BERK-37617
For: PROCESS FOR DETERMINING	)	
OBJECT LEVEL	)	
PROFITABILITY	)	

AMENDMENT

MS: Amendment -Fee
Commissioner for Patents
P.O. Box 1450
Alexandria, Virginia 22313-1450

Dear Sir:

In response to an Office Action dated August 4, 2003, please amend the above-identified application as follows:

Amendments to the Specification begin on page 2 of this paper.

Amendments to the Claims are reflected in the listing of claims which begins on page 19 of this paper.

Amendments to the Drawings begin on page 29 of this paper and include attached replacement sheets.

Remarks/Arguments begin on page 30 this paper.

Ex/Note:
Amst entered
in part.
REQUEST
So B. SPEC.

Amendments to the Specification:

Please replace the paragraph beginning at page 2, line 1, with the following rewritten paragraph:

Many businesses today are struggling to accurately measure profit contribution at a level necessary to accurately measure profit contribution of individual customer interactions. The reason for dilemma is found in the manner in which generally accepted accounting principles are applied. Fundamental accounting theory takes lumpy cash flows that occur in the day-to-day management of a business conducted with its customers and ~~transform~~ transforms them into smoothed income or expense items (known as accruals.) At the end of every profit reporting cycle these income and expense items are consolidated into a period end balance sheet and income statements. Reports on the state of the business can then be presented by accountants in formats necessary for the independence of ownership and management that is the basis of capital markets. Indeed, most businesses today would call its accounting process critical for survival. Unfortunately, the complexity of maintaining an accurate financial accounting process has obscured the measurement of profit contribution at a very detailed level. While the aggregate cash flows of a large company are relatively stable the individual customer-to-business cash flows are very volatile. Accounting practice to date has been comfortable with using aggregate cash flow information for the accrual accounting process(10). The accounting process based on aggregates has lead to blindness by businesses of incremental customer profit contribution measures necessary to implement customer level decision making, particularly in large businesses with many millions of customers.

Please replace the 2nd paragraph on page 2, line 23, with the following:

General Ledgers(11)(double entry book keeping systems) were early adapters of automated data processing solutions due to the match between computing capabilities of computers and the execution of the accounting process. The benefit, from reduced cost for accounting processes easily justified large expenditures in information processing technology, both in hardware and in software development. The complexity of today's general ledger applications and the age of these systems have retarded the innovation of new automated techniques taking advantage of technological advances in massively parallel computing capability.

Please replace Page 5, paragraph 8 as follows:

There remains, however, a need to resolve profit measures at a detailed level without using analytical models or statistical extrapolation(12). Such a process should utilize rule driven and data base measurement processes which will give large scale businesses a lower cost of maintenance and a technologically scalable tool to measure profit at a level of precision or resolution not possible in prior financial performance measurement processes. The present invention fulfills this need and provides other related advantages.

Please replace the Summary of the Invention, beginning on Page 5 as follows:

SUMMARY OF THE INVENTION

Prior approaches to satisfying management's desire for an accurate measure of an individual decisionsdecision's (incremental or marginal) profit impact have been solved by automating the accounting process for

implementing accounting methods. Cash flows are transformed into two parts, a debit part or credit part, according to an accounting rule. Other non-cash accounting rules are implemented to create "accrual" debits and credits smoothing income and expenses and adjusting for future contingencies. (see Management Accounting Theory ~~Book~~ books or any source of accounting theory, where the balance sheet equation and the consolidation process, the combination of flows and stocks of financial data, are developed.) The first large scale use of automated computing technology is frequently found to be the automation of the financial control or accounting processes, since it is easy to develop software to implement accountancy rules and there were large benefits in staff productivity easily observable. For businesses to observe marginal profit contributions it was necessary to use accounting information and make reasoned conclusion on how to apportion or extrapolate(12) this information into incremental customer, product or organizational profit detail. (See Fig. 1)

What these methods of profit measurement lack are the adequate level of detail to measure an individual or incremental decision's impact on profit. To gain this new level of profit resolution this invention is designed to use micro profit measurement rules applied at a granular level consistent with standard accounting practice using a combination of actuarial science and mathematical set theory(48). The invention is designed to utilize massively parallel computing operations using relational database management techniques enabling profit measurement at a level not available today in a large individual customer scale business. This invention does this through a consistent application of measures(27), to a class of business entities which represent the smallest common component of profit measurement desired - the Profit Object(32).

The invention's method of apportionment of non-object related profit measures specifies a method(25) which will not change the ordinal or cardinal profit contribution ranking when only marginal profit measures are counted. This specification is what makes it possible to apply marginal measurement rules(20) (see Micro-economic theory literature) with macro

economic principals; namely the sum-of-the-parts equals the whole criterion which is the basis of financial accounting theory and practice.

The invention decomposes profit measurement analytical calculations into five classifications:

- Marginal profit measures(21) associated with use of the business' balance sheet resources;
- Marginal measures(23) of non-balance oriented revenues;
- Marginal cost measures(22);
- Marginal measures of expected(24) costs or revenues; and,
- Apportioned cost measures(26).

This classification provides for additive profit measures across the five ~~components~~ classes. The preferred calculation process is designed to be independent across classes 1, 2, 3, & 4 above with the addition of class five to preserve sum-of-the-parts integrity without simultaneous calculations typically found in profit measurement processes. When all five profit measures are summed at the lowest level of profit detail, a consistent set of profit values for all types of aggregations(30) are possible - all profit measurement then originates from the same point in a profit database(42). The simultaneous use of these five analytical frameworks makes possible a detailed level of profit calculation consistent with GAAP.

In particular, the present invention relates to a process for determining object level profitability. In its basic form the process includes the steps of:

1. Preparing information to be accessed electronically(50);
2. Establishing rules for processing the prepared information(51);
3. Calculating at least one marginal value of profit using established rules as applied to a selected set of prepared information(52, 53,54,55);
4. Calculating a fully absorbed value of profit adjustment using established rules as applied to the selected set of prepared information(56); and,

5. Combining the at least one marginal value of profit and fully absorbed value of profit adjustment to create a measure for object level of profitability(57).

More specifically in the step of preparing information(40) to be accessed electronically, the database is prepared; object attributes are extracted, conditioned and loaded into the database(43), and financial statement attributes are extracted, conditioned and loaded into the database(45). If desired the step may also include extracting, conditioning and loading the event attributes into the database(44), and calculating funds transfer treatment rates(46).

In the step of establishing for processing the prepared information for rule establishment providing the information necessary to select objects and perform the correct profit calculus is accomplished(47). The step of calculating at least one marginal value of profit using established rules as applied to a selected set of prepared information includes calculating net interest, other revenue, direct expense, and/or provision for the selected set of prepared information. Net Interest (NI)(52) is the summation of interest income, value of funds provided and earnings on equity funds used less the sum of interest expense and cost of funds used. Other Revenues (OR)(53) is a measure of profit contribution from non-interest related sources. Direct Expense (DE)(54) is the profit value reduction due to marginal resource consumption by the object. Provisioning (P)(55) is the expected profit value adjustment for future outcomes related to the object.

The step of fully absorbed profit adjustment, Indirect Expense (IE)(56), is an apportioned profit value adjustment for all non-object related resource consumption by the business.

In the step of combining the five profit values, $NI + OR - DE - P - IE$, may be adjusted for taxes and/or object economic value(57).

The foregoing elements of the invention, which have been explained at a micro elemental level can be advantageously employed in massive amounts and parallel process power(41). For example, in the macro perspective of the invention the basic steps can be utilized.

The present invention gives management profit measures tailored to its need for accurate decision oriented profit information required to manage a large organization based on profit measurement. This invention gives businesses the ability to resolve profit measures(49) at a level of detail necessary for all types of application of profit oriented performance measurement.

Other features and advantages of the present invention will become apparent from the following more detailed description, taken in conjunction with the accompanying drawings which illustrated, by way of example, the principles of the invention.

Please change line 7, on Page 9 as follows:

FIGURE 1 shows ~~existing~~ profit calculation process flow apparent in prior art.

Please replace the first paragraph of the Detailed Description of the Preferred Embodiment starting on Page 9 as follows:

As shown in the accompanying drawings for purposes of illustration, the present invention is concerned with a detail profit metric (DPM) designed to be a computer database application (i.e. software) for profitability measurement. DPM's profit measurement system is fundamentally different from the common profit measurement system used by regulators and public accountancy - yet, it is consistent with generally accepted accounting principals. DPM is based on object level detail of cash flows(31), ~~customer~~ events(33) and management allocations of profit arising from ~~non-customer~~ object related events(34). DPM provides both marginally(35) and fully absorbed profit measures, something traditional "general ledger" based profit accounting systems(11) can not accomplish due to reliance on aggregate debit and credit amounts(10).~~(see Figs. 2-4.)~~

Please change the subheadings on Page 10, 11 as follows:

Object Attributes(43)

Event Attributes(44)

Financial Statement Attributes(45)

Profit Measurement Parameters(46)

On Page 12, please replace the first paragraph with the following:

DPM's processing approach is to combine profit measurement techniques with (non-modeled) data and calculation parameters. Each application of this calculus is called a rule. DPM is designed to allow the user the freedom to associate a group of objects with a rule and to use object-level information in combination with rule parameters to calculate profit values. The DPM invention uses profit measurement rules separate from, but applied to, object data and the use of relational database concepts, giving the user a flexibility in both the assignment and depth of definition of measurement rules and measurement resolution. Use of this method is especially suited for massively parallel computing technology where linear scaleable capital investment in processing technology is possible vis-à-vis object and event count and rule complexity.

On Page 13, please replace paragraph 3 with the following paragraph:

- Apportionment ~~- In both Other Revenue, Provision and Indirect Expense calculations are applied at the object level using Financial Statement Attributes which are not related directly to an object. Used in Other Revenue, Provision and Indirect Expense calculations applied at the object level using Financial Statement Attributes that are not related directly to an object.~~ These profit adjustments are made so that the sum of all object profit equals the whole enterprise's profit - an important property of DPM's output. Accountants refer to this profit measurement technique as "full allocation of profit." DPM's

approach is to pool indirect costs and revenues and then apportion them. Apportionment rules specify how the pool is completely allocated to appropriate objects. DPM uses a specific closed form (mathematical formula that require only information known in the current period and no iterative computation) allocation rules.

Please replace the first paragraph on Page 15, with the following:

Before the calculation rules can be applied at the object or event level a calculation rule must be associated with an object, designating the methods DPM will use to calculate components of profit at the object level. An object grouping is designed to associate objects having common and defined set of object attributes for similar processing (note that a group may consist of one object). The association of a group of objects with a calculation rule is referred here as a Rule Map(47).

Please replace the fourth full paragraph beginning at the bottom of Page 15 with the following paragraph.

The DPM system is designed for Rules to be applied to any object without loss of integrity of output. This design feature allows the user to incrementally migrate objects to increased measurement precision as justified. This valuable piecewise increase in functionality is possible due to DPM's combination of rules and data in a mathematical set theoretic framework(41). This approach allows for a relational database management system implementation(42). It is nearly impossible develop and maintain procedural based software with as much flexibility and with the capability to simultaneously support the number of calculation permutations required by DPM.

On Page 16, please replace the first full paragraph with the following paragraph:

Since DPM is a ~~rule~~ rules based system the ability to restate prior period's Profit calculations are systematically possible providing historical data exists. DPM's design of object level profit measurement enables a unique historical profit restatement capability. Three features of DPM's restatement capability are:

On Page 17, at the top of the page, insert the following paragraph:

Processing Calculations

Following processing 1 and 2, database preparation and rule set-up, processing 3 through 6 perform object and event level profit calculations. In the preferred embodiment, processing calculations 3, 4, 5, and 6 are designed to allow independent execution, processing 7's calculations may require values derived in processing 3, 4, 5, and 6 and therefore occurs sequentially. In figure 5 this sequential dependence is relaxed, illustrating DPM's fundamental processing thread - the looping over objects(58) - enabling an inventive use of parallel computer processing power.

On Page 17, beginning at line 1, please replace with the following:

Processing (see Fig. 5)

Processing 1. Populate Database (see Fig. 6)

Perform standard database administration actions to initialize data for the required calculations:

- Perform database Initialization(60)
- Extract, condition & load object attributes(61)
- Extract, condition & load event attributes(62)
- Extract, condition & load financial statement attributes(63)
- Calculate and populate NI treatment rate attributes(64)

On Page 17, beginning at line 10, please replace with the following:

Processing 2. ~~MAINTAIN OBJECT GROUPS AND RULE MAPS (SEE FIG. 7)~~
Maintain Groups and Rule Maps (see Fig. 7)

Populate or edit Rule parameters necessary to perform calculations. Rules definition is by association of specific, non-iterative calculation, as described below, with to a set of object or event attributes defined as a data filter (see Relational Data Base Management System ~~textbook~~ textbooks).

Rules have two pieces:

1. Parameters to drive the object selection or data filter for calculations(70); and,
2. Parameters specific to the appropriate calculation methodology(71).
An easy-to-use graphical user interface can be used to maintain these data for all rules(72).

~~Steps 3 through 6 perform object and event level profit calculations. Steps 3, 4, 5, and 6 can be processed independently, step 7 requires values derived in step 3, 4, 5, and 6 and therefore occurs sequentially.~~

On Page 17, beginning at line 23, please replace with the following:

Processing 3. Calculate Net Interest for All Objects (see Fig. 8)

On Page 18, line 12, please change the heading as follows:

NI CALCULATION RULE TYPE I(80)

On Page 19, line 6, please change the heading as follows:

NI CALCULATION RULE TYPE II(81)

On Page 20, line 14, please change the heading as follows:

NI CALCULATION RULE TYPE III(82)

On Page 21, line 13, please change the heading as follows:

NI CALCULATION RULE TYPE IV(83)

On Page 22, line 10, please change the heading as follows:

NI CALCULATION RULE TYPE V(84)

On Pages 23-27, please change the headings as follows:

Option 1(85)

Option 2(86)

Option 3(87)

Option 4(88)

Processing 4. Calculate Other Revenue for All Objects (see Fig. 9)

OR Calculation Rule Type I(90)

OR Calculation Rule Type II(91)

OR Calculation Rule Type III(92)

On Pages 19-32, please change to the headings as follows:

OR Calculation Rule Type IV(93)

OR Calculation Rule Type V(94)

Processing 5. Calculate Direct Expense for All Object (see Fig. 10)

DE Calculation Rule Type I(100)

DE Calculation Rule Type II(101)

DE Calculation Rule Type III(102)

DE Calculation Rule Type IV(103)

DE Calculation Rule Type V(104)

Processing 6. Calculate Provision for All Objects (see Fig. 11)

P Calculation Rule Type I(110)

P Calculation Rule Type II(111)

P Calculation Rule Type III(112)

P Calculation Rule Type IV(113)

P Calculation Rule Type V(114)

Processing 7. Calculate Indirect Expense for All Objects (see Fig.12)

On Page 34, please change the headings as follows:

IE Calculation Rule Type I(120)

IE Calculation Rule Type II(121)

IE Calculation Rule Type III(122)

On Page 36, please change the headings as follows:

IE Calculation Rule Type IV(123)

IE Calculation Rule Type V(124)

Processing 8. Calculate After-Tax Object Profit for All Objects (see Fig. 13)

On Page 36, after the headings above, please change to read as follows:

$$\text{Profit } (o_i) = [\text{NIR}(o_i) + \text{OR}(o_i) - \text{DE}(o_i) - \text{IE}(o_i) - \text{P}(o_i)] * (1 - \text{EffectiveTaxRate}) \quad (130)$$

where, for a two tier taxation system, Effective Tax Rate is calculated as:

$$\text{Effective Tax Rate} = (1 - \text{tax rate 2}) * (\text{tax rate 1}) + \text{tax rate 2}.$$

In the calculation of Effective Tax Rate, this formula assumes the two rates are effective rates which apply to the business conditions (not the nominal statutory rates), and that tax rate can be deducted from income in the calculation of tax rate. Then,

$$\text{Total Profit} = \sum_i [\text{Profit } (o_i)]$$

For those companies ~~which~~ who use economic profit value calculations, the formula changes to:

$$\text{Profit}(o_i) = \{[\text{NIR}(o_i) + \text{OR}(o_i) - \text{DE}(o_i) - \text{IE}(o_i) - \text{P}(o_i)] * (1 - \text{EffectiveTaxRate})\} - \text{SVA}(o_i)$$

where

$$\text{SVA}(o_i) = \alpha(o_i) + \beta(o_i) * \text{Amount}(o_i)$$

and

$\alpha(o_i)$, $\beta(o_i)$ are functions for a cohort of objects in which o_i is a member, and $\text{Amount}(o_i)$ is given by a rule which maps o_i to a data value (such as balance, or allocated equity) also defined at the cohort level. (A cohort defined here represents a grouping of objects with similar risk characteristics, consistent with Modern Portfolio Theory and the Capital Asset Pricing Model.)

On Pages 38 and 39, please change to read the following:

For ease in understanding the rule ~~the~~ specifications used to populate the database ~~with~~ based on rule parameters the processing instructions are shown below ~~in the as~~ Rules. Also, most rules group by plane – in the rule ~~discussion~~ discussions below which follows ~~assumes~~ assume this grouping without reference.

Step 3: Calculate Net Interest for Seat – Four types of NIR rules are processed - type I, II, III, IV for each seat. Interest rates are matched to plane purchase date for initial plane investments, and interest rates for plane net ~~capitalizable~~ capitalize improvements are funded ~~with~~ using interest based on a 5 year pool of rates. Plane asset balances are keep in the Plane table maintained in Step 1.2 above.

NIR Type I: Carry cost of plane asset by seat is determined.

Rule

Populated in Step 2 are:

The AAB(seat) parameter is Plane: net__orig_bal * (1/total seats on plane)

- The rt parameter is Treatment_rts: 25_yr_rate (maintained for each plane) There is no need for liability rates.

Calculate COF(seat) = AAB(seat) * rt for all seats on flight.

All other attributes are NI Type I calculations results are null.

No grouping.

NIR Type II : Allocate net receivable/payable to seat for carry cost profit adjustment. This adjusts profitability for the impact of cash flows vs. accounting flows. This airline wants to apportion this cost across all revenue seats based on class_wt, a ~~modelling~~ modeling parameter. ~~Total weighted seats (tw) for the accounting period is a modelling parameter. Where the seat~~ Total weighted seats (tw) for the accounting period are modeling parameter. Seat factor is determined as a ratio of seat footprint to class portion of the plane's seat revenue space. (e.g. 1st = 15%, 2nd = 25% & 3rd = 60% of plane's seat revenue space with each seat evenly apportioned in class – 1/20, 1/80, 1/300 respectively, in this case.)

On Page 42, beginning at line 10, please replace as follows:

Rule

normalized weight for apportioning revenue amongst classes.

(1/ (no_seats???)

where type "freight" for each seat.

Group seats by class where ??? is 1st,2nd,3rd. class cabin

On Page 44, beginning at line 24, please replace as follows:

Rule

Populated in Step 2 are:

- Customer bene_miles is maintained using prior periods provision for benefit miles by loyalty customer.
- A parameter estimating the usage rate by loyalty cohort called burn factor

Calculate P(seat) = Flight:distance * burn(loyalty_rating)

Grouping by loyalty rating into rule map.

P Type IV: Future order cancellation reserve.

Rule

Populated in Step 2 are:

- Future airplane order cancellation penalty (pen) and order size (fut_planes) is maintained in the financial entity
- Last 12 months loading is calculated by plane

Calculate P(seat) = pen * (Plane:orig_bal /fut_planes) * 1/(total no. seats on plane) * 1/4 where last 12 months loading less than 75%. Only for seats on where last 12 months loading is less than 75%.

Step 7: Calculate Indirect Expenses for each Seat – The calculation of indirect expense is the final step of detailed level profit calculation. Here remaining cost measures that are not differentiable by seat are measured. Fuel and oil, ground costs, regular aircraft maintenance, overheads, and general marketing expenses are apportioned in IE. The airline also wants to view customer profitability loaded with the cost of unoccupied seats.

IE Type I: General and administrative costs are apportioned to a seat in this rule.

Rule

Populated in Step 2 are:

- The periods financial entity is populated with all of the airlines G&A expenses (e.g., type of G&A are passenger services, navigation licenses, rentals, miscellaneous costs, premises and property taxes.) Allocate these costs based on seat revenue (NI + OR.)

Calculate $IE(seat) = \frac{\text{sum}(\text{Financial } trn\_amt) * (\text{sum}(\text{NI}(seat)) + \text{sum}(\text{OR}(seat)))}{(\text{Total OR} + \text{NI for period})}$

No seat grouping in rule map for all Financial type = "G&A".

IE Type II: Ground location costs, airport specific and gate expenses are apportioned by flight.

Rule

Populated in Step 2 are:

- Populate all of these expenses for the period Transactions trn_amt with the type being the three letter international airport identifier.

On Page 47, line 3, replace as follows:

Calculate $IE(seat) = \text{sum of Transactions } trn\_amt *$

On Page 48, line 6, please replace as follows:

Populated, after all prior steps are ~~calculated~~ calculated, are the total DE less OR for each flight during the period, ideo.

On Page 48, line 26, please change as follows:

Cost of capital rate is ~~parameterized~~ parameterized (eqrt)

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

1. (Original) A process for determining object level profitability in a relational database management system, comprising the steps of:

preparing information to be accessed electronically through the relational database management system;

establishing, in the relational database, rules for processing the prepared information;

calculating independently at least one marginal value of profit for each object being measured using the established rules as applied to a selected set of prepared information;

calculating a fully absorbed profit adjustment value for each object being measured; and

combining the at least one marginal value of profit and the fully absorbed profit adjustment value to create a measure for object level profitability.

2. (Original) The process of claim 1, wherein the relational database comprises a structured query language (SQL).

B.

3. (Original) The process of claim 1, wherein the preparing step includes the step of extracting, conditioning and loading object attribute values into the database.

4. (Original) The process of claim 1, wherein the preparing step includes the steps of extracting, conditioning and loading financial statement attribute values into the database.

5. (Original) The process of claim 1, wherein the preparing step includes the steps of extracting, conditioning and loading event attribute values into the database.

6. (Original) The process of claim 1, wherein the preparing step further includes the step of calculating opportunity values of funds used or supplied by each object being measured.

7. (Original) The process of claim 1, wherein the establishing step includes the steps of providing the information necessary to select objects, and performing the correct profit calculus.

8. (Original) The process of claim 1, wherein the step of calculating at least one marginal value of profit includes the steps of calculating net interest (NI), other revenue (OR) and direct expense (DE), wherein net interest (NI) is the summation of interest income, value of funds provided and earnings on equity funds used less the sum of interest expense and costs of funds used, other revenue (OR) is a measure of profit contribution from non-

interest related sources, and direct expense (DE) is the profit value reduction due to marginal resource consumption by the object.

9. (Original) The process of claim 1, wherein the step of calculating at least one marginal value of profit includes the step of provisioning (P) for the selected set of prepared information, provisioning being the expected profit value adjustment for future outcomes related to the object.

10. (Original) The process of claim 9, wherein the step of calculating at least one marginal value of profit includes the steps of calculating net interest (NI), other revenue (OR) and direct expense (DE), wherein net interest (NI) is the summation of interest income, value of funds provided and earnings on equity funds used less the sum of interest expense and costs of funds used, other revenue (OR) is a measure of profit contribution from non-interest related sources, and direct expense (DE) is the profit value reduction due to marginal resource consumption by the object.

11. (Original) The process of claim 10, wherein the step of calculating a fully absorbed profit adjustment value includes the step of calculating the value for indirect expense (IE) which is an apportioned profit value adjustment for all non-object related resource consumption.

12. (Original) The process of claim 11, wherein the combining step includes the steps of adding net interest (NI) and other revenues (OR), and subtracting therefrom direct expense (DE), provisioning (P) and indirect expense (IE).

13. (Original) The process of claim 12, including the step of adjusting the measure for object level profitability for taxes and/or object economic value.

14. (Original) The process of claim 1, wherein the at least one marginal value of profit is calculated in parallel.

15. (Original) The process of claim 1, wherein the fully absorbed profit adjustment value is calculated utilizing the calculated at least one marginal value of profit.

16. (Currently Amended) A process for determining object level profitability in a relational database management system, comprising the steps of:

~~repairing~~ preparing information to be accessed electronically through the relational database management system;

establishing, in the relational database, rules for processing the prepared information;

calculating independently at least one marginal value of profit for each object being measured using the established rules as applied to a selected set of prepared information;

calculating a fully absorbed profit adjustment value including value adjustments for taxes and/or object economic value; and

combining the at least one marginal value of profit and the fully absorbed profit adjustment value to create a measure for object level profitability.

17. (Original) The process of claim 16, wherein the relational database comprises a structured query language (SQL).

18. (Original) The process of claim 16, wherein the preparing step includes the step of extracting, conditioning and loading object attribute values into the database.

19. (Original) The process of claim 18, wherein the preparing step includes the steps of extracting, conditioning and loading financial statement attribute values into the database.

20. (Original) The process of claim 19, wherein the preparing step includes the steps of extracting, conditioning and loading event attribute values into the database.

21. (Original) The process of claim 20, wherein the preparing step further includes the step of calculating opportunity values of funds used or supplied by each object being measured.

22. (Original) The process of claim 16, wherein the establishing step includes the steps of providing the information necessary to select objects, and performing the correct profit calculus.

23. (Original) The process of claim 16, wherein the step of calculating at least one marginal value of profit includes the steps of calculating net interest (NI), other revenue (OR) and direct expense (DE), wherein net interest (NI) is the summation of interest income, value of funds provided and

earnings on equity funds used less the sum of interest expense and costs of funds used, other revenue (OR) is a measure of profit contribution from non-interest related sources, and direct expense (DE) is the profit value reduction due to marginal resource consumption by the object.

24. (Original) The process of claim 16, wherein the step of calculating at least one marginal value of profit includes the step of provisioning (P) for the selected set of prepared information, provisioning being the expected profit value adjustment for future outcomes related to the object.

25. (Original) The process of claim 24, wherein the step of calculating at least one marginal value of profit includes the steps of calculating net interest (NI), other revenue (OR) and direct expense (DE), wherein net interest (NI) is the summation of interest income, value of funds provided and earnings on equity funds used less the sum of interest expense and costs of funds used, other revenue (OR) is a measure of profit contribution from non-interest related sources, and direct expense (DE) is the profit value reduction due to marginal resource consumption by the object.

26. (Original) The process of claim 25, wherein the step of calculating a fully absorbed profit adjustment value includes the step of calculating the value for indirect expense (IE) which is an apportioned profit value adjustment for all non-object related resource consumption.

27. (Original) The process of claim 26, wherein the combining step includes the steps of adding net interest (NI) and other revenues (OR), and subtracting therefrom direct expense (DE), provisioning (P) and indirect expense (IE).

28. (Original) The process of claim 16, wherein the at least one marginal value of profit is calculated in parallel.

29. (Original) The process of claim 16, wherein the fully absorbed profit adjustment value is calculated utilizing the calculated at least one marginal value of profit.

30. (Original) A process for determining object level profitability in a relational database management system, comprising the steps of:

preparing information to be accessed electronically through the relational database management system, including the step of calculating opportunity values of funds used or supplied by each object being measured;

establishing, in the relational database, rules for processing the prepared information;

calculating independently at least one marginal value of profit for each object being measured using the established rules as applied to a selected set of prepared information;

calculating a fully absorbed profit adjustment value for each object being measured; and

combining the at least one marginal value of profit and the fully absorbed profit adjustment value to create a measure for object level profitability.

31. (Original) The process of claim 30, wherein the relational database comprises a structured query language (SQL).

32. (Original) The process of claim 30, wherein the preparing step includes the step of extracting, conditioning and loading object attribute values into the database.

33. (Original) The process of claim 32, wherein the preparing step includes the steps of extracting, conditioning and loading financial statement attribute values into the database.

34. (Original) The process of claim 33, wherein the preparing step includes the steps of extracting, conditioning and loading event attribute values into the database.

35. (Original) The process of claim 30, wherein the establishing step includes the steps of providing the information necessary to select objects, and performing the correct profit calculus.

36. (Original) The process of claim 30, wherein the step of calculating at least one marginal value of profit includes the steps of calculating net interest (NI), other revenue (OR) and direct expense (DE), wherein net interest (NI) is the summation of interest income, value of funds provided and earnings on equity funds used less the sum of interest expense and costs of funds used, other revenue (OR) is a measure of profit contribution from non-interest related sources, and direct expense (DE) is the profit value reduction due to marginal resource consumption by the object.

37. (Original) The process of claim 30, wherein the step of calculating at least one marginal value of profit includes the step of provisioning (P) for

the selected set of prepared information, provisioning being the expected profit value adjustment for future outcomes related to the object.

38. (Original) The process of claim 37, wherein the step of calculating at least one marginal value of profit includes the steps of calculating net interest (NI), other revenue (OR) and direct expense (DE), wherein net interest (NI) is the summation of interest income, value of funds provided and earnings on equity funds used less the sum of interest expense and costs of funds used, other revenue (OR) is a measure of profit contribution from non-interest related sources, and direct expense (DE) is the profit value reduction due to marginal resource consumption by the object.

39. (Original) The process of claim 38, wherein the step of calculating a fully absorbed profit adjustment value includes the step of calculating the value for indirect expense (IE) which is an apportioned profit value adjustment for all non-object related resource consumption.

40. (Original) The process of claim 39, wherein the combining step includes the steps of adding net interest (NI) and other revenues (OR), and subtracting therefrom direct expense (DE), provisioning (P) and indirect expense (IE).

41. (Original) The process of claim 40, including the step of adjusting the measure for object level profitability for taxes and/or object economic value.

Bl

42. (Original) The process of claim 30, wherein the at least one marginal value of profit is calculated in parallel.

43. (Original) The process of claim 30, wherein the fully absorbed profit adjustment value is calculated utilizing the calculated at least one marginal value of profit.

Amendments to the Drawings:

As described in the Remarks/Arguments section, substitute drawings are submitted herewith.

Attachment: Replacement Sheets 1/12 - 12/12



1 / 12

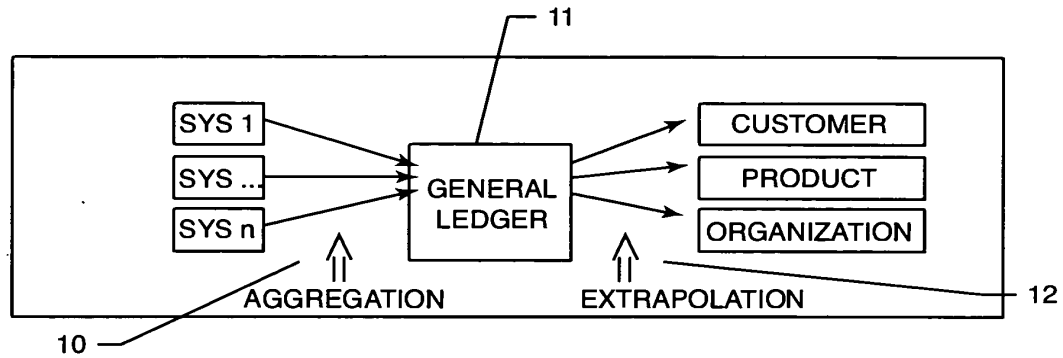


FIG. 1
PRIOR ART

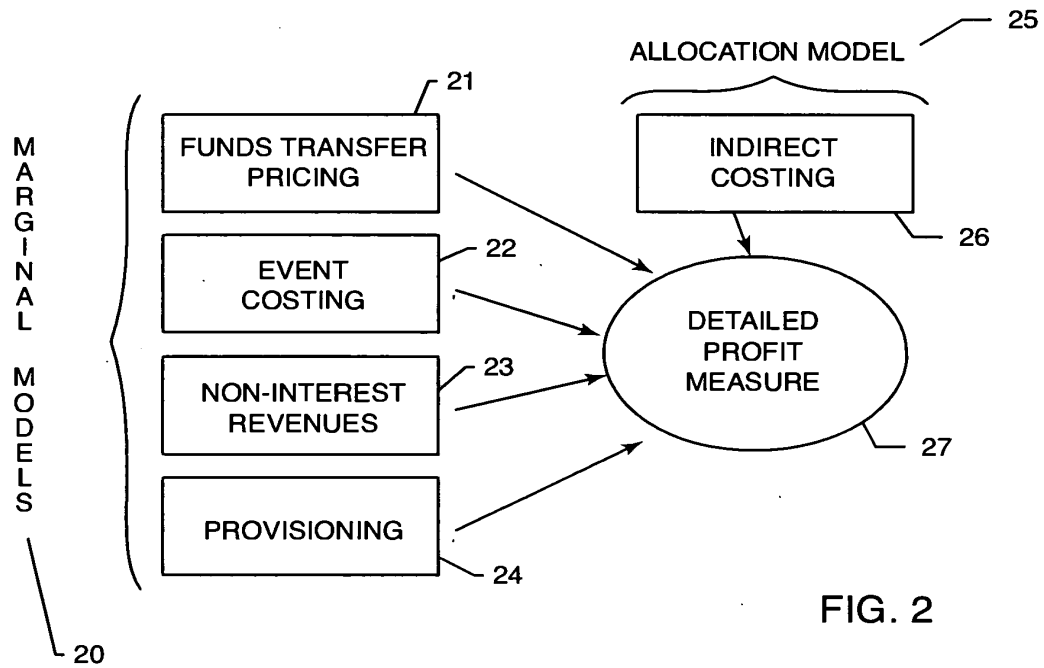


FIG. 2



2 / 12

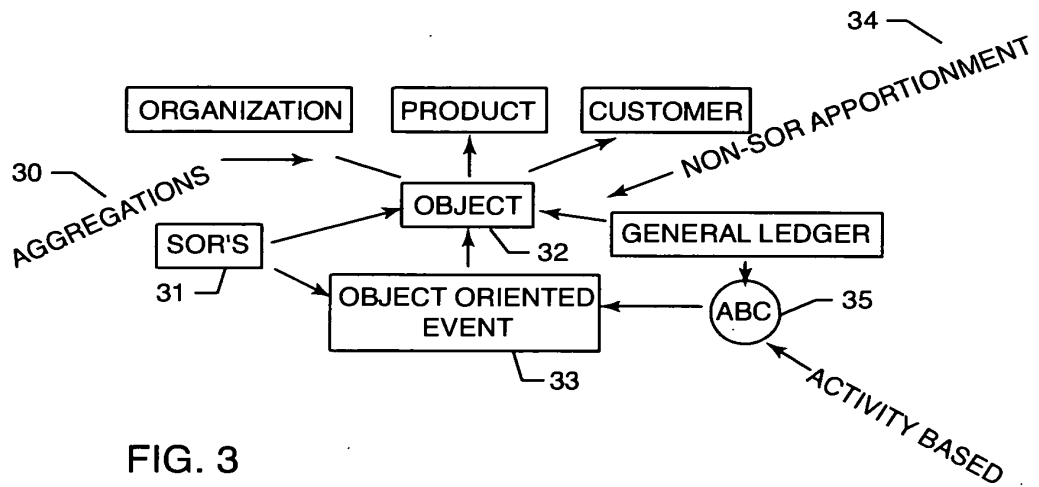


FIG. 3

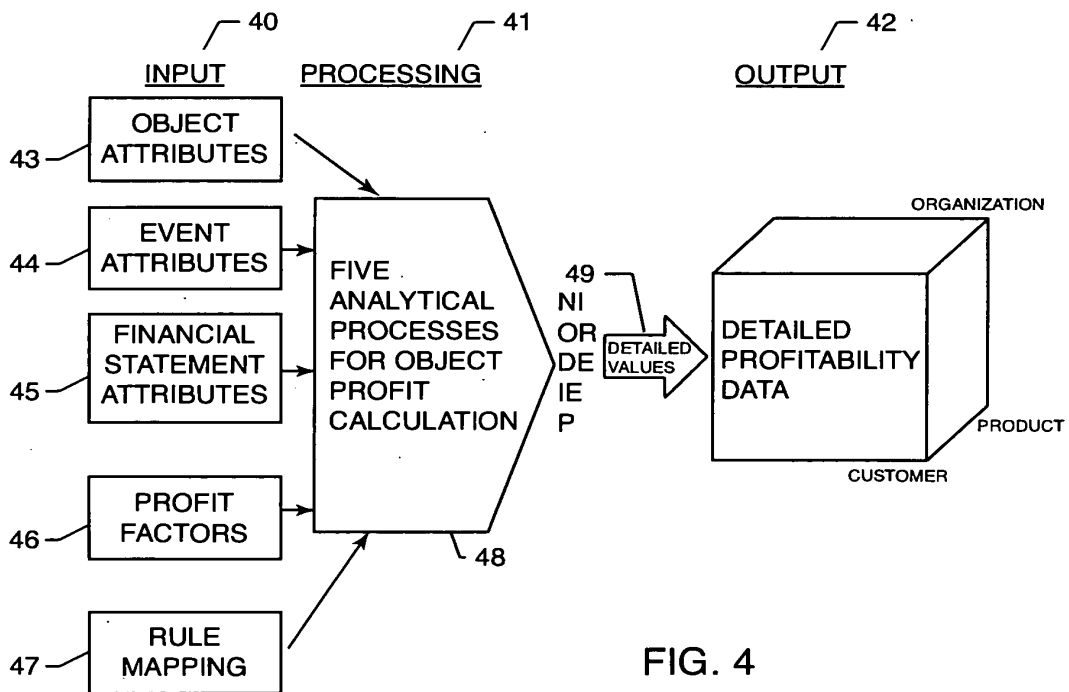


FIG. 4



3 / 12

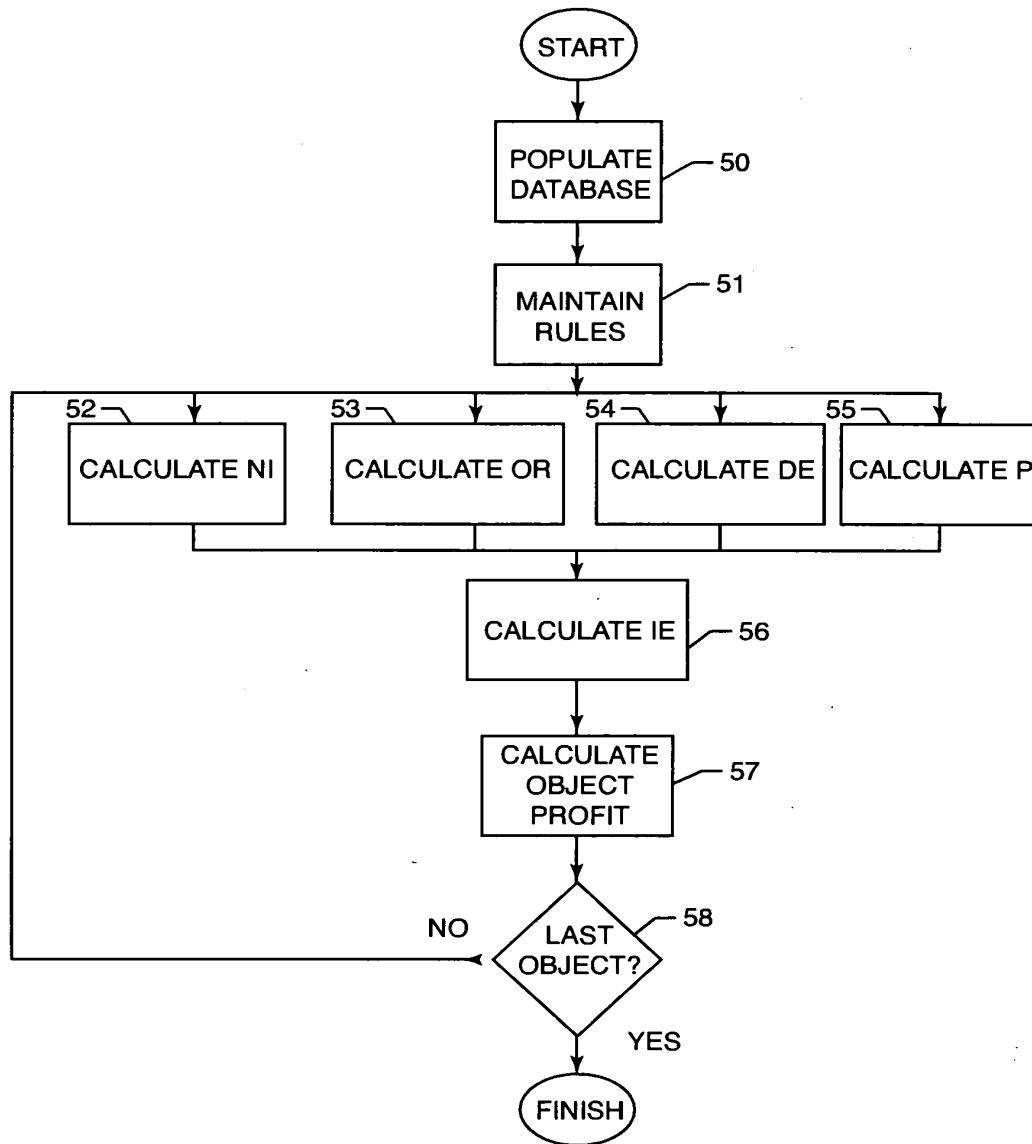


FIG. 5



4 / 12

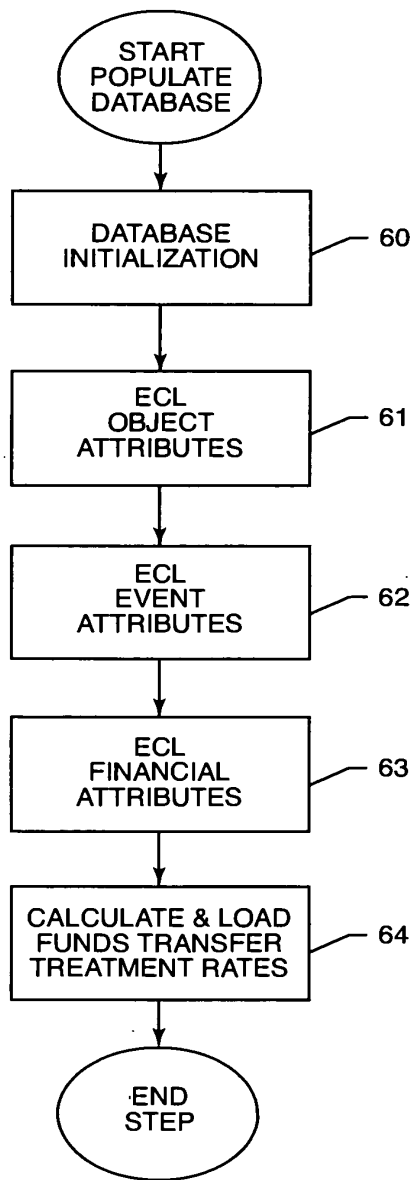


FIG. 6



5 / 12

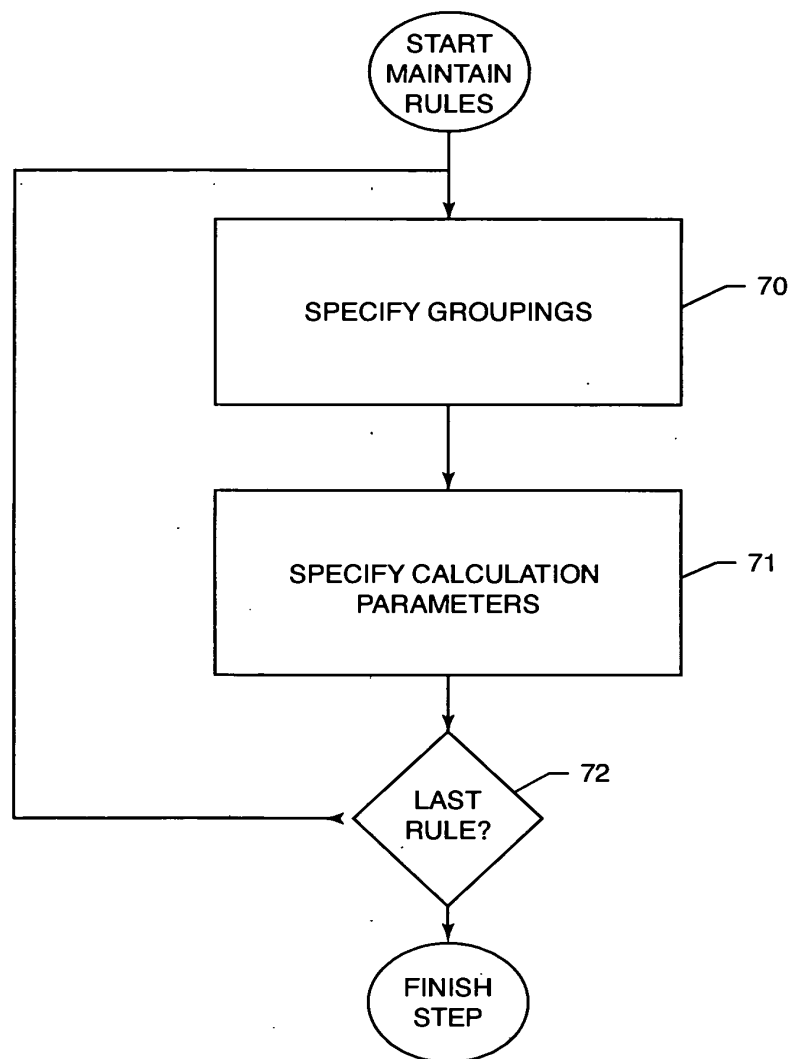
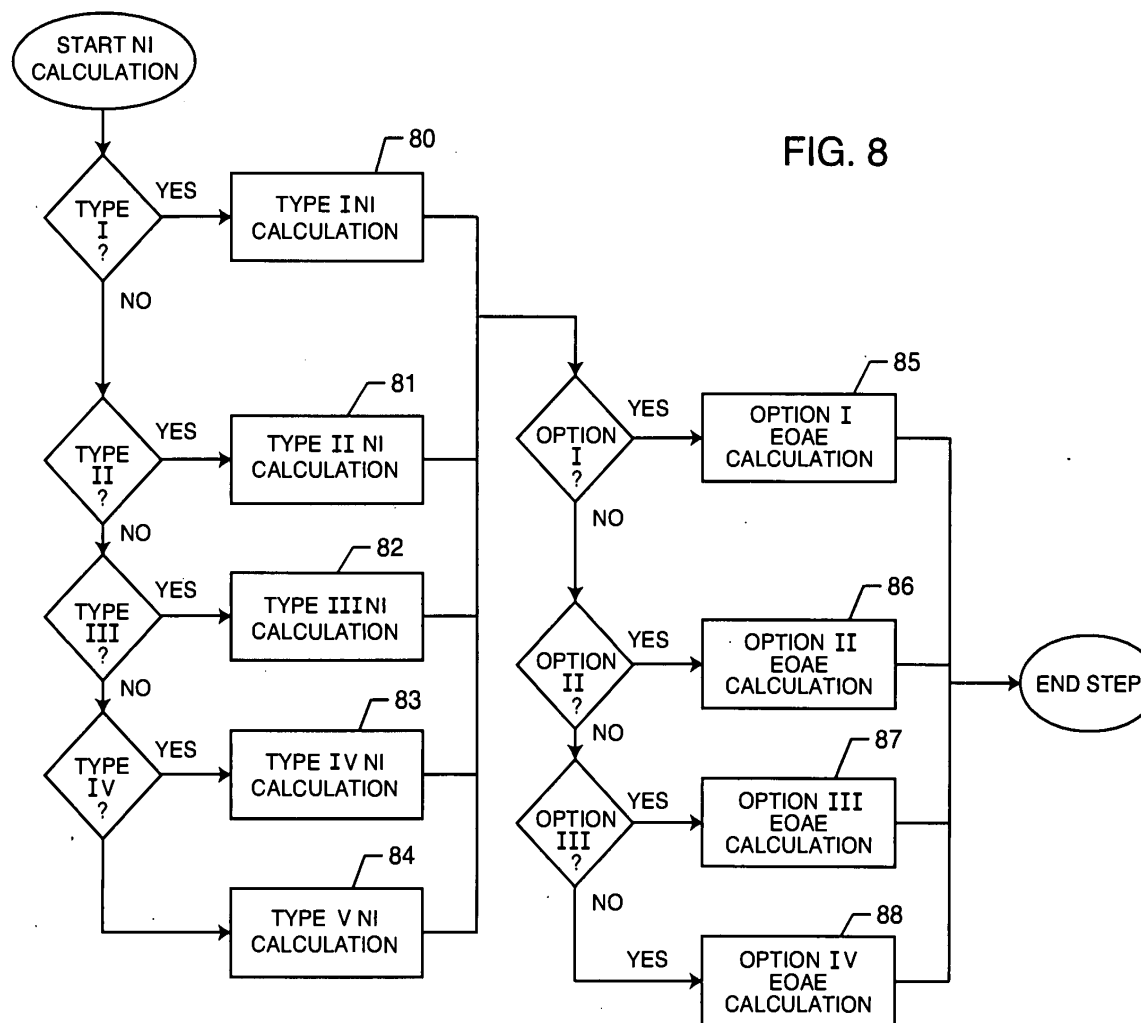


FIG. 7



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7 / 12

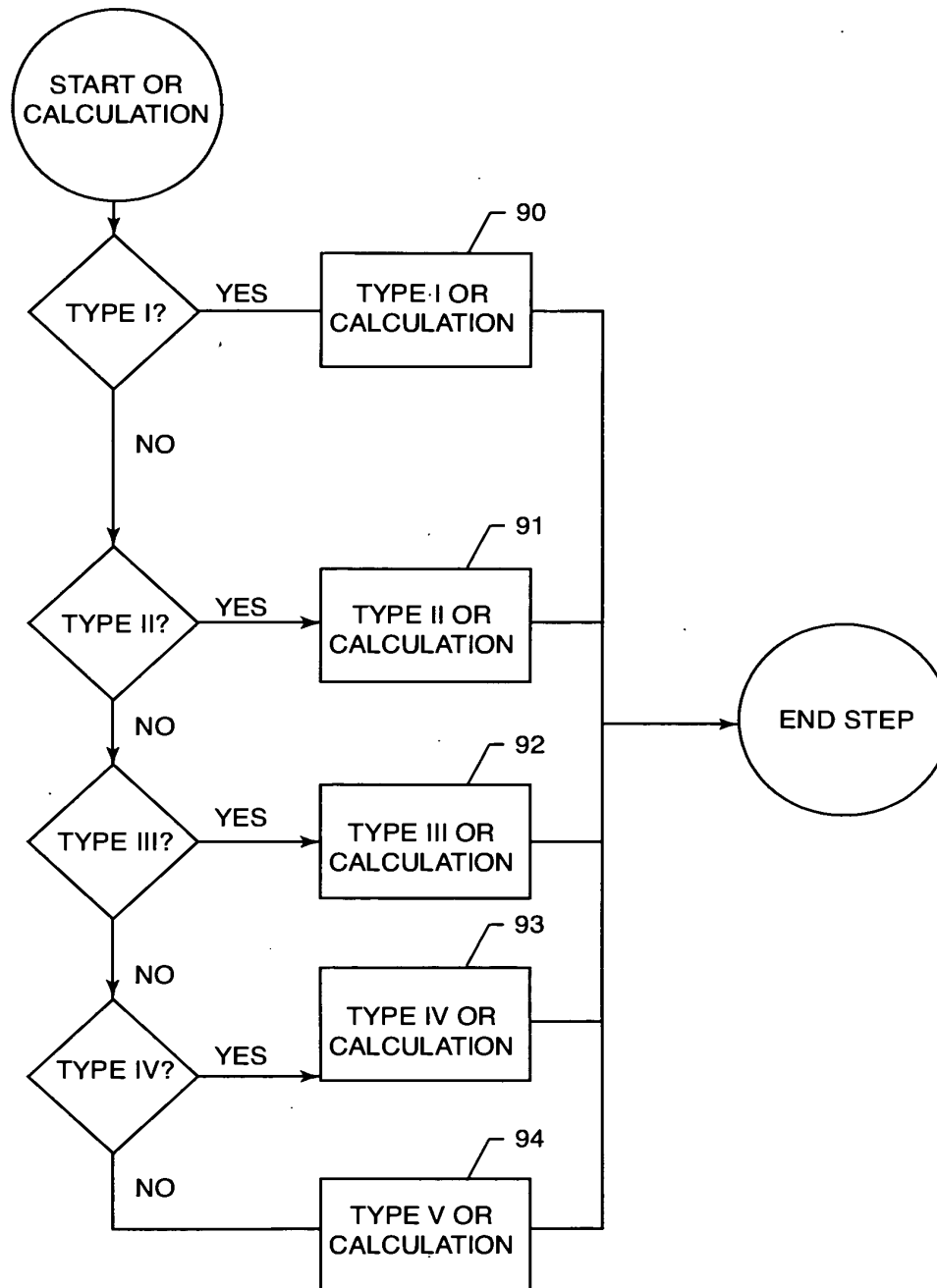


FIG. 9



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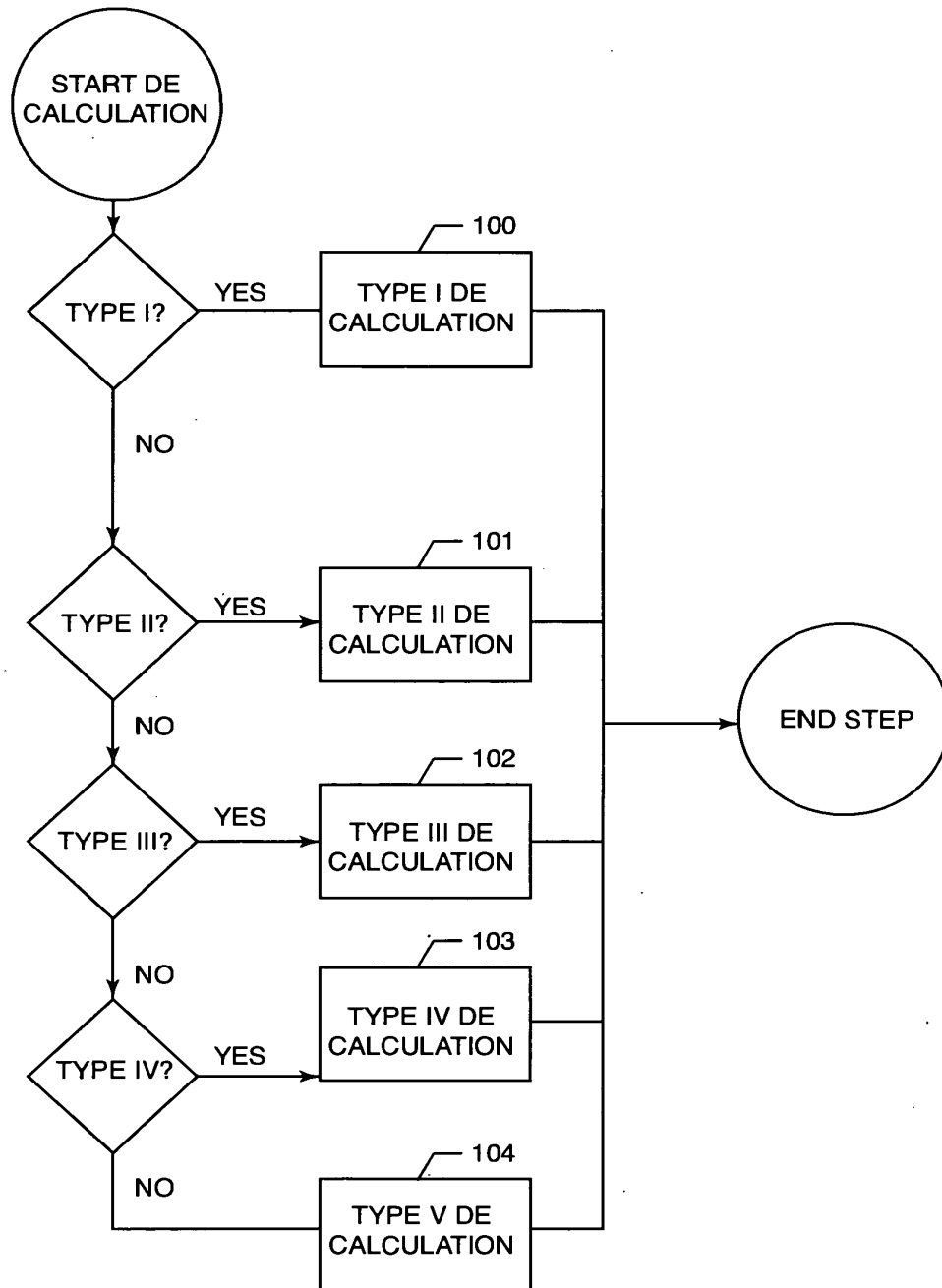


FIG. 10



9 / 12

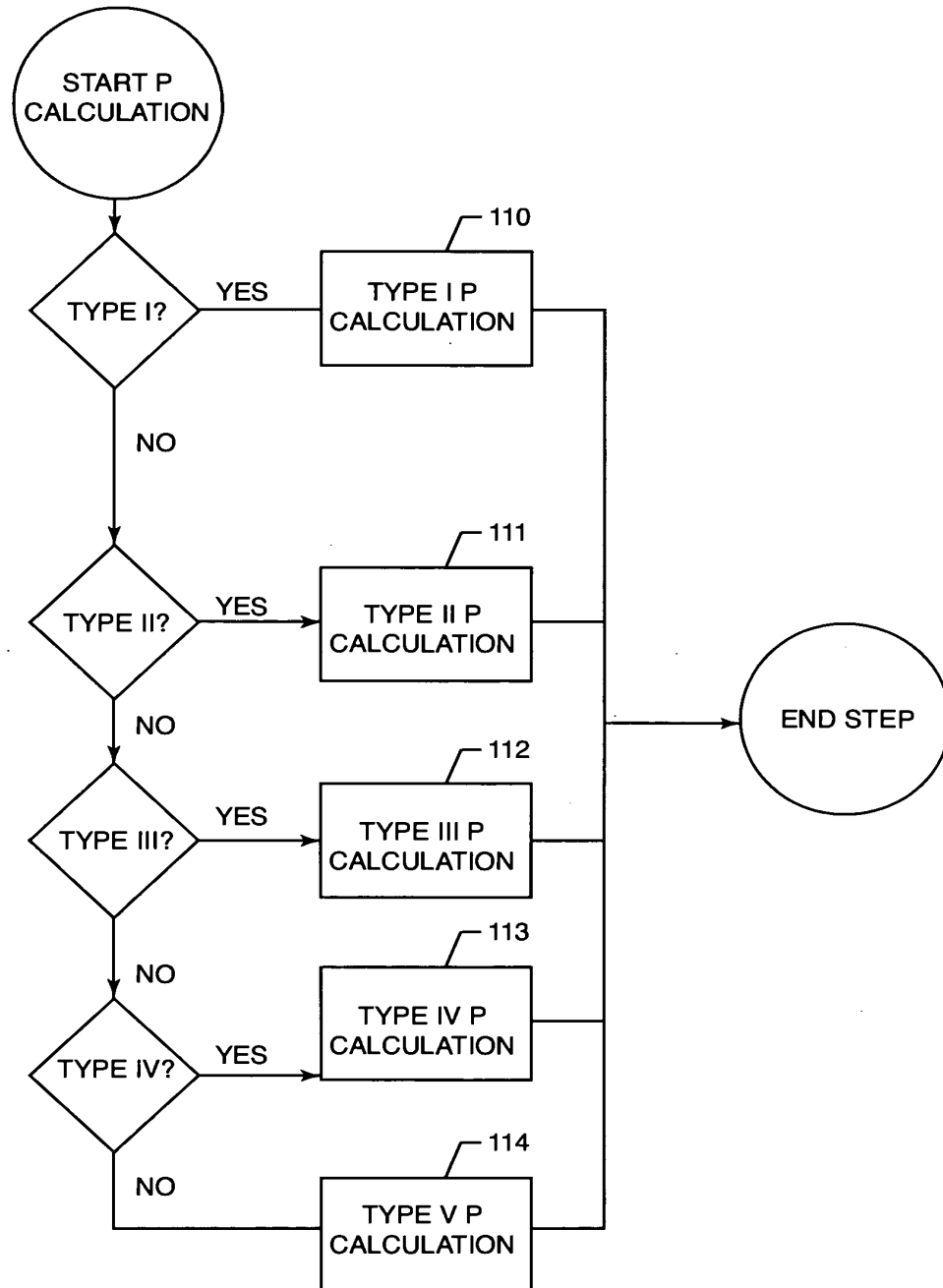


FIG. 11



10 / 12

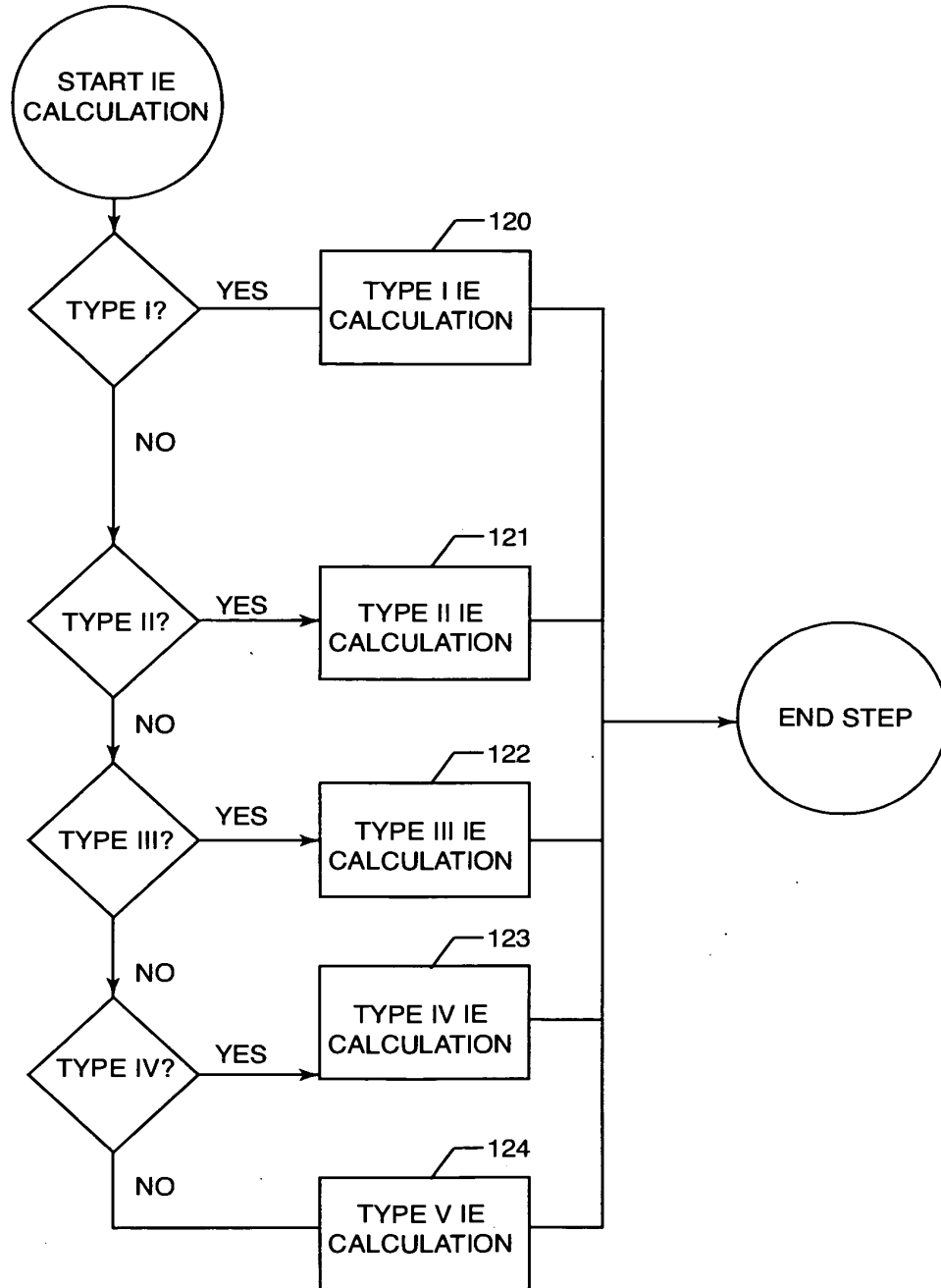


FIG. 12



11 / 12

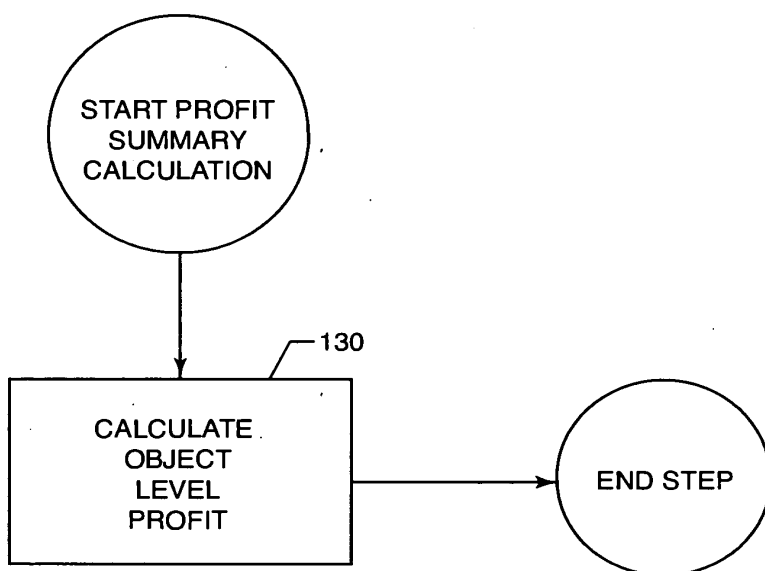


FIG. 13

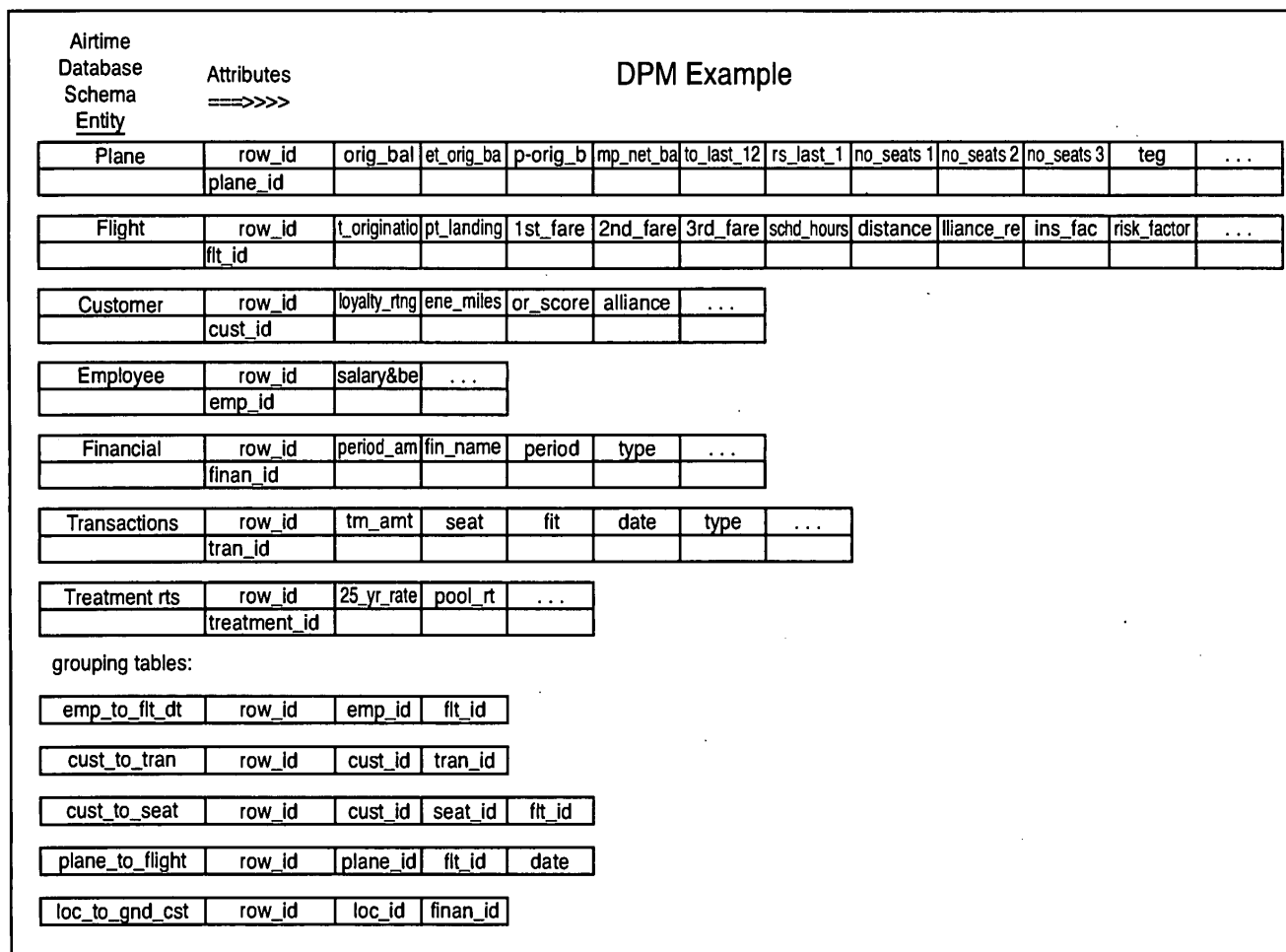


FIG. 14



REMARKS/ARGUMENTS

DRAWINGS

In the August 4, 2003 Office Action, Figure 1 was objected to for failure to label it as "prior art". Applicant submits herewith revised drawings illustration that Figure 1 is now appropriately labeled "prior art". The drawings were further objected under 37 CFR §1.83(a) for failing to describe FIGS. 2-5 as described in the Specification. Also, FIG. 7 was objected to for not describing steps 3-6 as detailed from Page 17 of the present application. Applicant has amended the Specification to include description specifically directed to these figures, with reference numbers which have been added to the drawings. No new matter has been added to the application, but rather the contents of the drawings described in the Specification by reference number. Spelling and punctuation errors have been corrected in the Specification. Accordingly, in light of the foregoing amendments and substitute drawings, Applicant believes that the objection to the drawings have been overcome.

TIME EXTENSION

A one-month extension of time request, with appropriate fee is filed herewith.

CLAIM REJECTIONS

Claims 1-15 were rejected as being obvious under 35 U.S.C. §103(a) over the Curley "Royal Bank unearths profitability solution" publication. However, the publication is dated April of 2000 whereas the

present application is based on a provisional patent application which was filed on April 9, 1999. Furthermore, as shown in the Declaration of Richard Tad Lepman, the publication is actually directed to the invention. In June of 1999, the inventor licensed the invention to NCR. Subsequently, NCR granted rights to the Royal Bank of Canada. The publication discusses the invention with respect to the Royal Bank of Canada. In light of this, the §103 rejection is improper and should be withdrawn.

Claims 16-43 were withdrawn from further consideration due to an election to a Restriction Requirement on May 28, 2003. However, in the August 4, 2003 Office Action, it was erroneously stated that the election was made **without** traverse. Applicant respectfully quotes from the May 22, 2003 "Response to Restriction Requirement and Preliminary Amendment the statement "Contrary to the statement to the contrary in the Office Action, independent claim 1 is generic". Accordingly, Applicant believes that the election was made **with traverse**. Furthermore, Applicant continues to assert that claim 1 is generic for all claims.

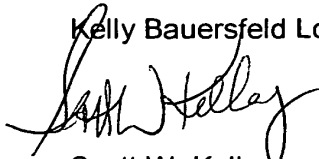
■ 1 3 0

CONCLUSION

As Applicant has overcome the §103 claim rejections as well as the drawing objections, Applicant believes that the present application is in condition for allowance. Due to the fact claim 1 is generic, Applicant respectfully asserts that all pending claims 1-43 are in condition for allowance, a formal Notice of Allowance being respectfully requested.

Respectfully submitted,

Kelly Bauersfeld Lowry & Kelley, LLP



Scott W. Kelley
Registration No. 30,762

SWK/kr
6320 Canoga Avenue, Suite 1650
Woodland Hills, California 91367
(818) 347-7900

I hereby certify that this correspondence is being deposited with the United States Postal Service as first class mail in an envelope addressed to Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450 December 3, 2003.

Scott W. Kelley, Reg. No. 30,762

December 3, 2003
Date



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PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of	)	Group Art Unit: 3627
	)	
Richard Tad Lepman	)	Examiner: Andrew Rudy
	)	
Serial No. 09/545,628	)	
	)	
Filed: April 7, 2000	)	Docket No. BERK-37617
	)	
For: PROCESS FOR DETERMINING	)	
OBJECT LEVEL PROFITABILITY	)	
	)	

DECLARATION OF PRIOR INVENTION IN THE UNITED STATES TO
OVERCOME CITED PUBLICATION (37 C.F.R. §1.131)
RICHARD TAD LEPMAN

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

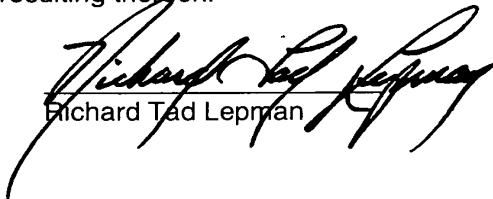
Dear Sir:

1. My name is Richard Tad Lepman and I am the inventor of the above-identified application.
2. I had prepared and filed a Provisional Patent Application directed to the invention, which was filed on April 9, 1999 and granted Serial No. 60/128,769.

3. In June of 1999, I, through Berkeley *IEOR, licensed the invention to NCR.
4. Subsequently, the Royal Bank of Canada obtained rights to the invention from NCR. Thus, the *Curley* reference cited in the August 4, 2003 Office Action (which is dated April of 2000) is in fact directed to my invention, licensed through NCR.

The undersigned declares that all statements made herein of my own knowledge are true and all statements made on information and belief are believed to be true; and these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code, and that such false statements may jeopardize the validity of the application or any registration resulting thereon.

19 November 2003
Date


Richard Tad Lepman

BERK-37617
S/N: 09/545,628
DECLARATION



3627 \$

PTO/SB/21 (08-03)
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TRANSMITTAL FORM (to be used for all correspondence after initial filing)	Application Number	09/545,628
	Filing Date	April 7, 2000
	First Named Inventor	Richard Tad Lepman
	Art Unit	3627
	Examiner Name	Rudy
Total Number of Pages in This Submission	Attorney Docket Number	BERK-37617

ENCLOSURES (Check all that apply)		
☒ Fee Transmittal Form	☒ Drawing(s) Sub.	☐ After Allowance communication to Technology Center (TC)
☒ Fee Attached	☐ Licensing-related Papers	☐ Appeal Communication to Board of Appeals and Interferences
☒ Amendment/Reply	☐ Petition	☐ Appeal Communication to TC (Appeal Notice, Brief, Reply Brief)
☐ After Final	☐ Petition to Convert to a Provisional Application	☐ Proprietary Information
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Firm or Individual name	Scott W. Kelley Kelly Bauersfeld Lowry & Kelley LLP
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Date	12/03/03

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☒ Applicant claims small entity status. See 37 CFR 1.27

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Application Number 09/545,628
Filing Date 04/07/2000
First Named Inventor Richard Tad Lepman
Examiner Name Rudy
Art Unit 3627
Attorney Docket No. BERK-37617

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1003 530	2003 265	Plant filing fee		
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SUBTOTAL (1)			(\$)	

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Total Claims		Extra Claims	Fee from below	Fee Paid
Independent Claims		-20** =	X	
Multiple Dependent		-3** =	X	
Large Entity Fee Code (\$)	Small Entity Fee Code (\$)	Fee Description	Fee Paid	
1202 18	2202 9	Claims in excess of 20		
1201 86	2201 43	Independent claims in excess of 3		
1203 290	2203 145	Multiple dependent claim, if not paid		
1204 86	2204 43	** Reissue independent claims over original patent		
1205 18	2205 9	** Reissue claims in excess of 20 and over original patent		
SUBTOTAL (2)			(\$)	

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3. ADDITIONAL FEES

Large Entity Fee Code (\$)		Small Entity Fee Code (\$)		Fee Description	Fee Paid
1051 130	2051 65	1051 130	2051 65	Surcharge - late filing fee or oath	
1052 50	2052 25	1052 50	2052 25	Surcharge - late provisional filing fee or cover sheet	
1053 130	2053 65	1053 130	2053 65	Non-English specification	
1812 2,520	2812 1,260	1812 2,520	2812 1,260	For filing a request for <i>ex parte</i> reexamination	
1804 920*	2804 460*	1804 920*	2804 460*	Requesting publication of SIR prior to Examiner action	
1805 1,840*	2805 920*	1805 1,840*	2805 920*	Requesting publication of SIR after Examiner action	
1251 110	2251 55	1251 110	2251 55	Extension for reply within first month	55
1252 420	2252 210	1252 420	2252 210	Extension for reply within second month	
1253 950	2253 475	1253 950	2253 475	Extension for reply within third month	
1254 1,480	2254 740	1254 1,480	2254 740	Extension for reply within fourth month	
1255 2,010	2255 1,005	1255 2,010	2255 1,005	Extension for reply within fifth month	
1401 330	2401 165	1401 330	2401 165	Notice of Appeal	
1402 330	2402 165	1402 330	2402 165	Filing a brief in support of an appeal	
1403 290	2403 145	1403 290	2403 145	Request for oral hearing	
1451 1,510	2451 755	1451 1,510	2451 755	Petition to institute a public use proceeding	
1452 110	2452 55	1452 110	2452 55	Petition to revive - unavoidable	
1453 1,330	2453 665	1453 1,330	2453 665	Petition to revive - unintentional	
1501 1,330	2501 665	1501 1,330	2501 665	Utility issue fee (or reissue)	
1502 480	2502 240	1502 480	2502 240	Design issue fee	
1503 640	2503 320	1503 640	2503 320	Plant issue fee	
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1810 770	2810 385	1810 770	2810 385	For each additional invention to be examined (37 CFR 1.129(b))	
1801 770	2801 385	1801 770	2801 385	Request for Continued Examination (RCE)	
1802 900	2802 450	1802 900	2802 450	Request for expedited examination of a design application	

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		Date	12/3/03

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☒ Applicant claims small entity status. See 37 CFR 1.27

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Filing Date 04/07/2000
First Named Inventor Richard Tad L. pman
Examiner Name Rudy
Art Unit 3627
Attorney Docket No. BERK-37617

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1003 530	2003 265	Plant filing fee	
1004 770	2004 385	Reissue filing fee	
1005 160	2005 80	Provisional filing fee	

SUBTOTAL (1) (\$)

2. EXTRA CLAIM FEES FOR UTILITY AND REISSUE

Total Claims -20** = X =
Independent Claims -3** = X =
Multiple Dependent =

Large Entity Fee Code (\$)	Small Entity Fee Code (\$)	Fee Description	Fee Paid
1202 18	2202 9	Claims in excess of 20	
1201 86	2201 43	Independent claims in excess of 3	
1203 290	2203 145	Multiple dependent claim, if not paid	
1204 86	2204 43	** Reissue independent claims over original patent	
1205 18	2205 9	** Reissue claims in excess of 20 and over original patent	

SUBTOTAL (2) (\$)

**or number previously paid, if greater; For Reissues, see above

FEE CALCULATION (continued)

3. ADDITIONAL FEES

Large Entity Small Entity

Fee Code (\$)	Fee Code (\$)	Fee Description	Fee Paid
1051 130	2051 65	Surcharge - late filing fee or oath	
1052 50	2052 25	Surcharge - late provisional filing fee or cover sheet	
1053 130	1053 130	Non-English specification	
1812 2,520	1812 2,520	For filing a request for <i>ex parte</i> reexamination	
1804 920*	1804 920*	Requesting publication of SIR prior to Examiner action	
1805 1,840*	1805 1,840*	Requesting publication of SIR after Examiner action	
1251 110	2251 55	Extension for reply within first month	
1252 420	2252 210	Extension for reply within second month	
1253 950	2253 475	Extension for reply within third month	
1254 1,480	2254 740	Extension for reply within fourth month	
1255 2,010	2255 1,005	Extension for reply within fifth month	
1401 330	2401 165	Notice of Appeal	
1402 330	2402 165	Filing a brief in support of an appeal	
1403 290	2403 145	Request for oral hearing	
1451 1,510	1451 1,510	Petition to institute a public use proceeding	
1452 110	2452 55	Petition to revive - unavoidable	
1453 1,330	2453 665	Petition to revive - unintentional	
1501 1,330	2501 665	Utility issue fee (or reissue)	
1502 480	2502 240	Design issue fee	
1503 640	2503 320	Plant issue fee	
1460 130	1460 130	Petitions to the Commissioner	
1807 50	1807 50	Processing fee under 37 CFR 1.17(q)	
1806 180	1806 180	Submission of Information Disclosure Stmt	180.00
8021 40	8021 40	Recording each patent assignment per property (times number of properties)	
1809 770	2809 385	Filing a submission after final rejection (37 CFR 1.129(a))	
1810 770	2810 385	For each additional invention to be examined (37 CFR 1.129(b))	
1801 770	2801 385	Request for Continued Examination (RCE)	
1802 900	1802 900	Request for expedited examination of a design application	

Other fee (specify)

*Reduced by Basic Filing Fee Paid

SUBTOTAL (3) (\$ 180.00)

SUBMITTED BY

Name (Print/Type) Scott W. Kelley Registration No. (Attorney/Agent) 30,762 Telephone 818-347-7900
Signature Date 12/3/03

WARNING: Information on this form may become public. Credit card information should not be included on this form. Provide credit card information and authorization on PTO-2038.

This collection of information is required by 37 CFR 1.17 and 1.27. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.

If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.

I hereby certify that this correspondence is deposited with the United States Postal Service as first class mail in an envelope addressed to MS-AMENDMENTFEE, Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450 December 3, 2003.

Scott W. Kelley, Reg. No. 30,762 December 3, 2003 Date



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DEC 17 2003

GROUP 3500

PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of	)	Group Art Unit: 3627
Richard Tad Lepman	)	Examiner:
Serial No. 09/545,628	)	Andrew Rudy
Filed: April 7, 2000	)	Docket No. BERK-37617
For: PROCESS FOR DETERMINING	)	
OBJECT LEVEL PROFITABILITY	)	

REQUEST FOR EXTENSION OF TIME

MS: Amendment - Fee
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

Applicant respectfully petitions for a One-month extension of time to file a Response to the Office Action dated August 4, 2003. A check for \$55.00, as prescribed in 37 C.F.R. §1.136(a) is submitted herewith.

Respectfully submitted,

KELLY BAUERSFELD LOWRY & KELLEY, LLP

By Scott W. Kelley
Scott W. Kelley, Reg. No. 30,762
Attorney for Applicant

12/10/2003 EHAILE1 00000076 09545628

01 FC:2251

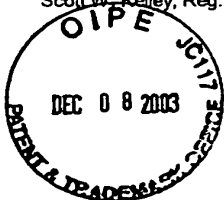
55.00 0P

SWK/kr
6320 Canoga Avenue
Suite 1650
Woodland Hills, CA 91367
(818) 347-7900

1/7/04
PH
#8

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Scott W. Kelley December 3, 2003
Scott W. Kelley, Reg. No. 30,762 Date



PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of	)	Group Art Unit: 3627
	)	
Richard Tad Lepman	)	Examiner: Andrew Rudy
	)	
Serial No. 09/545,628	)	
	)	
Filed: April 7, 2000	)	Docket No. BERK-37617
	)	
For: PROCESS FOR DETERMINING	)	
OBJECT LEVEL PROFITABILITY	)	
_____	)	

SUPPLEMENTAL DISCLOSURE STATEMENT

RECEIVED
DEC 29 2003
GROUP 3600

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Dear Sir:

In accordance with 37 C.F.R. §1.97, enclosed herewith are additional reference patents relating generally to the above-identified application. For the convenience of the Examiner, these references are listed on the attached PTO

Form PTO/SB/08.

12/10/2003 EHAILE1 00000098 09545628

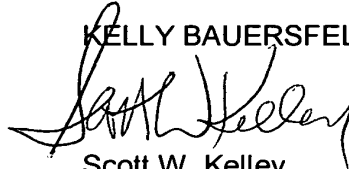
01 FC:1806

180.00 OP

It is requested that the enclosed reference patents be considered in the examination of this application and that their consideration be made of written record in the application file.

Respectfully submitted,

KELLY BAUERSFELD LOWRY & KELLEY, LLP



Scott W. Kelley
Registration No. 30,762

SWK:kr.
Enclosures

6320 Canoga Avenue, Suite 1650
Woodland Hills, CA 91367
(818) 347-7900



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/545,628	04/07/2000	Richard Tad Lepman	Berk-37617	2145
7590 01/26/2004			EXAMINER	
Scott W Kelley Kelly Bauersfeld Lowry & Kelly LLP 6320 Canoga Avenue Suite 1650 Woodland Hills, CA 91367			RUDY, ANDREW J	
			ART UNIT	PAPER NUMBER
			3627	
DATE MAILED: 01/26/2004				

Please find below and/or attached an Office communication concerning this application or proceeding.

2

Office Action Summary	Application No.		Applicant(s)	
	09/545,628		LEPMAN, RICHARD TAD	
	Examiner		Art Unit	
	Andrew Joseph Rudy		3627	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 08 December 2003.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-43 is/are pending in the application.
- 4a) Of the above claim(s) 16-43 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-15 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 08 December 2003 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. §§ 119 and 120

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☐ All b) ☐ Some * c) ☐ None of:
 1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
* See the attached detailed Office action for a list of the certified copies not received.
- 13) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application) since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.
a) ☐ The translation of the foreign language provisional application has been received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121 since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)	4) ☐ Interview Summary (PTO-413) Paper No(s). _____
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)	5) ☐ Notice of Informal Patent Application (PTO-152)
3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____	6) ☐ Other: _____

DETAILED ACTION

Response to Amendment

Election/Restrictions

1. Claims 1-43 are pending. Applicant's REMARKS received December 8, 2003 regarding the Restriction Requirement are noted. However, the ARGUMENTS that claim 1 is generic do not address the remaining independent claims 16 and 30 in relationship to the species noted. Thus, claims 16-43 are still withdrawn from consideration.

Drawings

2. The drawings were received on December 8, 2003. These drawings are not acceptable. The drawings do not correspond to the descriptive portion of the specification. The proposed Amendment to the descriptive portion of the specification does not cure the issue. For example, proposed Figure 2, element 22, is not consistent with the page 5, line 8 of the proposed amendment. Also, Figures 4, 5, element 42, is not consistent with the page 5, line 18 are not consistent with the proposed amendment. Likewise, Figures 5, element 50, is not consistent with the page 5, line 23, are not consistent with the proposed amendment. Further, Figure 7, element 70, is not consistent with the page 11, line 9 are not consistent with the proposed amendment. Other discrepancies appear. Correction is required.

In order to avoid abandonment, the drawing informalities noted in Paper No. 5, mailed on August 6, 2003, must now be corrected. Correction can only be effected in the manner set forth in the above noted paper.

3. The proposed amendment will not be entered. Applicant is requested to provide a substitute specification for the proposed amendment as the sheer volume of the proposed changes dictates such. Also, Applicant is cautioned that support in the originally filed specification for the proposed specification in juxtaposition to the drawing figures must be present.
4. The DECLARATION filed on December 8, 2003 under 37 CFR 1.131 is sufficient to overcome the Curley reference. Thus, the rejection from Paper No. 5 mailed August 6, 2003 is withdrawn pursuant to Applicant's Response received December 8, 2003.

Claim Rejections - 35 USC § 103

5. Claims 1-31 are rejected under 35 U.S.C. 103(a) as being unpatentable over Price et al. "College Accounting, Seventh Edition" (hereafter "Price")

Price discloses, e.g. pgs 28-41, 529,531, 966-982 (Fig. 27-5), a method measuring profit based on the factors of net interest revenue, other revenues (Fig. 27-5, line 4, "Operating Revenues"), direct expenses (Fig. 27-5, line 22, "Direct Expenses"), indirect expenses (Fig. 27-5, line 30, "Indirect Expenses"), and risk (Fig. 27-5, line 6, "Less Sales Returns and Allowances"), all set up to take advantage of flexible business rules.

Official Notice is taken that performing financial processing using computer software is common knowledge in the art.

To have provided a method of performing financial processing for an account using software for a computer measuring profit based on the factors of net interest revenue, other revenues, direct expenses, indirect expenses and risk, all set up to take advantage of flexible business rules the business rules to calculate known variations of one of the factors, e.g. net interest revenue, would have been obvious to one of ordinary skill in the art. Doing such would incorporate common knowledge data along with common knowledge software.

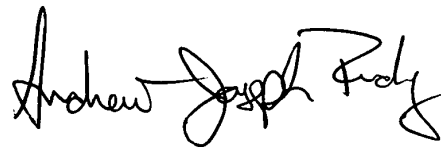
6. A further pertinent reference of interest is noted on the attached PTO-892.
7. Applicant's Information Disclosure Statement has been reviewed. Note attached PTO-1449.

Conclusion

8. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Andrew Joseph Rudy whose telephone number is 703-308-7808. The examiner can normally be reached on Tuesday thru Friday, 7:30 a.m until 6 p.m..

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Mr. Robert Olszewski can be reached on (703) 308-5183. The fax phone number for the organization where this application or proceeding is assigned is (703) 872-9306.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-305-3900.

A handwritten signature in black ink, reading "Andrew Joseph Rudy". The signature is written in a cursive, flowing style with a large initial 'A' and 'R'.

Notice of References Cited	Application/Control No. 09/545,628	Applicant(s)/Patent Under Reexamination LEPMAN, RICHARD TAD	
	Examiner Andrew Joseph Rudy	Art Unit 3627	Page 1 of 1

U.S. PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Name	Classification
	A	US-			
	B	US-			
	C	US-			
	D	US-			
	E	US-			
	F	US-			
	G	US-			
	H	US-			
	I	US-			
	J	US-			
	K	US-			
	L	US-			
	M	US-			

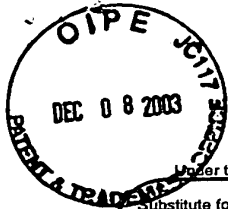
FOREIGN PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Country	Name	Classification
	N					
	O					
	P					
	Q					
	R					
	S					
	T					

NON-PATENT DOCUMENTS

*		Include as applicable: Author, Title Date, Publisher, Edition or Volume, Pertinent Pages)
	U	Price et al., "College Accounting", Glencoe Macmillan/McGraw-Hill, Seventh Edition, 1994, pgs. 28-41, 529-531, 966-982.
	V	Ainsworth et al., "Introduction to Accounting: An Integrated Approach", Preliminary Edition, 1996, Vol. 2, chapter 22.
	W	
	X	

*A copy of this reference is not being furnished with this Office action. (See MPEP § 707.05(a).)
Dates in MM-YYYY format are publication dates. Classifications may be US or foreign.



PTO/SB/08B (08-03)
Approved for use through 07/31/2006. OMB 0651-0031
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

Substitute for form 1449/PTO

INFORMATION DISCLOSURE STATEMENT BY APPLICANT

(Use as many sheets as necessary)

Sheet 2

of 2

Complete if Known	
Applicati n Number	09/545,628
Filing Date	April 7, 2000
First Nam d Invent r	Richard Tad Lepman
Art Unit	3627
Examiner Name	Rudy
Attorney Docket Number	BERK-37617

NON PATENT LITERATURE DOCUMENTS			
Examiner Initials*	Cite No. ¹	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc.), date, page(s), volume-issue number(s), publisher, city and/or country where published.	T ²
ASZ		CHAN, DKC A document-driven approach to database report generation; August 26, 1998; pages 925-930; XP010296617	
ASZ		GUPTA VR An Introduction to Data Warehousing; August 1997; XP002204504	

Examiner Signature	<i>Andrew Lepman Rudy</i>	Date Considered	January 20 2004

*EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.

¹ Applicant's unique citation designation number (optional). ² Applicant is to place a check mark here if English language Translation is attached. This collection of information is required by 37 CFR 1.98. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 2 hours to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.

If you need assistance in completing the form, call 1-800-PTO-9199 (1-800-786-9199) and select option 2.

LAW OFFICES

KELLY BAUERSFELD LOWRY & KELLEY, LLP

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SCOTT W. KELLEY
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GARY D. MANN
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FAX: (818) 340-2859

PATENT, TRADEMARK
AND COPYRIGHT CAUSES

OF COUNSEL
R. L. MIKESELL

April 27, 2004
VIA FEDEX

Examiner Andrew Rudy
Art Unit: 3627
United States Patent and Trademark Office
Crystal Park 5, 2541
7th Floor, A20
Arlington, VA 22202

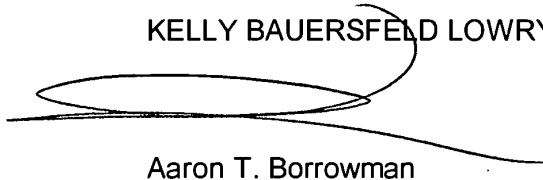
RE: Applicant: Richard Tad Lepman
Serial No. 09/545,628
Filed: April 7, 2000
Title: PROCESS FOR DETERMINING
OBJECT LEVEL PROFITABILITY
Our Docket No. BERK-37617

Dear Examiner Rudy:

Pursuant to telephone conversations with my office, enclosed for your review in preparation for our Telephonic Conference scheduled for May 5, 2004 at 12:00 noon, is the Declaration of Richard Tad Lepman for the above-identified application.

Very truly yours,

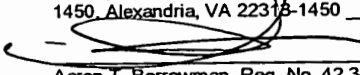
KELLY BAUERSFELD LOWRY & KELLEY, LLP



Aaron T. Borrowman

ATB/kr
Enclosure

I hereby certify that this correspondence is being deposited with the United States Postal Service as first class mail in an envelope addressed to Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450


Aaron T. Borrowman, Reg. No. 42,348 April 27, 2004
Date

#10

PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of	)	Group Art Unit: 3627
	)	
Richard Tad Lepman	)	Examiner: Andrew Rudy
	)	
Serial No. 09/545,628	)	
	)	
Filed: April 7, 2000	)	Docket No. BERK-37617
	)	
For: PROCESS FOR DETERMINING	)	
OBJECT LEVEL PROFITABILITY	)	
	)	

RECEIVED
TECHNOLOGY CENTER 3600
04 MAY -6 AM 8:31

DECLARATION OF RICHARD TAD LEPMAN

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Dear Sir:

1. My name is Richard Tad Lepman and I am the inventor of the above-identified patent application. As shown in my attached Curriculum Vita (Exhibit A), I have a great deal of experience in the field of financial services and information technology industries.
2. As fully described in the pending application, the present invention is directed to a process for determining object level profitability; determining accurate, consistent and holistic profit measurement data

not previously available in a data warehouse apparatus. The inventive process calculates independently at least one marginal value of profit for each object being measured in a "bottoms up" manner (i.e. driven by business transactions or events) utilizing a relational database management system. Object attribute values are extracted, conditioned, and loaded into the database as are financial statement attribute values and event attribute values. At least one marginal value of profit is calculated based on the innovative mathematical formulation of accounting calculation applied within a relational database system. Calculating at least one marginal value of profit includes the steps of calculating interest, other revenue, or direct expense and preferably indirect expense. Provisioning, or taking into account the expected profit value adjustment for future outcomes related to the object, or economic value adjustment may also be preferably performed during the calculation of the fully absorbed profit adjustment value for each object being measured.

3. I have reviewed the January 26, 2004 Office Action which asserts that the claims of the present application are rendered obvious in light of excerpts taken from *College Accounting*, 7th Edition, authored by John Ellis Price, and David Haddock, and Horace R. Block (hereinafter "Price"). I have reviewed Price and respectfully disagree with the Examiner as Price only discloses what I have referred to in my application as being "prior art", as illustrated in FIG. 1 and discussed in the Background section of the present application.
4. Price covers the basics of transactional accounting, or bookkeeping. Price does not discuss methods of marginal pricing (activity based costing or funds transfer pricing) necessary for object profit measures which are more detailed than departmental or business segments. In contrast to the present invention, Price states that interest income and interest expense are not allocated in responsibility accounting - Price's detailed or object level profit equivalent. Price's scope is financial

bookkeeping and not economic theory or market based financial concepts, and thus Price is silent on the concepts of funds transfer pricing or of risk based adjustment to profit measures and therefore Price's discussion of contribution margin does not lead to shareholder value add measure.

5. Claim 1 recites a process for determining object level profitability in relational database management system by preparing information to be accessed electronically through the relational database management system and establishing, in the relational database, rules for processing the prepared information. There is no discussion whatsoever in Price as to preparing information to be accessed electronically through a relational database or establishing the types of rules necessary in the relational database for processing prepared information. As discussed above, Price does not combine at least one marginal value of profit and the fully absorbed profit adjustment value to create a measure for object level profitability either. Further, Price's accounting rules do not lead to relational database formulation or mathematical rules making parallel computer financial calculation possible.
6. With respect to claim 3 which recites extracting, conditioning and loading object attribute values into the relational database, the use of a financial object more discrete than management responsibility or business segment requires data not discussed in Price.
7. With respect to claim 4, although Price discusses the creation of financial statements, Price does not discuss whatsoever the extracting, conditioning and loading of financial statement attribute values into a relational database.
8. Claim 5 recites the steps of extracting, conditioning and loading event attribute values into the database. In a relational database, certain attributes of transactions must be included which Price would consider

unnecessary for transactional accounting or marginal valuing attributes. Thus, Price is completely silent with respect to these steps.

9. Claim 6 recites that the preparing step for the inclusive step of calculating opportunity values of funds used or supplied by each object being measured. Net interest revenue calculations require object oriented balance sheet linkage for evaluations. However, Price is totally silent on how to properly value balance sheet dynamics in responsibility accounting and thus completely ignores this step necessary for consistent and holistic detailed profit metrics appropriate for a data warehouse apparatus.
10. With respect to claim 7, Price is completely silent on establishing steps of providing the information necessary to select objects, and performing the correct profit calculus. Price in no way leads to joining relational tables or the filtering rows in Tuples, or joined tables, performing financial calculus.
11. With respect to claims 8-12, Price does not mention the profit calculation recited in these claims required to value a financial object's balance sheet dynamic. The present invention's detailed profit measures, as recited in these claims, are holistic at a more detailed level than a business segment or management unit and more inclusive as it takes into account net interest revenue. Price simply does not imply the use of expected valuing in risk provisioning. Once again, Price is directed to the creation of financial statements in a traditional accounting sense. The present invention combines at least one marginal value of calculated profit and fully absorbed profit adjustment value to create a measure for object level profitability which has much more depth and detail in scope than a financial statement.
12. With respect to claim 13, the present invention adjusts the measure for object level profitability for taxes and/or object economic value. No

economic adjustment is proscribed in Price.

13. With respect to claim 15, the present invention calculates the full absorbed profit adjustment value utilizing the calculated at least one marginal value of profit. This is considered a “bottoms up” taking into account information to analyze each object which is simply not mentioned in Price.
14. With respect to claim 14, the marginal value of profit is calculated in parallel. This is done utilizing the relational database in a structured query language. Price is completely silent as to this aspect of the invention. In the Office Action, “Official Notice” was taken that “performing financial processing using computer software is common knowledge in the art.” Although the creation of financial statements and bookkeeping using computer software is common knowledge in the art, performing the “bottoms up” or object level calculations utilizing a relational database is not common knowledge and is a breakthrough technology in the financial world. Based upon my nearly thirty years experience in this field, although account level profitability has been attempted with limited success using computer software, object level profitability using a relational database management system was not in place before my invention and has many benefits over prior methodologies and systems. Preparing the information, creating and establishing rules in the relational database and calculating in parallel in accordance with the present invention allows “bottoms up” or behaviorally based calculation in determination of object level profitability in a manner which has been heretofore unattainable.
15. Attached Exhibits B-M support this assertion. Exhibit B is a copy of an article in the October 7, 2002 European Edition of *Fortune* Magazine describing the problems encountered by companies who are unable to figure out how profitable their customers are. The article states that

"Board of Directors will soon begin to demand customer-profitability data from companies, investors will demand that companies report it."

Although the Fortune article discusses some possible solutions to these problems besides the present invention at Royal Bank of Canada, these solutions are not based on event driven (behavior) based profitability measurement solutions developed solely within a relational database.

16. As stated in my November 19, 2003 Declaration, I am the inventor of the present invention. I, through my company Berkeley*IEOR, licensed the invention to NCR, which refers to the invention as "Value Analyzer".
17. Exhibit C is an article stating that NCR won the 2000 CRM Project Award for the implementation of its profitability analysis software. The article states that if used in combination with the Teradata platform (a relational database), Value Analyzer (the invention) is able to analyze enormous volumes of customer behavior data in hours, rather than days. Value Analyzer was launched in 1999 and was recognized for its implementation within Royal Bank of Canada earlier in 2000, according to the article. The *Curley* reference cited in the August 4, 2003 Office Action was directed to the Royal Bank of Canada implementation of my invention.
18. Exhibit D is directed to an NCR press release which indicates the uniqueness of the present invention, to wit: "Teradata Value Analyzer's detailed, behavior based approach differs from more traditional measurement tools that determine profitability by using high-level averages or aggregations." This press release points to a weakness of the prior art, namely, detailed profit measures based upon "averages", as discussed in Price. The present invention overcomes these weaknesses.
19. Exhibit E is another NCR press release describing my invention as "an end-to-end solution that pinpoints profitability calculations across five

distinct components at the fundamental level, the billing telephone number.” The components are: revenue (direct and indirect), interest revenue/expense, direct expense (applied to customer behavior or events), indirect expense (cost of doing business), and risk provision (applying the cost of credit and other potential risks and fraud)”. This article further states that the invention uses “complex mathematical models” and “detailed data.” As discussed above, the distinct components at the fundamental level are recited in claims 8-12 of the present invention, and not in Price.

20. Exhibit F is an NCR white paper, discussing the type of “rules based” process the invention is. The paper’s definition of the “rules” are clearly distinct from Price, as are the rules in the present application and claims, as the invention uses metadata driven rules for a dynamic solution customizable for each unique business.
21. Exhibit G is another NCR white paper stating that the invention “helps users better understand the value of their customers”. It measures in detail, the components of customer revenue and customer expense at the basic unit and transactional level. From this data, companies can develop any number of aggregations, including by customer or household, by channel, by product, or by organization. The calculations involve the measurement of each basic units profit contribution across five components: base revenue, net interest revenue, direct expense, indirect expense and risk provision. This approach allows easy reconciliation with a general ledger and consistent data analysis- certainly a revolutionary step for many companies. “This article points out other profitability measurement systems use summaries, or proxies, or even the “smallest inaccuracies or missing data will have dramatic impact” on profitability measures. Lastly, the article indicates that the invention is internal to the relational database by stating “all data relating to the rules of the profitability model are stored in the database and can be retrieved.”

22. Exhibits H and I are also NCR publications which discuss Value Analyzer (my invention). As stated in these articles, the invention “takes a bottom up approach that begins with the transactions, events and activities of the business. By measuring profitability at a detailed level, it provides you with consistent and accurate profit level analytics across a complex set of business functions and views.” The articles also paint the prior art approaches, such as Price, distinctly - “traditionally, businesses have based their profitability calculations on averages and assumptions derived from the financial systems of record, particularly general ledgers.”
23. Exhibit J is an NCR document describing the customer success story of Royal Bank of Canada, which the Examiner based his first rejection upon. The article states that the improvement obtained by using the methodology of the present invention, “75% of our customers move to or more deciles” - a very significant shift, especially for Royal Bank of Canada, which was already using sophisticated evaluations.
24. Exhibit K illustrates the business case and application of the present invention in the telecommunications industry. The document describes the ability of the invention to accurately measure margin per user, a new performance metric for telecommunications providers.
25. Exhibit L is a product review of the present invention (Teradata Value Analyzer). Of the competing products mentioned, none of these other solutions is a pure relational database solution or use a “bottom up” approach based on set theory mathematical accounting models. The document cites fifteen successful banking industry implementations of the present invention.
26. Exhibit M is an article taken from *Retail Banking Technologies* describing the benefit case and uniqueness of the present invention. It

cites prior solutions which were based, procedural not relational and using samples or averages. It states that the present invention uses "the smallest possible item of data, and combining it with the capability to aggregate and analyze it in an infinite variety of different ways".

27. In summary, traditional accounting methods, as described in Price, do not teach or disclose my invention. Whereas Price is concerned with transactional accounting creating financial statements or general ledgers, my invention determines object level profitability which requires rules, considerations, and information beyond that contemplated by Price. Due to the scale and complexity of the analysis, I have implemented the invention within a relational database, which has not been done before and allows the information to be analyzed in hours instead of days for a major Bank using parallel calculations processes. I believe that the aforementioned documents contained in the attached Exhibits show the non-obviousness of the invention due to the awards and accolades the invention has received and the success it has generated in various industries.

The undersigned declares that all statements made herein of my own knowledge are true and all statements made on information and belief are believed to be true; and these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code, and that such false statements may jeopardize the validity of the application or any registration resulting thereon.

April 26, 2004
Date

Richard Tad Lepman
Richard Tad Lepman

Curriculum Vita

Richard Tad Lepman

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tad@bieor.com

Twenty-seven years experience in the Financial Services and Information Technology Industries. Accomplishments utilised knowledge of financial evaluation, technological development, operations research and banking. Consistently contributes to improvement of shareholder value.

Employment History

➤ **1993 to Present -- Berkeley*IEOR, President**

Founded company, provides consulting services specialising in large scale decision support systems and analyst empowerment. Develops applications using detailed risk adjusted profit measurement processes. Lectures on performance measurement topics and uses of data warehousing technology in the Financial Services Industry.

➤ **1995 to 2001 -- NCR, Global Solution Consultant**

Key member of Customer Relationship Management initiative and product line development for the Financial Services Industry. Presented and consulted solutions to NCR's banking customers world-wide. Work included solution design, funds transfer pricing concepts, costing methods, data modelling, profit measurement theory, customer implementation, development specification and solution testing.

➤ **1993 to 1996 -- Barclays Bank, Data Warehouse Consultant**

Advised executive management on uses of large scale decision support opportunities using Teradata technology. Worked with Group Treasury and Group Portfolio Management to establish a sound decision support environment providing immediate and strategic value. Deliverables included: customer segmentation, maturity profiles, risk v. return portfolio analysis, analyst training and development.

➤ **1992 to 1993 -- WhiteLight Systems, Consultant**

Founding member of company. Beta tested software in a business consultant role, helping create a customer's "off-shore" strategic plan, including the consolidation and long term plan for 50+ full or partially owned foreign subsidiaries plus new investments and divestments.

➤ **1976 to 1992 -- Bank of America, Vice President & Sr. Manager of Finance**

Analytical corporate level roles including: mergers & acquisitions, performance measurement policies, asset sales and servicing, long term capital planning, capital investment analysis, tax planning, funds transfer pricing, budget and planning, and management science projects (e.g., credit scoring, check sorting, mail and courier routing, mainframe replacement, premises planning and customer retention.)

Education

➤ **University of California at Berkeley, School of Engineering, Masters of Science in Industrial Engineering and Operations Research; 1976**

➤ **Claremont Men's College, Bachelor of Arts in Applied Mathematics; 1975**

EXHIBIT A

Work Products

Decision Support Systems

- FFAPM™ invention
- funds transfer pricing methodology
- liability mark-to-market accounting
- customer relationship tracking
- investment decision analyser
- loan profitability measurement tools
- three generations of corporate planning and budgeting processes
- two generations of transfer pricing accounting processes
- daily settlement risk and liquidity monitoring & valuing
- interest rate forecasting tool development
- tax position forecasting tool development
- check processing volume forecasting
- loan and credit card loss methodology, scoring and research
- cash and regulatory reserve position forecasting and control
- foreign exchange dealer support system design

Financial Analysis

- debt/equity transaction evaluations
- litigation reserve estimations
- product profitability analyses
- cost accounting methodology
- incentive stock option evaluation
- employee benefit costing

Capital Budgeting

- over 35, \$5 million+ capital investment decision financial reviews of:
 - branch automation
 - premises acquisition
 - mainframe investments
 - business acquisition/ divestment
 - corporate-wide investment expenditure policy and control
 - premises planning and investment optimisation
 - lease-buy fixed asset acquisition decision support
 - computer technology
 - procurement financial review

Asset Backed Securities

- negotiated and managed the sale and servicing of \$1.3 billion of automobile receivables
- managed tax receivable sale, \$77 million private placement
- asset value adjusted preferred stock (NYSE: BAC pfd. C) transaction support

Merger & Acquisition

- SeaFirst Corporation merger financial evaluation
- 50+ deposit base evaluations, public and private purchases by Bank of America
- Security Pacific Corporation merger retail liability base evaluation
- Managistics payroll services acquisition evaluation
- Decimus Computer Leasing Corporation divestment
- AT&T, Chemical & Bank of America electronic banking partnership development
- Bank of America, Canada consolidation financial analyst

Operations Research

- credit scoring research and tracking development
- courier routing (transportation model heuristic)
- mail room work flow optimisation
- float optimisation in check processing
- customer retention estimation using renewal theory

Strategic Planning

- bank liability base deregulation financial strategy development
- branch bank functional reengineering financial modelling
- technology direction financial evaluation and methodology
- bank item processing evolution strategy financial evaluation

Tax Planning

- tax room measurement and control
- tax position optimisation
- accounting impact analyses (e.g., new regulations or litigation reserve estimation)

Planning

- consolidated corporate plan analyses, three annual budget cycles
- strategic business unit annual plan review, two budget cycles
- econometric sensitivity analyses
- earnings sensitivity modelling under different interest rate and credit loss scenarios
- budget variance reporting and analyses

Long Term Planning

- capital planning using Monte Carlo and linear programming
- dividend modelling and decision support
- debt/preferred stock/common stock structuring analysis

Direct Supervision

- workflow consulting projects: two management scientists
- capital budgeting reviews: three financial analysts
- loan sales servicing: one analyst and one systems analyst
- intangible accounting and valuation: two financial consultants
- foreign exchange dealer control: two control officers

Project Management

- financial tasks: teams of two to fifteen officers and analysts one week to six months
- systems development: project manager of five large scale IT development efforts
- asset sales servicing: matrix managed four geographically dispersed loan servicing centres

Technical Experience

- Operating Systems: MS-DOS v3.x & 4; Windows v3.0a & 3.1 & 9x & 2000 & NT; OS/2 1.x & 2.0; MP-RAS; Linux; VM/CMS; VP/CSS; TPF/ACP; MacOS v6, 7, 8, 9 & X; InGrid; TOS; and EXEC.
- Database Management Systems; Teradata; Sybase; Oracle; Nomad; Versant, {IDEF - Data Modelling.}
- Programming Languages: SQL x, TQL; TSQL; SQL-Plus; Object-C; C-Shell; Unix tools (BSD4.3 & NFS); Nomad; REXX; FORTRAN; PL/I; APL; RPG; System 360 Assembler/Macro; Lotus; Excel; Javelin; Mesa; Paradox PAL; and Improv.
- Hardware: NCR/Teradata Worldmark & DBC/1012; IBM PS/2 and PC compatibles (Wintel); NeXTStep; IBM Systems 360/70, 36, & 3090; Digital PDP-8 & 11; Sperry Univac 1108; Apple Lisa, Macintosh, PowerBook, iMac, G4; and Grid Compass.

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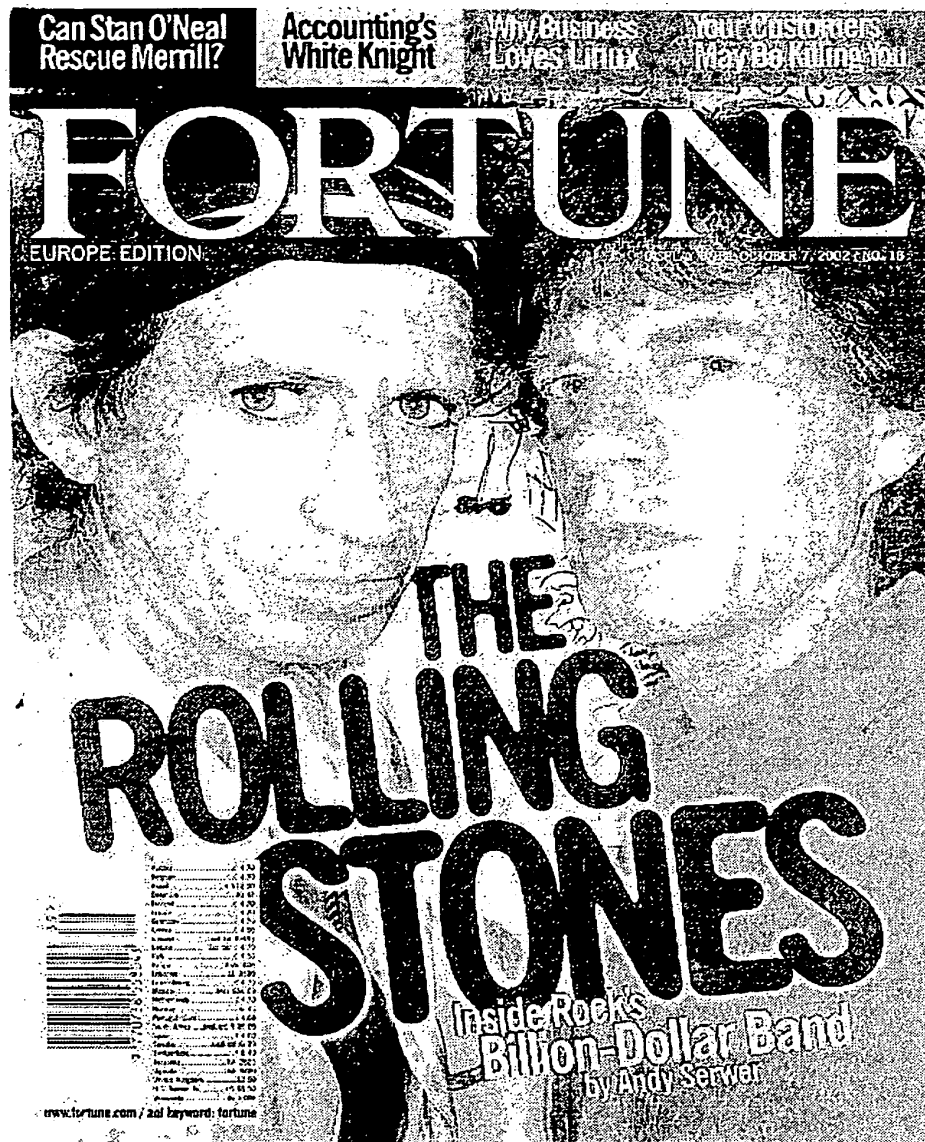


EXHIBIT B



W. FORTUNE

Will this customer sink your stock

WHO ARE YOUR UNPROFITABLE customers? We recently asked that question of top executives at one of America's biggest retailers. They responded defiantly that they had no unprofitable customers. Understand that this company was in trouble—it wasn't even earning enough to cover its cost of capital. Wall Street analysts were beating it up, and its stock was performing worse than the shares of most competitors. Yet its leaders insisted that through some dark financial voodoo, millions of profitable customers somehow added up to an unprofitable company.

The truth—which shocked them—was that some of their customers were deeply unprofitable. Simply doing business with certain customers was reducing the firm's profits and shareholder value. Other customers were fabulously profitable—but the effect of the bad-news buyers was overwhelming them. The retailer's managers didn't understand any of this. They didn't understand that their customer strategy—their whole plan for acquiring, maintaining, and developing customers—was determining their

Here's the newest way to grab competitive advantage: Figure out how profitable your customers really are.

By Larry Selden and
Geoffrey Colvill

customer profitability, and crucially, that their customer profitability was in turn determining their share price. Because the company didn't understand these connections, it was, among other serious errors, wasting marketing efforts at customers who weren't profitable and probably never would be. Here's how ridiculous the situation was: This company was actually spending money to bring in customers who were reducing the value of the firm.

Get ready for a big idea that's about to sweep through most com-

panies: managing the enterprise not as a collection of products and services, nor as a group of territories, but as a portfolio of customers. Of course, managers have always known that some customers are more profitable than others. But it's amazing how many executives, like those of that big retailer, haven't the least idea just how profitable (or unprofitable) individual customers or customer segments are.

Most managers don't understand how their customer portfolio determines their ultimate bottom line: the value of the com-

ILLUSTRATIONS BY CHRISTOPHER NORRIS

MANAGING

parry. Believe it or not, it's entirely typical to find that just the best 20% of a company's customers generate a huge portion of its share price—in some cases, all of it. The trouble is, the worst 20% may destroy a ton of value, with the middle 60% making up the difference. Until a company starts managing its highly diverse customer portfolio, it can't hope to maximize shareholder value.

That's a critical opportunity missed, because many companies are desperate for a new competitive advantage. Today about 60% of U.S. corporations, like the retailer mentioned above, are either chronically failing to cover their capital costs or just barely doing so. They can't hope to get their stock moving until they fix that problem. Cost cutting and Six Sigma quality programs are great, but when everyone in the industry is doing the same things, you're back to even. Now, in a tough economy and a brutal stock market, the hunt is on for a new source of advantage, one that can last a long time. Companies that find it early will build huge barriers against competitors.

A number of leading firms believe they've found such a competitive advantage. These truly customer-centric companies—including Dell Computer, Toronto-based Royal Bank of Canada, Fidelity Investments, and Canada's Hudson Bay Co.—are getting a grip on their customer portfolio and managing it to lengthen their lead over competitors. Why now? Because until recently trying to calculate the profitability of individual customers or even customer segments was too hard an infotech task for big companies to handle. Now the technology, which is getting more powerful and less expensive by the day, is finally up to the job. Here's a mind-boggling fact: Royal Bank calculates the profitability of every one of its ten million customers every month.

But infotech isn't the key. Many companies have spent millions on the needed software—including ERP (enterprise resource planning), CRM (customer relationship management), and many other applications—with little or nothing to show. That's because cashing in on customer profitability requires a deep change in corporate mindset, something no vendor can sell you. The customer portfolio needs to become the basis of how companies get organized, measured, and managed. Making this switch is tough. That's why even smart firms, which don't require point infotech systems to analyze customer profitability, have rarely done it. Yet companies that can make the shift are discovering huge advantages from managing their customer portfolio. Financial services firms, in particular, are leading the charge.

Consider Fidelity Investments, the world's largest mutual fund company. It realized that some customers were unprofitable because of the channels they used to interact with the company. When a customer who does limited business with Fidelity, and probably has limited potential, calls a service rep too frequently, the costs can easily outstrip any profits.

So a couple of years ago, when such customers called, Fidelity's reps began teaching them how to use the company's lowest-cost

channels: its automated phone lines and its website. It also made its site friendlier and more enticing to use. These customers could still talk to service reps, but the phone system identified their calls and routed them into longer queues, so the most-profitable customers could be served more quickly; for the unprofitable customers, the longer wait would be a disincentive to call.

Fidelity couldn't lose. If the unprofitable customers switched to lower-cost channels, they became profitable. If they didn't like the new experience and left, Fidelity became more profitable without them. But Fidelity found that 96% of those customers stayed, about the same retention rate as in the industry overall,

and most of them switched to lower-cost channels. Over time, customer satisfaction actually increased for the smaller customers as they learned how to save time and get faster service through the lower-cost channels, increasing Fidelity's operating profit within 12 months.

Note that because Fidelity could allocate resources based on customer profitability and potential, it could have its cake and eat it too. Unprofitable customers became profitable, and profitable customers got better service through shorter wait times when calling. This is typical of companies that make the kind of change Fidelity did. By contrast, when companies don't understand customer profitability,

they suffer a double whammy. Resources get squandered on unprofitable customers, which means the profitable ones get short shrift and become less satisfied.

Here's another example. In late 1999, Royal Bank of Canada, the largest bank in that country, reorganized itself not around products or territories but around customer segments. This focus on customer profitability revealed a large opportunity the bank had been missing. When clients from its elderly and well-off "wealth preserver" segment died, their assets passed to their heirs, who tended to be concentrated in one of the bank's most profitable customer segments, which it calls "builders and borrowers." But the bank wasn't satisfied with its retention of those assets; many heirs were not Royal Bank customers, and others were transferring the assets to other institutions.

So last year the bank thoroughly revised the experience it offers current and potential customers who have to settle estates. The process can involve tons of paperwork, so the bank made it easier and more efficient. Since settling an estate is a chore that most people don't know much about, and one that can be emotionally draining, the bank offered financial advice and planning to guide them through it. In a test of the new offer, the bank increased its retention of assets from 30% to 50% and attracted new assets equal to another 25%. Rolled out nationally, the program would translate into \$1.5 billion (Canadian) of net new balances. Royal Bank won't say how much extra profit that would create, but the amount is clearly substantial.

Because the bank calculates each segment's economic profit—*that is, profit after a capital charge*—management can figure out how much each contributes to the share price. The company is also telling stock analysts about segment profitability—

Until recently,
trying to calculate
the profitability of
customers was too
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for big companies.
Now the technology
is up to the job.

CHARLES DELLAPORTA is a professor at Columbia University's business school. GARY R. COOPER is ROYAL BANK's national director. The authors' book on customer and shareholder value will be published next year.

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valuable information that gives investors deeper insight into Royal Bank than they have into competing banks.

FINANCIAL SERVICES ARE one thing. But it's harder for many people to conceptualize how analyzing and acting on customer profitability might work in retailing. Retailers sometimes throw up their hands and ask, "What can I do—put a bouncer at the door to keep unprofitable customers out?"

Probably not, but retailers can do far more than they may imagine. We know a retailer that ran a loyalty program based on how much customers spent. Analyzing their profitability showed that many of the biggest spenders—the top tier in the loyalty program—were deeply unprofitable, often because they bought only sale items and made loads of returns. So the obvious first step for this retailer was to stop sending these customers announcements of big upcoming "private" sales. The company had been promoting such events heavily to its top-tier group, not realizing that actually doing less business with some of them would increase profits.

The retailer also found ways to do more business with its most profitable customers. For example, a woman who buys \$10,000 of full-price dresses each year but buys no shoes is a clear opportunity—because she's probably buying a lot of shoes somewhere. So the company could promote its shoe department to her and make sure salespeople mentioned the department to her in the store. The retailer could also take steps to turn unprofitable customers into profitable ones by trying to bundle profitable products with the unprofitable ones that the customers typically buy, based on computer analysis of frequent product pairings. This is "You want fries with that?" on steroids.

If understanding customer profitability is so valuable, how could the top managers of the major retailer we mentioned earlier have felt so certain—and been so wrong—about all their cus-

ways to fail

Many companies try hard to be customer-centric, but their efforts don't make their shares go up. The reason? They're committing some—and frequently all—of these five sins. Are you?

Denial

Do you insist that the differences in the profitability of your customers aren't important or aren't measurable? Do you deny that you have unprofitable customers? If you try to measure customer profitability, do you exclude some operating or capital costs?



The Growth Illusion

Are you adding lots of new customers without knowing how much they cost to acquire or how long they're likely to stay? Most important, are you clueless about the economic profit (operating profit minus a capital charge) you can expect from each new customer?



The Illusion of Averages

Do you make decisions based on average customer profitability? Are you ignorant of how much economic profit comes from the best 20% and the worst 20% of your customers? Are you unsure about which specific elements of customer behavior cause customers to fall into the top and bottom groups?



Failure to Act

Do you fail to make specific managers fully accountable for acting on customer profitability? Is your strategic plan disconnected from the economic profitability of customers or customer segments?



Failure to Drive Share Price

Have you stopped short of figuring out how much each customer segment contributes to your share price and then using that knowledge to drive the price up? Have you failed to tell your board and your investors how you're using your knowledge of customer profitability?



tomers: being profitable? These executives said that all their products had positive gross margins, and the company managed inventories well, so tons of capital weren't tied up. Thus, they reasoned, no matter what baskets of goods customers bought, they must all be profitable.

The trouble was that these managers were ignoring important costs. Start with the store's operating expenses: sales associates, rent, electricity, maintenance, and so on. If the shoe department used 10% of those resources, it should bear 10% of the operating costs. When our retailer began to allocate those expenses earlier this year, the company found that 25% of its product categories were unprofitable, many very unprofitable. Applying charges for capital—inventories, plus things like store improvements—yielded what finance experts call economic profit. It turned out that more than half its product categories were generating negative economic profit!

Using credit card data and simple observation in stores, the company began to analyze baskets of goods bought by a varied sample of customers. It found that some of them chronically bought mostly unprofitable products. Those customers were unprofitable. The retailer also found that some customers made lots of returns, behavior that could make profitable baskets unprofitable; others bought only items that were on sale.

Also unprofitable were customers who tied up sales associates but didn't buy anything.

WHEN COMPANIES FAIL TO UNDERSTAND CUSTOMER PROFITABILITY, they do worse than just miss big opportunities; they can also get themselves into deep trouble. We've observed two especially dangerous traps (for more, see "5 ways to fail").

► **The growth illusion.** Imagine a company that launches a big push for new customers and acquires 5,000 of them at a cost of

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\$1,000 each. That amount is what the company spends on advertising, promotion, sales calls, and so forth to get those customers in the door. (The company might spend \$100 reaching each prospect but succeed with just one in ten.) To keep things simple we'll assume that the new customers don't produce any business in the year in which they're acquired, so the company's operating profit is \$5 million lower than it otherwise would have been. That is, it has invested \$5 million in the hope of realizing much more than \$5 million in future profits.

Suppose this company typically holds its customers for three years, and it earns profits of \$300 per year from each customer. Obviously the company is losing money; it's earning \$900 on customers that cost \$1,000 to acquire, and that's not even discounting the future earnings to reflect the time value of money.

Yet remarkable as it may seem, the company's investors and even its managers, looking at conventional operating results rather than at customer profitability, might not know for years that anything is wrong. Why not? Suppose that in its second year the company acquires just 1,000 more customers, again at a cost of \$1,000 each, or \$1 million. Since the 5,000 recently acquired customers bring in a profit of \$300 each for a total of \$1.5 million, the company shows a profit increase of \$500,000. That's a nice change from the previous year's decline and the beginning of a good-looking trend line. It gets better. Suppose that in the next year the company again acquires 1,000 new customers for \$1 million. Now it has 6,000 new customers bringing in profits (\$1.8 million total) and shows a profit increase of \$300,000 over the previous year. Repeat the pattern once more, and profits again rise \$300,000 over the previous year.

This company looks like a star. Investors are frantic to buy the stock. The directors are paying management millions. Yet every new customer is unprofitable. The more customers the company adds, the more value it destroys.

Obviously this situation can't last forever. The 5,000 customers acquired in the big campaign, having stayed for three years, leave; if the company keeps adding 1,000 customers a year, and the cost and profit characteristics remain unchanged, it suddenly falls into a steady state of losing \$100,000 a year (that's before capital charges, which would make the value destruction even worse). The stock collapses, top management gets fired, and everyone is wondering at how a company could go into the tank so fast.

Does this scenario sound familiar? Leaving aside the simplified numbers, does it suggest Gap's recent experience as it furiously acquired new customers by opening new stores on every corner, then saw its stock collapse? Or WorldCom's spectacular run-up as it offered cash incentives to attract new customers, then crashed and burned? Or cellular phone companies nationwide that did the same thing? We hasten to add that we don't know for sure whether the scenario we describe is what afflicted those companies—and we suspect they don't know either. But the circumstances are certainly suggestive.

What scares so many managers we talk to is that they have no

rebecca.greider@fortune.com

idea whether they're facing this disaster, because they don't know how to look across their firm's products, regions, and sales channels to understand customer profitability. They don't know what it costs them to acquire customers or how long they hold customers or what it costs to maintain them, so they have no idea how much money they make (or lose) on each one.

► **The illusion of averages.** In our growth illustration above, we assumed for simplicity that all customers were economically the same. In reality that's never the case. The profitability of a company's customers often varies radically. For example, at Royal Bank just 17% of customers account for 93% of the bank's profits. Occasionally a company will calculate a rough measure of average customer profitability, but because profitability is so unevenly distributed, acting on an average number may do more harm than good.

To see why, consider two struggling companies, A and B.

The economic profitability of the average customer at each company is the same: -\$15. Yet this average figure masks two radically different customer portfolios. Suppose that at company A, every customer is yielding this same dismal economic profit of -\$15. But at company B, half the customers are generating economic profit of \$80 each, while the other half are yielding economic profit of -\$110 each, combining to create the -\$15 average.

While the averages for A and B are the same, the implications

are vastly different. Company A can't earn an economic profit with any customers and thus faces a bleak future. Company B, by contrast, is tremendously successful with half its customers and performing disastrously with the other half. If company B's managers can figure out which customers are in which group and why, and then focus on adding more great customers and doing more business with them, while converting or losing the terrible customers, they have a great story for investors. This type of customer de-averaging represents a powerful new way for companies such as B to allocate resources in ways that will turbocharge profits.

MANAGERS AREN'T THE ONLY ONES WHO NEED BETTER knowledge of customer profitability. Investors do too. They'd love to screen their holdings with the kind of analysis outlined above, but they can't. In today's environment many companies are publishing far more data than before, but they're still excluding a few pieces of extraordinarily valuable information: customer acquisition costs, maintenance costs, length of customer relationships, and some sense of how customer profitability is distributed.

Boards of directors will soon begin to demand customer profitability data and will challenge management to act on it; investors will demand that companies report it. They will have to, because knowledge of customer profitability will enable them to attract investors away from competitors that don't have this knowledge. And that's an advantage that no company can safely ignore. ■

**Boards of directors
will soon begin to
demand customer-
profitability data from
companies; investors
will demand that
companies report it.**

DATAMONITOR

Market Analysis Experts

Datamonitor Technology INSIGHT – December 2000

MEASURING SUCCESS: NCR AND ITS VALUE ANALYZER

Author: Andreas Kolind

SPP: Enterprise CRM and Customer Facing Technologies

The event

On 23 November, NCR won the CRM Project Award at this year's Information Management Awards for the implementation of its profitability analysis software. The product, Value Analyzer, was launched in 1999 and was recognized for its implementation within Royal Bank of Canada earlier this year. NCR has been moving gradually into the CRM space and this therefore merits some discussion of their solutions and strategy.

Value Analyzer

NCR has developed a number of applications, as part of its Relationship Technology package, which are intended to sit on top of its data warehousing platform, Teradata. One of the financial services products is Value Analyzer, which measures profitability from a 'bottom-up' perspective, i.e. at the account level. This depth of measurement means that profitability can be reported by customer, channel, product or functional department. Furthermore, its scalability means that it can be sold to banks of varying sizes and needs; however, small banks are unlikely to be able to afford this profitability solution, even though they might like it's level of detail in their decision-making.

If used in combination with NCR's Teradata platform, Value Analyzer is able to analyze enormous volumes of customer behavior data in hours, rather than days. The resulting data can then be used to improve decision-making in many areas, including channel migration initiatives, price setting and identifying underserved customer segments. And because the

calculation is based on actual customer transaction volumes, it is more accurate than software packages that use estimations.

Value Analyzer has been developed in collaboration with NCR's existing financial institution clients and will initially be targeted towards large retail banks, and then later spread across business lines, to include credit cards, corporate banking and insurance. NCR believes that this solution would be of interest to any organization where customer profitability is a critical issue and this could include other sectors such as insurers, telecoms and airlines. For example, insurers would be concerned with the current, latent and potential profitability of their customers, information that could be calculated using past data. In future, NCR also plans to add functionality and increase the performance of the Value Analyzer system to cope with greater amounts of data anticipated in the coming years.

NCR's strategy

This is part of NCR's strategic move from a hardware-only portfolio to also include software and services, though it makes considerable use of Teradata, NCR's well-regarded data warehouse solution. Value Analyzer has been designed with Teradata in mind and may lead to the client switching to Teradata to improve performance. Value Analyzer can also co-exist as a datamart with data warehouses from other vendors such as Oracle and IBM but is available only on the Teradata database.

Value Analyzer is not the only profitability measurement software available in the market and competes with Oracle's Financial Services Application, Peoplesoft's Profitability Management, IBM/HNC's ProfitVision and Siebel's Marketing application. However, NCR's solution is clearly positioned at the high-end and is aimed at banks with large volumes of transactions and accounts, such as the Royal Bank of Canada.

NCR's image has changed significantly in recent years, from being a financial services company selling ATMs, to a company with a complete portfolio of transaction and data warehousing solutions. Now, we see evidence that industry organizations are recognizing NCR's move into CRM. For example, NCR recently earned the number two position in DM Review magazine's annual ranking of the top 100 vendors in data warehousing, e-business and CRM. It beat household names traditionally associated with CRM, including Oracle, E.piphany and Siebel. Moreover, in September, NCR won the CRM category of the DM Review 2000 Readership Awards. It seems the image of NCR is no longer limited to cash registers and ATMs.

Datamonitor's view

NCR has correctly seen the emerging trend of banks to link shareholder value to CRM initiatives, based in part on the increased need for accountability in their decisions. Most banks now need to measure and manage customer profitability and look to CRM vendors for solutions. NCR's close collaboration with financial institutions in the past has allowed it to develop this and other products for the banking industry. That it has chosen to target large banks, most of whom are existing Teradata users, means that the first phase of sales will be relatively easy; it will be more difficult to sell to banks in which it hasn't already installed Teradata.

The challenge for NCR must be to convince new customers of the financial impact of buying Value Analyzer, given the size of the cost and the length of the implementation period (six to eighteen months depending on the size of the bank). Improving the mindshare of NCR in the CRM field by opening reference sites and promoting success stories (like the Royal Bank of Canada implementation award) are a good start. Encouraging prospect banks to invest in analytical CRM initiatives may well prove more difficult, partly because they are less glamorous than operational CRM tools. NCR's move into analytical CRM may go some way to changing the industry view of this area of CRM, while providing itself with yet another tool to demonstrate the power of Teradata.

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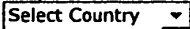
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Teradata Announces New Version of Value Analyzer - 3/15/2004
Detailed profitability analysis now available for all industries
DAYTON, Ohio – Teradata, a division of NCR Corporation (NYSE: NCR), today announced a new version of its award-winning Teradata Value Analyzer™, the only analysis tool that calculates profitability at the detail level driven by customer behavior. Much admired for its strength in the banking and telecommunications industries, Teradata Value Analyzer 3.0 is now available for all industries.
"Profitability analysis by product, channel and customer is an essential part of the planning process to make decisions regarding resource allocation, product development and for identifying pockets of opportunity," said Kim Collins, Gartner analyst.
The insights generated by Value Analyzer enable an assessment of all types of business profitability and support swift, sound decisions guiding marketing, product and customer service initiatives, according to Mike DeBrosse, vice president of Teradata. "In today's economy, using a profitability measurement solution that depends on averages doesn't make sense. Details answer the question 'why' and provide companies with actionable information that can create a competitive advantage. Averages don't."
Teradata Value Analyzer's detailed, behavior-based approach differs from more traditional measurement tools that determine profitability by using high-level averages or aggregations. Without the details that drive revenue and costs, companies are left with an inaccurate view of value leading to misguided business decisions that affect the bottom line.
Teradata Value Analyzer links revenue and expense data to actual customer transactions and interactions within a company. For a complete profit and loss metric, it also can include risk provisions and capital allocations. The metric can be calculated for any profit object. A profit object at the lowest level can be an account, a telephone number, reservation record or shipment, to name a few. Starting from a profit object, a company can easily get to different views of profitability across the enterprise including customer, product, organization and channel.

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Teradata Poll

What percentage of your corporation's data resides outside of your Enterprise Data Warehouse?

☐ None

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- ☐ About 25%
- ☐ About 50%
- ☐ 75% or more



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Teradata Value Analyzer provides for flexible and robust analytical capabilities that support strategic decisions. It supports the detail flow of revenue and expenses through all entities of the organization, providing an important link between standard finance-led organizational profitability and detailed customer profitability. Modeling cost flows, it also supports the creation of activity-based management processes and calculations.

Teradata Value Analyzer calculations are easily completed inside the Teradata data warehouse engine, rather than consuming resources and time moving large amounts of data in and out of a separate system as it is processed. In addition to speed of the calculations, accuracy, which is critical for making confident business decisions, is not compromised. Working in a single integrated database, Teradata allows for an actionable review of all data, not just a sample that may offer misleading clues to profitability.

About Teradata Division

Teradata, a division of NCR Corporation (NYSE: NCR), is the global technology leader in enterprise data warehousing, analytic applications and data warehousing services. Organizations around the world rely on the power of Teradata's award-winning solutions (www.teradata.com) to get a single, integrated view of their business to enhance decision-making, customer relationships and profitability.

About NCR Corporation

NCR Corporation (NYSE: NCR) is a leading global technology company helping businesses build stronger relationships with their customers. NCR's ATMs, retail systems, Teradata® data warehouses and IT services provide Relationship Technology™ solutions that maximize the value of customer interactions and help organizations create a stronger competitive position. Based in Dayton, Ohio, NCR (www.ncr.com) employs approximately 29,000 people worldwide.

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Teradata Poll

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☐ None

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Teradata Profitability Analytics Bolsters the Bottom Line for Mobile Communications Companies - 9/23/2002

Actual behaviors, transactions and activities analyzed for precise, integrated profitability measurement

DAYTON, Ohio - With billions of wireless users in hand, mobile communications companies must now determine not only how to improve retention rates, but also how to maximize the value of these subscribers. Teradata, a division of NCR Corporation (NYSE: NCR), today introduced Teradata Profitability Analytics software, which runs on the Teradata® warehouse engine. Comprised of Teradata Value Analyzer, which precisely measures current profitability, and Teradata Lifetime Value, which predicts lifetime profitability, Teradata Profitability Analytics enables mobile communications companies to develop customer relationship management (CRM) strategies with value as the foundation.

There is a critical need for profitability analytics.

"Recent Yankee Group research has indicated that the current economic and competitive environment is forcing wire-line and wireless communication service providers to better understand the profitability of their service customers and sales channels," said the Yankee Group's David Hawley. "The Yankee Group's findings indicate that CSPs are prioritizing business intelligence investments that will enable them to increase their understanding of the profitability of customers as well as products and services over other technology initiatives. It will be fascinating to see which communication service providers leverage their underlying data warehousing technology to use detailed data in solving this challenge," said Hawley.

"In what has felt like a parallel to Bill Gates' vision for a computer on every desktop and in every home, mobile communications companies have led the charge for a wireless phone in every hand," said Jack Knapp, vice president of communications industry marketing at Teradata. "But as penetration rates begin to peak, many of these companies are shifting their focus to retaining customers and encouraging higher spending to drive revenue growth. In doing so, they need to determine not only which customers are likely to spend more money, but which customers are more valuable to retain."

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EXHIBIT E

- ☐ About 25%
- ☐ About 50%
- ☐ 75% or more



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"Most mobile companies measure their business on average revenue per user (ARPU), which is fine during rapid growth mode. But today's market requires different standards. Measuring revenues without analyzing affiliated costs - everything from network usage, customer care expense and incentives - doesn't give a true picture of each account's contributions to the bottom line. Actual margin per user (AMPU) is the optimal measure, as it enables mobile communications companies to build and implement plans based on actual customer value. That's where Teradata's Profitability Analytics comes in. Now communications companies can measure the profitability of each wireless customer and use this information to guide marketing, sales and service decisions," added Knapp.

Teradata Value Analyzer is an end-to-end solution that pinpoints profitability calculations across five distinct components at the fundamental level, the billing telephone number. These components are: revenue (direct and indirect), interest revenue/expense, direct expense (applied to customer behavior or events), indirect expense (cost of doing business) and risk provision (applying the cost of credit and other potential risks and fraud). To boost speed, Value Analyzer calculations are completed inside the Teradata warehouse engine, rather than consuming time by moving large amounts of data in and out of the data warehouse as it is processed. This also heightens accuracy as Teradata allows for an exhaustive review of all data, not just a sample that may offer misleading clues to customer profitability and behavior.

Mobile communications companies can utilize Teradata Value Analyzer to proactively manage their business by tracking profitability by customer segment, rate plan, channel and geographic market. Decisions on investments in new applications, products and services, network expansion and phased service rollouts can be prioritized. Teradata Value Analyzer can also provide analyses that help companies build more profitable rate-plan offers and better target customers for rate-plan migrations. Customers can be segmented by behavioral profitability as opposed to revenue, and marketing campaigns can be designed to change the overall account mix, capitalizing on the attributes that characterize higher-margin customers.

Teradata's Lifetime Value Solution provides mobile communications companies with business intelligence that allows them to measure the ongoing value of any object - everything from customers, products and delivery channels to the sales force, geographic regions and customer service centers. The Teradata Lifetime Value Solution identifies patterns and trends by applying complex mathematical models to detailed customer-behavior data. Those patterns and trends are linked to customer-attribution projections, demographics and propensity to buy data to provide insights into customers' lifetime value. Measuring actual behavior provides reliable results and can provide insight into the challenges and opportunities that lie ahead.

Mobile communications companies can use this information to a variety of applications and activities, such as product development and testing, pricing, marketing programs, customer retention and relationship management.

Teradata Profitability Analytics is available for immediate delivery.

About Teradata Division

Teradata, a division of NCR Corporation (NYSE: NCR), is the global leader in enterprise data warehousing and enterprise analytic technologies and services. For more information visit www.teradata.com.

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Solve Specific Business Problems With Rules-Based, Data-Driven Applications

By Brian Wasserman, consulting software analyst

Every business is unique. Each has its own set of customer detail data and its own way of performing functions such as profitability calculations. So how can those businesses meet the customized needs of different customers with a single set of source code? With a Rules-Based, Data-Driven application.

Tailored to customer-specific data

A Rules-Based, Data-Driven Application, such as Teradata Value Analyzer (TVA), is a two-pronged solution that can be customized and tailored to fit the needs of any customer site. The "data-driven" component operates against customer-specific data without requiring changes to the core application software. And the "rules-based" application can process any business rule based on specified templates. Together, the applications permit calculations based on user-defined rules, with the resulting calculations driven by the specifics of customer data.

Here's how a Rules-Based, Data-Driven Application works in a financial institution:

Like other businesses, financial institutions maintain diverse types of detail data about both their customers and their financial transactions. Some institutions keep extremely detailed data, while others are far less sophisticated. At the same time, those institutions also perform profitability calculations in an equally different manner. A "rules-based" application provides them with business rule templates for calculating the various facets of profitability, including revenue, expenses, and risk according to their specific business needs. These templates query for information that users must enter to calculate profitability and include options and choices that are based on customer-specific data.

Effective innovation

Why is this such an innovative — yet effective — approach? Because of the flexibility a Rules-Based, Data-Driven Application can create. First, a Rules-Based, Data-Driven software application can meet the customized needs of different customers with a single set of source

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code. Just as important, it allows Sales and Professional Services teams — as well as the customers themselves — to reuse applications such as Teradata Value Analyzer and focus their energies on solving a customer business problem, not on engineering software.

Pick the right technology

There are many ways to engineer this type of application. The Value Analyzer architecture, for example, includes a Metadata Definition and a SQL Generator to facilitate the Rules-Based, Data-Driven approach. The Metadata Definition is used to define elements of customer data that will be used in profitability calculations. The SQL Generator uses the Metadata Definitions and generates Teradata-optimized SQL macros that process the dynamic, or customer-specific portions of the profitability rules.

Business Examples

Here are just a few examples of how a Rules-Based, Data-Driven application can solve an array of potential business problems:

Financial Industry: *Apply a fixed \$10,000 cost of the bank president to all accounts.*

Here, a financial institution has a fixed amount of money (\$10,000), representing the cost of the office of the bank president, that it wishes to spread evenly across all accounts. The software will retrieve the total number of accounts contained in the data warehouse, and will add a cost to each account based on its share of the \$10,000. The actual cost applied to each account will vary based on the number of accounts defined.

Travel Industry: *Assign a fixed cost to all flights based on the booking channel.*

In this example, an airline has to pay a fixed (\$50) cost for flights that are booked through a travel agency, while flights booked through the airline's web site receive a lesser cost (\$1). In this example, a flight is represented by a Passenger-Name-Record (PNR), which is analogous to a master account. A flight booking is a PNR event. The *booking channel* is an attribute of a booking, and is identified to the software through the application metadata during the business discovery process.

The software applies two rules: one acts on PNRs where the *booking channel* = "travel agency;" the second acts on PNRs where the *booking channel* = "web site." The SQL Generator software uses the metadata information to retrieve all PNRs with the appropriate *booking channels* for each rule, insuring that the correct charge is applied.

Communications Industry: *Take a Customer Billed Amount from all customers having calling plan "Family 300", and apply to individual phones based on the total number of minutes for all calls made if the total number of calls is greater than 300 minutes.*

In this example, customers are analogous to master accounts, and phones are equivalent to accounts. During the Business Discovery Process, Customer Attributes *Calling Plan* and *Billed Amount* were identified to the software through metadata. Phones contain calling events which are called Call-Detail-Records (CDRs), and the number of minutes per phone call is an attribute of a CDR.

In processing this Rule, the software uses the *Billed Amount* attribute of a customer as the source for the money being allocated. However, the SQL Generator must first find in the data only those customers with the specified *Calling Plan* = "Family 300." Once these customers have been identified, the SQL Generator must find all phones belonging to these customers and aggregate the number of minutes of phone calls (based on the CDRs). Where this total is greater than 300 minutes, a percentage of the customer *Billed Amount* will be applied.

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DETAILS, DETAILS

How much are your customers worth? The answer is in their actions.

by Barb Swartz

AS AN INVESTOR IN TODAY'S STOCK MARKET, you know you can't make a wise decision without considering a company's annual and quarterly reports, its past stock performance, independent reviews of its market share and more. For instance, two popular U.S.-based retail companies reported comparable revenue figures in their 2002 high-level financial reports, but a little research revealed that one corporation actually had a stronger balance sheet and accompanying stock price, while the other was experiencing higher growth.

Investors look for the details that can help them make informed decisions. By the same token, businesses must demand details when they evaluate the profitability and value of their investment in their customer base.

Most companies say they know who their most valuable customers are, but their view is often based on simplistic measurements like average revenue per user, miles flown, number of products owned, number of accounts, purchase frequency or average number of stays. With a more detailed, behavior-based measure of profitability, businesses can feel confident that they are optimizing their investments in customers, products and channels.

By the numbers

The marketplace abounds with profitability systems. Most of them use data that has already been summarized by source systems of record, e.g. by transaction type or by the number of occurrences of that transaction type in the last period. These summaries, or proxies, are then multiplied by the cost per transaction type to arrive at the customer expense or direct cost.

Most profitability systems are unable to process high volumes of data, so proxies are used

**Most companies say
they know who their
most valuable
customers are, but
their view is often
based on flawed data,
simplistic**

4/19/2004

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**measurements or
incomplete
information.**

instead. Proxies serve to condense customer behavior into manageable amounts of information that are useful for a specific time and purpose.

While generally accurate enough to develop relative profitability measures, proxies lack insight into individual customer behavior and are inadequate for companies looking to build a franchise around individual customers. When a company attempts to extrapolate future value from proxies, even the smallest inaccuracies or missing data will have a dramatic impact on the results.



Summarized data presumes that the summary will be used to answer specific questions. Even though the summaries were constructed from actual events, they can't be deconstructed to recreate those events. This impacts not only the calculation of the profitability figures, but also the analysis for an individual customer or group of customers.

A look at behavior

Teradata provides a unique solution for accurately measuring profitability at the lowest level—the basic unit and transaction level. Teradata Value Analyzer, which runs on the Teradata Warehouse, enables multi-dimensional views of profitability, using customer activity as the foundation. This satisfies the need for detailed enterprise profitability reporting and analysis, which leads to better informed decisions that maximize profitability. In other words, the measurement of profitability is driven by the behavior associated with the basic unit instead of summaries or averages—a practice that ensures true cost- and income-drivers can be identified and understood at the most detailed level across the organization.

Teradata Value Analyzer helps users better understand the value of their customers. It measures, in detail, the components of customer revenue and customer expense at the basic unit and transaction level. From this data, companies can develop any number of aggregations, including by customer or household, by channel, by product or by organization. The calculations involve the measurement of each basic unit's profit contribution across five components: base revenue, net interest revenue, direct expense, indirect expense and risk provision. This approach allows easy reconciliation with the general ledger and consistent data analysis—certainly a revolutionary step for many companies.

Case study

Consider the telecommunications industry, which often uses average revenue per user (ARPU) as its measurement for customer value and success. Customer A has an ARPU of \$200 per month, and Customer B has an ARPU of \$100 per month. At face value, Customer A is twice as valuable as Customer B. However, things are not always as they appear.

With Teradata Value Analyzer, the communications service provider (CSP) can incorporate into the profitability calculation variables such as network, call and product mix, along with other behavioral data such as payment history and service calls. The "Customer Profitability/Percent of Revenue" calculation in the chart below yields a value that would cause the CSP to view

**Just knowing
profitability by**

4/19/2004

customer, account, shipment or flight is not enough to improve financial results. The analysis must result in action.

these customers differently than if they just used the ARPU calculation.

Communications Services Provider		
Account Type	Account Type	Account Type
ARPU	\$100	\$100
Network Mo	70% roaming	10% roaming
Call Mo	25% int	2% int
Product Mo	4 products	5 products
Payment	10 days late	0 days late
Service Cnts	2	5
Credits	\$4	\$0
Longevity	3 months	4 years
Customer Profitability Percent of Revenue	\$68 / 68%	\$43 / 43%

Teradata Value Analyzer captures the way the CSP treats the account by defining business rules associated with profitability drivers such as network expense.

The solution also captures the way the customer interacts with their accounts by incorporating actual transactions in the profitability calculation. Therefore, the account-level profit reflects the uniqueness of each customer by the transactions, channels and usage relating to every account owned by the customer.

This process can scale for businesses of any size. Royal Bank of Canada, for example, has 25 million accounts and handles 52 million transactions on a monthly basis. Despite the size of the database, it takes less than eight hours to run the Teradata Value Analyzer process against detail data once a month with nearly 250 business rules.

Analyzing the analyzer

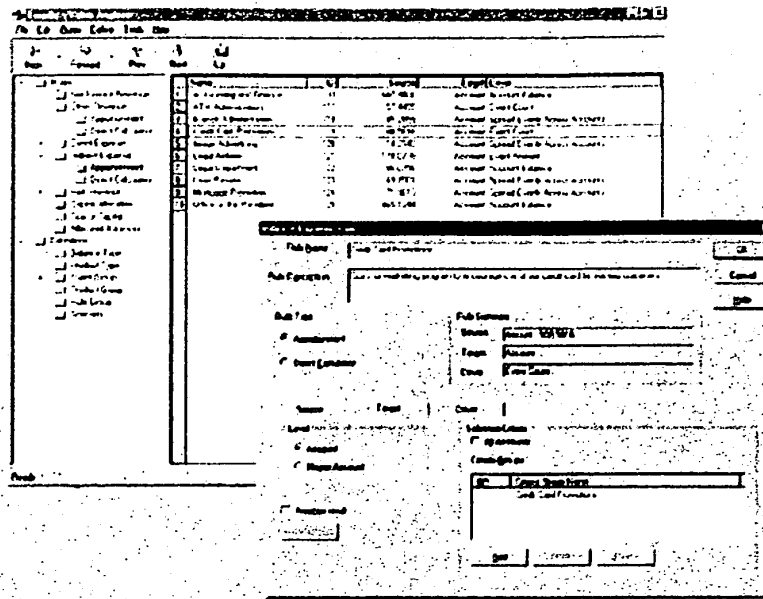
Teradata Value Analyzer has an easy-to-use graphical user interface (GUI) that allows users to set up, define and maintain policies and processes concerning revenue and expense structures as they relate to each component of profitability. The application allows an unlimited number of these "business rules," which are unique to every company.

To set business rules in the application, users must provide input in two main areas. First, they need to define the products and events on which the application will base its modeling. This information is the foundation of the profitability calculation process. Second, users must define the rules relating to each component of profitability. This step is performed by selecting attributes, such as frequent flyer status, and inputting specific data or variables relating to each attribute.

The GUI was designed for business users rather than technical users, making the rules easy to maintain. All data related to the rules of the profitability model are stored in the database and can be retrieved. In addition, the front-end screens remain set up from the previous run of the model, allowing users to see how the model was defined in the last cycle and giving them the option to simply re-run the next month's data without changing any parameters.

The next step in the Teradata Value Analyzer process is to invoke the profitability engines that run

inside the Teradata Warehouse. Tables are then populated with the detail profitability results and ready for users to view in a manner that best meets their needs.



click to enlarge photo

Call to action

Customer profitability measurement is a three-step exercise. The first step is to understand what the customer's profit-ability level is. The second step is to analyze why that level is what it is. Finally, the third step is to take action, based on the analysis, to improve the customer's value to the organization.

To properly understand why a customer is profitable, analysts must have access to the information that was used to calculate the value. Behind every value calculated by Teradata Value Analyzer are the five components mentioned earlier. This information needs to be calculated and stored to understand trends and anomalies.

To illustrate this, consider a financial services institution. It studied a segment of customers with a particular service package that, while valuable due to their overall relationship, including mortgages and investments, were not contributing to profit as a result of the current service package. In analyzing the actual transactions performed by this customer segment, the bank found that a high percentage of them used the bill payment function at the ATM. This type of transaction was expensive for the bank and was determined to be draining profitability from this segment.

The bank needed to influence the behavior of these valuable customers so they would migrate to a more cost-effective means of performing the same transaction. There were three options.

Option 1: Introduce a fee for paying bills at the ATM. **Projected response:** Negative public relations move that would penalize customers and could potentially cause a retention problem.

Option 2: Introduce "Web-enabled ATMs" that would read and process bill payments electronically. **Projected Response:** Further decline in profitability, as this option costs more than ATM bill payment.

Option 3: Introduce telephone and Internet banking access into the package. **Projected Response:** Clients would see this option as an added convenience, thus increasing the bank's perceived value.

The bank initiated Option 3. As a result they saw very positive results in both financial performance and customer satisfaction. Over time, as bill payment transactions migrated to the Web, the costs to serve this customer segment dropped significantly, and fewer than 10% of these packages were loss leaders. After 24 months, an additional package enhancement for increased transactions each month and a small increase in the monthly fee eliminated these losses. The package is now fully profitable and, much more importantly, the clients using the package are very satisfied and well-anchored with little incentive to move to another bank's Internet service.

CRM's the thing

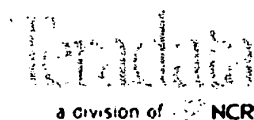
Just knowing profitability by customer, account, shipment or flight is not enough to improve financial results. The analysis must result in an action taken to improve results. Any complete customer relationship management (CRM) initiative will recognize the need for detailed and accurate profitability calculations. A CRM-oriented profitability measurement process has to meet the needs of CRM managers by providing:

- > **Enough detail** to explain how the customer comes into contact with the company and the expense and revenue associated with each of those contacts;
- > **A comprehensive view** of the customer's relationship with the business so that the true contribution or cost of the relationship is understood;
- > **A consistent view** so that changes in the relationship can be properly understood;
- > **Timely information** so that the enterprise can act before the opportunity is lost or risk has been fully realized;
- > **Credible results** that reflect the company's own costs and unique business practices; and
- > **Flexibility** so that the measurement process can easily change as the business environment changes.

In profitability, actionable information is found either hidden in the bits that go into the calculation or in the ways the information can be combined with other information unrelated to profit. But, without a doubt, truly actionable information is what management wants and needs. **T**

Barb Swartz is Teradata's Profitability Analytics Marketing Director. She can be reached via e-mail at barbara.swartz@teradata-ncr.com.

ILLUSTRATION BY JOYCE HESSELBERTH



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Teradata Profitability Analytics Solutions

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There's more. Because it operates on the Teradata Database, Teradata Value Analyzer delivers detailed information with unmatched speed. That means you can quickly complete even the most complex profitability calculations – then analyze those calculations to determine the best steps toward improving profitability.

Lifetime values are estimated by calculating the Present Value of objects, such as customers, accounts, products, cash flows, households, and channels, as well as estimating the value of the object in the future. The process of calculating the present value of the current object is referred to as the Net Present Value (NPV); the process of determining the current value of the object in the future is referred to as the Future Value (FV). Both of these components are used to indicate the Lifetime Value of any object.

Teradata Lifetime Value

Teradata Lifetime Value is the first business intelligence software that lets you and your business predict the ongoing value of any object. In fact, by basing all its calculations on the object, Teradata Lifetime Value can measure anything you can define: customers, products, and delivery channels, as well as your sales force, geographic regions, or customer service centers.

Teradata Lifetime Value lets you look toward tomorrow. It brings together the results and trends of the past – everything you're using to determine current value – and blends them with future metrics, including propensities, attrition rates, and current value information. The result is a single version of the truth, a detailed look at the future that will help you pave the way to profitable performance in the months and years ahead.

"If used in combination with Teradata's platform, Teradata Value Analyzer is able to analyze enormous volumes of customer behavior data in hours rather than days. The resulting data can then be used to improve decision-making in many areas, including channel migration initiatives, price setting, and identifying under-served customer segments. And because the calculation is based on actual customer transaction volumes, it is more accurate than software packages that use estimations."

Robert Klined, Director, Global Financial Services Group

The Power to Predict

Teradata Lifetime Value is a set of complex mathematical models that runs inside your Teradata Database. The results of the calculations are placed directly into Teradata tables. The application applies the models to detailed behavior data, which in turn uncovers patterns and trends. Those patterns and trends are linked to customer attrition projections, demographics, and propensity to buy data. The result: a powerful insight into lifetime value easily accessed by any OLAP tool or through a query.

Whatever the activity or application, the result is the same – a clearer picture for designing strategies and tactics that support the expected values of products, offers, customers, or channels.

Build a Better Business

Teradata Lifetime Value results will help you make more informed decisions about a wide range of activities, including:

Marketing

- > Identify long-term targets
- > Determine optimal customer mix
- > Attract, retain, and maintain profitable relationships
- > Target intelligent offers to specific customers

Product Management

- > Support product design, pricing, packaging, and relationships
- > Assist in future product and offer development and testing

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Distribution

- > Calculate channel lifetime value
- > Improve customer service, relationship management, and migration

Build on Your Teradata Foundation

We engineered Teradata Value Analyzer and Teradata Lifetime Value for your data warehouse environment. The Teradata Warehouse has an underlying philosophy of "load once, use many." This enables you to use existing data in the warehouse, for example, customer management data for other solutions, such as Profitability Analytics. And Teradata profitability analytics leverage the parallelism of the Teradata Warehouse – they're 100% scalable. So the applications grow right along with your business. And no other database's performance can match the speed of Teradata. Profitability calculations that might take other databases days to run can be completed in Teradata in a

matter of hours or even minutes. And we give you fast, accurate access to detailed event and transactional information – anywhere in your organization.

The Teradata Advantage

Teradata has a rich history of providing analytical solutions that solve real-world problems for companies in many industries. We've given businesses like yours the knowledge and technology to drive strategic and operational decisions and to create

close, personal relationships with every customer. Teradata has the power to help you make better, faster decisions so you can manage your business and drive growth.

In addition, our services professionals can offer consulting, integration, management, and maintenance services, as well as vital support in data mining, analytics, and customer education. These experts are trained in your industry and are ready to go to work for you on day one. They can help you deliver the results you're looking for and will answer your business and technical questions.

For More Information

To learn more about how a Teradata Profitability Analytics solution can expand and enhance your data warehouse and your ability to build a better, stronger business, contact your Teradata representative or visit us at Teradata.com.

"Lifetime Value helps with our understanding of how investments made today pay out over time, and explains how profitability and customer behaviors are related. It's not just response rates or cross-sell ratios that count, but how they contribute to building customer equity over time. Without lifetime value analysis, you simply won't know."

— Tom Richard, Meridian Petroleum Inc.

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Teradata Profitability Analytics Solutions

Applications > Profitability Analytics

Understanding business performance is more crucial than ever in today's tough economic climate. And the way you view your business is also undergoing critical change. But before allocating resources to any strategy, you must understand the value of your customers, not just your product and delivery channels.

As products and services become commodities, and market penetration rates begin to peak, it's important for you to implement new strategies...knowing who your most profitable customers are and why.

Maybe you're currently using techniques, such as revenue or propensity modeling, to target those customers you believe to be most profitable. But are your measurement models based on actual customer behavior? Or are they general ledger and product/profit-based models that may be giving you an inaccurate or misleading picture of a customer's value?

Conducting Business around Customer Behavior

Prior to implementing Teradata Value Analyzer, RBC (formerly Royal Bank of Canada) conducted customer value analysis using sophisticated methodologies developed at the institution.

It used a system of deciles to classify customers according to their calculated value. However, once RBC implemented Teradata Value Analyzer, the deciles changed dramatically.

Using Teradata Value Analyzer, analyses showed that 75% of the bank's clients shifted two or more deciles. That's three out of four accounts. The bank used this critical information to decide how and where to invest marketing dollars, how to develop new pricing strategies, and how to determine RBC's greatest challenges – and greatest opportunities.

Your best strategy is to implement a profitability analysis solution that provides measurements based on a single, consistent view of your business. You need a solution that lets you view profitability across multiple dimensions so that you can make accurate, informed decisions based on detailed data from across your entire enterprise. That means moving beyond traditional methods of measuring value toward a behavioral approach to profitability. And toward a solution that lets you use the details in your profitability calculation to solve your business problems.

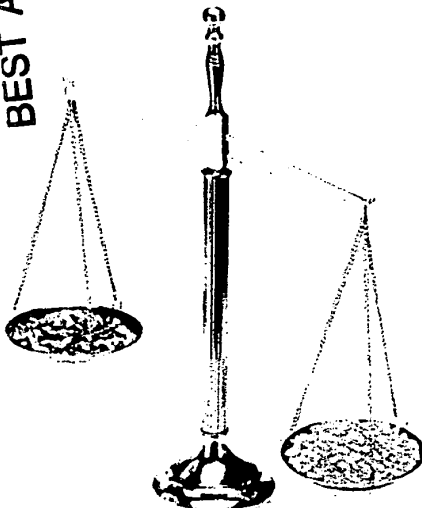
A Behavioral-Based Approach to Profitability

Teradata, a division of NCR, has created a comprehensive portfolio of profitability products designed to help companies like yours look beyond profitability models that

are based solely on summary information due to application and/or technology limitations. Teradata Profitability Analytics solutions enable you to calculate both the current and lifetime value of your customers, products, services, channels, and offers in any dimension you choose. It's a unique behavioral approach that provides accurate assessments of the value of every facet of your business.

Teradata Profitability Analytics solutions include Teradata Value Analyzer and Teradata Lifetime Value. Both products calculate profitability at the most basic profit object and interaction level specific to your industry. In telecommunications, that profit object might be the subscriber; in banking, the account; in transportation, the shipment; and in travel, the reservation record. Because the calculation includes

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Teradata Profitability Analytics Solutions

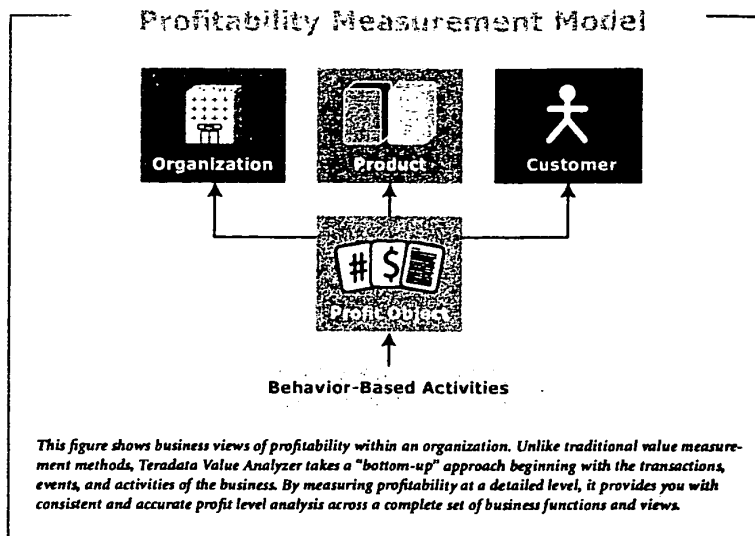
actual transactions, behaviors, and activities – not averages – you receive a more consistent, more detailed, and accurate profit-level analysis across your entire enterprise.

Teradata Value Analyzer

Teradata Value Analyzer is a current value measurement tool providing you with multi-dimensional views of profitability. Using behavioral-based activity as the foundation, in addition to your distinct business rules, it lets you focus on profit measures driven by relationships. The result? A solution that satisfies your need for detailed enterprise profitability reporting and analysis. A solution that leads to more informed marketing, sales, and service decisions that can help you maximize profitability.

This dynamic profitability measurement solution is an essential element for your Customer Management strategy. Why? Because Teradata Value Analyzer does more than merely calculate profitability numbers – it provides the necessary details behind the metrics to answer the question WHY? The profitability calculation looks at profit contribution across six components:

- > Direct and indirect revenue
- > Interest and other revenue
- > Direct expenses – costs that apply to behaviors or events
- > Indirect expenses – the overhead costs of doing business
- > Risk and loss provisions – applying the cost of potential risks and fraud
- > Capital allocations – applying the cost of capital



A Different Viewpoint

Unlike traditional value measurement methods, Teradata Value Analyzer takes a bottom-up approach that begins with a base profit object and provides you with consistent and accurate profit-level analysis across a complete set of business functions. This approach provides you with a deeper understanding of the cost and return you receive from each account, customer, subscriber, shipment, policy, or any profit object you want to measure. From this base profit object of measure, you can develop any number of profitability aggregations: by customer, channel, product, or organization. The results of Teradata Value Analyzer can be easily reconciled with the general ledger giving you the confidence that your results are accurate. It provides consistent analysis across the enterprise of customer,

product, or channel effectiveness, as well as organization historical profitability.

Results You Can Use

The result is information you can use to support an array of strategic and tactical decisions concerning:

- > Channel migration initiatives
- > Relationship pricing
- > Targeting campaigns to the right customers
- > Cost management
- > Service levels
- > Structuring of products and services
- > Identifying under-served customer segments
- > Customer management

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Teradata Value Analyzer

Applications > Profitability Analytics

A Behavioral-Based Approach to Profitability Measurement



Understanding profitability is fundamental to the growth of any business. But all too often, companies fail to accurately assess what is driving the profit, or lack of profit, of their customers, products, services, or channels. That's because, traditionally, businesses have based their profitability calculations on averages and assumptions derived from the financial systems of record, particularly general ledgers.

Unfortunately, this limited value measurement creates a summary picture of revenues and expenses that can grossly misstate profitability across dimensions. Why? Because it's a value measurement built on a cornerstone of aggregated information, a measurement that leads to misguided business decisions. You simply can't make sound, strategic decisions

around targeted marketing, sales and service alignment, and pricing if you are basing them on inaccurate premises. The results can erode your profit. What if, for example, you discover that 75% of your customer population has been classified into the wrong profitability decile?

To answer that question, you must first understand the dynamics behind customer profitability and the true drivers of profit and loss. Your financial statements may provide a summary of revenue, cost, and expenses, but how do you bridge the gap between the summary and the

individual customer? Not by using averages and assumptions. But by considering individual behavior – everything from transactional frequency to channels used. It's behavior that ultimately impacts profitability – and your bottom line.

Detailed Flow of Revenue and Expense

To help bring behavior into your profitability measurements, Teradata, a division of NCR, developed a dynamic solution called Teradata Value Analyzer. It's a solution that addresses the converging demands of two distinct facets of your organization: financial management's need for organizational profitability and

Business Area	Specific Benefits
Marketing	> enhance high value customer base through appropriate services, products and relationships > increase wallet share with effective targeting of campaigns and customers > strengthen accuracy of segmentation methods
Product Management	> combat competition through relevant products and relationship pricing > increase product bottom line performance > design cost-effective, customer-centric offers
Distribution	> align investment in customer servicing and relationship management > access channel value, usage, and optimization > investment or disinvestment in channels
Finance	> clarity of cost and expense drivers for improved cost management > performance assessment, process management and planning > risk-adjusted assessment of value
IT	> improve the quality of information in the Teradata Warehouse > single, detailed view of profitability for the entire organization

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EXHIBIT I

Teradata Value Analyzer

customer management's requirements for detailed, behavior-based profitability. We engineered Teradata Value Analyzer to provide the answers to key questions about why aspects of your enterprise are or are not profitable. It lets you identify individual differences between customers, products, and organization by looking at concerns such as: how revenue is generated, how costs are incurred, or the impact of a specific customer using a specific channel.

Teradata Value Analyzer establishes the foundation of a customer management strategy by precisely measuring profitability at a detailed level. Unlike traditional value measurement methods, Teradata Value Analyzer takes a "bottom-up" approach beginning with the transactions, events, and activities of the business. It provides you with consistent and accurate profit level analysis across a complete set of business functions and views.

You can use Teradata Value Analyzer to generate insight from profitability information to impact marketing, distribution, product, and risk management decisions. And, just as important, you can use the profitability data proactively as a powerful tool for building a better, more profitable business.

Total Account Analysis Factors	
Operational Revenue	All revenue streams relating to your business.
Net Interest Revenue	Represents all revenue accrued through your balance sheet activities.
Direct Expense	Represents costs that apply to customer behavior or events through various channels at various locations and times.
Indirect Expense	Relates to the costs of doing business that are not driven by transaction activity of customers, e.g. overhead expense.
Risk Provision	Reflects the analysis of an individual customer for risk, fraud, loss provisioning, and exposure management.
Capital	Reflects capital allocation down to the customer or account level. Useful in calculating shareholder value.

Every calculation cycle, Teradata Value Analyzer produces a P&L statement by profit object. It breaks down total profit into a number of "factors." These factors and the supporting detail enable the answer to the question, "Why is this object profitable or unprofitable?"

Teradata Value Analyzer allows you to define the object of measurement, also known as profit object. Using transactions, events, and activities, it compiles detailed Profit and Loss (P&L) statements that can include six critical components of a complete financial model: operational and interest revenue, direct and indirect expenses, risk, and capital provisions. When the calculation engine runs, Teradata Value Analyzer links the appropriate revenues and expenses to every transaction from the object of measurement. Once complete, this detailed information can be aggregated to the views required by the business including customer, product, and channel – across your entire organization.

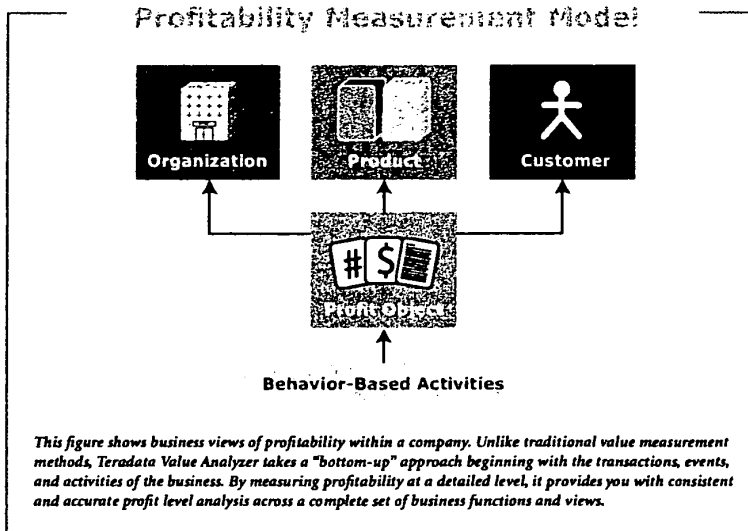
The result? Information you can use to support an array of strategic and tactical decisions concerning:

- > Channel migration initiatives
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- > Targeting campaigns to the right customers
- > Cost management
- > Service levels
- > Structuring of products and services
- > Identifying under-served customer segments
- > Customer management

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Teradata Value Analyzer



Converging Needs

Teradata Value Analyzer provides an important link between organizational profitability and detailed, behavior-based profitability. Modeling the relationships of the organization, it can capture expense and revenue flows among all entities. Supporting a flexible and complex modeling environment, Teradata Value Analyzer focuses on creating behavior-based profitability information and provides modeling support for costing and organizational profitability.

A Blend of Speed and Accuracy

We've built the Teradata Value Analyzer solution on the powerful Teradata Relational Database Management System, the foundation for maximum scalability. Teradata Value Analyzer completes all processes and calculations, and stores all data, right in the warehouse. Teradata Value Analyzer also delivers usable information with unmatched speed, despite the complexity of the profitability calculations and the vast amount of data processed. Once the calculations are complete, you can quickly understand the results and take action to improve profitability.

Of course, accuracy of data is just as vital as speed when it comes to making swift, sound business decisions. Working in a single integrated database, Teradata allows for an exhaustive review of all data, not just a sample that may offer misleading clues to profitability behavior.

Easy to Manage and Enhance

Teradata Value Analyzer is also adaptable, ready to accommodate change in your business, from cost updates to new products to expanded channels. It's a dynamic solution that you can use to define and support a roadmap for changes in your measurement practices.

A Graphical User Interface provides you with a link between your profitability measurement methodology and the data available to define and further enhance the scope and precision of your profitability model.

Rules based and data driven, Teradata Value Analyzer performs calculations based on user-defined rules. That means its rules and the resulting calculations are driven by the specifics of your data. What's more, you can customize Teradata Value Analyzer to fit your unique requirements without changing the application software.

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Teradata Value Analyzer

Teradata.com

Put Your Profitability Intelligence to Work

Teradata can show you how to build a better business by converting a combination of your customer data and your business methodology into profitability intelligence.

That's because we've had a long and successful track record of helping companies – in industries ranging from retail, financial services and telecommunications to travel, transportation logistics and e-commerce – apply customer management techniques. And because we offer a spectrum of services customized to your business needs. Everything from consulting services and data mining to advanced analytics, education programs, and project management support. Our consulting services personnel are support specialists who focus exclusively on data warehousing and are available to you around the clock.

We understand the unique challenges you face every day. And we bring you the power to proactively manage business relationships to drive growth. As a division of NCR, Teradata has a built-in foundation of industry knowledge, consulting

Conducting Business around Detailed Profitability

Prior to implementing Teradata Value Analyzer, RBC, formerly Royal Bank of Canada, conducted customer value analysis using sophisticated methodologies developed at the institution. They used a system of deciles to classify customers according to their calculated value. However, once the bank implemented the Teradata Value Analyzer application, its results were altered drastically. Using Teradata Value Analyzer, subsequent analyses showed that 75% of the bank's clients shifted two or more deciles. Why is this important? Because this information was extremely valuable to the bank as it made decisions about how and where to invest marketing dollars, how to develop new pricing strategies, and how to determine what were the best opportunities and greatest challenges.

expertise, global customer support services, and world-leading hardware technology – a combination of strengths unmatched in the industry, a combination of strengths ready to go to work for you.

For more information about how Teradata Value Analyzer can help you determine the true value of your customers to grow a more profitable business, contact your Teradata representative or visit Teradata.com.

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RBC Royal Bank



RBC Royal Bank uses a Teradata Warehouse and Teradata Value Analyzer to realize its CRM strategy

The Customer

RBC Royal Bank is Canada's largest bank and global financial services organization with assets of CAN\$294 billion. RBC Royal Bank serves more than 11 million personal and commercial banking customers through 1,300 retail branches, more than 4,800 ATMs, telephone and Internet banking, and point-of-sale terminals. It provides personal and commercial banking, credit card services, wealth management services, insurance, corporate and investment banking, and transaction processing on a global basis.

Business Objectives

Unlike most banks, RBC Royal Bank has well understood the need to leverage the economic value of customer information for many years. Since the late 1970's, the bank has searched for and found innovative ways to use its customer data to improve its business performance and better serve clients. In fact, RBC Royal Bank was one of the first to realize the powerful capabilities of data warehousing and by the early 1990's it had implemented a first-generation Teradata® Warehouse solution.

- **By differentiating between the current and potential value of clients, the bank uses CRM to better manage customer relationships by ensuring the right products are available at the right times in each customer's life.**
- **Revenue per marketing dollar has shown double-digit growth each year for the past three years.**
- **Direct marketing campaign response rates are up dramatically, as high as 40% in some cases – compared to an industry average response rate of 2 – 4%.**
- **A targeted marketing program led to a 51% increase in deposits for Registered Retirement Savings Plans.**
- **Sales personnel proactively pursue opportunities with clients, enabling true account management that generates greater customer loyalty through relevant product offers.**

The data warehouse effectively captured millions of daily client transactions, and performed broad client segmentation, but Royal, always on the leading edge, sought new ways to assess and manage customer relationships – at the individual client level. Royal's emerging CRM vision was confirmed by a 1997 study that challenged conventional thinking – that key differentiating factors for banks amounted to a 24/7 call center and a branch on every corner. The study revealed that customers wanted a banking relationship where they were well understood, their needs anticipated and their business was valued. In this environment, mass marketing to huge customer segments simply wouldn't work.

To RBC Royal Bank, the future became clear: the bank would find ways to be increasingly responsive and client-focused in a competitive environment where banking services were largely undifferentiated. This meant

Customer Success Stories

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RBC Royal Bank

establishing an aggressive, one-to-one CRM strategy. RBC Royal Bank knew its enterprise data warehouse would serve as the core CRM information engine. Yet they also knew they would need a powerful analytical application to score and manage millions of individual clients by value – and enable one-to-one CRM dialogues across all customer touch points.

Kevin Purkiss, manager, customer analytics, summarizes its CRM focus. “True sustainable advantage will only be created by successfully integrating client information, sales processes

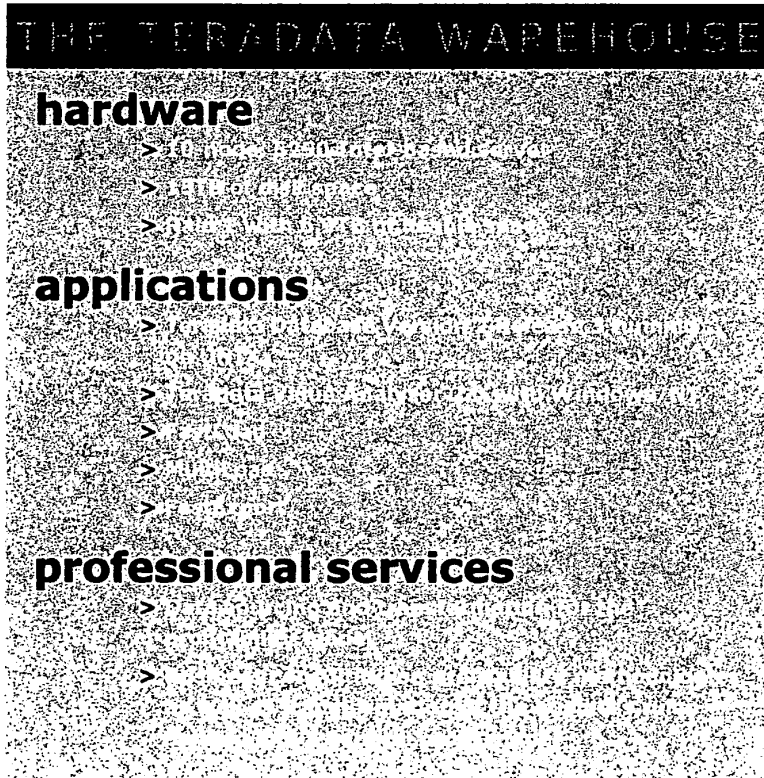
across all channels and technology platforms into a comprehensive solution for clients – no matter where, when or how they interact with the bank. And central to the realization of this customer-centric strategy is the ability to measure client value accurately, efficiently and on a continuing basis.”

The Teradata Decision

In its drive to further refine service and product offerings, cost management, pricing initiatives and marketing programs, the bank began work to upgrade its existing

profitability prototype so it could gain a more granular measure of client profitability. To augment its existing client-value model and support its CRM strategy, the bank knew it needed a solution that would be:

- behavioral-based and customer-centric;
- integrated with its CRM strategy;
- flexible enough to aggregate profitability according to user-defined units within the bank, such as the entire spectrum of business units, products and product groups, client segments, geographical regions and distribution channels; and,
- scalable to evolve with the bank's business direction and strategy

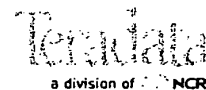


With a view to finding the best technology platform for measuring profitability, RBC Royal Bank set about evaluating the third-party products and vendors that seemed best able to meet all of its criteria. In the end, the bank chose the option that offered the best all-around solution: Teradata's Value Analyzer.”

By adding Teradata's Value Analyzer to its existing data warehouse platform, the bank could move from product portfolio reporting to client segment reporting. Initial design to full operation was completed in only a little more than six months, including fully defining business requirements and an extensive data verification process.

Business Insights

RBC Royal Bank's ten million retail customers are grouped into discrete segments based on such factors as current and potential profitability and channel preferences. Strategies are then developed for each segment, and



RBC Royal Bank

for thousands of micro-segments within each segment. Individual treatment strategies are tested on small cells of clients to establish what works and what doesn't work.

"We recalculated customer profitability using the account level metric produced by Teradata's Value Analyzer, which showed that 75 percent of our customers moved two or more deciles," says Purkiss.

With the re-defined client value measures, the bank makes strategic investments in relationships for their future potential profitability.

"We streamlined decision-making and reporting for all marketing and sales initiatives with this accurate and concise assessment of client portfolios and their values," says Purkiss.

RBC Royal Bank knew it also needed to integrate the application of client value metrics into the day-to-day activities of the front line staff. The bank's client sales and service system (CSS) enables sales personnel to proactively pursue opportunities with clients, enabling true account management that generates greater customer loyalty through relevant product offers.

The use of current and historical client value measures lets Royal Bank assess client segmentation in a more sophisticated way, by taking into account factors such as life stage changes.

"From current value, we have progressed to potential value," says Ted Brewer, vice president, CRM and information management. "It is critically important to differentiate between the current and potential value of clients. In this way, we can manage a relationship, actualizing CRM by ensuring the right product is available at the right time in the customer's life."

We recalculated customer profitability
using the account level metric produced
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that 75 percent of our customers moved two
or more deciles.

- Kevin Purkiss, Manager, Customer Analytics,
RBC Royal Bank

And that's showing in the bank's direct marketing campaigns, where response rates are up dramatically, as high as 40 percent in some cases – compared to an industry average response rate of two to four percent. For its Registered Retirement Savings Plans (similar to Individual Retirement Accounts), RBC Royal Bank used its CRM solution to execute a marketing program targeted to specific investment styles. The result? An 11 percent increase in RSP deposits.

For its Royal Certified Service (RCS) everyday banking package, the bank determined that 90 percent of the accounts of customers using the service were unprofitable. By drilling into the transaction data that supports Value Analyzer's account level calculation, the bank identified that a large proportion of customers' account transactions were higher cost bill payments at Automatic Banking Machines.

Recognizing that most of these customers represented valuable overall relationships, RBC Royal Bank did not want to increase the

package price. Instead, the bank introduced fuller channel access to the package, including telephone (IVR) and Internet at no added cost to the customer. The enhanced convenience and access were promoted for existing package clients. Over the next 18 to 24 months, the clients' migrated their bill payment methods to a more convenient channel for them, and a more cost-effective channel for the bank.

The re-packaged Royal Certified Service was then promoted to non-users, targeting clients with a high volume of checks and withdrawals. To lessen potential negative impact on short-term revenue, the bank also targeted clients paying less than the monthly package fee for RCS. Within 12 months, RBC Royal Bank generated CAN \$21 million in additional revenue and increased this "satisfied" client base of everyday banking package users by 50% over two years.

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RBC Royal Bank

After a complete analysis and complete review of the marketplace, we chose

Teradata and have never looked back. Teradata's single-minded focus on data warehousing and providing solutions, and expertise within those solutions, really set them apart from everyone else we looked at.

— Ted Brewer, Vice President, CRM and Information Management, RBC Royal Bank

The Teradata Warehouse and Value Analyzer are proving their ability to scale as RBC Royal Bank has begun incorporating an additional 500,000 small business customers into the warehouse.

"Each year for the past three years, the amount of revenue per marketing dollar has shown double digit growth," says Brewer.

Why Teradata?

"After a complete analysis and complete review of the marketplace, we chose Teradata and have never looked back," says Brewer.

"Teradata's single-minded focus on data warehousing and providing solutions, and expertise within those solutions, really set them apart from everyone else we looked at."

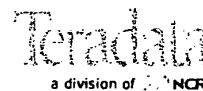
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Customer Value Measurement

*Using a Data Warehouse to Determine Customer Profitability,
Customer Tenure and Lifetime Value — Mobile Market*



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February 2003

A Teradata White Paper

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Customer Value Measurement

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Introduction

The mobile market is undergoing a major transition. In many countries, penetration rates are beginning to peak, and therefore, the operators are moving from a strategy of new customer acquisition to one of retention and increasing customer spending and profitability.

Several operators are seeing their stock prices fall due to analysts' reports that the number of new subscribers is declining. The move towards measuring an operator's performance based on average revenue per user (ARPU) is a step in the right direction. ARPU only represents revenues. It can portray a false economy if an operator needs to increase marketing and systems spend by €30 per user to see an increase in ARPU of €15.

In most mobile operators, customer value is determined by revenue. However, this does not consider the true cost of providing service to the subscriber. The major drivers of costs such as call behaviour and customer care usage are not taken into account. The obvious flaw in using revenue to determine customer value is the cost of providing service is not necessarily proportional to revenue. Using revenue to make decisions about retention and acquisition can result in poor decisions being made. This can drive up cost and reduce margins.

The market is now at a mature stage of development whereby the true measurement of a company's performance should be average margin per user (AMPU). By having the complete view of revenue and costs, operators will be in a much stronger position to develop marketing, pricing,

network roll out, and IT strategies.

Strategic and tactical decisions can be made with the underlying ethos of profitability driving the business.

Using profitability as the key metric when determining the value of customers involves being able to calculate the actual margin for individual users, corporate customers, across product offerings, and by many different market segments. Only when an operator has this information will they be able to roll out new, targeted marketing and CRM campaigns. This would seem the best foundation when deciding on which targets should get subsidised GPRS and 3G handsets. Using existing information to maximise return on investment (ROI) by implementing value-based marketing plans would seem the optimal way to go. Having customer profitability measurements involves using customer value measurement as the basis for driving behaviour.

Many mobile operators already have the data in their systems. This data can be used to implement a move to measuring customer profitability and thus reporting company performance not on new subscriber additions, not on average revenue per user, but moving to a more meaningful metric of measuring customer profitability. As stated, the data, in many cases, already exists. It is a matter of knowing where to look for it, what to look for, and using data warehousing and reporting methodologies to present the information. This can have a dramatic effect on marketing, CRM, partner management, network building, roll out, and enhancement as strategic and tactical budgetary spending decisions are made with the solid foundation of profitability measurement which can optimise ROI on operational spending.

Customer Value Measurement

A key performance indicator of many companies is customer Lifetime Value (LTV). However, many mobile customers are not tied into a time sensitive fixed-term contract (e.g., pre-paid), and the length of current contract is not a practical guide to the lifetime tenure of a post-paid customer. Some advanced operators have adopted a statistical analysis technique called Survival Analysis to provide Customer Lifetime / Tenure forecasts to determine the expected lifetime of customers. This involves analysing behaviour to determine the expected lifetime of a customer. Since this is based on customer behaviour and not contracts then it is equally applicable for both pre- and post-paid customers.

The combination of customer tenure based on customer lifetime analysis and customer profitability measurement gives a view of customer LTV based on profitability and behaviour.

Sample Financial Impact of Customer Profitability Measurement

The rationale associated with creating a customer profitability measurement solution for a customer is based on developing cost and spend allocation plans that are built on the premise of maximising ROI. The following marketing and CRM example uses industry figures to highlight the financial benefits that can be gained.

Marketing, CRM and Customer Retention, Churn, and Acquisition

The pressure from the market to acquire new customers could be reduced. Churn, decreasing ARPU, and increasing cost of acquiring new subscribers (Cost Per Gross Addition — CPGA) are forcing operators to chase new, often non-profitable customers, sometimes at the expense of spending money retaining their most profitable customers. If we take an example from the U.S. long distance market, we can see the results of consistent pressure to measure performance of new subscribers. The U.S. long distance industry boasts revenues of around \$110B from approximately 230 million accounts with an ARPU of just over \$40 per month. The long distance CPGA averages between \$250 and \$400. Assuming a low-end churn rate of 25%, more than \$27B of industry revenue shifted among carriers in the last year. For a major carrier with a 38% market share, churn costs them around \$10B in lost revenue. That's the equivalent of 21 million average revenue subscribers (accounts). At a \$250 CPGA, it will cost that carrier more than \$5B to replace those accounts. That's \$15B, or more than 41% of their gross long distance revenue.

By adopting a performance and measurement metric of customer profitability, operators can see where to allocate their marketing, CRM, and customer retention spending. This can have significant implications on the financial performance of an operator. Going back to the U.S. long distance market example, if we assume a high-end

retention cost of \$100 per account, this carrier would have saved more than \$13B in lost revenue and acquisition costs avoided with the right retention efforts by knowing which customers they did not want to lose. This may never be 100% achievable, but even if only 10% of this is achievable, it represents a \$1.3B in savings. Relating this figure to stock market performance, assuming a total of 3.5 billion shares outstanding, this \$1.3B equates to 37 gross cents per share. Assuming a 40% bottom line impact (gross less taxes and other expenses) this would yield 17 cents per share or more than four cents per quarter.

One more point on the U.S. long distance market example. With a \$20 per month profit, at best it will take 12.5 months just to recoup the acquisition cost. Based on this and a variety of other factors, most industry estimates indicate two to four years to attain account profitability. Unfortunately as market pressure increases and operators scramble for new subscribers, there is a good chance that many of those new accounts will not be around after two years.

Although the above example covers the U.S. long distance market, there are many parallels that can be drawn on the European mobile market. For example, who's going to pay for the handset when migrating an existing second-generation GSM customer to third generation? Subsidising handsets for everyone may not be cost effective. Pro-actively subsidising handsets to the most profitable customers could, on the other hand, be a worthwhile investment.

Customer Value Measurement

Marketing and CRM are only two areas that can benefit. Others can include network optimization, whereas the implementation of this solution will provide significant customer value, in that it enables customer profitability to be taken into account when deciding on network build and roll out. Operators can manage and prioritize network infrastructure investments based on high-value customer locations.

Solution Concept

The proposed solution would be based on the following concept. Customer behaviour event data from a data warehouse is used to allocate major cost categories based on customer behaviour patterns. For example, one major expense category is network expense. This would be allocated based on call behaviour. This can include voice calls, messaging, data calls and IP-based browsing, content purchasing, and exposure to advertising on mobile portals on 3G services. An example of call type profitability measurement could be SMS users sending a high volume of messages between 3pm and 4pm. This could be children getting home from school. SMS is relatively inexpensive (about 10c per message), but it is also highly profitable for the operators.

In addition to this, call types must be analysed for profitability by customer.

Sample call types include:

- Mobile to mobile (on net and off net)
- Fixed to mobile
- Mobile to fixed (local, long distance, international)
- Messaging — SMS (short message service), MMS (multi-media messaging service)

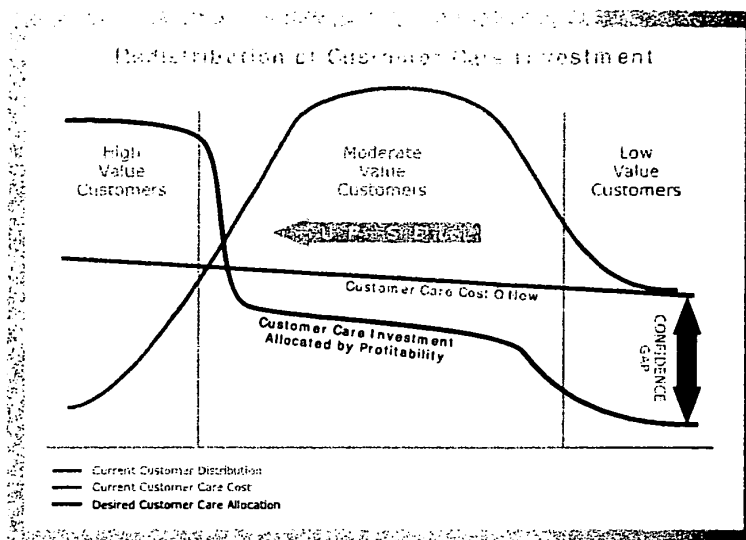


Figure 1: Customer Care Investment

- Data — mobile to fixed
- Data — mobile to mobile
- Content — browsing
- Content — with purchase (value variables will apply)
- Content — access to 'sponsored' advertising
- Roaming (all variables as above)

Variables that can affect the costing of a call include:

- Network usage — optimal capacity
- Time of day
- Roaming network
- Routing of calls
- Interconnect pricing agreements (for transit and off net terminated calls)
- QoS, Latency, and SLA for IP calls
- Call discounts based on promotions (e.g., friends and family type discounts)

Customer Types can include:

- Pre-paid: by numerous market segments
- Post-paid: contract type and package subscribed to, also by numerous market segments

The above list is not exhaustive. It intends to give only a sample. Different operators will have their own definitions, terminology, and ability to capture and analyse different costs. When implementing a customer profitability measurement solution, a key point to remember is operators will vary and there is no 'one-size-fits-all' approach.

Customer Value Measurement

Sample Use of Customer Profitability Information - Maximising ROI from CRM

While operators look to offer less expensive methods of CRM than dealing with a customer service representative (CSR) for low profitability customers, in reality this is not happening on a global basis. Figure 1 indicates that CRM spend per customer is roughly the same for ALL customers.

Low profitability customers should be directed to integrated voice response (IVR), computer telephony interaction (CTI), and web-based CRM solutions. With the advent of 3G and content services, the types and levels of questions a CSR may face will increase. This may result in an operator making additional human and training investment in CSR resources. Such resources must be used in a profit-oriented, optimum fashion.

How to Get There

How an operator reaches the point where they can have the processes and solutions in place to be able to measure customer profitability will depend on where they start. There are certain basic processes that must be in place to embark on the road to using profitability as the main measurement metric on which to develop and implement operational plans. This roadmap will be different for operators depending on their circumstances.

Figure 2 illustrates a sample roadmap for an operator's implementation of a customer profitability measurement solution, whereby different revenues and costs can be captured and measured over planned time periods. As can be seen from Figure 2, the goal is to be calculating customer lifetime value, using profitability and not just revenues. However, to

measure lifetime value, there must be two basic metrics — customer value and customer lifetime. We will discuss how to measure customer lifetime in a later section of this paper.

One of the crucial points is that it is up to the operators to define profitability. Different operators will have different measurements and definitions of profitability.

Solution for Customer Profitability Analysis

Revenue data and cost data exist in your business support and financial systems. It is a question of collecting this data in a data warehouse and turning the combination of data into actionable information. However, many operators have individual data marts for each business support system (BSS) 'source system' (e.g., a separate data mart for retail billing, a separate data mart for customer care, and so on). Several leading operators are now adopting data mart consolidation (DMC) as they look to gain an enterprise view of their customers. DMC has also been proven to reduce total operational and data management cost.

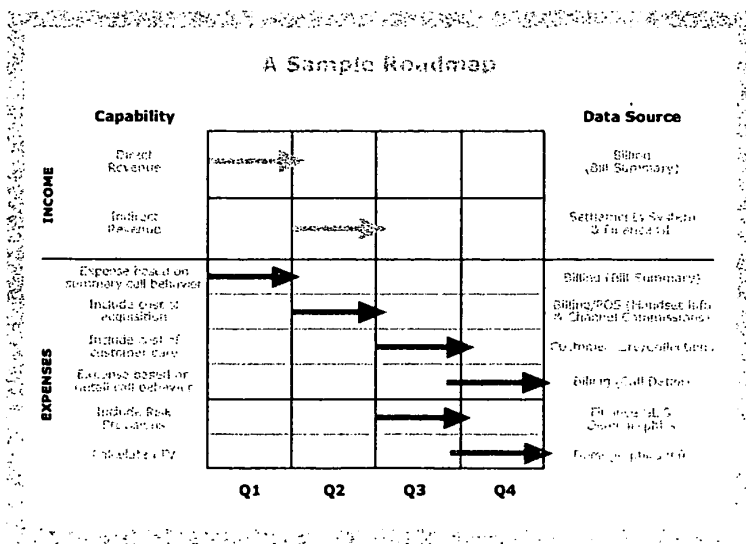


Figure 2: A Sample Roadmap

Customer Value Measurement

The enterprise data warehouse collects data from numerous different systems to build up a picture of all relevant customer revenues and costs. The data is transformed into information by the data warehouse and can be accessed by the relevant departments and management and transformed into strategic and tactical actions.

Figure 3 represents the proposed solution architecture.

Determining Customer Profitability

Revenues

Retail Bill

The immediate assumption is to look at the retail billing system. The higher the retail bill, the more revenue a customer is generating. However, there are other elements to consider.

Interconnect for Incoming Mobile Calls

How much interconnect revenue is a customer responsible for? If a mobile user only rarely makes calls, we must not overlook the fact that calls to the user's mobile phone may be generating interconnect revenue for calls made from fixed line phones. For example, a user offering an "out of office" business service (e.g., plumbers or electricians). By the nature of their professions these people are 'on the road' all the time. Their mobile phone is their office phone, and for all fixed to mobile calls, the mobile operator will receive a percentage of the retail call value in interconnect settlement.

Other Third-Party Settlements

Other third-party settlements could include content purchases, which are made with an electronic purse or a credit

card. Under a content value chain agreement, the mobile operator may be entitled to a percentage of the value of the content transaction in return for hosting the content on their mobile portal. These transactions could involve low-value content (e.g., browsing local weather) or high-value transactions (e.g., buying a last minute plane ticket en route to the airport). For high-value transactions it may not be prudent to put them on the retail bill at the month end, so the transaction data will not appear on the bill. Likewise an operator could host advertising on their mobile portals. An advertiser may pay the operator a fixed fee per month and/or a percentage of all subsequent purchases and visits to the advertiser's home site via the operator's mobile portal. Again, this information will not appear on the retail bill, but needs to be taken into account when determining the revenue element of the profitability equation for each customer.

Customer Profitability Measurement

Overview

This section provides an overview of the expense categories that will be used. It also provides a recommended approach for allocating expenses on a per-event basis.

At a high level it can be seen that calls made during the peak busy hour would be assigned a heavy share of network costs, whereas calls that are made during off-peak periods would be assigned a lighter share of costs. As shown in Figure 4, the other cost categories that are allocated by behaviour include, Call Centre operations, billing, collections, and customer acquisition costs, which would include channel commissions and subsidised equipment.

Cost data is aggregated to the customer level and stored in the data warehouse. Profitability data can then be used to segment customers. This would allow

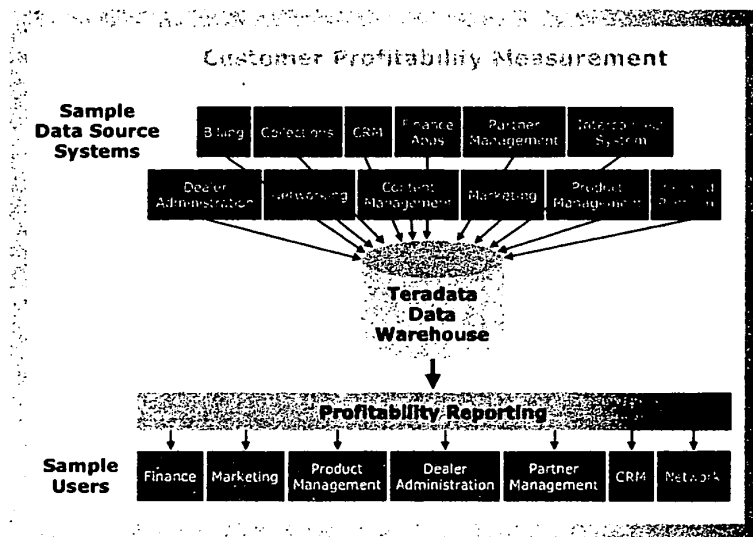


Figure 3: Solution Architecture Overview

Customer Value Measurement

marketing to focus retention campaigns on highly profitable customers. Acquisition campaigns would be focused on the profile of customers who are most profitable. The net result would be a shift to a mix of customers that yield greater margins at the same level of cost.

Expenses can be analysed further, and will include the following categories:

Overhead Expense

Overhead expenses will consist of all expenses not specifically broken out in the remainder of this section. In general, overhead is considered to be fixed expenses that will not increase as a function of the number of subscribers, the number of calls handled, etc. There may be, in fact, some expenses that do increase as a function of the number of subscribers and the number of calls that are lumped into this category. This is done to make the expense allocation model simpler. For the purpose of this paper we are considering the effect of this allocation rule to be minor in the overall scheme of things. Overhead expenses will be allocated evenly to all active subscribers.

Network Expense

Overview

Network cost represents one of the most significant categories of expense for a mobile operator. The network is engineered to handle peak call volumes. If peak call volumes are increased the network must be expanded in order to prevent call blocking during the peak period. For purposes of allocating network costs, we have divided the cost into three different categories: Mobile Network and Interconnect Transport expense.

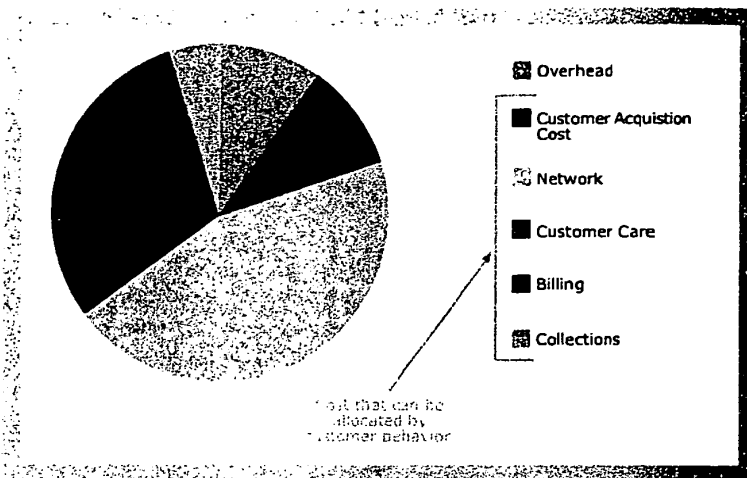


Figure 4: Costs that can be Allocated Based on Customer Behavior

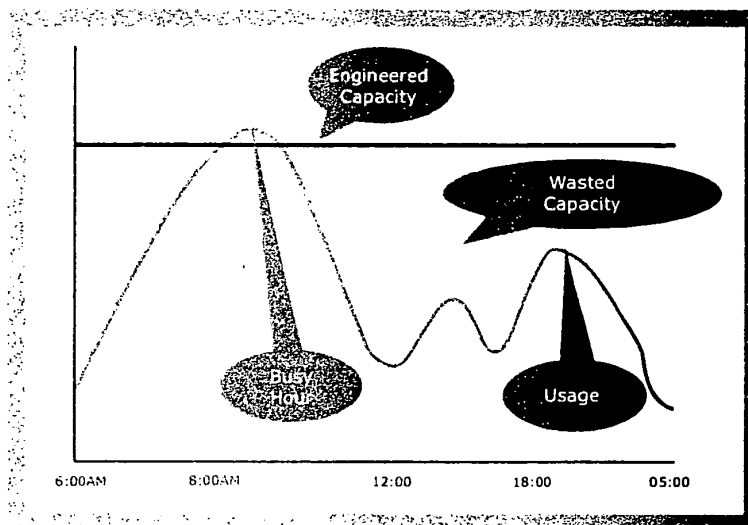


Figure 5: Mobile Network Utilisation

As can be seen from Figure 5, a mobile operator may have a large amount of dormant capacity dependent of usage by time of day.

Once customer behaviour is understood, you would like to acquire more customers with a similar behaviour through targeted marketing campaigns and price-plans

Customer Value Measurement

designed to attract the right kind of customers and to stimulate the right kind of calling behaviour. Figure 6 illustrates how this can be done.

Mobile Network Expense

This expense category includes the vast majority of network costs. This includes switches, cell sites, and leased lines that connect cell sites to the switch. This also includes central office expense, right-of-ways and land associated with the network, and any other miscellaneous network expenses. When doing new network build out and planning additional capacity, operators can prioritise roll out based on the geographic usage patterns of their most profitable customers. For example, if an operator finds that the majority of their high profit traffic is generated from a specific geographic location (down to cell site ID) then, build out should be concentrated in those areas. This will optimise usage based on return over network enhancement expense.

Interconnect Transport Expense

This expense category includes the cost of transit and terminating portions of a call that traverse or terminate on a third party's network. Optimised routing of calls can be based on customer profitability, routing cost, and interconnect partner agreement. For example, transit calls are cheaper from Ireland to Germany if the call is routed via Operator A as opposed to operator B. With the introduction of voice and data over IP, operators must ensure that customer profitability is not penalised by interconnect charges being greater than the retail bills for certain types of calls. This could happen if the mobile operator has introduced service level agreements (SLAs) with some customer groups. As a result of these SLAs, pricing can be carried out based on, among other variables, quality of service (QoS) of the call. If these SLAs are not enforced on interconnect partners at a wholesale level, the operators may have to discount a call because of a poor QoS. However, they may still face the full wholesale bill from

their interconnect partner. This would show the retail customer as non-profitable, which is not the case and could lead to poor decisions being made.

In the case of roaming calls, operators must account for different roaming agreements and the interconnect portions of roaming calls when determining the profitability of the calls made.

Billing Expense

Overview

Billing costs represent the second biggest cost category behind network costs. Billing costs have been divided into two basic categories: call record processing and invoice processing. The rationale behind this breakdown is to reflect the high cost of capturing, guiding, rating, and posting calls to a customer invoice. The CDR process in billing occurs for each call made, whereas invoice processing need be done only once per month.

Billing Call Record Process Expense

This expense category includes the cost of CDR recording, processing, and storage for both pre- and post-billing. Processing includes guiding, rating, and invoice posting. The rationale behind this cost category is to reflect the billing expense associated with invoicing calls. Thus a subscriber that makes a lot of short calls will carry a higher cost than a subscriber that uses the same number of minutes with fewer calls.

Billing Invoice Processing Expense

This expense category includes the processing needed to create a billing invoice. This includes bill calculation, invoice formatting, printing, mailing/handling, and payment processing. The rationale behind this

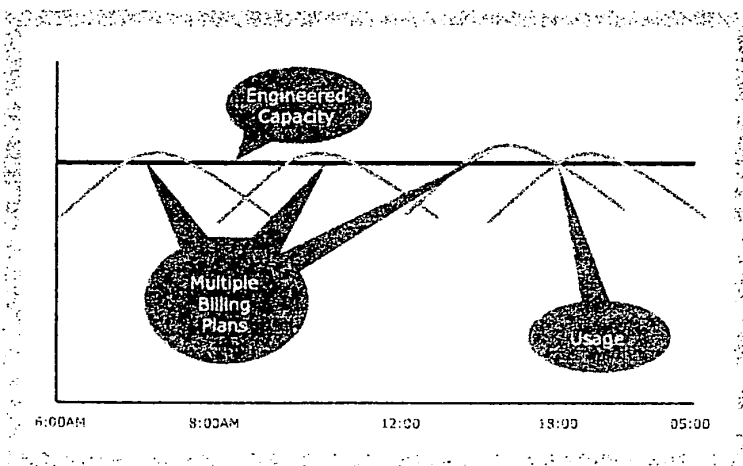


Figure 6: Using Price Plans to Stimulate Desired Mobile Network Utilisation

Customer Value Measurement

cost category is to reflect the expense of producing a billing invoice each month. A subscriber that has a very inexpensive plan and produces little revenue will have a high billing cost as a percent of revenue since this cost is fixed each month for each subscriber.

Customer Care Expense

This expense category includes all costs associated with handling an in-bound customer contact. This includes the cost of labour, facilities, and communications. The rationale behind this cost category is to reflect the expense of supporting subscribers that make an excessive number of calls to customer care to get credits, report problems, or to get general support.

Collections and Past Due Expense

This expense category includes all costs associated with collection of past due accounts. The rationale behind this cost category is to reflect the expense of carrying accounts receivables for those who pay late.

Sales & Marketing Expense

This is the expense to acquire and retain customers. The customer acquisition expense normally comes in the form of a commission that is paid to a sales channel. This customer profile should contain information about the channel that acquired the customer and the amount of the commission paid, as well as subsidies paid on handset upgrades.

Customer Lifetime and Lifetime Value

Survival Analysis — Providing the Tenure Element in Calculating Lifetime Value

Survival Analysis utilises statistical modelling based on customer behaviour that will help operators understand how

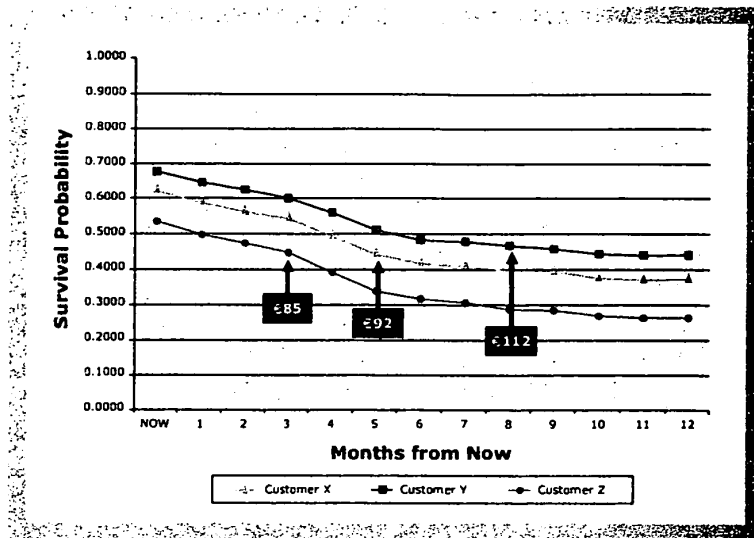


Figure 7: Survival Scores of Three Different Mobile Customers

long they can expect to keep a customer. As well as the factors that can affect longevity, survival analysis provides valuable insights into how operators can:

- Keep customers longer;
- Provide a better resource planning;
- Have a more profitable relationship with customers.

Survival analysis is designed to complement traditional churn modelling, and there are several ways survival models predicting length of time as a customer can be used by businesses. We will discuss these next.

Customer Planning and Management Applications.

A customer planning and management application has three parts to it:

1. Identifying timing of survival risk;
2. Profiling customers;
3. Performing "what if" analysis to help drive appropriate marketing actions.

Survival analysis enables the business to identify timing of "risky behaviour patterns" that lead to reduced survival probability in the future. The timing can be used as a way of staging marketing actions, as well as their expenditure. If a valuable customer is expected to churn next month, then aggressive action is warranted. If the company has six months, they can try less expensive alternatives first.

Figure 7 shows an example of three mobile prepaid customers, with their monthly value to the company, as well as when they are likely to churn.

A mobile operator would typically spend as much as several hundred Euros to keep customers as valuable as these from churning. That is, however, if churn were imminent. In this case, the company has as much as eight months before one of these customers is at high risk. This allows the potential to try less expensive retention programs.

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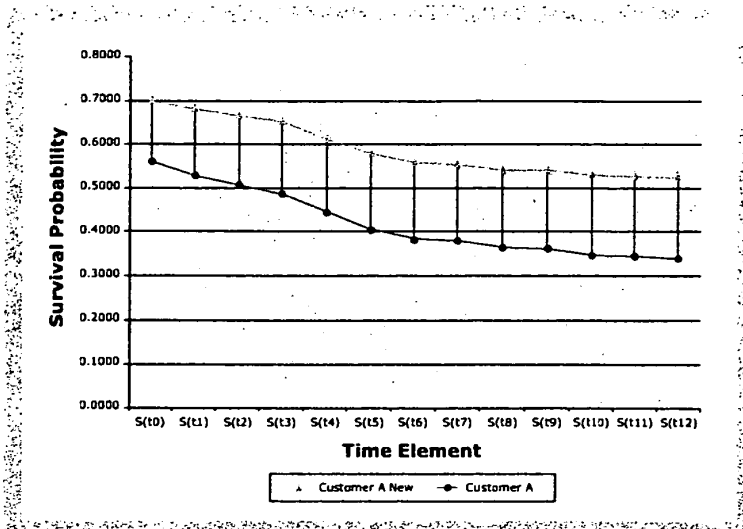


Figure 8: Survival Probability Change Based on Change in Customer Behaviour

Customers with different survival prospects can also be grouped together and profiled to see differences. Customers can be grouped based on their time as customer, similar demographics, or any other attributes of interest. These profiles can then show differences in calling patterns, topups, and network service problems.

Survival analysis applications can also be used to perform what if analysis to determine what the impact on survival probability over time would be from modifying a customer's, or group of customers, behaviour over time. This can be used to drive appropriate marketing actions, including call centre activities.

In Figure 8, we show the predicted impact on a customer's survival probability over the next year if the customer changes his behaviour from making low-value prepayments to making medium-value prepayments. This would increase his survival probability such that he would probably be retained as a customer. Exploring the impact of different factors on customers, or groups of customers, allows the marketer to plan marketing communications and offers so as to best maximise long-term customer retention.

Customer Survival Change Application

This application looks for changes in customers' survival scores, then uses important changes in scores to help drive appropriate marketing actions. The application works as follows.

1. Score customers monthly on the Survival model. Save score history.
2. Track scores over time.
3. If a customer's score decreases more than some, set threshold and the customer's value is greater than a set amount, then schedule a marketing action.
4. Marketing action is a call from the call centre where the application provides information about the factor(s) that caused the drop in score, as well as the urgency of timing in terms of survival probability.

Lifetime Value and Business Planning Framework

Another application of survival modelling is within the customer value management and business planning framework where survival modelling is combined with customer value to provide the basis for calculating customer lifetime value. This application enables a company to project expected profits, revenue, (or losses), or any other business metric, based on predicted survival rates of customer segments over time.

Customer value estimates are multiplied by predicted survival rates for the segments to derive forecasts that can be used for business planning purposes. This can also

Customer Value Measurement

be extended to a customer lifetime value application, where value scores are derived from a statistical model. Monthly deseasonalised scores are multiplied by predicted survival rates for the segments to derive forecasts for lifetime value adjusted for survival probabilities.

Input to the application is a segment definition and the scores and projected survival probabilities of the customers within the segment. As in the customer planning and management application, segments can be groups of customers who are similar in terms of their time as customer, similar demographics, or any other attributes of interest.

For mobile operators, survival modelling is especially interesting for pre-pay customers, as well analysing the tenure for customers beyond a one-year contract term. Models can be built using detailed data representing such things as calling patterns, top-up behaviour (for pre-pay), abnormal call termination patterns, and customer service information. Customers can be scored based on the model. These scores can then be used to identify and analyse longevity problems with profitable customers. Over time, score histories can be saved to quickly spot those customers who have had a sudden shift in their predicted *lifespan*. Sensitivity analysis can be done using key factors known to influence customer survival. This helps the company make better use of resources and plan its marketing and customer service activities.

Summary

Developing a customer profitability measurement model can provide dividends to mobile operators. The mobile industry is still less than twenty years old, and as such is moving from a growth to a maturity stage. Like many other industries, different performance measurement metrics are used depending on the stage of evolution. The days when mobile operators are judged on the number of new subscribers are over. It is essential that this metric is not used as the driving force to determine the success of 3G, otherwise operators could find themselves being pressured to subsidise users, including the non-profitable users in order to provide market analysts with 'easy' figures. The market and the industry have evolved.

Developing average margin per user (AMPU) figures based on customer profitability measurement is the optimal way forward. It provides more accurate measures, and it can be used to show the market is now at a mature stage of development where the true-measurement of a company's performance should be based on customer value. By having the complete view of revenue and costs, operators will be in a much stronger position to develop marketing, pricing, network roll out, and IT strategies. Strategic and tactical decisions can be made with the underlying ethos of profitability driving the business. However, many profitability measurements only provide the current picture of profitability.

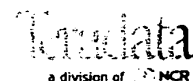
In order to get an understanding of the expected lifetime value of a customer an operator must be able to forecast the expected tenure of a customer. Survival analysis provides a statistical modelling technique based on constant analysis of customer behaviour to provide the time element in calculating customer lifetime value. The current and historical profitability measures can be used to provide the 'value' element in this forecast.

Using profitability as the key metric when determining the value of customers involves being able to calculate the actual margin for individual users, corporate customers, across product offerings, and by many different market segments. Only when operators have this information will they be able to roll out new, targeted marketing and outbound CRM campaigns. This would seem the best foundation when deciding on which targets should get subsidised GPRS and 3G handsets. Using existing information to maximise ROI by implementing value-based marketing plans would seem the optimal way to go. Understanding customer profitability is more than about corporate reporting — it involves using customer value measurement as the basis for driving behaviour and profitability figures by individual customers, groups, segments, product lines, and so on. This is the key to unlocking customer value and ensuring that all strategic and tactical decisions are based on a strong financial foundation.

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Teradata Value Analyzer

**A Tool for Determining Customer Value and
CRM Performance**

By Lynne Harvey

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EXHIBIT L

Teradata Value Analyzer

A Tool for Determining Customer Value and CRM Performance

By Lynne Harvey

June 7, 2001

NETTING IT OUT

NCR's Teradata Value Analyzer helps companies in the financial services and insurance industries understand the value of their customer relationships and their CRM efforts.

Value Analyzer calculates profitability along several dimensions including overall transaction value, the cost to serve, and profitability by specific product lines. Teradata Value Analyzer displays the results and lets you see how the results were calculated as well as access the data used in the analysis. This level of flexibility results mainly from Value Analyzer's integration with NCR's Teradata data warehouse and CRM solutions.

When used with Teradata CRM, Value Analyzer helps marketers create personalized offers based on customer value and determines specific actions such as when to waive fees or waive a prequalification or preapproval process when interacting with customers.

As NCR's Teradata division attempts to broaden its range of customer intelligence functionality in its Teradata CRM suite, it will incorporate Value Analyzer into the fold and will extend Value Analyzer's analytic functionality to other vertical industries.

THE CHALLENGE OF UNDERSTANDING CUSTOMER VALUE

Understanding customer value is an essential part of succeeding in business today, especially in the

financial services sector. It is ironic that companies which exist to serve the financial needs of their customers often have a difficult time assessing customer value. Nevertheless, these companies frequently have a tough time assessing how customers are profitable to their enterprise, determining the lifetime value of their customers, and assessing how much they own of the customer's share of wallet.

Profitability, especially, is a tricky thing to estimate. In banks, lending institutions, and financial service corporations, there can be as many assessments about the profitability of a customer as there are departments within the organization. In addition, these assessments can have a ripple-like effect in helping companies better understand what's driving corporate profitability. For example, if finance executives have the ability to determine the value of their customers, they also have the ability to understand the cost-based accounting measurements that drive profitability and can communicate this information better to the corporation's shareholders. Executives can also improve upon the costs to develop, market, and sell products and improve the optimal price point of their products.

In the financial services industry, understanding customer value and CRM performance can have a tremendous effect on the strategies companies use in managing the customer assets, especially in the areas of portfolio management tactics and CRM strategies. For years, banks and financial service companies have believed that CRM and account aggregation tactics are the basics for building customer loyalty and corporate profitability but are difficult to put into practice and assess. In theory, customer value and account aggregation have a synergistic relationship throughout an enterprise. After all, if you know more about how valuable a customer is, you can offer better services and products, build the relation-

ship, and increase value and profitability in each department. But many financial service firms have created Chinese walls around their product lines making it difficult, if not impossible, to assess customer value. In some cases, SEC regulations prohibit companies from sharing customer-related data between different types of funds (such as 401K funds and the retail brokerage accounts). However, companies can compute customer value through specific life-event related scenarios, such as retirement re-allocations after the age 70 and funds transfer pricing for mortgages and automobile and small business loans.

Technology plays a critical role in helping companies gather the right information that can be measured using the right kinds of tools to process and analyze the customer data. The technology, moreover, is not your father's Chrysler. New kinds of technology solutions are needed to gather, store, and, especially, analyze customer information. These technologies, which often fall under the category of customer value analysis solutions, provide companies with the ability to calibrate complex value-based measurements such as lifetime value, behavior-based customer profitability, and share of wallet as well as determining how customer value relates to corporate profitability.

TERADATA VALUE ANALYZER

Value Analyzer, a solution from Teradata, a division of NCR, is a solution that helps companies in the financial services and insurance industries assess customer value and CRM performance. It helps companies like the Royal Bank of Canada measure how profitable each customer is to their enterprises. Value Analyzer leverages the data gathered and stored in an NCR Teradata data warehouse to provide insight into customer value. Teradata CRM can then leverage the analysis provided by Value Analyzer to provide targeted campaigns and personalized customer interactions.

Value Analyzer offers a broad range of customer value analytics and predictive modeling environment for companies to assess customer value and CRM performance.

Key Features and Functionality

Teradata Value Analyzer offers a broad range of customer value analytics and a predictive modeling environment for assessing customer value and CRM performance. Teradata Value Analyzer can determine customer value and CRM performance along several dimensions:

- By the transactional value of an individual customer account in relation to the enterprise
- By the cost to serve and interact with customers at each touchpoint
- By specific product lines
- By the relationships of the customer with a company's functional departments.

So, for example, if Mary Sue Jones is a customer of Our-Bank, Value Analyzer can help the bank understand: how profitable Mary Sue is for the company, how profitable is Mary

Sue in relation to the different touchpoints that she interacts with (which can also show the relationship between the value Mary Sue generates and the average costs of interaction at each touchpoint), how profitable Mary Sue is based on the kinds of investment and banking products that she's purchased and based on her interaction history, and even how profitable Mary Sue is to a particular department like customer service. Value Analyzer's analytics and predictive modeling environment can leverage the Teradata data warehouse and feed Teradata CRM components. Leveraging the Teradata data warehouse platform provides complete scalability, enabling Value Analyzer to process hundreds of millions of transactions for millions of accounts with hundreds of products.

Using Value Analyzer

When used with Teradata CRM, Value Analyzer helps marketers create personalized offers based on customer value and determines specific actions, such as when to waive fees and eliminate (or shorten) the

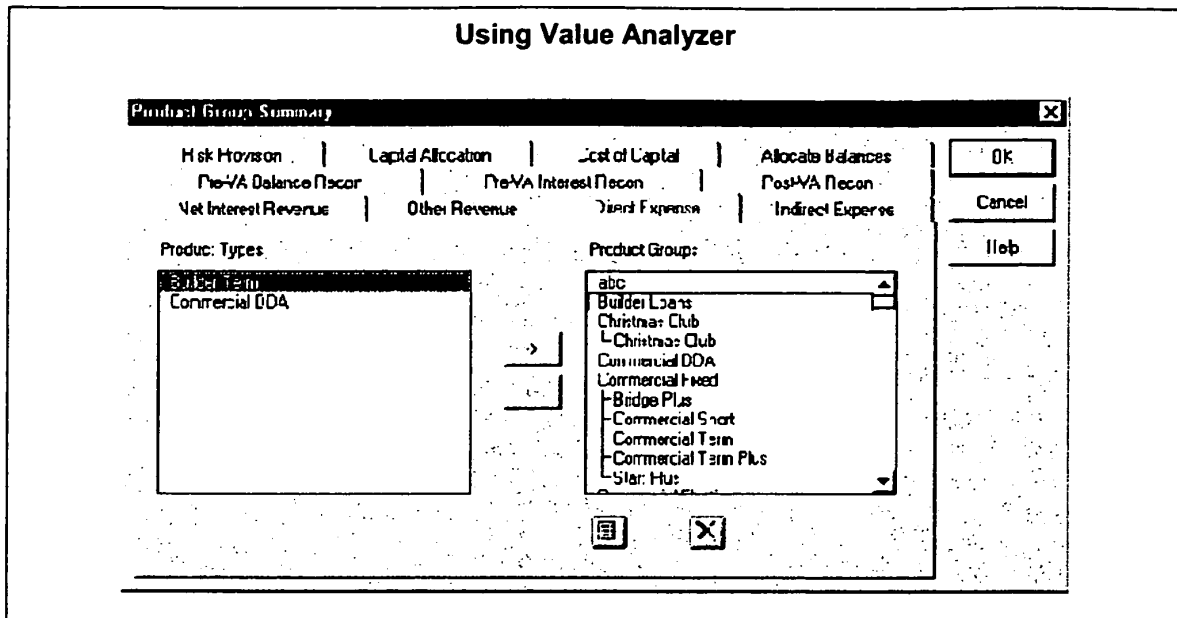


Illustration. Value Analyzer lets you define business rules to customer account profitability measurements including net interest revenue, direct and indirect expenses, risk provision, and capital allocation.

approval process when interacting with established customers. Marketers and financial service representatives typically use Value Analyzer to build profit and product-based customer segmentation models in which Value Analyzer identifies the customer segments with the highest transactional values and related products with the most profitability. Then, to gain the full view of customer value, companies can evaluate customer segments against customer behavior information and touchpoint usage. When the analysis is applied against Teradata CRM's business rules framework, users can determine the appropriate actions and offers to make to the customer.

Teradata Value Analyzer can also help portfolio managers build funds transfer pricing models and financial services companies calculate the costs to serve their customers with different mortgage and loan rates. For example, Value Analyzer can help a bank determine the cost of a 30-year mortgage and determine to the cost of providing the mortgage versus other kinds of loans. It can also factor in risk, especially in determining the net effect of a customer's ability to pay off a loan. A financial services

company can even use Value Analyzer to determine the optimum interest rate for a specific loan amount.

In terms of analyzing customer value and profitability, Value Analyzer has a broader range of functionality than many of the homegrown solutions that have been used over the years. For example, Value Analyzer's dynamic modeling environment (shown in the illustration) can support the complex business rules framework that companies use to grow the value of their customer relationships.

Custom solutions, in contrast, tend to be more departmentally focused on specific issues rather than on providing analytics that could be applied across the entire enterprise. Because of this broader focus, Value Analyzer makes its analysis accessible to everyone in the organization. Moreover, custom solutions typically feed their results to individuals through a portal or dashboard, masking the analysis behind the results. Thus, there's often no way to determine how a particular result was calculated.

Integration and Architecture

Teradata Value Analyzer, on the other hand, displays its results, lets you see how the results were

calculated, and provides access to the data used in the analysis. This level of flexibility results mainly from Value Analyzer's integration with NCR's Teradata data warehouse and CRM solutions. Value Analyzer not only draw on the relevant data sources for analysis across the enterprise, but it can also offer the appropriate environment for multidimensional predictive modeling. Additionally, it can easily be used in tandem with some of Teradata's other customer intelligence analysis tools, such as Behavior Explorer for the financial services industry and Teradata Churn Management for the communications industry.

Value Analyzer's flexibility, moreover, goes hand in hand with scalability, which, as mentioned earlier, is one of the main benefits of being architected on the Teradata data warehouse platform. Teradata is also equipped to concurrently support and prioritize mixed workloads of strategic, tactical, and event-driven decision-making, thereby enabling end users to access the same data for their strategic predictive analysis as well as their more time-sensitive operational analysis.

Pricing

Pricing for Teradata Value Analyzer is tiered based on the number of accounts that are processed, starting at \$200,000 and increasing in price based on increments of two to four million accounts.

Competition and the Road Ahead

Since its release in December 1999, Value Analyzer has been implemented in 15 financial services institutions worldwide. As NCR's Teradata division attempts to broaden its range of customer intelligence functionality in its Teradata CRM suite, it will incorporate Value Analyzer into the fold and will extend Value Analyzer's analytic functionality to other vertical industries.

In the meantime, Teradata will face competition from several areas, including the following:

- CRM vendors that provide their solutions as add-on components to their CRM platforms, such as Oracle's Financial Services application and PeopleSoft's Customer Profitability Management application
- ECRM vendors, such as E.piphany, Xchange, Unica, and Kana Communications (formerly Broadbase Software), which provide some customer valuation functionality in their predefined reporting templates
- Custom solutions developed with analytic platforms such as SPSS and SAS
- Specialized banking tools that leverage other data storage platforms, such as HNC Software's ProfitVision, Fiserv IPS-Sendero's Customer Profitability System, ABC Technologies Oros Solution, Metavante's Relationship Profitability, and PMG Systems' TruCUSTOMER applications

With the practice of customer valuation still in its early stages of development, we expect consolidation to take place among these vendors within the next two years. As part of the Teradata CRM solution, NCR is well positioned to become a dominant player, going head-to-head with the CRM and eCRM players rather than the specialized banking tool providers, as they broaden Value Analyzer's applicability to other industries.

The Bottom Line

For companies in the financial services or insurance industries, NCR's Teradata Value Analyzer is an important solution to add to their CRM and customer intelligence framework to help them understand the value of their customer relationships.

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C004

As competition intensifies in the retail financial services marketplace, accurate measures of customer value down to the account level are becoming increasingly pivotal to success at the retail end of the market. This applies both to established players and new entrants.

CUSTOMER VALUE: GAINING THE COMPETITIVE EDGE

> Simon Doherty
> NCR

The fact is that the pressures that have made profitability measures a prerequisite in the corporate marketplace are now increasingly present in the retail sector. Individual consumers are becoming ever more demanding, both on price and service. At the same time, institutions are looking to gain a competitive edge by establishing one-to-one relationships with customers and a higher degree of personalisation in their services. Significantly, the one factor which had previously hampered the application of profitability measures to individual accounts — the sheer volumes of data involved — has been addressed by advances in technology.

New technology, new insight

While the concept of establishing customer profitability is being imported from the corporate market, the systems to handle the measurement are not. Traditionally, banks used to measure customer value by building bespoke systems, generally developed in-house on the mainframe. This would be a massive application, pulling in data from a whole range of operational systems. As customers, circumstances and requirements changed, these applications became increasingly complex, due to the original design being overlaid with a rolling series of piecemeal changes.

The underlying problem with these mainframe-based approaches to measuring retail customer profitability was that it is a dynamic, fast-changing and fluid area where flexibility is key. This is especially true given that measurement must be conducted right down to the account level if the real benefits are to be realised. Experience has shown that the 'half-way house' approach of analysing profitability on the basis of sample accounts or high-level averages, or only down to the level of branches or products, is too limited

and rigid to deliver the degree of flexibility, responsiveness and functionality now required.

In contrast, by establishing the value of each account to its business, the institution gets all the benefits of detailed data, plus the ability to aggregate this data in an infinite variety of ways. The value of this capability is reflected by the wide range of functions across the institution which queue up to make use of aggregated account data as soon as it becomes available. In fact, our experience with financial services institutions worldwide — who have adopted NCR's Value Analyzer solution to drill down to account-level profitability information — shows that virtually every department benefits directly.

Direct benefits across the organisation

The most immediate advantages arise in marketing and customer management. For any marketing initiative, it is crucial to understand what products are important and attractive to which customers, and which customer groups are likely to use a product in a way that is profitable to the provider. With products such as banking current accounts, where profitability is determined by customer behaviour, account-level information may be decisive in determining both the target market and the pricing.

Customer retention and incentivisation can be similarly transformed by the detailed data on customer profitability. Using the information to focus on profitable customers, in a way which matches their behaviour, can result in substantial savings on the retention budget — while also delivering better bottom-line results for the institution in the long-term. Incentives to encourage customers to stay, or to move to new products, can also be applied more effectively and efficiently.

Everywhere you look, the benefits are equally

dramatic. For example, the profitability of various channels can be notoriously difficult to ascertain accurately. But the profitability of individuals using a particular ATM could be established very easily, aiding any decision on whether that equipment was worth retaining or even upgrading. Similarly, the data might indicate that a particular product is being used by a large number of customers in a very unprofitable way. This situation might be addressed — and the profitability of the product improved — either by redesigning the product, or by incentivising customers to use it more appropriately.

Looking forward, the benefits are likely to increase still further. Relationship pricing — one of the original drivers behind customer profitability measures in the corporate banking sector — is beginning to emerge as a key aspiration for retail financial services providers. Now retail customer value data opens the way for it to become a reality. As banks move to a customer-focused basis for their organisational structure, dynamically generated customer profitability figures can form the ideal basis for defining the scope of each business unit. And in sales and service, a customer value system can provide an objective and ongoing basis for allocating staff rewards and defining 'banded' customer service levels.

Moving to customer value systems

Given the potential effects across the business, it is hardly surprising that the move towards account-level customer profitability measurement is accelerating rapidly — and institutions that hang back are clearly risking being left behind. NCR's experience among its own global financial services clients demonstrates the speed with which the benefits can flow through, and their applicability to institutions at each stage of development.

For example, NCR recently advised a major new UK-based entrant to the banking sector, which was taking on massive numbers of new accounts at a very rapid rate. These circumstances made it crucial for the bank to establish the profitability of these accounts at the earliest possible stage, in order to meet its business plan and justify its business model. Customer value analysis provided the answer. At the same time, moving straight to customer value analysis enabled this new player to leap-frog an entire stage of development and experience, giving it the tools needed to make informed decisions

without first having to build up years of retail banking knowledge.

At the other end of the scale, the well-established Royal Bank of Canada recently conducted an exercise that demonstrated the improved accuracy available from measuring profit at the account level and using this as input into customer segmentation. The bank took a sample set of clients and measured their value using an in-house product profitability model comparable to NCR's account-based profitability model (aggregated to the customer level). The result was that 75 per cent of clients moved two or more deciles — with the result that the bank redirected its marketing efforts towards the redefined segments that reflected the behavioural-based calculations of NCR's Value Analyzer.

Another NCR customer, a UK high-street bank, developed its own tactical customer value application and wanted to move to a sustainable strategic platform. The potential problems of maintainability over time with such a system meant it decided to combine its existing learnings with the flexibility and adaptability of NCR's Value Analyzer. The result was a system able to handle the dynamic nature of retail customer value analysis (and this in turn will enable the bank to take on new types of products, and also to respond to new product portfolios arising through acquisition or organic growth).

Conclusion: the organisational challenge

From such examples, it is clear that financial institutions are now seizing the opportunities presented by customer value systems. Interestingly, the fact that the application and demonstrable benefits of the data are so widespread across the business means the initial challenges in making the move may appear to be organisational rather than technological. Getting all the different areas of a bank to agree on precisely how the data should be collected and used can be difficult.

However, such disagreements are actually illusory. By capturing the smallest possible item of data, and combining it with the capability to aggregate and analyse it in an infinite variety of different ways, a customer value system brings the flexibility to give everyone in the organisation precisely what they want. Which means the organisation as a whole gets the real commercial benefits that it — and its shareholders — require. >

CRM

Biography

Simon Doherty, a career banker and a qualified accountant, joined NCR's Financial Solutions Group in 1997 to work in their data warehousing area, focusing on financial services organisations. Simon is currently responsible for NCR's customer value practice in the UK and the Nordic Region. In this role he has been closely involved in the development of the corporation's global customer value solution 'Value Analyzer™' and its promotion and implementation in a number of major retail banks. Prior to this, Simon worked in the financial and management information area of NatWest between 1986 and 1997. He was involved in management information projects in various parts of the NatWest Group including the UK retail, corporate and international divisions, Lombard North Central, Ulster Bank and Coutts.

For further information, you can email: michelle.houareau@ncr.com or visit NCR's website: www.ncr.com



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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/545,628	04/07/2000	Richard Tad Lepman	Berk-37617	2145
7590 05/07/2004				
Scott W Kelley Kelly Bauersfeld Lowry & Kelly LLP 6320 Canoga Avenue Suite 1650 Woodland Hills, CA 91367			EXAMINER RUDY, ANDREW J	
			ART UNIT 3627	PAPER NUMBER

DATE MAILED: 05/07/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Interview Summary	Application No.		Applicant(s)	
	09/545,628		LEPMAN, RICHARD TAD	
	Examiner		Art Unit	
	Andr w Joseph Rudy		3627	<i>MLJ</i>

All participants (applicant, applicant's representative, PTO personnel):

(1) Andrew Joseph Rudy. (3) Richard Tad Leman.

(2) Aaron T Barrowman (Reg. No. 42,348). (4) _____

Date of Interview: 05 May 2004.

Type: a) ☒ Telephonic b) ☐ Video Conference
c) ☐ Personal (copy given to: 1) ☐ applicant 2) ☐ applicant's representative]

Exhibit shown or demonstration conducted: d) ☒ Yes e) ☐ No.
If Yes, brief description: April 26, 2004 Declaration of Richard Tad Leman.

Claim(s) discussed: 1.

Identification of prior art discussed: Price.

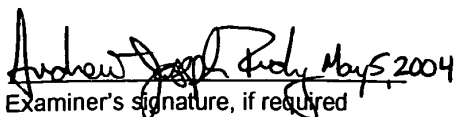
Agreement with respect to the claims f) ☐ was reached. g) ☒ was not reached. h) ☐ N/A.

Substance of Interview including description of the general nature of what was agreed to if an agreement was reached, or any other comments: Claim 1 doesn't presently define over the prior art of record.

(A fuller description, if necessary, and a copy of the amendments which the examiner agreed would render the claims allowable, if available, must be attached. Also, where no copy of the amendments that would render the claims allowable is available, a summary thereof must be attached.)

THE FORMAL WRITTEN REPLY TO THE LAST OFFICE ACTION MUST INCLUDE THE SUBSTANCE OF THE INTERVIEW. (See MPEP Section 713.04). If a reply to the last Office action has already been filed, APPLICANT IS GIVEN ONE MONTH FROM THIS INTERVIEW-DATE, OR THE MAILING DATE OF THIS INTERVIEW SUMMARY FORM, WHICHEVER IS LATER, TO FILE A STATEMENT OF THE SUBSTANCE OF THE INTERVIEW. See Summary of Record of Interview requirements on reverse side or on attached sheet.

Examiner Note: You must sign this form unless it is an Attachment to a signed Office action.


Examiner's signature, if required



I hereby certify that this correspondence is being deposited with the United States Postal Service as first class mail in an envelope addressed to Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450 on May 26, 2004.

Scott W. Kelley
Scott W. Kelley, Reg. No. 30,762 May 26, 2004
Date

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JUN 7 2004

PATENT

GROUP 3600

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of	)	Group Art Unit: 3627
Richard Tad Lepman	)	
Serial No. 09/545,628	)	Examiner:
Filed: April 7, 2000	)	Rudy, Andrew J.
For: <u>PROCESS FOR DETERMINING</u>	)	
<u>OBJECT LEVEL PROFITABILITY</u>	)	Docket No. BERK-37617

AMENDMENT

Commissioner for Patents
P.O. Box 1450
Alexandria, Virginia 22313-1450

Dear Sir:

In response to an Office Action dated January 26, 2004, please amend the above-identified application as follows:

Amendments to the Specification begin on page 2 of this paper.

Amendments to the Claims begin on page 56 of this paper.

Remarks/Arguments begin on page 69 of this paper.

06/03/2004 MGE BREM1 00000005 09545628

01 FC:2201
02 FC:2202

172.00 OP
90.00 OP

Amendments to the Specification:

Please replace the entire Specification with the following (a clean copy being attached hereto):

PROCESS FOR DETERMINING OBJECT

LEVEL PROFITABILITY

RELATED APPLICATION

This application claims priority from provisional patent application Serial No. 60/128,769, filed April 9, 1999.

BACKGROUND OF THE INVENTION

The process of measuring profit is an important business activity. Profit measures are the primary basis for understanding financial performance and value creation in a business. Once a business is owned publicly, an independent review of a firm's financial position becomes a mandatory process well known as measuring profit according to "generally accepted accounting principals" (GAAP.) While these standards and regulations are adequate for an external view of a company's financial condition, the measurement of profit contribution amongst the business is required for proper management of the franchise. Internal financial performance measurement is especially complex for a multi-product, multi-location, and/or large customer based businesses. The use of internal financial performance measures drives most businesses planning processes, management incentive processes and control processes. Many businesses have found that internal profit measures can be

consistent with the external financial statement measures. These businesses implement internal accounting processes consistent with external measures using common metrical units similar to a GAAP Financial Statement presentation - a consistent metric or "yard stick" (i.e. numerically the sum-of-the-profit-parts equals the whole company's profit according to GAAP.)

Many businesses today are struggling to accurately measure profit contribution at a level necessary to accurately measure profit contribution of individual customer interactions. The reason for dilemma is found in the manner in which generally accepted accounting principles are applied. Fundamental accounting theory takes lumpy cash flows that occur in the day-to-day management of a business conducted with its customers and transform them into smoothed income or expense items (known as accruals.) At the end of every profit reporting cycle these income and expense items are consolidated into a period end balance sheet and income statements. Reports on the state of the business can then be presented by accountants in formats necessary for the independence of ownership and management that is the basis of capital markets. Indeed, most businesses today would call its accounting process critical for survival. Unfortunately, the complexity of maintaining an accurate financial accounting process has obscured the measurement of profit contribution at a very detailed level. While the aggregate cash flows of a large company are relatively stable the individual customer-to-business cash flows are very volatile. Accounting practice to date has been comfortable with using aggregate cash flow information for the accrual accounting process(10), as illustrated in FIG. 1. The accounting process based on aggregates has lead to blindness by businesses of incremental customer profit contribution measures necessary to implement customer level decision making, particularly in large businesses with many millions of customers.

General Ledgers (double entry book keeping systems)(11) were early adapters of automated data processing solutions due to the match between computing capabilities of computers and the execution of the accounting process. The benefit, from reduced cost for accounting processes easily justified large expenditures in information processing technology, both in hardware and in software development. The complexity of today's general ledger applications and the age of these systems have retarded the innovation of new automated techniques taking advantage of technological advances in massively parallel computing capability.

References describing generally accepted accounting principals and procedures are listed below, and are incorporated by reference herein:

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There remains, however, a need to resolve profit measures at a
detailed level without using analytical models or statistical
extrapolation(12). Such a process should utilize rule driven and data base
measurement processes which will give large scale businesses a lower
cost of maintenance and a technologically scalable tool to measure profit
at a level of precision or resolution not possible in prior financial

performance measurement processes. The present invention fulfills this need and provides other related advantages.

SUMMARY OF THE INVENTION

Prior approaches to management's desire for an accurate measure of individual decisions (incremental or marginal) profit impact have been solved by automating the accounting process for implementing accounting methods. Cash flows are transformed into two parts, a debit part or credit part, according to an accounting rule. Other non-cash accounting rules are implemented to create "accrual" debits and credits smoothing income and expenses and adjusting for future contingencies. (see Management Accounting Theory ~~Books~~books or any source of accounting theory, where the balance sheet equation and the consolidation process, the combination of flows and stocks of financial data, are developed.) The first large scale use of automated computing technology is frequently found to be the automation of the financial control or accounting processes, since it is easy to develop software to implement accountancy rules and there were large benefits in staff productivity easily observable. For businesses to observe marginal profit contributions it was necessary to use accounting information and make reasoned conclusion on how to apportion or extrapolate this information into incremental customer, product or organizational profit detail. (See Fig. 1)

What these methods of profit measurement lack are the adequate level of detail to measure an individual or incremental decision's impact on profit. To gain this new level of profit resolution this invention is designed to use micro profit measurement rules applied at a granular level

consistent with standard accounting practice using a combination of actuarial science and mathematical set theory. The invention is designed to utilize massively parallel computing operations using relational database management techniques enabling profit measurement at a level not available today in a large individual customer scale business. This invention does this through a consistent application of measures to a class of business entities which represent the smallest common component of profit measurement desired - the Profit Object.

The invention's method of apportionment of non-object related profit measures specifies a method which will not change the ordinal or cardinal profit contribution ranking when only marginal profit measures are counted. This specification is what makes it possible to apply marginal measurement rules (see Micro-economic theory literature) with macro economic principals; namely the sum-of-the-parts equals the whole criterion which is the basis of financial accounting theory and practice.

The invention decomposes profit measurement analytical calculations into five classifications:

1. Marginal profit measures associated with use of the business' balance sheet resources;
2. Marginal measures of non-balance oriented revenues;
3. Marginal cost measures;
4. Marginal measures of expected costs or revenues; and,
5. Apportioned cost measures.

This classification provides for additive profit measures across the five components. The calculation process is designed to be independent across classes 1, 2, 3, & 4 above with the addition of class five to preserve sum-of-the-parts integrity without simultaneous calculations typically found in profit measurement processes. When all five profit measures are summed at the lowest level of profit detail, a consistent set of profit values for all types of aggregations are possible - all profit measurement then originates from the same point in a profit database. The simultaneous use

of these five analytical frameworks makes possible a detailed level of profit calculation consistent with GAAP.

In particular, the present invention relates to a process for determining object level profitability. In its basic form the process includes the steps of:

1. Preparing information to be accessed electronically;
2. Establishing rules for processing the prepared information;
3. Calculating at least one marginal value of profit using established rules as applied to a selected set of prepared information;
4. Calculating a fully absorbed value of profit adjustment using established rules as applied to the selected set of prepared information; and,
5. Combining the at least one marginal value of profit and fully absorbed value of profit adjustment to create a measure for object level of profitability.

More specifically in the step of preparing information to be accessed electronically, the database is prepared, object attributes are extracted, conditioned and loaded into the database, and financial statement attributes are extracted, conditioned and loaded into the database. If desired the step may also include extracting, conditioning and loading the event attributes into the database, and calculating funds transfer treatment rates.

In the step of establishing for processing the prepared information for rule establishment providing the information necessary to select objects and perform the correct profit calculus is accomplished. The step of calculating at least one marginal value of profit using established rules as applied to a selected set of prepared information includes calculating net interest, other revenue, direct expense, and/or provision for the selected set of prepared information. Net Interest (NI) is the summation of interest income, value of funds provided and earnings on equity funds used less

the sum of interest expense and cost of funds used. Other Revenues (OR) is a measure of profit contribution from non-interest related sources. Direct Expense (DE) is the profit value reduction due to marginal resource consumption by the object. Provisioning (P) is the expected profit value adjustment for future outcomes related to the object.

The step of fully absorbed profit adjustment, Indirect Expense (IE), is an apportioned profit value adjustment for all non-object related resource consumption by the business.

In the step of combining the five profit values, $NI + OR - DE - P - IE$, may be adjusted for taxes and/or object economic value.

The foregoing elements of the invention, which have been explained at a micro elemental level can be advantageously employed in massive amounts and parallel process power. For example, in the macro perspective of the invention the basic steps can be utilized.

The present invention gives management profit measures tailored to its need for accurate decision oriented profit information required to manage a large organization based on profit measurement. This invention gives businesses the ability to resolve profit measures at a level of detail necessary for all types of application of profit oriented performance measurement.

Other features and advantages of the present invention will become apparent from the following more detailed description, taken in conjunction with the accompanying drawings which illustrated, by way of example, the principles of the invention.

BRIEF DESCRIPTION OF THE DRAWINGS

The accompanying drawings illustrate the invention. In such drawings:

FIGURE 1 shows existing profit calculation process flow.

FIGURE 2 shows analytical processing relationships.

FIGURE 3 shows the invention's information flow.
FIGURE 4 shows the invention's data relationships.
FIGURE 5 shows the invention's process flow.
FIGURE 6 shows the invention's database preparation process step detail.
FIGURE 7 shows the rule maintenance process.
FIGURE 8 shows the net interest measuring process
FIGURE 9 shows the other revenue measuring process.
FIGURE 10 shows the direct expense measuring process.
FIGURE 11 shows the provision measuring process.
FIGURE 12 shows the indirect expense measuring process.
FIGURE 13 shows the profit component aggregation and adjustment process.
FIGURE 14 shows a partial relational database schema for an airline industry example.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

As shown in the accompanying drawings for purposes of illustration, the present invention is concerned with a detail profit metric (DPM) designed to be a computer database application (i.e. software) for profitability measurement. DPM's profit measurement system is fundamentally different from the common profit measurement system used by regulators and public accountancy - yet, it is consistent with generally accepted accounting principals.

With reference to FIG. 2, the present invention's method of apportionment of non-object related profit measure specifies a method or allocation model (25) which will not change the ordinal or cardinal profit contribution ranking when only marginal profit measures are counted. This specification is what makes it possible to apply marginal measurement rules or models(20) with macro economic principals. The invention

decomposes profit measurement and analytical calculations into five classifications, namely:

Marginal profit measures or funds transfer pricing (21) associated with use of the business' balance sheet resources;

Marginal cost measures or event costing (22);

Marginal measures or non-interest revenues (23) (non-interest or balance sheet related revenue);

Marginal measures of expected costs or revenues, also referred to as provisioning (24); and

Apportioned costs or indirect costing (26). These profit measurement analytical calculations result in a detailed profit measure (27).

With reference now to FIG. 3, once all five profit component measures are summed from the lowest level of profit detail (the "profit object"), a consistent set of profit values for all types of aggregations (30) are possible. DPM is based on object level detail sourced from a business systems of record's cash flows (31), sourced from of customer's transactions, (object oriented events) (33) and sourced from management allocations of profit arising from non-customer related events (34). DPM provides both marginally and or fully absorbed profit measures using activity based costing techniques(35), something traditional "general ledger" based profit accounting systems can not accomplish due to reliance on aggregate debit and credit amounts (see Figs. 2-4.) This results in the smallest common component of profit measurement desired – the profit object (32) common to the business' organizations, products or customers.

More specifically, with reference to FIG. 4, in the step of preparing information to be input (40) to be accessed electronically, a database is prepared. Object attributes are extracted, conditioned, and loaded into the database (43), and financial statement attributes are extracted, conditioned and loaded into the database (45). If desired, the method may

also include extracting, conditioning and loading the event attributes into the database (44) and calculating funds transfer treatment rates and activity based costing rates (46).

In the step of establishing for processing (41) the prepared information information on how to select objects and perform the correct profit calculus rule mapping (47) is accomplished. The step of calculating (48) at least one marginal value of profit using establishment rules as applied to a selected set of prepared information includes calculating net interest (NI), other revenue (OR), direct expense (DE), and/or provision for the selected set of prepared information. Provisioning (P) is expected profit value adjustment for future outcomes related to the object. The step of fully absorbed profit adjustment, Indirect expense (IE), is an apportioned profit value adjustment for a non-object related resource consumption by the business. The foregoing elements of the invention, which have been explained at a micro-elemental level, can be advantageously employed in massive amounts and parallel processing power (41). The present invention gives businesses the ability to resolve profit measures at a level of detail (49) necessary for all types of applications of profit oriented performance measurement or detailed profitability data as an output (42) for enabling aggregation to a particular customer, product or organization within a business.

The following is a definition of the inputs (attributes or measurement parameters), the method of processing and the output of the DPM process.

Definitions

Object Attributes (43)

These are data about the object being measured. Different businesses have different objects of detailed profit measurement. Examples of profit measurement objects include an airline using "seat" as the profit object, an insurance company using a "policy" object or a bank use an "account" object - these objects represent

the lowest level of detail required for consistent internal multi-dimensional internal profit analyses. Types of data attributes associated with these objects include: balances, rates (or interest accrued), product identification, exposures, expected loss frequency, and various dates (e.g., start, finish, rate reset, last payment, next payment, life, etc.)

Event Attributes (44)

These data are about events (a resource consuming activity) related to the object being measured. Data found here include object identification, transaction amounts, quantities, event location, event time, counter-party identification, event type (e.g., payments, interest paid or earned, purchases, refunds, etc.) At least one of these attributes must relate the event to at least one Object.

Financial Statement Attributes (45)

These are data about the company's financial statement. Data found here include balance sheet and profit statement amounts usually aggregated by the legal or management entities that own a group of objects being measured. These data will be current accounting period either actual or planned.

Profit Measurement Parameters (46)

These data include parameter values necessary to perform the object or event level profit calculations. The major classifications of these data are:

- Funds valuing rates ("Treatment Rates") - DPM's funds transfer pricing method uses maturity opportunity rates used in valuing each object's marginal use or source of internal funds (balance sheet resources).
- Unit Costs - DPM's Direct Expense calculations require unit cost parameters. DPM can calculate unit costs, when unit cost data are

not available; in these instances, if the total cost is provided a financial statement attribute and then unit cost is derived by dividing total cost by an appropriate attribute quantity amount.

- Allocated Amounts - In both Other Revenue and Indirect Expense calculations this amount is apportioned amongst all objects in a group.
- Miscellaneous Calculation Values - Some of DPM's calculations require non-system of record values. For example, number of days in profit measurement period or equity allocation weighting. These values are known as "modeling" parameters.
- Amortization Parameters - Interest amortization requires an interest rate and expected life attributes. Straight line and declining balance methods of amortization require expected life values.
- Expected Profit Adjustment Measurement Parameters - Provision calculations require appropriate attributes, such as: expected loss rates, reserve percentages, exposure factors, recovery rates, default probabilities and collection costs.
- Tax Rates - Tax rates are required for after-tax profit calculation. DPM is designed to calculate pre-tax income on a taxable equivalent basis (where an single effective tax rate is all that is required to transform pre-tax income into after tax earnings.)

Profit Measurement Rule Specification

DPM's processing approach is to combine profit measurement techniques with (non-modeled) data and calculation parameters. Each application of this calculus is called a rule 47. DPM is designed to allow the user the freedom to associate a group of objects with a rule and to use object-level information in combination with rule parameters to calculate profit values. The DPM invention uses profit measurement rules separate from, but applied to, object data and the use of relational database concepts,

giving the user a flexibility in both the assignment and depth of definition of measurement rules and measurement resolution. Use of this method is especially suited for massively parallel computing technology where linear scaleable capital investment in processing technology is possible vis-à-vis object and event count and rule complexity.

The types of calculation (Rule types) are:

- Funds Treatment - Every object with cash flows affecting a financial statement's balance sheet requires a method of valuing an object's use or source of funds. The common name for this approach to valuing is known as "Matched Maturity Funds Transfer Pricing." DPM uses a canonical representation of an object's funding characteristics for computational performance. DPM's methodology requires effective yield adjustment to eliminate the allocation of interest payable / receivable required by GAAP. A value, based on effective yield adjusted market price (the yield curve), is then determined by DPM for each instance that requires an interest rate transfer prices to calculate an object's marginal Net Interest (NI).
- Equity Allocation - In order for precise net interest revenue or economic value adjusting calculations the amount of equity funds required at an object level must be determined. DPM's equity allocation to the object level calculations may use any of the following methods: simple ratios; regulatory definitions; economic allocations based on econometric modeling (see book on Modern Portfolio Theory) methodologies; or, as statically defined allocations.
- Balance Sheet Allocations – Complete calculation of Net Interest may require an object level allocation of some financial statement balance sheet amounts.
- Apportionment - In both Other Revenue, Provision and Indirect Expense calculations are applied at the object level using Financial Statement Attributes which are not related directly to an object. These

profit adjustments are made so that the sum of all object profit equals the whole enterprise's profit - an important property of DPM's output. Accountants refer to this profit measurement technique as "full allocation of profit." DPM's approach is to pool indirect costs and revenues and then apportion them. Apportionment rules specify how the pool is completely allocated to appropriate objects. DPM uses a specific closed form (mathematical formula that require only information known in the current period and no iterative computation) allocation rules.

- Amortization - Some types of income or expense are deferred or accrued over multiple periods including and subsequent to the current accounting period. This is common to accrual accounting methods used in financial statement profit presentation and give rise to timing differences between cash flows and their related profit as presented in a financial statement in any accounting period. Since DPM is designed to mirror a financial statement's profit measure it must support deferral and accrual accounting principals. Amortization methods are included in DPM to reflect these GAAP concepts. DPM's amortization methods include: interest method of amortization (used for interest income and expense accruals and for deferral of fees that are in lieu of interest); and, straight line or declining balance amortization methods (used for cost or income deferrals and capitalized investment depreciation.)
- Other Revenue Pricing - In situations where object and event activity can be used to derive object level income or fees DPM provides for the calculation of these drivers of profitability in Other Revenue profit calculations. These calculations take the mathematical form of a linear combination of event or object values and modeled coefficients.
- Direct Expense - Calculation of object profit adjustment due to object related activity requires rules that take the form of linear combinations of event or object values and modeled coefficients.

- Indirect Expense - In situations where expense apportionment or amortization amounts are aggregated the user may want different rules applied depending on the path (or dimension) of aggregation. These rules allow for multiple profit calculations rules to be applied to derive multiple object level indirect expense amounts.
- Provision - Adjusting current profit for expected future value changes is known as "actuarial" profit provisioning. The technique is well known by the financial industry's accounting practice. DPM applies actuarial based methods in its object level profit calculations where the Provision pre-adjusts profit for contingent or known exposures to future profit.
- Taxable Equivalent Gross-up - Profit is usually an after-tax measure. Some events or portions of some object profit may be excluded from normal taxation. DPM's approach is to adjust these pre-tax values so that a singular tax rate can be used to convert pre-tax profit into after-tax values, known as taxable equivalent adjustment. For the purpose of the remaining detailed description all profit and loss profit measures are tax equivalent amounts (e.g., $TEG * Amount$.) These rules use object and event attributes to drive an adjustment for each of the five classes of profit amounts to a taxable equivalent basis.
- Interest Yield Adjustments - Since DPM can derive profit for any length of accounting period from daily to annual, the adjustment of cash interest payments and the financial statement's accrual or smoothed representation of interest related Profit, DPM requires a method for converting cash interest amounts to financial statement accrual amounts. DPM implements the mathematical concept of "effective interest rate" conversion to accomplish this type of calculation.

Before the calculation rules can be applied at the object or event level a calculation rule must be associated with an object, designating the methods DPM will use to calculate components of profit at the object level. An object grouping is designed to associate objects having common and defined set of object attributes for similar processing (note that a group

may consist of one object). The association of a group of objects with a calculation rule is referred here as a Rule Map (47).

Inheritance Functionality

In nature the concept of inheritance is where a descendant receives properties of its predecessors, in computer science inheritance is defined in "Object Oriented" software development theory as the ability to increase function without loss of function using the same data. In DPM the concept of inheritance is applied and in essence it means that an implementation can change Rules (change profit calculus) without losing any profit measurement capabilities of the preceding state(s). This feature allows DPM users a unique ability to apply techniques of differing levels of sophistication to different sets of objects according to the trade-off between the value of more accurate object-focused profit measures and the cost of obtaining and populating data and maintaining Rule Maps.

The DPM system is designed for Rules to be applied to any object without loss of integrity of output. This design feature allows the user to incrementally migrate objects to increased measurement precision as justified. This valuable piecewise increase in functionality is possible due to DPM's combination of rules and data in a mathematical set theoretic framework. (41) This approach allows for a relational database management system implementation (42). It is nearly impossible develop and maintain procedural based software with as much flexibility and with the capability to simultaneously support the number of calculation permutations required by DPM .

Restatement Functionality

Since DPM is a rule based system the ability to restate prior period's Profit calculations are systematically possible providing historical data exists. DPM's design of object level profit measurement enables a

unique historical profit restatement capability. Three features of DPM's restatement capability are:

1. Produces a mathematically consistent time series (i.e. no measurement bias) of object level Profit. DPM restatement functionality is designed to apply the same Rules to all available historical object or event level data.
2. DPM's restatement functionality preserves object accrual ~~objecting~~ integrity when the object history is restated for different length accounting periods. Implementations of daily, weekly, monthly, quarterly, semi-annual, or annual profit calculations and mixing different periodicity in historical data without loss of analytical integrity.
3. Capable of object's profit history restatement. If a DPM user changes Rules or Rule Maps and/or changes the way a subset of object's Profit are calculated and if the historical data is available per the new set of Rules then the user can restate historical profit measures for these subset of objects.

Processing (see Fig. 5)

With reference to FIG. 5, the database is first populated (50). Rules are maintained (51), as will be more fully discussed herein, and the NI, OR, DE, and P are calculated (52-55). Next, the IE is calculated (56) to arrive at a calculation of the object profitability (57). This process is repeated for all objects. After the last object (58), the process is finished as the detail profitability data is obtained. FIGS. 6-13 describe in more detail the steps taken in FIG. 5 in accordance with the present invention.

1. *Populate Database* (see Fig. 6)

Perform standard database administration actions to initialize data for the required calculations:

1. Perform database Initialization (60)
2. Extract, condition & load object attributes (61)
3. Extract, condition & load event attributes (62)
4. Extract, condition & load financial statement attributes (63)

5. Calculate and populate NI treatment rate attributes (64)

2. MAINTAIN OBJECT GROUPS AND RULE MAPS (SEE FIG.

7)

Populate or edit Rule parameters necessary to perform calculations. Rules definition is by association of specific, non-iterative calculation, as described below, with a set of object or event attributes defined as a data filter (see Relational Data Base Management System textbook textbooks). Rules have two pieces:

1. Parameters to drive the object selection or data filter for calculations (70); and,
2. Parameters specific to the appropriate calculation methodology (71).

An easy-to-use graphical user interface can be used to maintain these data for all rules (72).

The following processing steps. Steps 3 through 6 perform object and event level profit calculations. Steps 3, 4, 5, and 6 can be processed independently, step 7 requires values derived in step 3, 4, 5, and 6 and therefore occurs sequentially.

3. Calculate Net Interest for All Objects (see Fig. 8)

Net Interest is:

NI = Interest Income - Cost of Funds + Value of Funds - Interest Expense + Earning on Allocated Equity

Correct interest rates for calculation of interest income or expense depend on the length of the profit measurement period. Using actuarial mathematical techniques the bookkeeping required by GAAP for interest receivables and Payables can be avoided in NI calculus. A known technique (see M Stigum, Money Markets) to accomplish this adjustment for profit measurement according to GAAP (i.e. accruals) the following calculation is used to convert interest rates:

Let r_{new} = annualized rate with new
compounding factor
 r = annualized rate with old compounding
factor
 m = number of old compounding periods per
year
 n = number of new compounding periods
per year

Then
$$r_{\text{new}} = \left[\left(1 + \frac{r}{m} \right)^{m/n} - 1 \right] * n$$

NI CALCULATION RULE TYPE I (80)

The object balance is either an asset or a liability amount for Type I calculation.

Let AAB (o_i) = Average Asset Balance of the object o_i
ALB (o_i) = Average Liability Balance of the object o_i
rate_{asset} (o_i) = Effective interest rate for object o_i as an asset
balance
rate_{liability} (o_i) = Effective interest rate for object o_i as a liability
balance

Rt = Treatment rate based on the identified treatment for
the object's product attributes

Int Inc (o_i) = Interest Income of object o_i
COF (o_i) = Cost of funds used by object o_i
Int Exp (o_i) = Interest Expense for object o_i
VOF (o_i) = Value of funds provided by object o_i

Then,

$$\text{Int Inc } (o_i) = \text{AAB } (o_i) * \text{rate}_{\text{asset}} (o_i)$$

{Compute only if object attribute doesn't exist}
 $COF(o_i) = AAB(o_i) * Rt$
 $Int\ Exp(o_i) = ALB(o_i) * rate_{liability}(o_i)$
 {Compute only if object attribute doesn't exist}

$$VOF(o_i) = ALB(o_i) * Rt$$

NI CALCULATION RULE TYPE II (81)

Let $AB_{(c,t)}(o_i)$ = Average Balances of the object o_i
 $rate_{(c,t)}(o_i)$ = Effective interest rate for the corresponding balance
 asset or liability
 $Rt(o)$ = Object o's product type/group as needed to identify
 treatment rate
 $R_{(c,t)}(pt(o))$ = Rate (treatment rate) for objects of this product
 type/group, given the balance class, and tier
 $Int\ Inc(o_i)$ = Interest Income of object o_i
 $COF(o_i)$ = Cost of funds used by object o_i
 $Int\ Exp(o_i)$ = Interest Expense for object o_i
 $VOF(o_i)$ = Value of funds provided by object o_i

Then, where summations are over the possible balance variables
 (class, tier) for the object,

$$Int\ Inc(o_i) = \sum_{\forall c,t} AB_{(asset\ c,t)}(o_i) * rate_{(asset\ c,t)}(o_i)$$

{calculate only if object attribute doesn't

exist}

$$COF(o_i) = \sum_{\forall c,t} AB_{(asset\ c,t)}(o_i) * R_{(asset\ c,t)} R_{(c,t)}(pt(o))$$

$$Int\ Exp(o_i) = \sum_{\forall c,t} AB_{(liability\ c,t)}(o_i) * rate_{(liability\ c,t)}(o_i)$$

{calculate only if object attribute doesn't

exist}

$$VOF(o_i) = \sum_{\forall c, t} AB_{(liability\ c, t)}(o_i) * R_{(liability\ c, t)} R_{(c, t)}(pt(o))$$

Allocated Balances

Let Total Amount = Balance Sheet amount to be allocated to object

Rule = Rule for allocating Amount

Then, DPM calculates the allocation to object o to determine the allocated balance:

$$B(o_i) = \text{Rule applied to (Total Amount)}$$

$$= \text{The Allocated Balance}$$

Treat this balance as any one of the average balances associated with the object, where class is specified by users, tier is "allocated". Thus, $B_i(o_i)$ is one of the $AB_{(c, t)}(o_i)$ defined above.

NI CALCULATION RULE TYPE III (82)

Let $AB_{(c, t)}(o_i)$ = Average Balances of the object o_i

$rate_{(c, t)}(o_i)$ = Effective interest rate for the corresponding balance

$Type_{p, a}(o_i)$ = Object o_i 's product and object attributes as needed to identify treatment

$R_{(c, t)}(type_{p, a}(o_i))$ = Rate (treatment rate) for this object's product type, given the balance class, and tier/tenor

$Int\ Inc(o_i)$ = Interest Income of object o_i

$COF(o_i)$ = Cost of funds used by object o_i

$Int\ Exp(o_i)$ = Interest Expense for object o_i

$VOF(o_i)$ = Value of funds provided by object o_i

Then, where summations are over the possible balance attributes (state, tier) for the object,

$$\begin{aligned} \text{Int Inc } (o_i) &= \sum_{\forall c,t} AB_{(\text{asset } c, t)}(o_i) * \text{rate}_{(\text{asset } c, t)}(o_i) \\ &\quad \{calculate \text{ only if object attribute doesn't exist}\} \\ \text{COF } (o_i) &= \sum_{\forall c,t} AB_{(\text{asset } c, t)}(o_i) * R_{(\text{asset } c, t)}(\text{type}_{p.a}(o_i)) \\ \text{Int Exp}(o_i) &= \sum_{\forall c,t} AB_{(\text{liability } c, t)}(o_i) * \text{rate}_{(\text{liability } ,t)}(o_i) \\ &\quad \{calculate \text{ only if object attribute doesn't exist}\} \\ \text{VOF}(o_i) &= \sum_{\forall c,t} AB_{(\text{liability } c ,t)}(o_i) * R_{(c,t)}(\text{type}_{p.a}(o_i)) \end{aligned}$$

NI CALCULATION RULE TYPE IV (83)

Let $AB_{(c,t)}(o_i)$ = Average Balances of the object
 $\text{rate}_{(c,t)}(o_i)$ = Effective interest rate for the corresponding
balance amounts
 $\text{type}_{p,a,b}(o_i)$ = Object o_i 's product, object attribute, and
behavior types as needed to identify treatment
rate
 $R_{(c,t)}(\text{type}_{p,a,b}(o_i))$ = Rate (treatment rate) for objects of this product
type, balance class, and tier/tenor
 $\text{Int Inc}(o_i)$ = Interest Income of object o_i
 $\text{COF } (o_i)$ = Cost of funds used by object o_i
 $\text{Int Exp } (o_i)$ = Interest Expense for object o_i
 $\text{VOF } (o_i)$ = Value of funds provided by object o_i

Then, where summations are over the possible balance variables
(state, tier) for the object,

$$\begin{aligned} \text{Int Inc}(o_i) &= \sum AB_{(\text{asset } c, t)}(o_i) * \text{rate}_{(\text{asset } c, t)}(o_i) \\ &\quad \{calculate \text{ only if object attribute} \\ &\quad \text{doesn't exist}\} \end{aligned}$$

$$\text{COF}(o_i) = \sum \text{AB}_{(\text{asset } c, t)}(o_i) * R_{(\text{asset}, t)}(\text{type}_{p, a, b}(o_i))$$

$$\text{Int Exp}(o_i) = \sum \text{AB}_{(\text{liability}, t)}(o_i) * \text{rate}_{(\text{liability}, t)}(o_i)$$

{calculate only if object attribute doesn't exist}

$$\text{VOF}(o_i) = \sum \text{AB}_{(\text{liability}, t)}(o_i) * R_{(\text{liability}, t)}(\text{type}_{p, a, b}(o_i))$$

NI CALCULATION RULE TYPE V (84)

Any Net Interest calculation that is non-iterative, canonical, and represents the marginal GAAP valuation of an object's balance sheet resource related revenues or expenses for each (o_i).

Note that in firms that are highly leveraged, the use of COF/VOF separation leads to a significant and volatile piece of NI, the net difference between to sum of COF and the sum of VOF (after adjusting for EOAE per the following section) and the firm's total NI. This is known by a banker as "mismatch profits arising from the difference in tenors" (duration) of the assets and liabilities. If VOF and COF rates are based on matched maturity of objects then the difference between the firms total NI and the sum of the objects is the profit arising from the firm having different duration of balance sheet related objects. Since this profit is not related to a specific object, but the combination of objects in the enterprise, a separate profit measure is appropriate and possible using DPM's approach. The use of the rules above allow for a novel method of calculating funds transfer pricing, since the rules are based on sets, the processing can be preformed in parallel. Further, since the rules are canonical this approach leads to a computationally efficient method of calculating these types of profit values.

NI CALCULATIONS OF EOAE

Since GAAP financial statement's balance sheet is based on the balancing equation Assets equals Liabilities plus Equity, NI should be adjusted for the value of the Equity resource consumed by each Asset or Liability object. Calculating Earnings on Allocated Equity as part of an object's NI:

Four exclusive options are provided for allocating equity to objects. DPM's options are as follows:

- Option 1 No calculation of EOAE.
- Option 2 EOAE calculation based on a simple equity ratio.
- Option 3 Equity allocation for all assets following regulatory standards.
- Option 4 Equity allocation using an economic allocation rule, based on object cohorts and modern portfolio theory's capital asset pricing model.

Option 1 (85)

$$EOAE(o_i) = 0$$

Option 2 (86)

Let $AB_{(asset, t)}(o_i)$ = Average Asset balances of the object o_i ,
including any allocated asset
balances

ER = Equity Ratio

R_{equity} = Treatment Rate for equity

$$\text{Then, } EOAE(o_i) = R_{equity} * ER * \sum AB_{(asset, t)}(o_i)$$

where the summation is taken over all asset
balances.

Option 3 (87)

Let $\text{Amount}(o_i)$ = Amount(s) associated with object 'a' This may be the average asset balances of the object ' o_i ' including any allocated asset balances, or may be an object parameter, etc.

$\text{Wt}(\text{type}(o_i))$ = Code needed to identify the weight for object o balances, at the object-type level

$\text{W}(\text{Wt}(\text{type}(o_i)))$ = determined by the weight code

Cap Ratio = An appropriate risk-weighted capital ratio chosen

R_{equity} = Treatment Rate for equity

Then, $\text{EOAE}(o_i)$ = $R_{\text{equity}} * \sum [\text{Amount}(o_i) * \text{W}(\text{Wt}(o_i)) * \text{Cap Ratio}]$

where the summation is taken over all balances of o_i if there are multiple amounts.

Option 4 (88)

Let $\text{Amount}(o_i)$ = An amount or amounts related to the object, such as average balances of the object (denoted $\text{AB}_{(c,s,t)}(o_i)$)

$\text{Cohort}(o_i)$ = The cohort of objects in which object o is a member

$E_{\text{cohort}}(o_i)$ = The equity allocation rule for the cohort of object o. This is a linear (two-valued) function that operates on $\text{Amount}(o_i)$ of the form $\alpha + \beta * \text{Amount}(o)$.

R_{equity} = Treatment Rate(s) for equity for the $\text{Amount}(o_i)$ value(s)

Then, $\text{EOAE}(o_i)$ = $\sum R_{\text{equity}} * E_{\text{cohort}}(o)(\text{Amount}(o_i))$
= $\sum R_{\text{equity}} * [\alpha + \beta * \text{Amount}(o_i)]$

where summation occurs if Amount(o_i) is a set of values (such as the object and allocated balances related to the object).

4. Calculate Other Revenue for All Objects (see Fig. 9)

OR Calculation Rule Type I (90)

Let OR_i = Financial Statement Other Revenue attribute subset ,
 $OR_i(o_i)$ = The amount of OR_i apportioned to object o_i ,
 $O(OR_i)$ = the objects that map to OR_i .

Let M be an OR calculation method, where M is dependent upon the OR subset under consideration. We then have the following.

If $M(OR_i)$ = a "balance" attribute method.

Define

$M(OR_i)(o_i)$ = An average balance method for calculating o_i 's

OR

$$\text{and } OR_i(o_i) = OR_i * \frac{\text{Balance}(o_i)}{\sum_j (\text{Balance}(o_j))}$$

where the summation is over all o_i in $O(OR_i)$.

If $M(OR_i)$ = A "count" method for calculating o_i 's OR

Define

$M(OR_i)(o_i)$ = 1

$$\text{and } OR_i(o_i) = OR_i * \frac{1}{(\text{count}(a_j) \text{ in } O(OR_i))}$$

where the count is over all o_i in $O(OR_i)$.

If $M(OR_i)$ = "event count," we can define

$M(OR_i)(o_i)$ = Count of events in profit measurement period for object o_i

$$\text{and } OR_i(o_i) = OR_i * \frac{\text{count of events for object } o_i}{\sum_j (\text{count of events for object } (o_j))}$$

where the summation is over all o_i in $O(OR_i)$.

If $M(OR_i)$ = "event amount"

Define $M(OR_i)(o_i)$ = $\sum_{\text{events over the period}} (\text{event amounts for } o_i)$

and $OR_i(o_i)$ = $OR_i * \frac{\sum_{\text{events over the period}} (\text{event amounts for object } o_i)}{\sum_j \sum_{\text{events over the period}} (\text{event amounts for object } o_i)}$

where the summation is over all events in $o_i (OR_i)$,

and the events are restricted to a class of event type. Then, we have the total OR for object o given by the sum of these allocations for all sets for which a has an association:

$OR(o_i) = \sum (OR_i(o_i))$, summing over i.

As a generalization, these formulas can be written in shorthand

where $M(OR)$ is the corresponding function of 'o' above, as:

$OR_i(o_i) = OR_i * \frac{M(OR_i)(o_i)}{\sum_{a_j \in A(OR_i)} M(OR_i)(o_i)}$

and

$OR(o_i) = \sum_i^{o_i \in O(OR_i)} [OR_i * \frac{M(OR_i)(o_i)}{\sum_{a_j \in A(OR_i)} M(OR_i)(o_i)}]$

OR Calculation Rule Type II (91)

The formula for OR calculation is given as follows:

Let o_i = Object being considered

$OR_i(o_i)$ = OR apportioned to a (if any) from a set OR_i

$Event(t)_i(o_i)$ = The event reflecting the activity of object o_i in the period restricted to a given event type t.

$Amount(Event(o_i))$ = An event amount

$Rev(Evt_i(o_i))$ = The revenue amount associated with this event.

This is

assumed to be of the form

$$= \sum_{type\ t} \sum_i [x_i * Count(Event(t)_i(o)) + \beta_i * Amt(Event(t)_i(o))]$$

where α, β are pre-entered values.

$OR(o_i)$ = Total OR apportioned to object o_i

Then $OR(o_i)$ = $\sum_{type\ t} \sum_i (Rev(Event(t)_i(a)))$ summed over all the events

of o_i

+ apportioned revenue as in the Type I case.

$$= \sum_{type\ t} \sum_i [x_i * Count(Event(t)_i(a)) + \beta_i * Amt(Event(t)_i(a))] +$$

$$\sum_i (OR_i(o_i))$$

OR Calculation Rule Type II (92)

Let o_i = Object being considered

$OR_i(o_i)$ = OR apportioned to the object (if any) from a set

OR_i

$Event(t)_i(o_i)$ = The events reflecting the activity of object o in the period

restricted to a given event type t

$Amount(Event(t)_i(o_i))$ = The event amount

$Rev(Event(t)_i(o_i))$ = The revenue amount associated with this

event. This is assumed to be of the form

$$= \sum_{type\ t} \sum_i [x_i * Count(Event(t)_i(o)) + \beta_i * Amt(Event(t)_i(o))] \text{ where } \alpha, \beta$$

are pre-entered values based on event type. For completeness, $\alpha = \beta = 0$ in the event amount is null.

AM = The method of amortization = cash, SL, DB,
interest
 $AM_k \{amount\}$ = Deferral on amount, using method AM, at time k (= 0 if k > life);

and life = 1 if cash basis is selected

$AM_{now} \{amount\}$ = Deferral on amount, using method M, at this period now; note

that this is at various points of life for various amounts

Let $OR(o_i)$ = Total OR apportioned to object o_i .

Then $OR(o_i)$ = Amortized amounts in their first amortization period
+ amortized amounts in their higher amortization periods

+ amounts not amortized but apportioned from a pool

as in Type I

We take this step at a time. First, consider the amounts in their first amortization period. These are calculated as follows, using the formula generated in Type II:

Then $OR(o_i)$ = $\sum_{type\ t} \sum_i (Rev(Event(t)_i(o_i)))$ summed over all the transactions of

+ apportioned revenue as in the Type I case.

$$= \sum_{type\ t} \sum_i \left[x_i * Count(Event(t)_i(o_i)) + \beta_i * Amt(Event(t)_i(o_i)) \right] + \sum_i (OR_i(o_i))$$

where the AM_1 methods vary with the event types. We can group the amounts being amortized by their amortization characteristics. For this purpose, let

$Pool_1(L, M)$ = the pools of amounts amortizing in this period for the first time

according to life L and amortization method M. The new amortizing amounts can be rewritten as follows:

$$\text{New amortized amounts} = \sum_{L,M} \text{Pool}_1(L, M)$$

Similarly, define

$\text{Pool}_k(L, M)$ = the pools of amounts amortizing in this period for the k^{th} time according to life L and amortization method M, where $L \leq k$. N.B. any amortization calculation can be used if the calculation can be derived using known Object Attributes.

Then, the total OR for object o_i in this period is computed as follows:

$$\begin{aligned} \text{OR}(o_i) &= \sum_{\text{type } t} \sum_i \left[x_i * \text{Count}(\text{Event}(t)_i(o_i)) + \beta_i * \text{Amt}(\text{Event}(t)_i(o_i)) \right] \\ &\quad + \sum_{k>1} \sum_{L,M} \text{Pool}_k(L, M) \\ &\quad + \sum_i (\text{OR}_i(o_i)) \\ &= \sum_k \sum_{L,M} \text{Pool}_k(L, M) + \sum_i (\text{OR}_i(o_i)) \end{aligned}$$

OR Calculation Rule Type IV (93)

Foregone OR:

Let Actual OR for object $o_i = \text{OR}_{\text{actual}}(o_i)$ - CASH AMOUNTS

Let Expected OR for object $o_i = \text{OR}_{\text{expected}}(o_i)$

Then, Foregone OR for object $o_i = \text{OR}_{\text{foregone}}(o_i) = \text{OR}_{\text{expected}}(o_i) - \text{OR}_{\text{actual}}(o_i)$ - CASH AMOUNTS

OR Calculation Rule Type V (94)

Any Other Revenue calculation that is non-iterative, canonical, and represents the entire GGAP valuation of non-balance sheet resource related revenues or expenses.

5. Calculate Direct Expense for All Objects (see Fig. 10)

DE Calculation Rule Type I (100)

None directly specified - use IE calculation rules (any type). For each IE rule used in this way, substitute $DE(o_i)$ for $IE(o_i)$ in any IE calculations used as DE.

DE Calculation Rule Type II (101)

Direct expense will be a variable dependent upon the object and the event being costed. These determine the unit cost to be used and the calculation type, along with the multiplier rule being used if external amounts are needed. Thus, using subscripts to indicate variables used,

$DE_{\text{object, event-type}}$

= unit cost_{event type} * (no. of events of this type in the period)

+ amounts taken from an event file

+ costs calculated as a

percentage of Event Amount Where the unit costs, and revenue

percentage by event type, are all entered by the user as pre-processing inputs.

Then, $DE_{\text{object}} = \sum_{\text{event types}} DE_{\text{object, event-type}}$ where the summation is over event types.

DE Calculation Rule Type III (102)

$DE_{\text{object, event-type, event-sub}}$

= unit cost_{event type} * (no. of events of this type in the period)

+ amounts taken from an event file

+ costs calculated as a percentage of event amount

DE Calculation Rule Type IV (103)

Two calculations are made, each one using the above calculations, processing two independent DE attributes for each object. DE is

calculated twice for each object, allowing for comparison of plan to actual values or standard to actual values or any scenario to scenario comparison.

DE Calculation Rule Type V (104)

Any Direct Expense calculation that is non-iterative, canonical, and represents the entire GGAP valuation of costs related to object or sub-object level details.

6. Calculate Provision for All Objects (see Fig. 11)

P Calculation Rule Type I (110)

The formula for calculating P of Object i is as follows, where PG(o_i) denotes the P group in which o_i is a member:

$$P(o_i) = PG(o_i) * \frac{\text{Balance of } o_i}{\sum_{o_k \in RPG(o_i)} \text{Balance } o_k}$$

P Calculation Rule Type II (111)

The formula for calculating P of o_i is as follows, using the same symbols as above and RF(o_i) denotes the expected adjustment factor for o_i:

$$P(o_i) = PG(o_i) * \frac{\text{Balance}(o_i) * RF(o_i)}{\sum_{o_k \in RPG(o_i)} [\text{Balance}(o_k) * RF(o_k)]}$$

P Calculation Rule Type III (112)

The formula for calculating P of object "o_i" is as follows, where Pr(o_i) is a probability for object o_i.

$$P(o_i) = \text{Exposure}(o_i) * Pr(o_i) * \text{Expected Value Adjustment}(o_i) * \frac{1}{L_i}$$

Where L is the expected number of reporting periods during the life of o_i.

P Calculation Rule Type IV (113)

The addition of any of the Type I, II or III P rules applicable to an object i.

$$P(o_i) = P(o_i)_{P \text{ Type I}} + P(o_i)_{P \text{ Type II}} + P(o_i)_{P \text{ Type III}} + P(o_i)_{P \text{ Type IV}}$$

P Calculation Rule Type V (114)

Any Provision calculation that is non-iterative, canonical, and represents the entire GGAP valuation of expected costs related to future events, contingencies, timing effects.

7. Calculate Indirect Expense for All Objects (see Fig. 12)

Indirect expense, by its nature is not related directly to an Object, therefore apportionment techniques are used to allocate indirect expense to an Object. Any apportionment function is allowed as long as it is derivable at the object level using ratios of attributes available at the object level to the summation of this available attribute across all objects receiving the apportioned expense. Examples of this type of ratio calculation (the function "F" used in the IE calculation types) are:

- Ratio 1: Balance-based apportionment of IE.
Define Apportionment ratio using Current Balance of (o_i) .

Thus, the allocation of Indirect Expense k becomes (function $F(IE_k)(o_i)$ in IE rules below):

$$IE_k * \frac{\text{Current Balance of } o_i}{\sum_j (\text{Current Balance of } o_j)}, \text{ summed over all objects in grouping j.}$$

- Ratio 2: Count-based apportionment of IE

Thus, the allocation of Indirect Expense k becomes (function $F(IE_k)(o_i)$ in IE rules below):

$$IE_k * \frac{1}{(\text{count of } o_j \text{ in } O(IE_k))}, \text{ for all objects in grouping } j.$$

- Ratio 3: Revenue-based apportionment of IE
Define $NI(o_i) + OR(o_i) = \text{Total Revenue}$ (using NI & OR rules above) for (o_i) .

Thus, the allocation of Indirect Expense k becomes (function $F(IE_k)(o_i)$ in IE rules below):

$$IE_k * \frac{NIR(o_i) + OR(o_i)}{\sum_j (NIR(o_j) + OR(o_j))}, \text{ summed over all objects in grouping } j$$

- Ratio 4: Event Count apportionment of IE
Count of events for (o_i) are restricted to an event type.

Thus, the allocation of Indirect Expense k becomes (function $F(IE_k)(o_i)$ in IE rules below):

$$IE_k * \frac{\text{count of event for object } o_i}{\sum_j (\text{count of event for object } (o_j))}$$

for some event type, summed over all objects in grouping j.

- Ratio 5: Transaction Amount apportionment of IE
Summation of event amounts for (o_i) , restricted to an event type.

Thus, the allocation of Indirect Expense k becomes (function $F(IE_k)(o_i)$ in IE rules below):

$$IE_k * \frac{\sum_{\text{event over the period}} (\text{event amounts for object } (o_i))}{\sum_j \sum_{\text{event over the period}} (\text{event amounts for object } (o_j))},$$

for some event type, summed over all objects in grouping j.

- Ratio 6: Direct Expense apportionment of IE
Using DE rules above for O_i .

Thus, the allocation of Indirect Expense k becomes (function $F(IE_k)(o_i)$ in IE rules below):

$$IE_k * \frac{DE(o_i)}{\sum_j (DE(o_j))}, \text{ summed over all objects in grouping } j.$$

- Ratio 7: Normalized (averaged) apportionment of IE

Thus, the allocation of Indirect Expense k becomes in IE rules below:

$$F(IE_k)(o_i) = [IE \text{ using Ratio 1 } F(IE_k)(o_i) + IE \text{ using Ratio 3 } F(IE_k)(o_i) + IE \text{ using Ratio 6 } F(IE_k)(o_i)] \div 3.$$

IE Calculation Rule Type I (120)

Indirect expense is apportioned to accounts using one of the first three apportionment ratios above. Accordingly, using the nomenclatures above,

$$IE(o_i) = (\text{Total IE to be apportioned}) * \frac{F(IE_k)(o_i)}{\sum_k F(IE_k)(o_i)}$$

IE Calculation Rule Type II (121)

The rules for partitioning IE and defining corresponding object groups are based on product and event attributes. The calculation of $IE(o_i)$ is exactly as described above, and is given by the following, where the F's are the given apportionment ratios (any of the seven apportionment ratios are permitted for any partition O or groupings of objects).

$$IE(o_i) = \sum_k^{o_i \in O(IE)} \left(IE_k * \frac{F(IE_k)(o_i)}{\sum_j^{o \in O(IE)} F(IE_k)(o_j)} \right)$$

IE Calculation Rule Type III (122)

For Indirect Expense before deferral calculations, the process is similar to that as listed for the Type II Level, where:

$IE(o_i) =$

 New amounts in their first period of amortization

 + Amounts not being amortized (cash basis)

 + Amounts in their 2nd through last amortization

 period.

Since we include non-amortized amounts (cash basis) to be considered as amortized with only one period, this is re-written as follows:

$IE(o_i) =$ New amounts in their first period of amortization (including cash-basis)

 + Amounts in their 2nd through last amortization period.

Note that non-amortized amounts are made to fit this equation by considering them to be an amortization of one profit reporting period only. Each IE set can have a different amortization type or period, though all objects receiving a specific apportionment will share the same amortization Rule.

The new amounts to be deferred are computed, therefore, as the following:

$$\text{Before deferral } IE(o_i) = IE_k * \frac{F(IE_k)(o_i)}{\sum_j F(IE_k)(o_j)} \text{ added over each set } IE_k \text{ to}$$

which o_i is related.

$$= \sum_k^{o \in O(IE)} \left(IE_k * \frac{F(IE_k)(o_i)}{\sum_j F(IE_k)(o_j)} \right)$$

Each of these terms may be deferred over its amortization period according to any of the amortization rules (cash, straight line, declining balance, or interest amortization calculations). Since amortization methods may vary by set, we have the following, where $AM_1(L,R)$ is used to denote the amortization rule and its life:

$$IE(o_i) = \sum_k^{o_i \in O(IB)} AM_1(L,R) \left(IE_k * \frac{F(IE_k)(o_i)}{\sum_j^{o_j \in O(IB)} F(IE_k)(o_j)} \right)$$

To this is added the amounts with remaining amortization life for which amortization was begun in earlier periods.

IE Calculation Rule Type IV (123)

Multiple combinations of the any of the above IE type rules I, II, or III are calculated per object.

IE Calculation Rule Type V (124)

Any Indirect Expense apportionment calculation that is non-iterative, canonical, and represents the GAAP evaluation of indirect costs.

8. Calculate After-Tax Object Profit for All Objects (130)(see Fig. 13)

$$\text{Profit}(o_i) = [\text{NIR}(o_i) + \text{OR}(o_i) - \text{DE}(o_i) - \text{IE}(o_i) - \text{P}(o_i)] * (1 - \text{EffectiveTaxRate})$$

where, for a two tier taxation system, Effective Tax Rate is calculated as:

$$\text{Effective Tax Rate} = (1 - \text{tax rate 2}) * (\text{tax rate 1}) + \text{tax rate 2}.$$

In the calculation of Effective Tax Rate, this formula assumes the two rates are effective rates which apply to the business conditions (not the nominal statutory rates), and that tax rate can be deducted from income in the calculation of tax rate. Then,

$$\text{Total Profit} = \sum_i [\text{Profit}(o_i)]$$

For those companies which use economic profit value calculations, the formula changes to:

$$\text{Profit}(o_i) = \{[\text{NIR}(o_i) + \text{OR}(o_i) - \text{DE}(o_i) - \text{IE}(o_i) - \text{P}(o_i)] * (1 - \text{EffectiveTaxRate})\} - \text{SVA}(o_i)$$

where

$$SVA(o_i) = \alpha(o_i) + \beta(o_i) * \text{Amount}(o_i)$$

and

$\alpha(o_i)$, $\beta(o_i)$ are functions for a cohort of objects in which o_i is a member, and $\text{Amount}(o_i)$ is given by a rule which maps o_i to a data value (such as balance, or allocated equity) also defined at the cohort level. (A cohort defined here represents a grouping of objects with similar risk characteristics, consistent with Modern Portfolio Theory and the Capital Asset Pricing Model.)

Shareholder Value Add (SVA) is a method financial analysts use to adjust profit measures for risk. The idea is to subtract from the profit measure the cost of the equity required to support whatever is being measured. Companies use this risk adjustment measure essentially to burden the profit for risk being taken with the equity funds used by the object. These institutions will classify cohorts of risk and the risk cost equivalent as a percentage of account balance or allocated equity (i.e., "Hurdles").

DPM Example

In the airline industry a need for detailed customer profitability can be measured using DPM. Here the fundamental object is the seat, allowing consistent profitability values aggregated by route, aircraft type, as well as customer dimensions using data warehousing technology. The need for detailed customer profitability is being driven by the business impact analysis required to support loyalty and alliance strategic decisions. The following is a DPM profit calculation for a seat, with real profit measurement parameters simplified (not all aspects of true airline business is demonstrated) and where examples of each type of rule are utilized in DPM processing.

Flight: Air101

Date: 7/1/1998

From: London

To: New York

Equipment: Boeing 747-400

Classes: First (20 Seats); Business (80 Seats); Economy(300 seats)

DETAILED PROFIT METRIC PROCESSING

Step 1: Populate Database – assuming a relational database management system and terminology.

- Initialize database;

Extract, Condition, and Load the following tables: Planes, Flights, Customers, Employees, Locations; The net balances in the Planes entity can be maintained by use of DPM amortization IE calculation from the prior period.

- Extract, Condition, and Load the following tables: Financial Transactions, Events; Manifest (occupant, seat, flight, date attributes);
- Extract, Condition, and Load the Financial Statement table;
- Calculate and populate Rate table;

Figure 14 shows a partial relational database schema showing the entities and attributes used in the example's processing.

Step 2: Maintain Object Groups and Rule Maps – a database processing routine is run creating the following groupings:
Class to Seat

- Flight to Locations
- Seat to Plane

For ease in understanding the rule the specifications used to populate the database with rule parameters the processing instructions are shown below in the Rules. Also, most rules group by plane – the rule discussion below assumes this grouping without reference.

Step 3: Calculate Net Interest for Seat – Four types of NIR rules are processed - type I, II, III, IV for each seat. Interest rates are matched to plane purchase date for initial plane investments, and interest rates for plane net capitalizable improvements are funded with a 5 year pool of

rates. Plane asset balances are kept in the Plane table maintained in Step 1.2 above.

NIR Type I: Carry cost of plane asset by seat is determined.

Rule

Populated in Step 2 are:

- The AAB(seat) parameter is Plane: net__orig_bal * (1/total seats on plane)
- The rt parameter is Treatment_rts: 25_yr_rate (maintained for each plane) There is no need for liability rates.

Calculate COF(seat) = AAB(seat) * rt for all seats on flight.

All other attributes are NI Type I calculations results are null.

No grouping.

NIR Type II : Allocate net receivable/payable to seat for carry cost profit adjustment. This adjusts profitability for the impact of cash flows vs. accounting flows. This airline wants to apportion this cost across all revenue seats based on class_wt, a modelling parameter. Total weighted seats (tw_s) for the accounting period is a modelling parameter. Where the seat factor is determined as a ratio of seat footprint to class portion of the plane's seat revenue space. (e.g. 1st = 15%, 2nd = 25% & 3rd = 60% of plane's seat revenue space with each seat evenly apportioned in class – 1/20, 1/80, 1/300 respectively, in this case.)

Rule

Populated in Step 2 are:

- The AB(seat) parameter is Financial: net_recv'ble * (1 / tw_s)
- The rt parameter is Treatment_rts: pool (for null plane row) There is no need for liability rates.

Calculate $COF(seat) = AB(seat) * rt * class\_wt$

Grouped by class all seats, so no_seats??? is no_seats1st value in the plane entity for first class seats on this plane, and so on for 2nd & 3rd class seat groups. The net rcv'ble column is derived from the difference between sum of period_amts for the receivables minus sum of payable rows for this profit period.

All other attributes and NI Type II calculations results are null.

NIR Type III : Calculate the NI value of the customer mileage benefit payable for each seat.

Rule

Populated in Step 2 are:

- The AB(seat) parameter is Customer: bene_miles * loyalty factor
- The rt parameter is Treatment_rts: pool (for null plane row) There is no need for an asset rate.

Calculate $COF(seat) = AB(seat) * rt$

Since a customer can only occupy one seat, no groupings are used in this rule map.

All other attributes and NI Type III calculations results are null.

NIR Type IV : Calculate the NI impact of the plane's improvements for each seat. Upper classes interior, customer electronics and seating are improved faster during the life of the plane. Management strategy is for these improvements to be loyalty program related; they are amortized quicker and hence shorter funding requirement with less certain life. Management wants the loyal customers to pay proportionately more of the funding costs of improvement assets.

Rule

Populated in Step 2 are:

- The AB(seat) parameter is $\text{Plane:imp\_net\_bal} * (1/\text{tsw})$
- The rt parameter is $\text{Treatment\_rts: pool (for plane row)} * \text{Customer: loyalty\_rtng}$

There is no need for a liability rate.

Calculate $\text{COF(seat)} = \text{AB(seat)} * \text{rt} * \text{class\_fac}$

The unique class_fac values sum to 1. The rule map is grouped by classes (or class_fac).

All other attributes and NI Type IV calculations results are null.

NI EOAE- Option 4: Allocate equity based on mileage benefit and have it reduce NI by the weighted average cost of capital for the airline.

Rule

Populated in Step2 are:

- The Amount(seat) parameter is $\text{Customer:bene\_miles}$
- The equity rate is 9.75%

Calculate $\text{EOAE(seat)} = \text{Amount(seat)} * \text{equity rate} * \text{cohort\_wt}$

The cohort is based groups of each instance of loyalty_rtng and class of seat paired. Cohort_wt is "beta" and no "alpha."

All other attributes and EOAE calculations results are null.

Step 4: Calculate Other Revenues from each Seat – Revenue arises from ticket fares, duty free sales on board aircraft, excess baggage penalties collected, alliance code sharing license and multiple leg customer trips.

OR Type 1 : Apportion revenue from code sharing with alliance.
Apportion revenue by seat allocated to alliance passenger.

Rule

Populated in Step 2 are:

- Flight:period_amt is alliance revenue per flight plus the sum of all flight/date alliance financial transactions.

Calculate $OR(seat) = \text{sum of Flight:period\_amt} \times$

$(1 / \text{no alliance seats available on flight})$

Only for seats occupied by an alliance customer or a seat that is empty.

OR Type II: Use Transaction table to find direct passenger revenue by seat.

Rule

Populated in Step 2 are:

- Transaction:* (amounts, seats, flight, date, transaction type) are populated for events, financial or non-financial.

Calculate $OR(seat) = \text{sum of Transaction:trn\_amt}$

where type = "passenger_payment" for each seat.

No seat grouping in rule map.

OR Type III: Apportion flight freight revenue amongst all seats, weighted by class_wt.

Rule

Calculate $OR(seat) = \text{sum of Transaction:trn\_amt} \times \text{class\_wt}$

*

$(1 / \text{no\_seats???})$

where type "freight" for each seat.

Group seats by class (??? Is 1st, 2nd, 3rd.) Class_wt is a normalized weight for apportioning revenue amongst classes.

OR Type IV: Calculate the loyalty mileage benefit by seat.

Rule

Calculate Forgone OR(seat) = Flight: ???_fare – sum of Transactions:trn_amt where type = “passenger_payment” for each seat.

Group by class for loyalty passenger occupied seats only.

Step 5: Calculate Direct Expenses for each Seat –

Compute the direct cost of using the seat. This is true for both occupied and unoccupied seats. Fuel and flight deck crew are costs of all seats, while cost of duty free goods sold and meals are a function of occupied seats. Some costs are a function of the plane taking off, no matter the duration of the flight (e.g., maintenance.) Some costs are a function of class, such as cabin crew expense and customer consumables.

DE Type I: Show direct cost of non-food materials consumed in flight.

Rule

Populated in Step 2 are:

- Transactions:* is populated based on these direct costs.

Calculate DE(seat) = Transactions:trn_amt for all flight and date rows where type = direct_exp for each seat.

No grouping in rule map.

DE Type II: Show direct cost duty free goods sold by seat.

Rule

Populated in Step 2 are:

- Transactions:* are populated based on these direct costs.

Calculate DE(seat) = Transactions:trn_amt for all flight and

date rows where type = duty_free for each seat.

No grouping in rule map.

DE Type III: Show direct cost of food and beverage consumed.

Rule

Populated in Step 2 are:

- Transactions:* are populated based on these direct costs
- Loading is calculated as the ratio of occupied to total class seats by class (cl_load) using manifest table and plane configuration values.

Calculate DE(seat) = Flight: catering_cost * class_wt * cl_load

for each seat.

Grouped by class in rule map.

DE Type IV: The staffing of each cabin has a maximum count with a minimum of 1 per 50 passengers. The air deck crew must fly the plane even if there are no passengers. Calculate DE twice, once for based on a labor cost per seat based on total crew cost and total seats; and calculate DE a second time with actual staff apportioned to actual passengers.

Rule

Populated in Step 2 are:

- Total crew cost (tcc1) parameter is derived using the employee entity for all crew on flight. $Tcc = \text{Employee:salary+bene} * (\text{Flight:schd\_hours} + 1.5) / 110$
- Total crew cost (tcc2) parameter is derived using the employee entity for all crew on flight by class. $Tcc??? = \text{Employee:salary+bene} * (\text{Flight:schd\_hours} + 1.5) / 110$

Note: $tcc = tcc1st + tcc2nd + tcc3rd$

Calculate $DE1(seat) = tcc * (1/(total\ no.\ of\ seats\ on\ plane))$

Calculate $DE2(seat) = tcc?? * (1/(no.\ of\ seats\ occupied\ in\ class))$

for each seat.

Grouped by class in rule map.

Step 6: Calculate Provisions for each Seat – The cost of expected future events are measured here. The airline self insures property, casualty and miscellaneous insurance premiums on a per flight basis. And a provision for future loyalty benefit, a function of loyalty rating, claimed is made in step 6.

P Type I: - The cost of the flight's insurance premium is apportioned to each seat.

Rule

Populated in Step 2 are:

- Insurance premium is maintained in the flight entity (total PG)

Calculate $P(seat) = Flight:ins\_prem * 1/(total\ no.\ seats\ on\ plane)$

No grouping in rule map.

P Type II: Provision for unusual maintenance cost is made on a function of the inverse of flight time and takeoffs in the last 12 months.

Rule

Populated in Step 2 are:

- Financial:period_amt is maintained in the financial entity by equipment type.
- Total flight hours and last 12 months take-offs are accumulated each month, their product is to_hrs parameter.

Calculate $P(\text{seat}) = \text{Financial:period\_amt} * 1/(\text{total no. of seats on plane}) * (\text{Plane:to\_last12} * \text{Flight:schd\_hrs}) / \text{to\_hrs}$

No seat grouping in rule map.

P Type III: Providing for future loyalty benefit.

Rule

Populated in Step 2 are:

- Customer:bene_miles is maintained using prior periods provision for benefit miles by loyalty customer
- A parameter estimating the usage rate by loyalty cohort called burn factor

Calculate $P(\text{seat}) = \text{Flight:distance} * \text{burn}(\text{loyalty\_rating})$

Grouping by loyalty rating in rule map.

P Type IV: Future order cancellation reserve.

Rule

Populated in Step 2 are:

- Future airplane order cancellation penalty (pen) and order size (fut_planes) is maintained in the financial entity
- Last 12 months loading is calculated by plane

Calculate $P(\text{seat}) = \text{pen} * (\text{Plane:orig\_bal} / \text{fut\_planes}) * 1/(\text{total no. seats on plane}) * 1/24$. where last 12 months loading less than 75%.

Only seats on where last 12 months loading less than 75%.

Step 7: Calculate Indirect Expenses for each Seat – The calculation of indirect expense is the final step of detailed level profit calculation. Here remaining cost measures that are not differentiable by seat are measured. Fuel and oil, ground costs, regular aircraft maintenance, overheads, and general marketing expenses are apportioned in IE. The airline also wants

to view customer profitability loaded with the cost of unoccupied seats.

IE Type I: General and administrative costs are apportioned to a seat in this rule.

Rule

Populated in Step 2 are:

- The periods financial entity is populated with all of the airlines G&A expenses (e.g., type of G&A are passenger services, navigation licenses, rentals, miscellaneous costs, premises and property taxes.) Allocate these costs based on seat revenue (NI + OR.)

Calculate $IE(seat) = \frac{\text{sum}(\text{Financial:trn\_amt}) * (\text{sum}(\text{NI}(seat)) + \text{sum}(\text{OR}(seat)))}{(\text{Total OR} + \text{NI for period})}$

No seat grouping in rule map for all Financial:type = "G&A".

IE Type II: Ground location costs, airport specific and gate expenses are apportioned by flight.

Rule

Populated in Step 2 are:

- Populate all of these expenses for the period Transactions:trn_amt with the type being the three letter international airport identifier.
- Calculate the number of seats flown to the flight airports during the profit period (tfc)

Calculate $IE(seat) = \frac{\text{sum of Transactions:trn\_amt}}{(1 / \text{tfc}) / 2}$

Group transactions by pair of airports in flight row for rule map, where only these types of expenses are included in the tuple.

IE Type III: Fixed asset depreciation is allocated to a seat.

Rule

Populated in Step 2 are:

- The net plane balances (Plane:net_orig_bal & Plane:imp_net_bal) are updated for last period's amortization or write-off.
- The amortization factor (function of amortization) given age of asset (for both original investment and improvements) is amfo and amfi for each plane.
- The tax planning estimate for taxable equivalent gross-up, due to accelerated tax amortization, is .8 = teg (less than 1 since a tax credit)

Calculate $IE(seat) = ((Plane:net\_orig\_bal - Plane:orig\_bal) * amfo) + (Plane:imp\_org\_bal - Plane:imp\_org\_bal) * amfi) * teg * (1 / (total\ no.\ seats\ on\ plane)) * (Flight:schd\_hrs / Plane:hrs\_last\_12 / 12)$

No grouping of seats in rule map.

IE Type IV: Indirect marketing expenses are apportioned by loyalty class for customer profit aggregations and by seat for other aggregations.

Rule

Populated in Step 2 are:

- Indirect marketing expense per loyalty tier per flight is ~~parameterized~~ parameterized as mef???, where ??? is 1st, 2nd, 3rd class.

Calculate $IE(seat) = mef??? * (1 / (no.\ of\ occupied\ seats\ in\ ???))$

Group seats by class in rule map.

IE Type V: For loyalty investment analysis, allocate all DE for empty seats to occupied seats equally.

- Populated, after all prior steps are ~~calculated~~ calculated, are the total DE less OR for each flight during the period, idef.

Calculate $IE(seat) = idef / (total\ no.\ of\ occupied\ seats)$

Only calculate for occupied seats.

Step 8: Calculate After-tax Seat Profit – The

After-tax Profit:

Rule

Populated in Step 2 are:

- The effective tax rate (etr) for the airline is maintained in the database.
Calculate Profit(seat) = sum(NI(seat) + OR(seat)
+DE(seat) + IE(seat) + P(seat)) * (1-etr)

Each seat is calculated individually, no grouping is used.

Shareholder Value-add: The airline has determined that some routes have a greater risk of loss due to the volatility of loading factors. Therefore each route is given a risk factor based on the last 12 months standard deviation of loading.

Rule

Populated in Step 2 are:

- Flight:risk_factor is maintained here
- Economic equity per average seat parameter (Flight:risk_factor) per route
- Cost of capital rate is ~~parameterized~~ parameterized (eqrt)

Calculate SHV(seat) = Profit(seat) – (Flight:risk_factor *
eqrt)

Each seat is calculated.

From the foregoing, it will be appreciated that DPM provides a metric of profit measurement consistent with GAAP at a level of detail that has not been accomplished using the traditional General Ledger based data with analytical and/or sample survey based information.

This new ability to resolve profit measures at a detailed level without using analytical models or statistical extrapolation is a capability

needed throughout industries that find their ability to determine a marginal decision's profit impact inadequate for optimization of ownership value. The use of rule driven and database measurement processes will give large scale businesses a lower cost of maintenance and technologically scaleable tool to measure profit at a level of precision or resolution not possible in prior financial performance measurement processes.

Although a particular embodiment of the invention has been described in detail for purposes of illustration, various modifications may be made without departing from the spirit and scope of the invention. Accordingly, the invention is not to be limited, except as by the appended claims.

ABSTRACT OF THE DISCLOSURE

A process for determining object level profitability includes the steps of (1) preparing information to be accessed electronically, (2) establishing rules for processing the prepared information, (3) calculating at least one marginal value of profit using established rules as applied to a selected set of prepared information, (4) calculating a fully absorbed value of profit adjustment using established rules as applied to the selected set of prepared information, and (5) combining the at least one marginal value of profit and fully absorbed value of profit adjustment to create a measure for object level profitability. The inventive process gives management profit measures tailored to its need for accurate decision oriented profit information required to manage a large organization based on profit measurement.

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

1. (Currently Amended) A process ~~for~~ determining object level profitability in a relational database management system, comprising the steps of:

providing an electronic relational database;

preparing information to be accessed electronically through the relational database management system by extracting, conditioning and loading object attribute values, financial statement attribute values and event attribute values into the relational database;

establishing, in the relational database, rules for processing the prepared information;

in the relational database, simultaneously and independently calculating independently in parallel at least one marginal value of profit for each object being measured using the established rules as applied to a selected set of prepared information;

in the relational database, calculating a fully absorbed profit adjustment value for each object being measured; and

combining the at least one marginal value of profit and the fully absorbed profit adjustment value to create a measure for object level profitability.

2. (Original) The process of claim 1, wherein the relational database comprises a structured query language (SQL).

3.-5. Canceled.

6. (Original) The process of claim 1, wherein the preparing step further includes the step of calculating opportunity values of funds used or supplied by each object being measured.

7. (Original) The process of claim 1, wherein the establishing step includes the steps of providing the information necessary to select objects, and performing the correct profit calculus.

8. (Original) The process of claim 1, wherein the step of calculating at least one marginal value of profit includes the steps of calculating net interest (NI), other revenue (OR) and direct expense (DE), wherein net interest (NI) is the summation of interest income, value of funds provided and earnings on equity funds used less the sum of interest expense and costs of funds used, other revenue (OR) is a measure of profit contribution from non-interest related sources, and direct expense (DE) is the profit value reduction due to marginal resource consumption by the object.

9. (Original) The process of claim 1, wherein the step of calculating at least one marginal value of profit includes the step of provisioning (P) for the selected set of prepared information, provisioning being the expected profit value adjustment for future outcomes related to the object.

10. Canceled

11. (Currently Amended) The process of claim 8-10, wherein the step of calculating a fully absorbed profit adjustment value includes the step of calculating the value for indirect expense (IE) which is an apportioned profit value adjustment for all non-object related resource consumption.

12. (Original) The process of claim 11, wherein the combining step includes the steps of adding net interest (NI) and other revenues (OR), and subtracting therefrom direct expense (DE), provisioning (P) and indirect expense (IE).

13. (Original) The process of claim 12, including the step of adjusting the measure for object level profitability for taxes and/or object economic value.

14.-15. Canceled

16. (Previously Amended) A process for determining object level profitability in a relational database management system, comprising the steps of:

preparing information to be accessed electronically through the relational database management system;

establishing, in the relational database, rules for processing the prepared information;

calculating independently at least one marginal value of profit for each object being measured using the established rules as applied to a selected set of prepared information;

calculating a fully absorbed profit adjustment value including value adjustments for taxes and/or object economic value; and

combining the at least one marginal value of profit and the fully absorbed profit adjustment value to create a measure for object level profitability.

17. (Original) The process of claim 16, wherein the relational database comprises a structured query language (SQL).

18. (Original) The process of claim 16, wherein the preparing step

includes the step of extracting, conditioning and loading object attribute values into the database.

19. (Original) The process of claim 18, wherein the preparing step includes the steps of extracting, conditioning and loading financial statement attribute values into the database.

20. (Original) The process of claim 19, wherein the preparing step includes the steps of extracting, conditioning and loading event attribute values into the database.

21. (Original) The process of claim 20, wherein the preparing step further includes the step of calculating opportunity values of funds used or supplied by each object being measured.

22. (Original) The process of claim 16, wherein the establishing step includes the steps of providing the information necessary to select objects, and performing the correct profit calculus.

23. (Original) The process of claim 16, wherein the step of calculating at least one marginal value of profit includes the steps of calculating net interest (NI), other revenue (OR) and direct expense (DE), wherein net interest (NI) is the summation of interest income, value of funds provided and earnings on equity funds used less the sum of interest expense and costs of funds used, other revenue (OR) is a measure of profit contribution from non-interest related sources, and direct expense (DE) is the profit value reduction due to marginal resource consumption by the object.

24. (Original) The process of claim 16, wherein the step of calculating at least one marginal value of profit includes the step of

provisioning (P) for the selected set of prepared information, provisioning being the expected profit value adjustment for future outcomes related to the object.

25. (Original) The process of claim 24, wherein the step of calculating at least one marginal value of profit includes the steps of calculating net interest (NI), other revenue (OR) and direct expense (DE), wherein net interest (NI) is the summation of interest income, value of funds provided and earnings on equity funds used less the sum of interest expense and costs of funds used, other revenue (OR) is a measure of profit contribution from non-interest related sources, and direct expense (DE) is the profit value reduction due to marginal resource consumption by the object.

26. (Original) The process of claim 25, wherein the step of calculating a fully absorbed profit adjustment value includes the step of calculating the value for indirect expense (IE) which is an apportioned profit value adjustment for all non-object related resource consumption.

27. (Original) The process of claim 26, wherein the combining step includes the steps of adding net interest (NI) and other revenues (OR), and subtracting therefrom direct expense (DE), provisioning (P) and indirect expense (IE).

28. (Original) The process of claim 16, wherein the at least one marginal value of profit is calculated in parallel.

29. (Original) The process of claim 16, wherein the fully absorbed profit adjustment value is calculated utilizing the calculated at least one marginal value of profit.

30. (Original) A process for determining object level profitability in a relational database management system, comprising the steps of:

preparing information to be accessed electronically through the relational database management system, including the step of calculating opportunity values of funds used or supplied by each object being measured;

establishing, in the relational database, rules for processing the prepared information;

calculating independently at least one marginal value of profit for each object being measured using the established rules as applied to a selected set of prepared information;

calculating a fully absorbed profit adjustment value for each object being measured; and

combining the at least one marginal value of profit and the fully absorbed profit adjustment value to create a measure for object level profitability.

31. (Original) The process of claim 30, wherein the relational database comprises a structured query language (SQL).

32. (Original) The process of claim 30, wherein the preparing step includes the step of extracting, conditioning and loading object attribute values into the database.

33. (Original) The process of claim 32, wherein the preparing step includes the steps of extracting, conditioning and loading financial statement attribute values into the database.

34. (Original) The process of claim 33, wherein the preparing step includes the steps of extracting, conditioning and loading event attribute values into the database.

35. (Original) The process of claim 30, wherein the establishing step includes the steps of providing the information necessary to select objects, and performing the correct profit calculus.

36. (Original) The process of claim 30, wherein the step of calculating at least one marginal value of profit includes the steps of calculating net interest (NI), other revenue (OR) and direct expense (DE), wherein net interest (NI) is the summation of interest income, value of funds provided and earnings on equity funds used less the sum of interest expense and costs of funds used, other revenue (OR) is a measure of profit contribution from non-interest related sources, and direct expense (DE) is the profit value reduction due to marginal resource consumption by the object.

37. (Original) The process of claim 30, wherein the step of calculating at least one marginal value of profit includes the step of provisioning (P) for the selected set of prepared information, provisioning being the expected profit value adjustment for future outcomes related to the object.

38. (Original) The process of claim 37, wherein the step of calculating at least one marginal value of profit includes the steps of calculating net interest (NI), other revenue (OR) and direct expense (DE), wherein net interest (NI) is the summation of interest income, value of funds provided and earnings on equity funds used less the sum of interest expense and costs of funds used, other revenue (OR) is a measure of profit contribution from non-interest related sources, and direct expense (DE) is the profit value reduction due to marginal resource consumption by the object.

39. (Original) The process of claim 38, wherein the step of calculating a fully absorbed profit adjustment value includes the step of calculating the value for indirect expense (IE) which is an apportioned profit value adjustment for all non-object related resource consumption.

40. (Original) The process of claim 39, wherein the combining step includes the steps of adding net interest (NI) and other revenues (OR), and subtracting therefrom direct expense (DE), provisioning (P) and indirect expense (IE).

41. (Original) The process of claim 40, including the step of adjusting the measure for object level profitability for taxes and/or object economic value.

42. (Original) The process of claim 30, wherein the at least one marginal value of profit is calculated in parallel.

43. (Original) The process of claim 30, wherein the fully absorbed profit adjustment value is calculated utilizing the calculated at least one marginal value of profit.

44. (New) A process determining object level profitability in a relational database management system, comprising the steps of:

providing a structured query language relational database;

preparing information to be accessed electronically through the relational database management system by extracting, conditioning and loading object attribute values, financial statement attribute values and event attribute values into the relational database;

establishing, in the relational database, rules for processing the prepared information;

in the relational database, simultaneously and independently

calculating in parallel at least one marginal value of profit for each object being measured using the established rules as applied to a selected set of prepared information, including the steps of calculating net interest (NI), other revenue (OR) and direct expense (DE), wherein net interest (NI) is the summation of interest income, value of funds provided and earnings on equity funds used less the sum of interest expense and costs of funds used, other revenue (OR) is a measure of profit contribution from non-interest related sources, and direct expense (DE) is the profit value reduction due to marginal resource consumption by the object;

in the relational database, calculating a fully absorbed profit adjustment value for each object being measured, including the step of calculating the value for indirect expense (IE) which is an apportioned profit value adjustment for all non-object related resource consumption; and

combining the at least one marginal value of profit and the fully absorbed profit adjustment value to create a measure for object level profitability.

45. (New) The process of claim 44, wherein the preparing step further includes the step of calculating opportunity values of funds used or supplied by each object being measured.

46. (New) The process of claim 44, wherein the establishing step includes the steps of providing the information necessary to select objects, and performing the correct profit calculus.

47. (New) The process of claim 44, wherein the step of calculating at least one marginal value of profit includes the step of provisioning (P) for the selected set of prepared information, provisioning being the expected profit value adjustment for future outcomes related to the object.

48. (New) The process of claim 47, wherein the combining step includes the steps of adding net interest (NI) and other revenues (OR), and subtracting therefrom direct expense (DE), provisioning (P) and indirect expense (IE).

49. (New) The process of claim 48, including the step of adjusting the measure for object level profitability for taxes and/or object economic value.

50. (New) A relational computation process measuring an individual or incremental decisions impact on profit, or fundamental object profitability, elemental to multiple business dimensions consistent with independently calculated total profit, the process comprising the steps of:

providing an electronic relational database;

preparing information to be accessed electronically through the relational database management system by extracting, conditioning and loading object attribute values, financial statement attribute values and event attribute values into the relational database;

establishing, in the relational database, rules for processing the prepared information;

in the relational database, simultaneously and independently calculating in parallel marginal profit measures using the established rules, including:

a) marginal profit measures associated with balance sheet resources;

b) marginal measures of non-balanced oriented revenues;

c) marginal cost measures; or

d) marginal measures of expected costs or revenues;

in the relational database, using the calculated marginal profit measures to calculate a fully absorbed profit adjustment value for each fundamental object being measured, including the step of calculating the

value for an apportioned profit value adjustment for all non-object related resource consumption; and

combining the at least one marginal value of profit and the fully absorbed profit adjustment value to create a measure for fundamental object profitability.

51. (New) The process of claim 50, wherein the relational database comprises a structured query language (SQL).

52. (New) The process of claim 50, wherein the preparing step further includes the step of calculating opportunity values of funds used or supplied by each object being measured.

53. (New) The process of claim 50, wherein the establishing step includes the steps of providing the information necessary to select objects, and performing the correct profit calculus.

54. (New) The process of claim 50, wherein the step of calculating at least one marginal value of profit includes the step of provisioning (P) for the selected set of prepared information, provisioning being the expected profit value adjustment for future outcomes related to the object.

55. (New) The process of claim 50, including the step of adjusting the measure for object level profitability for taxes and/or object economic value.

56. (New) A relational computation process measuring an individual or incremental decisions impact on profit, or fundamental object profitability, elemental to multiple business dimensions consistent with independently calculated total profit, the process comprising the steps of:

providing an electronic structured query language relational database;

preparing information to be accessed electronically through the relational database management system by extracting, conditioning and loading object attribute values, financial statement attribute values and event attribute values into the relational database;

calculating opportunity values of funds used or supplied by each object being measured;

establishing, in the relational database, rules for processing the prepared information, including providing the information necessary to select objects, and performing the correct profit calculus;

in the relational database, simultaneously and independently calculating in parallel marginal profit measures using the established rules, including:

- a) marginal profit measures associated with balance sheet resources;
- b) marginal measures of non-balanced oriented revenues;
- c) marginal cost measures; and
- d) marginal measures of expected costs or revenues;

in the relational database, using the calculated marginal profit measures to calculate a fully absorbed profit adjustment value for each fundamental object being measured, including the step of calculating the value for an apportioned profit value adjustment for all non-object related resource consumption;

combining the at least one marginal value of profit and the fully absorbed profit adjustment value to create a measure for fundamental object profitability; and

adjusting the measure for object level profitability for taxes and/or object economic value.

57. (New) A relational computation process measuring an individual or incremental decisions impact on profit, or fundamental object profitability, elemental to multiple business dimensions consistent with independently calculated total profit, the process comprising the steps of:

providing an electronic structured query language relational database;

preparing information to be accessed electronically through the relational database management system by extracting, conditioning and loading object attribute values, financial statement attribute values and event attribute values into the relational database;

establishing, in the relational database, rules for processing the prepared information, including providing the information necessary to select objects, and performing the correct profit calculus;

in the relational database, simultaneously and independently calculating in parallel marginal profit measures using the established rules, including:

- a) marginal profit measures associated with balance sheet resources;
- b) marginal measures of non-balanced oriented revenues;
- c) marginal cost measures;
- d) marginal measures of expected costs or revenues; calculating the marginal profit measures; and
- e) fully absorbed indirect expense.

58. (New) The process of claim 57, wherein the preparing step further includes the step of calculating opportunity values of funds used or supplied by each object being measured.

59. (New) The process of claim 57, including the step of adjusting the measure for object level profitability for taxes and/or object economic value.

REMARKS/ARGUMENTS

In the January 26, 2004 Office Action, the drawings/specification was objected to once again. The restriction of claims 16-43 was maintained. The Declaration filed on December 8, 2003 was indicated as being sufficient to overcome Curley reference. However, claims 1-31 were rejected under 35 USC §103(a) as being unpatentable over Price et al. "College Accounting, 7th Edition" in combination with an "Official Notice". On May 5, 2004, Applicant, his attorney and the Examiner conducted an interview regarding the rejections. An agreement with respect to the claims and the relevance of the reference was not reached during this interview.

In response to the above-identified Office Action, Applicant has amended the Specification to conform with the previously submitted formal drawings. Applicant has also amended claims 1 and 11, cancelled claims 3-5, 10 and 14-15, and added new claims 44-59. Reexamination and reconsideration of the application, as amended, is respectfully requested.

TIME EXTENSION REQUEST

Submitted herewith is a One-month Time Extension Request and required fee.

DRAWING OBJECTIONS

The drawings were objected to under 37 CFR §1.83(a) in the August 4, 2003 Office Action based upon the assertion that they failed to describe FIGS. 2-5 as described in the Specification, and that FIG. 7 did not describe steps 3-6 as detailed from page 17 of the application.

Furthermore, FIG. 1 failed to be labeled as prior art. In the August 4, 2003 Office Action, it was requested that any structural detail that was essential for a proper understanding of the disclosed invention should be shown in the drawing.

In the December 8, 2003 Response, Applicant provided a revised set of drawings which labeled steps and components of the drawings with reference numbers and labeled FIG. 1 (prior art). Portions of the Specification were amended to incorporate the reference numbers, provide added description of the figures, and correct deficiencies such as grammar or spelling deficiencies.

However, in the January 26, 2004 Office Action, the drawings were once again objected to as not being acceptable based upon the assertion that the drawings do not correspond to the descriptive portion of the Specification, pointing out various perceived inconsistencies.

In Response, Applicant submits herewith a substitute Specification incorporating changes in the Specification such that the Specification reflects the reference numbers in the drawings. Paragraphs have also been inserted to the Detailed Description of the Preferred Embodiment section having a basis in the original Specification and drawings to overcome the objections. No new matter has been added to the application. Applicant has taken the opportunity to correct a few misspellings as well. With these amendments, Applicant believes that there are no inconsistencies between the drawings and the revised Specification.

CLAIM REJECTIONS

As indicated above, claims 16-31 are subject to a Restriction Requirement. The remaining claims (1-15) were rejected as being obvious

in light of the Price publication and the Examiner's "Official Notice" regarding performing financial processing using computer software.

As part of the May 5, 2004 Interview with the Examiner, Applicant submitted a Declaration (which Examiner indicated would be entered into the record so as to be a part of this Response). In the Declaration, Applicant provided his expertise in this field, addressed the fact that the Price publication does not teach what is claimed in the present invention, and states the non-obviousness of the invention due to the benefits achieved by the present invention and the commercial success that it has attained.

During the Interview, the Examiner indicated that there might be an "intended use" concern with independent claim 1 due to the word "for" in the preamble. Applicant has amended claim 1 to delete "for" in the preamble to alleviate any such concern. During the Interview, Applicant explained the benefits derived by conducting the present invention in a relational database management system. The Examiner indicated that he was giving this consideration very little patentable weight as it was recited only in the preamble. Applicant has amended independent claim 1 to positively recite that a relational database is provided and that various steps are conducted within the relational database. Contrary to the statement in the May 7, 2004 Interview Summary, the Examiner maintained his assertion that claim 1 did not define over the Price reference; and Applicant maintained his assertion that the Price reference did not teach Applicant's invention, as claimed in independent claim 1. The Examiner indicated that it was the Group Art Unit's policy that a "relational database" consisted of any group of information which was interrelated. Applicant has amended independent claim 1 to positively recite an electronic relational database as well as to positively recite that many of the steps, including the preparing, establishing and calculating steps be performed within the electronic relational database. Applicant

respectfully asserts that this is simply not addressed in either the Price or "Official Notice" rejections.

As indicated above, claim 1 is directed to a process that determines object level profitability in a relational database management system. An electronic relational database is provided and information to be accessed electronically through the relational database management system is prepared by extracting, conditioning and loading object attribute values, financial statement attribute values and event attribute values into the relational database. Rules are established in the relational database for processing the prepared information. Within the relational database, at least one marginal value of profit for each object being measured is simultaneously and independently calculated in parallel using the established rules. In the relational database, a fully absorbed profit adjustment value for each object being measured is then calculated. Finally, the at least one marginal value of profit and the full absorbed profit adjustment value are combined to create a measure for object level profitability.

New independent claim 44 specifies that the relational database is a structured query language relational database. The at least one marginal value of profit calculation is defined as calculating net interest, other revenue and direct expense. The calculation of the fully absorbed profit adjustment value for each object being measured is recited as including the step of calculating the value for indirect expense. Otherwise, independent claim 44 contains the same recitations as independent claim 1.

While a single reference may serve as the basis of a rejection under 35 USC §103, that single reference must still disclose all the features of the claimed invention. To establish *prima facie* obviousness of a claimed invention, all the claim limitations must be taught or suggested by the prior art. M.P.E.P. §2143.03 (citing In re Royka, 180 USPQ 580 (CCPA 1974)). All words in a claim must be considered in judging the patentability of that

claim against the prior art. In re Wilson, 165 USPQ 494, 496 (CCPA 1970).

Although Price may disclose a method of measuring profit based on factors of revenues, direct expenses, indirect expenses, and risk, as stated in the Declaration of Tad Lepman, dated April 27, 2004 (copy attached). Price actually discloses what is referred to in the present application as being "prior art", as illustrated in FIG. 1 and discussed in the background section of the present application. Price covers the basics of transactional accounting, or bookkeeping. Price does not discuss methods of marginal pricing necessary for object profit measures which are more detailed than departmental or business segments. In contrast to the present invention, Price states that interest income and interest expense are not allocated in responsibility accounting. Price's scope is financial bookkeeping and not economic theory or market based financial concepts, and thus it is silent on the concepts of fund transfer pricing or of risk base adjustment to profit measures.

In particular, there is no discussion whatsoever in Price as to preparing information to be accessed electronically through a relational database, or establishing the rules necessary in a relational database for processing and preparing information. Price's accounting rules do not lead to relational database formulation or mathematical rules making parallel computer financial calculation possible.

As stated in paragraphs 6-8 of Mr. Lepman's Declaration, the steps of extracting, conditioning and loading object attribute values, financial statement attribute values and event attribute values into a relational database is not discussed whatsoever in Price. Moreover, as Mr. Lepman states, Price would consider it completely unnecessary for transactional accounting or marginal valuing attributes. Thus, Price teaches away from these recitations, which are now in independent claim 1 (as well as new independent claims 44, 50, 56 and 57).

Claims 6, 45, 52 and 58 recite that the preparing step includes a step of calculating opportunity values of funds used or supplied by each object being measured. Mr. Lepman, in paragraph 9 of his Declaration, states that Price is totally silent on how to properly value balance sheet dynamics in responsibility accounting and thus completely ignores this step.

With respect to claims 7, 36 and 53, Mr. Lepman, in paragraph 10 of his Declaration, states that Price is completely silent on establishing steps of providing the information necessary to select objects, and performing correct profit calculus.

With respect to claims 1, 8, 11, 12, 44, 50, 56 and 57, Mr. Lepman, in his Declaration, states that Price does not mention the profit calculation recited in these claims which is required to value a financial objects balance sheet dynamic. Mr. Lepman states that due to the fact that Price is directed to the creation of financial statements in a traditional accounting sense, Price simply does not imply the use of expected valuing in risk provisioning or combining at least one marginal value of calculated profit and fully absorbed profit adjustment values to create a measure for object level profitability.

With respect to claims 13, 48, 54 and 59, no economic adjustment is proscribed for taxes and/or object economic value in Price.

In light of the foregoing, Applicant respectfully submits that Price does not teach or suggest all of the claim limitations of the present application.

In the above-identified Office Action, the Examiner took "official notice" that performing financial processing using computer software is common knowledge in the art. Moreover, the Examiner asserted that "to have provided a method of performing a financial process for an account using software for a computer measuring profit based on the factors of net interest revenue, other revenues, direct expenses, indirect expenses and risks, also have to take advantage of flexible business rules to calculate

known variations of one of the factors e.g. net interest revenue, would have been obvious to one of ordinary skill in the art". Applicant respectfully disagrees and traverses this basis of rejection. Applicant is not merely claiming financial processing using computer software. Instead, Applicant is claiming a process for determining object level profitability in a relational database management system. Utilizing an electronic relational database in accordance with the present invention allows at least one marginal value of profit for each object being measured to be simultaneously and independently calculated in parallel. As stated by Mr. Lepman, in paragraph 14 of his Declaration, although account level profitability has been attempted with limited success using computer software, object level profitability using a relational database management system was not in place before his invention and provides many benefits over prior methodologies and systems. Calculating in parallel in accordance with the present invention allows "bottoms up" or behaviorally based calculation in determination of object level profitability in a manner which has been heretofore unattainable. The Examiner simply has not provided supporting documentation to show that such calculations would have been obvious to have been performed in a relational database using parallel computations in the manner recited in Applicant's independent claims at the time the application was filed.

Tad Lepman, in paragraphs 15-26 (referring to Exhibits B-M) points to the problem of companies who were unable to figure out how profitable their customers were. Mr. Lepman also describes the success that the present invention has attained, as well as the awards that it has won. Such success in the industry is evidence of the non-obviousness of the invention and counters the "official notice" that the invention is merely performing financial processing using computer software that is common knowledge in the art.

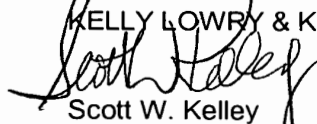
The United States Supreme Court in Graham v. John Deere Co., 383 U.S. 1 (1966) required that to make out a case of obviousness, one

must: (a) determine the scope and contents of the prior art; (b) ascertain the differences between the prior art and the claims in issue; (c) determine the level of skill in the pertinent art; and (d) evaluate any evidence of secondary considerations. MPEP §716 et. seq. and §2144 et. seq. require the Examiner to consider such secondary considerations such as commercial success in determining obviousness. Mr. Lepman's Declaration specifically discusses the previous unsolved need of companies who are unable to figure out how profitable their customers were (see Lepman Declaration, paragraph 15 and Exhibit B). Mr. Lepman, in his Declaration, has also shown the commercial success of his invention due to the embracing of the invention by many major companies and the awards that it has received (see Lepman Declaration, paragraphs 16-26). Such secondary considerations must be given substantial weight in the determination of obviousness or non-obviousness. See e.g. United States v. Adams, 383 U.S. 39 (1966); and In re Piasecki, 745 F.2d 1468 (Fed. Cir. 1984). Applicant respectfully asserts that when given the proper weight and consideration, such secondary considerations overcome the "official notice" and evidence the fact that the present invention was not obvious at the time of invention and filing of the present application.

Thus, Applicant respectfully asserts, that the "official notice" combined with Price still fail to teach or suggest the present invention, as recited in the currently pending claims. Accordingly, Applicant believes that the application is in condition for allowance, notice of which is hereby respectfully requested.

Respectfully submitted,

KELLY LOWRY & KELLEY, LLP



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TRANSMITTAL FORM (to be used for all correspondence after initial filing)	Application Number	09/545,628
	Filing Date	April 7, 2000
	First Named Inventor	Richard Tad Lepman
	Art Unit	3627
	Examiner Name	Andrew J. Rudy
Total Number of Pages in This Submission	Attorney Docket Number	BERK-37617

ENCLOSURES (Check all that apply)		
☒ Fee Transmittal Form	☐ Drawing(s)	☐ After Allowance communication to Technology Center (TC)
☒ Fee Attached	☐ Licensing-related Papers	☐ Appeal Communication to Board of Appeals and Interferences
☒ Amendment/Reply	☐ Petition	☐ Appeal Communication to TC (Appeal Notice, Brief, Reply Brief)
☐ After Final	☐ Petition to Convert to a Provisional Application	☐ Proprietary Information
☒ Affidavits/declaration(s) COPY	☐ Power of Attorney, Revocation	☐ Status Letter
☒ Extension of Time Request	☐ Change of Correspondence Address	☒ Other Enclosure(s) (please identify below):
☐ Express Abandonment Request	☐ Terminal Disclaimer	POSTCARD
☐ Information Disclosure Statement	☐ Request for Refund	CLEAN COPY OF SPECIFICATION
☐ Certified Copy of Priority Document(s)	☐ CD, Number of CD(s) _____	
☐ Response to Missing Parts/Incomplete Application	Remarks	
☐ Response to Missing Parts under 37 CFR 1.52 or 1.53		

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SIGNATURE OF APPLICANT, ATTORNEY, OR AGENT

Firm or Individual name	Scott W. Kelley Kelly Lowry & Kelley, LLP
Signature	
Date	May 26, 2004

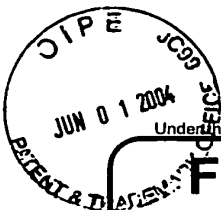
CERTIFICATE OF TRANSMISSION/MAILING

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Typed or printed name	Scott W. Kelley		
Signature		Date	5/26/2004

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FEE TRANSMITTAL for FY 2004 Effective 10/01/2003. Patent fees are subject to annual revision.		Complete if Known	
☒ Applicant claims small entity status. See 37 CFR 1.27		Application Number	09/545,628
TOTAL AMOUNT OF PAYMENT (\$) 317.00		Filing Date	April 7, 2000
		First Named Inventor	Richard Tad Lepman
		Examiner Name	Andrew J. Rudy
		Art Unit	3627
		Attorney Docket No.	BERK-37617

METHOD OF PAYMENT (check all that apply)		FEE CALCULATION (continued)																																																																																																																																																																																			
☒ Check ☐ Credit card ☐ Money Order ☐ Other ☐ None ☐ Deposit Account: Deposit Account Number: Deposit Account Name: The Director is authorized to: (check all that apply) ☐ Charge fee(s) indicated below ☐ Credit any overpayments ☐ Charge any additional fee(s) or any underpayment of fee(s) ☐ Charge fee(s) indicated below, except for the filing fee to the above-identified deposit account.		3. ADDITIONAL FEES <table border="1"><thead><tr><th colspan="2">Large Entity</th><th colspan="2">Small Entity</th><th rowspan="2">Fee Description</th><th rowspan="2">Fee Paid</th></tr><tr><th>Fee Code</th><th>Fee (\$)</th><th>Fee Code</th><th>Fee (\$)</th></tr></thead><tbody><tr><td>1051</td><td>130</td><td>2051</td><td>65</td><td>Surcharge - late filing fee or oath</td><td></td></tr><tr><td>1052</td><td>50</td><td>2052</td><td>25</td><td>Surcharge - late provisional filing fee or cover sheet</td><td></td></tr><tr><td>1053</td><td>130</td><td>1053</td><td>130</td><td>Non-English specification</td><td></td></tr><tr><td>1812</td><td>2,520</td><td>1812</td><td>2,520</td><td>For filing a request for <i>ex parte</i> reexamination</td><td></td></tr><tr><td>1804</td><td>920*</td><td>1804</td><td>920*</td><td>Requesting publication of SIR prior to Examiner action</td><td></td></tr><tr><td>1805</td><td>1,840*</td><td>1805</td><td>1,840*</td><td>Requesting publication of SIR after Examiner action</td><td></td></tr><tr><td>1251</td><td>110</td><td>2251</td><td>55</td><td>Extension for reply within first month</td><td>55.00</td></tr><tr><td>1252</td><td>420</td><td>2252</td><td>210</td><td>Extension for reply within second month</td><td></td></tr><tr><td>1253</td><td>950</td><td>2253</td><td>475</td><td>Extension for reply within third month</td><td></td></tr><tr><td>1254</td><td>1,480</td><td>2254</td><td>740</td><td>Extension for reply within fourth month</td><td></td></tr><tr><td>1255</td><td>2,010</td><td>2255</td><td>1,005</td><td>Extension for reply within fifth month</td><td></td></tr><tr><td>1401</td><td>330</td><td>2401</td><td>165</td><td>Notice of Appeal</td><td></td></tr><tr><td>1402</td><td>330</td><td>2402</td><td>165</td><td>Filing a brief in support of an appeal</td><td></td></tr><tr><td>1403</td><td>290</td><td>2403</td><td>145</td><td>Request for oral hearing</td><td></td></tr><tr><td>1451</td><td>1,510</td><td>1451</td><td>1,510</td><td>Petition to institute a public use proceeding</td><td></td></tr><tr><td>1452</td><td>110</td><td>2452</td><td>55</td><td>Petition to revive - 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SUBMITTED BY		(Complete if applicable)	
Name (Print/Type)	Scott V. Kelley	Registration No. (Attorney/Agent)	30,762
Signature	<i>Scott V. Kelley</i>	Telephone	818-347-7900
		Date	05/26/2004

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April 27, 2004

Aaron T. Borrowman, Reg. No. 42,348

Date



PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

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GROUP 3600

In re Application of	)	Group Art Unit: 3627
	)	
Richard Tad Lepman	)	Examiner: Andrew Rudy
	)	
Serial No. 09/545,628	)	
	)	
Filed: April 7, 2000	)	Docket No. BERK-37617
	)	
For: PROCESS FOR DETERMINING	)	
OBJECT LEVEL PROFITABILITY	)	
	)	

DECLARATION OF RICHARD TAD LEPMAN

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Dear Sir:

1. My name is Richard Tad Lepman and I am the inventor of the above-identified patent application. As shown in my attached Curriculum Vita (Exhibit A), I have a great deal of experience in the field of financial services and information technology industries.
2. As fully described in the pending application, the present invention is directed to a process for determining object level profitability; determining accurate, consistent and holistic profit measurement data

not previously available in a data warehouse apparatus. The inventive process calculates independently at least one marginal value of profit for each object being measured in a "bottoms up" manner (i.e. driven by business transactions or events) utilizing a relational database management system. Object attribute values are extracted, conditioned, and loaded into the database as are financial statement attribute values and event attribute values. At least one marginal value of profit is calculated based on the innovative mathematical formulation of accounting calculation applied within a relational database system. Calculating at least one marginal value of profit includes the steps of calculating interest, other revenue, or direct expense and preferably indirect expense. Provisioning, or taking into account the expected profit value adjustment for future outcomes related to the object, or economic value adjustment may also be preferably performed during the calculation of the fully absorbed profit adjustment value for each object being measured.

3. I have reviewed the January 26, 2004 Office Action which asserts that the claims of the present application are rendered obvious in light of excerpts taken from *College Accounting*, 7th Edition, authored by John Ellis Price, and David Haddock, and Horace R. Block (hereinafter "Price"). I have reviewed Price and respectfully disagree with the Examiner as Price only discloses what I have referred to in my application as being "prior art", as illustrated in FIG. 1 and discussed in the Background section of the present application.
4. Price covers the basics of transactional accounting, or bookkeeping. Price does not discuss methods of marginal pricing (activity based costing or funds transfer pricing) necessary for object profit measures which are more detailed than departmental or business segments. In contrast to the present invention, Price states that interest income and interest expense are not allocated in responsibility accounting - Price's detailed or object level profit equivalent. Price's scope is financial

bookkeeping and not economic theory or market based financial concepts, and thus Price is silent on the concepts of funds transfer pricing or of risk based adjustment to profit measures and therefore Price's discussion of contribution margin does not lead to shareholder value add measure.

5. Claim 1 recites a process for determining object level profitability in relational database management system by preparing information to be accessed electronically through the relational database management system and establishing, in the relational database, rules for processing the prepared information. There is no discussion whatsoever in Price as to preparing information to be accessed electronically through a relational database or establishing the types of rules necessary in the relational database for processing prepared information. As discussed above, Price does not combine at least one marginal value of profit and the fully absorbed profit adjustment value to create a measure for object level profitability either. Further, Price's accounting rules do not lead to relational database formulation or mathematical rules making parallel computer financial calculation possible.
6. With respect to claim 3 which recites extracting, conditioning and loading object attribute values into the relational database, the use of a financial object more discrete than management responsibility or business segment requires data not discussed in Price.
7. With respect to claim 4, although Price discusses the creation of financial statements, Price does not discuss whatsoever the extracting, conditioning and loading of financial statement attribute values into a relational database.
8. Claim 5 recites the steps of extracting, conditioning and loading event attribute values into the database. In a relational database, certain attributes of transactions must be included which Price would consider

unnecessary for transactional accounting or marginal valuing attributes. Thus, Price is completely silent with respect to these steps.

9. Claim 6 recites that the preparing step for the inclusive step of calculating opportunity values of funds used or supplied by each object being measured. Net interest revenue calculations require object oriented balance sheet linkage for evaluations. However, Price is totally silent on how to properly value balance sheet dynamics in responsibility accounting and thus completely ignores this step necessary for consistent and holistic detailed profit metrics appropriate for a data warehouse apparatus.
10. With respect to claim 7, Price is completely silent on establishing steps of providing the information necessary to select objects, and performing the correct profit calculus. Price in no way leads to joining relational tables or the filtering rows in Tuples, or joined tables, performing financial calculus.
11. With respect to claims 8-12, Price does not mention the profit calculation recited in these claims required to value a financial object's balance sheet dynamic. The present invention's detailed profit measures, as recited in these claims, are holistic at a more detailed level than a business segment or management unit and more inclusive as it takes into account net interest revenue. Price simply does not imply the use of expected valuing in risk provisioning. Once again, Price is directed to the creation of financial statements in a traditional accounting sense. The present invention combines at least one marginal value of calculated profit and fully absorbed profit adjustment value to create a measure for object level profitability which has much more depth and detail in scope than a financial statement.
12. With respect to claim 13, the present invention adjusts the measure for object level profitability for taxes and/or object economic value. No

economic adjustment is proscribed in Price.

13. With respect to claim 15, the present invention calculates the full absorbed profit adjustment value utilizing the calculated at least one marginal value of profit. This is considered a "bottoms up" taking into account information to analyze each object which is simply not mentioned in Price.
14. With respect to claim 14, the marginal value of profit is calculated in parallel. This is done utilizing the relational database in a structured query language. Price is completely silent as to this aspect of the invention. In the Office Action, "Official Notice" was taken that "performing financial processing using computer software is common knowledge in the art." Although the creation of financial statements and bookkeeping using computer software is common knowledge in the art, performing the "bottoms up" or object level calculations utilizing a relational database is not common knowledge and is a breakthrough technology in the financial world. Based upon my nearly thirty years experience in this field, although account level profitability has been attempted with limited success using computer software, object level profitability using a relational database management system was not in place before my invention and has many benefits over prior methodologies and systems. Preparing the information, creating and establishing rules in the relational database and calculating in parallel in accordance with the present invention allows "bottoms up" or behaviorally based calculation in determination of object level profitability in a manner which has been heretofore unattainable.
15. Attached Exhibits B-M support this assertion. Exhibit B is a copy of an article in the October 7, 2002 European Edition of *Fortune* Magazine describing the problems encountered by companies who are unable to figure out how profitable their customers are. The article states that

"Board of Directors will soon begin to demand customer-profitability data from companies, investors will demand that companies report it."

Although the Fortune article discusses some possible solutions to these problems besides the present invention at Royal Bank of Canada, these solutions are not based on event driven (behavior) based profitability measurement solutions developed solely within a relational database.

16. As stated in my November 19, 2003 Declaration, I am the inventor of the present invention. I, through my company Berkeley*IEOR, licensed the invention to NCR, which refers to the invention as "Value Analyzer".
17. Exhibit C is an article stating that NCR won the 2000 CRM Project Award for the implementation of its profitability analysis software. The article states that if used in combination with the Teradata platform (a relational database), Value Analyzer (the invention) is able to analyze enormous volumes of customer behavior data in hours, rather than days. Value Analyzer was launched in 1999 and was recognized for its implementation within Royal Bank of Canada earlier in 2000, according to the article. The *Curley* reference cited in the August 4, 2003 Office Action was directed to the Royal Bank of Canada implementation of my invention.
18. Exhibit D is directed to an NCR press release which indicates the uniqueness of the present invention, to wit: "Teradata Value Analyzer's detailed, behavior based approach differs from more traditional measurement tools that determine profitability by using high-level averages or aggregations." This press release points to a weakness of the prior art, namely, detailed profit measures based upon "averages", as discussed in Price. The present invention overcomes these weaknesses.
19. Exhibit E is another NCR press release describing my invention as "an end-to-end solution that pinpoints profitability calculations across five

distinct components at the fundamental level, the billing telephone number." The components are: revenue (direct and indirect), interest revenue/expense, direct expense (applied to customer behavior or events), indirect expense (cost of doing business), and risk provision (applying the cost of credit and other potential risks and fraud)". This article further states that the invention uses "complex mathematical models" and "detailed data." As discussed above, the distinct components at the fundamental level are recited in claims 8-12 of the present invention, and not in Price.

20. Exhibit F is an NCR white paper, discussing the type of "rules based" process the invention is. The paper's definition of the "rules" are clearly distinct from Price, as are the rules in the present application and claims, as the invention uses metadata driven rules for a dynamic solution customizable for each unique business.
21. Exhibit G is another NCR white paper stating that the invention "helps users better understand the value of their customers". It measures in detail, the components of customer revenue and customer expense at the basic unit and transactional level. From this data, companies can develop any number of aggregations, including by customer or household, by channel, by product, or by organization. The calculations involve the measurement of each basic units profit contribution across five components: base revenue, net interest revenue, direct expense, indirect expense and risk provision. This approach allows easy reconciliation with a general ledger and consistent data analysis- certainly a revolutionary step for many companies. "This article points out other profitability measurement systems use summaries, or proxies, or even the "smallest inaccuracies or missing data will have dramatic impact" on profitability measures. Lastly, the article indicates that the invention is internal to the relational database by stating "all data relating to the rules of the profitability model are stored in the database and can be retrieved."

22. Exhibits H and I are also NCR publications which discuss Value Analyzer (my invention). As stated in these articles, the invention "takes a bottom up approach that begins with the transactions, events and activities of the business. By measuring profitability at a detailed level, it provides you with consistent and accurate profit level analytics across a complex set of business functions and views." The articles also paint the prior art approaches, such as Price, distinctly - "traditionally, businesses have based their profitability calculations on averages and assumptions derived from the financial systems of record, particularly general ledgers."
23. Exhibit J is an NCR document describing the customer success story of Royal Bank of Canada, which the Examiner based his first rejection upon. The article states that the improvement obtained by using the methodology of the present invention, "75% of our customers move to or more deciles" - a very significant shift, especially for Royal Bank of Canada, which was already using sophisticated evaluations.
24. Exhibit K illustrates the business case and application of the present invention in the telecommunications industry. The document describes the ability of the invention to accurately measure margin per user, a new performance metric for telecommunications providers.
25. Exhibit L is a product review of the present invention (Teradata Value Analyzer). Of the competing products mentioned, none of these other solutions is a pure relational database solution or use a "bottom up" approach based on set theory mathematical accounting models. The document cites fifteen successful banking industry implementations of the present invention.
26. Exhibit M is an article taken from *Retail Banking Technologies* describing the benefit case and uniqueness of the present invention. It

cites prior solutions which were based, procedure not relational and using samples or averages. It states that the present invention uses "the smallest possible item of data, and combining it with the capability to aggregate and analyze it in an infinite variety of different ways".

27. In summary, traditional accounting methods, as described in Price, do not teach or disclose my invention. Whereas Price is concerned with transactional accounting creating financial statements or general ledgers, my invention determines object level profitability which requires rules, considerations, and information beyond that contemplated by Price. Due to the scale and complexity of the analysis, I have implemented the invention within a relational database, which has not been done before and allows the information to be analyzed in hours instead of days for a major Bank using parallel calculations processes. I believe that the aforementioned documents contained in the attached Exhibits show the non-obviousness of the invention due to the awards and accolades the invention has received and the success it has generated in various industries.

The undersigned declares that all statements made herein of my own knowledge are true and all statements made on information and belief are believed to be true; and these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code, and that such false statements may jeopardize the validity of the application or any registration resulting thereon.

April 26, 2004
Date

Richard Tad Lepman
Richard Tad Lepman

Curriculum Vita

Richard Tad Lepman

+44 (0) 20 8741 3324

tad@bieor.com

Twenty-seven years experience in the Financial Services and Information Technology Industries. Accomplishments utilised knowledge of financial evaluation, technological development, operations research and banking. Consistently contributes to improvement of shareholder value.

Employment History

- **1993 to Present -- Berkeley*IEOR, President**
Founded company, provides consulting services specialising in large scale decision support systems and analyst empowerment. Develops applications using detailed risk adjusted profit measurement processes. Lectures on performance measurement topics and uses of data warehousing technology in the Financial Services Industry.
- **1995 to 2001 -- NCR, Global Solution Consultant**
Key member of Customer Relationship Management initiative and product line development for the Financial Services Industry. Presented and consulted solutions to NCR's banking customers world-wide. Work included solution design, funds transfer pricing concepts, costing methods, data modelling, profit measurement theory, customer implementation, development specification and solution testing.
- **1993 to 1996 -- Barclays Bank, Data Warehouse Consultant**
Advised executive management on uses of large scale decision support opportunities using Teradata technology. Worked with Group Treasury and Group Portfolio Management to establish a sound decision support environment providing immediate and strategic value. Deliverables included: customer segmentation, maturity profiles, risk v. return portfolio analysis, analyst training and development.
- **1992 to 1993 -- WhiteLight Systems, Consultant**
Founding member of company. Beta tested software in a business consultant role, helping create a customer's "off-shore" strategic plan, including the consolidation and long term plan for 50+ full or partially owned foreign subsidiaries plus new investments and divestments.
- **1976 to 1992 -- Bank of America, Vice President & Sr. Manager of Finance**
Analytical corporate level roles including: mergers & acquisitions, performance measurement policies, asset sales and servicing, long term capital planning, capital investment analysis, tax planning, funds transfer pricing, budget and planning, and management science projects (e.g., credit scoring, check sorting, mail and courier routing, mainframe replacement, premises planning and customer retention.)

Education

- University of California at Berkeley, School of Engineering, Masters of Science in Industrial Engineering and Operations Research; 1976
- Claremont Men's College, Bachelor of Arts in Applied Mathematics; 1975

EXHIBIT A

Work Products

Decision Support Systems

- FFAPM™ invention
- funds transfer pricing methodology
- liability mark-to-market accounting
- customer relationship tracking
- investment decision analyser
- loan profitability measurement tools
- three generations of corporate planning and budgeting processes
- two generations of transfer pricing accounting processes
- daily settlement risk and liquidity monitoring & valuing
- interest rate forecasting tool development
- tax position forecasting tool development
- check processing volume forecasting
- loan and credit card loss methodology, scoring and research
- cash and regulatory reserve position forecasting and control
- foreign exchange dealer support system design

Financial Analysis

- debt/equity transaction evaluations
- litigation reserve estimations
- product profitability analyses
- cost accounting methodology
- incentive stock option evaluation
- employee benefit costing

Capital Budgeting

- over 35, \$5 million+ capital investment decision financial reviews of:
 - branch automation
 - premises acquisition
 - mainframe investments
 - business acquisition/ divestment
 - corporate-wide investment expenditure policy and control
 - premises planning and investment optimisation
 - lease-buy fixed asset acquisition
- decision support
- computer technology
- procurement financial review

Asset Backed Securities

- negotiated and managed the sale and servicing of \$1.3 billion of automobile receivables
- managed tax receivable sale, \$77 million private placement
- asset value adjusted preferred stock (NYSE: BAC pfd. C) transaction support

Merger & Acquisition

- SeaFirst Corporation merger financial evaluation
- 50+ deposit base evaluations, public and private purchases by Bank of America
- Security Pacific Corporation merger retail liability base evaluation
- Managistics payroll services acquisition evaluation
- Decimus Computer Leasing Corporation divestment
- AT&T, Chemical & Bank of America electronic banking partnership development
- Bank of America, Canada consolidation financial analyst

Operations Research

- credit scoring research and tracking development
- courier routing (transportation model heuristic)
- mail room work flow optimisation
- float optimisation in check processing
- customer retention estimation using renewal theory

Strategic Planning

- bank liability base deregulation financial strategy development
- branch bank functional reengineering financial modelling
- technology direction financial evaluation and methodology
- bank item processing evolution strategy financial evaluation

Tax Planning

- tax room measurement and control
- tax position optimisation
- accounting impact analyses (e.g., new regulations or litigation reserve estimation)

Planning

- consolidated corporate plan analyses, three annual budget cycles
- strategic business unit annual plan review, two budget cycles
- econometric sensitivity analyses
- earnings sensitivity modelling under different interest rate and credit loss scenarios
- budget variance reporting and analyses

Long Term Planning

- capital planning using Monte Carlo and linear programming
- dividend modelling and decision support
- debt/preferred stock/common stock structuring analysis

Direct Supervision

- workflow consulting projects: two management scientists
- capital budgeting reviews: three financial analysts
- loan sales servicing: one analyst and one systems analyst
- intangible accounting and valuation: two financial consultants
- foreign exchange dealer control: two control officers

Project Management

- financial tasks: teams of two to fifteen officers and analysts one week to six months
- systems development: project manager of five large scale IT development efforts
- asset sales servicing: matrix managed four geographically dispersed loan servicing centres

Technical Experience

- Operating Systems: MS-DOS v3.x & 4; Windows v3.0a & 3.1 & 9x & 2000 & NT; OS/2 1.x & 2.0; MP-RAS; Linux; VM/CMS; VP/CSS; TPF/ACP; MacOS v6, 7, 8, 9 & X; InGrid; TOS; and EXEC.
- Database Management Systems; Teradata; Sybase; Oracle; Nomad; Versant, {IDEF - Data Modelling.}
- Programming Languages: SQL x, TQL; TSQL; SQL-Plus; Object-C; C-Shell; Unix tools (BSD4.3 & NFS); Nomad; REXX; FORTRAN; PL/I; APL; RPG; System 360 Assembler/Macro; Lotus; Excel; Javelin; Mesa; Paradox PAL; and Improv.
- Hardware: NCR/Teradata Worldmark & DBC/1012; IBM PS/2 and PC compatibles (Wintel); NeXTStep; IBM Systems 360/70, 36, & 3090; Digital PDP-8 & 11; Sperry Univac 1108; Apple Lisa, Macintosh, PowerBook, iMac, G4; and Grid Compass.

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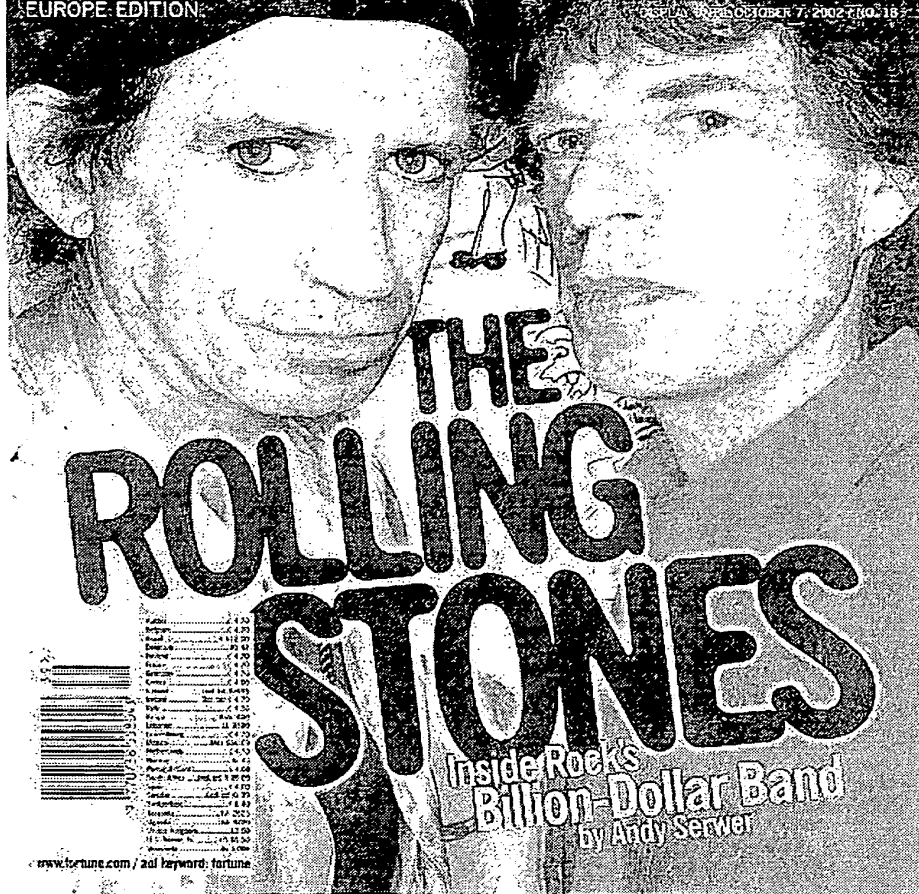
Why Business
Loves Linux

Your Customers
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EXHIBIT B



S. FORTUNE

Will this customer sink your stock

WHO ARE YOUR UNPROFITABLE customers? We recently asked that question of top executives at one of America's biggest retailers. They responded defiantly that they had no unprofitable customers. Understand that this company was in trouble—it wasn't even earning enough to cover its cost of capital. Wall Street analysts were beating it up, and its stock was performing worse than the shares of most competitors. Yet its leaders insisted that through some dark financial voodoo, millions of profitable customers somehow added up to an unprofitable company.

The truth—which shocked them—was that some of their customers were deeply unprofitable. Simply doing business with certain customers was reducing the firm's profits and shareholder value. Other customers were fabulously profitable—but the effect of the bad-news buyers was overwhelming them. The retailer's managers didn't understand any of this. They didn't understand that their customer strategy—their whole plan for acquiring, maintaining, and developing customers—was determining their

Here's the newest way to grab competitive advantage: Figure out how profitable your customers really are.

By Larry Selden and
Geoffrey Colvin

customer profitability, and crucially, that their customer profitability was in turn determining their share price. Because the company didn't understand these connections, it was, among other serious errors, aiming marketing efforts at customers who weren't profitable and probably never would be. Here's how ridiculous the situation was: This company was actually spending money to bring in customers who were reducing the value of the firm.

Get ready for a big idea that's about to sweep through most com-

panies: managing the enterprise not as a collection of products and services, nor as a group of territories, but as a portfolio of customers. Of course, managers have always known that some customers are more profitable than others. But it's amazing how many executives, like those of that big retailer, haven't the least idea just how profitable (or unprofitable) individual customers or customer segments are.

Most managers don't understand how their customer portfolio determines their ultimate bottom line: the value of the com-

ILLUSTRATIONS BY CHRISTOPHE NORET

MANAGING

pany. Believe it or not, it's entirely typical to find that just the best 20% of a company's customers generate a huge portion of its share price—in some cases, all of it. The trouble is, the worst 20% may destroy a ton of value, with the middle 60% making up the difference. Until a company starts managing its highly diverse customer portfolio, it can't hope to maximize shareholder value.

That's a critical opportunity missed, because many companies are desperate for a new competitive advantage. Today about 60% of U.S. corporations, like the retailer mentioned above, are either chronically failing to cover their capital costs or just barely doing so. They can't hope to get their stock moving until they fix that problem. Cost cutting and Six Sigma quality programs are great, but when everyone in the industry is doing the same things, you're back in even. Now, in a tough economy and a brutal stock market, the hunt is on for a new source of advantage, one that can last a long time. Companies that find it early will build huge barriers against competitors.

A number of leading firms believe they've found such a competitive advantage. These truly customer-centric companies—including Dell Computer, Toronto-based Royal Bank of Canada, Fidelity Investments, and Canada's Hudson Bay Co.—are getting a grip on their customer portfolio and managing it to lengthen their lead over competitors. Why now? Because until recently trying to calculate the profitability of individual customers or even customer segments was too hard an infotech task for big companies to handle. Now the technology, which is getting more powerful and less expensive by the day, is finally up to the job. Here's a mind-boggling fact: Royal Bank calculates the profitability of every one of its two million customers *every month*.

But infotech isn't the key. Many companies have spent millions on the needed software—including ERP (enterprise resource planning), CRM (customer relationship management), and many other applications—with little or nothing to show. That's because cashing in on customer profitability requires a deep change in corporate mindset, something no vendor can sell you. The customer portfolio needs to become the basis of how companies get organized, measured, and managed. Making this switch is tough. That's why even small firms, which don't require giant infotech systems to analyze customer profitability, have rarely done it. Yet companies that can make the shift are discovering huge advantages from managing their customer portfolio. Financial services firms, in particular, are leading the charge.

Consider Fidelity Investments, the world's largest mutual fund company. It realized that some customers were unprofitable because of the channels they used to interact with the company. When a customer who does limited business with Fidelity, and probably has limited potential, calls a service rep too frequently, the costs can easily outstrip any profits.

So a couple of years ago, when such customers called, Fidelity's reps began teaching them how to use the company's lowest-cost

channels: its automated phone lines and its website. It also made its site friendlier and more enticing to use. These customers could still talk to service reps, but the phone system identified their calls and routed them into longer queues, so the most-profitable customers could be served more quickly; for the unprofitable customers, the longer wait would be a disincentive to call.

Fidelity couldn't lose. If the unprofitable customers switched to lower-cost channels, they became profitable. If they didn't like the new experience and left, Fidelity became more profitable without them. But Fidelity found that 96% of those customers stayed, about the same retention rate as in the industry overall, and most of them switched to lower-cost channels. Over time, customer satisfaction actually increased for the smaller customers as they learned how to save time and get faster service through the lower-cost channels, increasing Fidelity's operating profit within 12 months.

Now that because Fidelity could allocate resources based on customer profitability and potential, it could have its cake and eat it too: Unprofitable customers became profitable, and profitable customers got better service through shorter wait times when calling. This is typical of companies that make the kind of change Fidelity did. By contrast,

when companies don't understand customer profitability, they suffer a double whammy. Resources get squandered on unprofitable customers, which means the profitable ones get short shrift and become less satisfied.

Here's another example. In late 1999, Royal Bank of Canada, the largest bank in that country, reorganized itself not around products or territories but around customer segments. This focus on customer profitability revealed a large opportunity the bank had been missing. When clients from its elderly and well-off "wealth preserver" segment died, their assets passed to their heirs, who tended to be concentrated in one of the bank's most profitable customer segments, which it calls "builders and borrowers." But the bank wasn't satisfied with its retention of those assets; many heirs were not Royal Bank customers, and others were transferring the assets to other institutions.

So last year the bank thoroughly revised the experience it offers current and potential customers who have to settle estates. The process can involve tons of paperwork, so the bank made it easier and more efficient. Since settling an estate is a chore that most people don't know much about, and one that can be emotionally draining, the bank offered financial advice and planning to guide them through it. In a test of the new offer, the bank increased its retention of assets from 30% to 50% and attracted new assets equal to another 25%. Rolled out nationally, the program would translate into \$1.5 billion (Canadian) of net new balances. Royal Bank won't say how much extra profit that would create, but the amount is clearly substantial.

Because the bank calculates each segment's economic profit—that is, profit after a capital charge—management can figure out how much each contributes to the share price. The company is also telling stock analysts about segment profitability—

Until recently,
trying to calculate
the profitability of
customers was too
hard an infotech task
for big companies.
Now the technology
is up to the job.

JAMES D. BROWN is a professor at Columbia University's business school, GSAPP, and a senior advisor to the company's chief executive. The author's book on customers and shareholder value will be published next year.

MANAGING

valuable information that gives investors deeper insight into Royal Bank than they have into competing banks.

FINANCIAL SERVICES ARE one thing. But it's harder for many people to conceptualize how analyzing and acting on customer profitability might work in retailing. Retailers sometimes throw up their hands and ask, "What can I do—put a bouncer at the door to keep unprofitable customers out?"

Probably not, but retailers can do far more than they may imagine. We know a retailer that ran a loyalty program based on how much customers spent. Analyzing their profitability showed that many of the biggest spenders—the top tier in the loyalty program—were deeply unprofitable, often because they bought only sale items and made loads of returns. So the obvious first step for this retailer was to stop sending these customers announcements of big upcoming "private" sales. The company had been promoting such events heavily to its top-tier group, not realizing that actually doing less business with some of them would increase profits.

The retailer also found ways to do more business with its most profitable customers. For example, a woman who buys \$10,000 of full-price dresses each year but buys no shoes is a clear opportunity—because she's probably buying a lot of shoes somewhere. So the company could promote its shoe department to her and make sure salespeople mentioned the department to her in the store. The retailer could also take steps to turn unprofitable customers into profitable ones by trying to bundle profitable products with the unprofitable ones that the customers typically buy, based on computer analysis of frequent product pairings. This is "You want fries with that?" on steroids.

If understanding customer profitability is so valuable, how could the top managers of the major retailer we mentioned earlier have felt so certain—and been so wrong—about all their cus-

ways to fail

Many companies try hard to be customer-centric, but their efforts don't make their shares go up. The reason: They're committing some—and frequently all—of these five sins. Are you?

Denial

Do you insist that the differences in the profitability of your customers aren't important or aren't measurable?

Do you deny that you have unprofitable customers? If you try to measure customer profitability, do you exclude some operating or capital costs?



The Growth Illusion

Are you adding lots of new customers without knowing how much they cost to acquire or how long they're likely to stay? Most important, are you clueless about the economic profit (operating profit minus a capital charge) you can expect from each new customer?



The Illusion of Averages

Do you make decisions based on average customer profitability? Are you ignorant of how much economic profit comes from the best 20% and the worst 20% of your customers? Are you unsure about which specific elements of customer behavior cause customers to fall into the top and bottom groups?



Failure to Act

Do you fail to make specific managers fully accountable for acting on customer profitability? Is your strategic plan disconnected from the economic profitability of customers or customer segments?



Failure to Drive Share Price

Have you stopped short of figuring out how much each customer segment contributes to your share price and then using that knowledge to drive the price up? Have you failed to tell your board and your investors how you're using your knowledge of customer profitability?



tomers' being profitable? These executives said that all their products had positive gross margins, and the company managed inventories well, so that of capital weren't tied up. Thus, they reasoned, no matter what baskets of goods customers bought, they must all be profitable.

The trouble was that these managers were ignoring important costs. Start with the store's operating expenses: sales associates, rent, electricity, maintenance, and so on. If the shoe department uses 10% of those resources, it should bear 10% of the operating costs. When our retailer began to allocate those expenses earlier this year, the company found that 25% of its product categories were unprofitable, many very unprofitable. Applying charges for capital—inventories, plus things like store improvements—yielded what finance experts call economic profit. It turned out that more than half its product categories were generating negative economic profit.

Using credit card data and simple observation in stores, the company began to analyze baskets of goods bought by a varied sample of customers. It found that some of them chronically bought mostly unprofitable products. Those customers were unprofitable. The retailer also found that some customers made lots of returns, behavior that could make profitable baskets unprofitable; others bought only items that were on sale.

Also unprofitable were customers who tied up sales associates but didn't buy anything.

WHEN COMPANIES FAIL TO UNDERSTAND CUSTOMER PROFITABILITY, they do worse than just miss big opportunities; they can also get themselves into deep trouble. We've observed two especially dangerous traps (for more, see "5 ways to fail").

► **The growth illusion.** Imagine a company that launches a big push for new customers and acquires 5,000 of them at a cost of

MANAGING

\$1,000 each. That amount is what the company spends on advertising, promotion, sales calls, and so forth to get those customers in the door. (The company might spend \$100 reaching each prospect but succeed with just one in ten.) To keep things simple we'll assume that the new customers don't produce any business in the year in which they're acquired, so the company's operating profit is \$5 million lower than it otherwise would have been. That is, it has invested \$5 million in the hope of realizing much more than \$5 million in future profits.

Suppose this company typically holds its customers for three years, and it earns profits of \$300 per year from each customer. Obviously the company is losing money; it's earning \$900 on customers that cost \$1,000 to acquire, and that's not even discounting the future earnings to reflect the time value of money.

Yet remarkable as it may seem, the company's investors and even its managers, looking at conventional operating results rather than at customer profitability, might not know for years that anything is wrong. Why not? Suppose that in its second year the company acquires just 1,000 more customers, again at a cost of \$1,000 each, or \$1 million. Since the 5,000 recently acquired customers bring in a profit of \$300 each for a total of \$1.5 million, the company shows a profit increase of \$500,000. That's a nice change from the previous year's decline and the beginning of a good-looking trend line. It gets better. Suppose that in the next year the company again acquires 1,000 new customers for \$1 million. Now it has 6,000 new customers bringing in profits (\$1.8 million total) and shows a profit increase of \$300,000 over the previous year. Repeat the pattern once more, and profit again rises \$300,000 over the previous year.

This company looks like a star. Investors are frantic to buy the stock. The directors are paying management millions. Yet every new customer is unprofitable. The more customers the company adds, the more value it destroys.

Obviously this situation can't last forever. The 5,000 customers acquired in the big campaign, having stayed for three years, leave; if the company keeps adding 1,000 customers a year, and the cost and profit characteristics remain unchanged, it suddenly falls into a steady state of losing \$100,000 a year (that's before capital charges, which would make the value destruction even worse). The stock collapses, top management gets fired, and everyone is marveling at how a company could go into the tank so fast.

Does this scenario sound familiar? Leaving aside the simplified numbers, does it suggest Gap's recent experience as it furiously acquired new customers by opening new stores on every corner, then saw its stock collapse? Or WorldCom's spectacular run-up as it offered cash incentives to attract new customers, then crashed and burned? Or cellular phone companies nationwide that did the same thing? We hasten to add that we don't know for sure whether the scenario we describe is what afflicted those companies—and we suspect they don't know either. But the circumstances are certainly suggestive.

What scares so many managers we talk to is that they have no

REYNOLD GARDNER/Forbes.com

idea whether they're facing this disaster, because they don't know how to look across their firm's products, regions, and sales channels to understand customer profitability. They don't know what it costs them to acquire customers or how long they hold customers or what it costs to maintain them, so they have no idea how much money they make (or lose) on each one.

► **The illusion of averages.** In our growth illustration above, we assumed for simplicity that all customers were economically the same. In reality that's never the case. The profitability of a company's customers often varies radically. For example, at Royal Bank just 17% of customers account for 93% of the bank's profits. Occasionally a company will calculate a rough measure of average customer profitability, but because profitability is so unevenly distributed, acting on an average number may do more harm than good.

To see why, consider two struggling companies, A and B.

The economic profitability of the average customer at each company is the same: -\$15. Yet this average figure masks two radically different customer portfolios. Suppose that at company A, every customer is yielding this same dismal economic profit of -\$15. But at company B, half the customers are generating economic profit of \$80 each, while the other half are yielding economic profit of -\$110 each, combining to create the -\$15 average.

While the averages for A and B are the same, the implications

are vastly different. Company A can't earn an economic profit with any customers and thus faces a bleak future. Company B, by contrast, is tremendously successful with half its customers and performing disastrously with the other half. If company B's managers can figure out which customers are in which group and why, and then focus on adding more great customers and doing more business with them, while overwriting or losing the terrible customers, they have a great story for investors. This type of customer de-averaging represents a powerful new way for companies such as B to allocate resources in ways that will unshock profits.

MANAGERS AREN'T THE ONLY ONES WHO NEED BETTER knowledge of customer profitability. Investors do too. They'd love to screen their holdings with the kind of analysis outlined above, but they can't. In today's environment many companies are publishing far more data than before, but they're still excluding a few pieces of extraordinarily valuable information: customer-acquisition costs, maintenance costs, length of customer relationships, and some sense of how customer profitability is distributed.

Boards of directors will soon begin to demand customer-profitability data and will challenge management to act on it; investors will demand that companies report it. They will have to, because knowledge of customer profitability will enable them to attract investors away from competitors that don't have this knowledge. And that's an advantage that no company can safely ignore. ■

DATAMONITOR

Market Analysis Experts

Datamonitor Technology INSIGHT – December 2000

MEASURING SUCCESS: NCR AND ITS VALUE ANALYZER

Author: Andreas Kolind

SPP: Enterprise CRM and Customer Facing Technologies

The event

On 23 November, NCR won the CRM Project Award at this year's Information Management Awards for the implementation of its profitability analysis software. The product, Value Analyzer, was launched in 1999 and was recognized for its implementation within Royal Bank of Canada earlier this year. NCR has been moving gradually into the CRM space and this therefore merits some discussion of their solutions and strategy.

Value Analyzer

NCR has developed a number of applications, as part of its Relationship Technology package, which are intended to sit on top of its data warehousing platform, Teradata. One of the financial services products is Value Analyzer, which measures profitability from a 'bottom-up' perspective, i.e. at the account level. This depth of measurement means that profitability can be reported by customer, channel, product or functional department. Furthermore, its scalability means that it can be sold to banks of varying sizes and needs; however, small banks are unlikely to be able to afford this profitability solution, even though they might like it's level of detail in their decision-making.

If used in combination with NCR's Teradata platform, Value Analyzer is able to analyze enormous volumes of customer behavior data in hours, rather than days. The resulting data can then be used to improve decision-making in many areas, including channel migration initiatives, price setting and identifying underserved customer segments. And because the

calculation is based on actual customer transaction volumes, it is more accurate than software packages that use estimations.

Value Analyzer has been developed in collaboration with NCR's existing financial institution clients and will initially be targeted towards large retail banks, and then later spread across business lines, to include credit cards, corporate banking and insurance. NCR believes that this solution would be of interest to any organization where customer profitability is a critical issue and this could include other sectors such as insurers, telecoms and airlines. For example, insurers would be concerned with the current, latent and potential profitability of their customers, information that could be calculated using past data. In future, NCR also plans to add functionality and increase the performance of the Value Analyzer system to cope with greater amounts of data anticipated in the coming years.

NCR's strategy

This is part of NCR's strategic move from a hardware-only portfolio to also include software and services, though it makes considerable use of Teradata, NCR's well-regarded data warehouse solution. Value Analyzer has been designed with Teradata in mind and may lead to the client switching to Teradata to improve performance. Value Analyzer can also co-exist as a datamart with data warehouses from other vendors such as Oracle and IBM but is available only on the Teradata database.

Value Analyzer is not the only profitability measurement software available in the market and competes with Oracle's Financial Services Application, Peoplesoft's Profitability Management, IBM/HNC's ProfitVision and Siebel's Marketing application. However, NCR's solution is clearly positioned at the high-end and is aimed at banks with large volumes of transactions and accounts, such as the Royal Bank of Canada.

NCR's image has changed significantly in recent years, from being a financial services company selling ATMs, to a company with a complete portfolio of transaction and data warehousing solutions. Now, we see evidence that industry organizations are recognizing NCR's move into CRM. For example, NCR recently earned the number two position in DM Review magazine's annual ranking of the top 100 vendors in data warehousing, e-business and CRM. It beat household names traditionally associated with CRM, including Oracle, E.piphany and Siebel. Moreover, in September, NCR won the CRM category of the DM Review 2000 Readership Awards. It seems the image of NCR is no longer limited to cash registers and ATMs.

Datamonitor's view

NCR has correctly seen the emerging trend of banks to link shareholder value to CRM initiatives, based in part on the increased need for accountability in their decisions. Most banks now need to measure and manage customer profitability and look to CRM vendors for solutions. NCR's close collaboration with financial institutions in the past has allowed it to develop this and other products for the banking industry. That it has chosen to target large banks, most of whom are existing Teradata users, means that the first phase of sales will be relatively easy; it will be more difficult to sell to banks in which it hasn't already installed Teradata.

The challenge for NCR must be to convince new customers of the financial impact of buying Value Analyzer, given the size of the cost and the length of the implementation period (six to eighteen months depending on the size of the bank). Improving the mindshare of NCR in the CRM field by opening reference sites and promoting success stories (like the Royal Bank of Canada implementation award) are a good start. Encouraging prospect banks to invest in analytical CRM initiatives may well prove more difficult, partly because they are less glamorous than operational CRM tools. NCR's move into analytical CRM may go some way to changing the industry view of this area of CRM, while providing itself with yet another tool to demonstrate the power of Teradata.

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Teradata Poll

What percentage of your corporation's data resides outside of your Enterprise Data Warehouse?

☐ None

Contact: Dan Conway, Teradata Division, NCR Corporation
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Teradata Announces New Version of Value Analyzer - 3/15/2004

Detailed profitability analysis now available for all industries

DAYTON, Ohio – Teradata, a division of NCR Corporation (NYSE: NCR), today announced a new version of its award-winning Teradata Value Analyzer™, the only analysis tool that calculates profitability at the detail level driven by customer behavior. Much admired for its strength in the banking and telecommunications industries, Teradata Value Analyzer 3.0 is now available for all industries.

"Profitability analysis by product, channel and customer is an essential part of the planning process to make decisions regarding resource allocation, product development and for identifying pockets of opportunity," said Kim Collins, Gartner analyst.

The insights generated by Value Analyzer enable an assessment of all types of business profitability and support swift, sound decisions guiding marketing, product and customer service initiatives, according to Mike DeBrosse, vice president of Teradata. "In today's economy, using a profitability measurement solution that depends on averages doesn't make sense. Details answer the question 'why' and provide companies with actionable information that can create a competitive advantage. Averages don't."

Teradata Value Analyzer's detailed, behavior-based approach differs from more traditional measurement tools that determine profitability by using high-level averages or aggregations. Without the details that drive revenue and costs, companies are left with an inaccurate view of value leading to misguided business decisions that affect the bottom line.

Teradata Value Analyzer links revenue and expense data to actual customer transactions and interactions within a company. For a complete profit and loss metric, it also can include risk provisions and capital allocations. The metric can be calculated for any profit object. A profit object at the lowest level can be an account, a telephone number, reservation record or shipment, to name a few. Starting from a profit object, a company can easily get to different views of profitability across the enterprise including customer, product, organization and channel.

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- ⌋ About 25%
- ⌋ About 50%
- ⌋ 75% or more



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Teradata Value Analyzer provides for flexible and robust analytical capabilities that support strategic decisions. It supports the detail flow of revenue and expenses through all entities of the organization, providing an important link between standard finance-led organizational profitability and detailed customer profitability. Modeling cost flows, it also supports the creation of activity-based management processes and calculations.

Teradata Value Analyzer calculations are easily completed inside the Teradata data warehouse engine, rather than consuming resources and time moving large amounts of data in and out of a separate system as it is processed. In addition to speed of the calculations, accuracy, which is critical for making confident business decisions, is not compromised. Working in a single integrated database, Teradata allows for an actionable review of all data, not just a sample that may offer misleading clues to profitability.

About Teradata Division

Teradata, a division of NCR Corporation (NYSE: NCR), is the global technology leader in enterprise data warehousing, analytic applications and data warehousing services. Organizations around the world rely on the power of Teradata's award-winning solutions (www.teradata.com) to get a single, integrated view of their business to enhance decision-making, customer relationships and profitability.

About NCR Corporation

NCR Corporation (NYSE: NCR) is a leading global technology company helping businesses build stronger relationships with their customers. NCR's ATMs, retail systems, Teradata® data warehouses and IT services provide Relationship Technology™ solutions that maximize the value of customer interactions and help organizations create a stronger competitive position. Based in Dayton, Ohio, NCR (www.ncr.com) employs approximately 29,000 people worldwide.

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Aaron Borrowman

From: Richard Tad Lepman [tad@bieor.com]
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Subj ct: Value Analyzer in telecommunications application

from url: <http://www.teradata.com/t/go.aspx?id=75103>



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☐ None

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Teradata Profitability Analytics Bolsters the Bottom Line for Mobile Communications Companies - 9/23/2002

Actual behaviors, transactions and activities analyzed for precise, integrated profitability measurement

DAYTON, Ohio - With billions of wireless users in hand, mobile communications companies must now determine not only how to improve retention rates, but also how to maximize the value of these subscribers. Teradata, a division of NCR Corporation (NYSE: NCR), today introduced Teradata Profitability Analytics software, which runs on the Teradata® warehouse engine. Comprised of Teradata Value Analyzer, which precisely measures current profitability, and Teradata Lifetime Value, which predicts lifetime profitability, Teradata Profitability Analytics enables mobile communications companies to develop customer relationship management (CRM) strategies with value as the foundation.

There is a critical need for profitability analytics.

"Recent Yankee Group research has indicated that the current economic and competitive environment is forcing wire-line and wireless communication service providers to better understand the profitability of their service customers and sales channels," said the Yankee Group's David Hawley. "The Yankee Group's findings indicate that CSPs are prioritizing business intelligence investments that will enable them to increase their understanding of the profitability of customers as well as products and services over other technology initiatives. It will be fascinating to see which communication service providers leverage their underlying data warehousing technology to use detailed data in solving this challenge," said Hawley.

"In what has felt like a parallel to Bill Gates' vision for a computer on every desktop and in every home, mobile communications companies have led the charge for a wireless phone in every hand," said Jack Knapp, vice president of communications industry marketing at Teradata. "But as penetration rates begin to peak, many of these companies are shifting their focus to retaining customers and encouraging higher spending to drive revenue growth. In doing so, they need to determine not only which customers are likely to spend more money, but which customers are more valuable to retain."

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- ⌂ About 25%
- ⌂ About 50%
- ⌂ 75% or more



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"Most mobile companies measure their business on average revenue per user (ARPU), which is fine during rapid growth mode. But today's market requires different standards. Measuring revenues without analyzing affiliated costs - everything from network usage, customer care expense and incentives - doesn't give a true picture of each account's contributions to the bottom line. Actual margin per user (AMPU) is the optimal measure, as it enables mobile communications companies to build and implement plans based on actual customer value. That's where Teradata's Profitability Analytics comes in. Now mobile communications companies can measure the profitability of each wireless customer and use this information to guide marketing, sales and service decisions," added Knapp.

Teradata Value Analyzer is an end-to-end solution that pinpoints profitability calculations across five distinct components at the fundamental level, the billing telephone number. These components are: revenue (direct and indirect), interest revenue/expense, direct expense (applied to customer behavior or events), indirect expense (cost of doing business) and risk provision (applying the cost of credit and other potential risks and fraud). To boost speed, Value Analyzer calculations are completed inside the Teradata warehouse engine, rather than consuming time by moving large amounts of data in and out of the data warehouse as it is processed. This also heightens accuracy as Teradata allows for an exhaustive review of all data, not just a sample that may offer misleading clues to customer profitability and behavior.

Mobile communications companies can utilize Teradata Value Analyzer to proactively manage their business by tracking profitability by customer segment, rate plan, channel and geographic market. Decisions on investments in new applications, products and services, network expansion and phased service rollouts can be prioritized. Teradata Value Analyzer can also provide analyses that help companies build more profitable rate-plan offers and better target customers for rate-plan migrations. Customers can be segmented by behavioral profitability as opposed to revenue, and marketing campaigns can be designed to change the overall account mix, capitalizing on the attributes that characterize higher-margin customers.

Teradata's Lifetime Value Solution provides mobile communications companies with business intelligence that allows them to measure the ongoing value of any object - everything from customers, products and delivery channels to the sales force, geographic regions and customer service centers. The Teradata Lifetime Value Solution identifies patterns and trends by applying complex mathematical models to detailed customer-behavior data. Those patterns and trends are linked to customer-attribution projections, demographics and propensity to buy data to provide insights into customers' lifetime value. Measuring actual behavior provides reliable results and can provide insight into the challenges and opportunities that lie ahead.

Mobile communications companies can use this information to a variety of applications and activities, such as product development and testing, pricing, marketing programs, customer retention and relationship management.

Teradata Profitability Analytics is available for immediate delivery.

About Teradata Division

Teradata, a division of NCR Corporation (NYSE: NCR), is the global leader in enterprise data warehousing and enterprise analytic technologies and services. For more information visit www.teradata.com.

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Aaron Borrowman

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Subject: Rules based Value Analyzer

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Solve Specific Business Problems With Rules-Based, Data-Driven Applications

By Brian Wasserman, consulting software analyst

Every business is unique. Each has its own set of customer detail data and its own way of performing functions such as profitability calculations. So how can those businesses meet the customized needs of different customers with a single set of source code? With a Rules-Based, Data-Driven application.

Tailored to customer-specific data

A Rules-Based, Data-Driven Application, such as Teradata Value Analyzer (TVA), is a two-pronged solution that can be customized and tailored to fit the needs of any customer site. The "data-driven" component operates against customer-specific data without requiring changes to the core application software. And the "rules-based" application can process any business rule based on specified templates. Together, the applications permit calculations based on user-defined rules, with the resulting calculations driven by the specifics of customer data.

Here's how a Rules-Based, Data-Driven Application works in a financial institution:

Like other businesses, financial institutions maintain diverse types of detail data about both their customers and their financial transactions. Some institutions keep extremely detailed data, while others are far less sophisticated. At the same time, those institutions also perform profitability calculations in an equally different manner. A "rules-based" application provides them with business rule templates for calculating the various facets of profitability, including revenue, expenses, and risk according to their specific business needs. These templates query for information that users must enter to calculate profitability and include options and choices that are based on customer-specific data.

Effective innovation

Why is this such an innovative — yet effective — approach? Because of the flexibility a Rules-Based, Data-Driven Application can create. First, a Rules-Based, Data-Driven software application can meet the customized needs of different customers with a single set of source

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EXHIBIT F

code. Just as important, it allows Sales and Professional Services teams — as well as the customers themselves — to reuse applications such as Teradata Value Analyzer and focus their energies on solving a customer business problem, not on engineering software.

Pick the right technology

There are many ways to engineer this type of application. The Value Analyzer architecture, for example, includes a Metadata Definition and a SQL Generator to facilitate the Rules-Based, Data-Driven approach. The Metadata Definition is used to define elements of customer data that will be used in profitability calculations. The SQL Generator uses the Metadata Definitions and generates Teradata-optimized SQL macros that process the dynamic, or customer-specific portions of the profitability rules.

Business Examples

Here are just a few examples of how a Rules-Based, Data-Driven application can solve an array of potential business problems:

Financial Industry: *Apply a fixed \$10,000 cost of the bank president to all accounts.*

Here, a financial institution has a fixed amount of money (\$10,000), representing the cost of the office of the bank president, that it wishes to spread evenly across all accounts. The software will retrieve the total number of accounts contained in the data warehouse, and will add a cost to each account based on its share of the \$10,000. The actual cost applied to each account will vary based on the number of accounts defined.

Travel Industry: *Assign a fixed cost to all flights based on the booking channel.*

In this example, an airline has to pay a fixed (\$50) cost for flights that are booked through a travel agency, while flights booked through the airline's web site receive a lesser cost (\$1). In this example, a flight is represented by a Passenger-Name-Record (PNR), which is analogous to a master account. A flight booking is a PNR event. The *booking channel* is an attribute of a booking, and is identified to the software through the application metadata during the business discovery process.

The software applies two rules: one acts on PNRs where the *booking channel* = "travel agency;" the second acts on PNRs where the *booking channel* = "web site." The SQL Generator software uses the metadata information to retrieve all PNRs with the appropriate *booking channels* for each rule, insuring that the correct charge is applied.

Communications Industry: *Take a Customer Billed Amount from all customers having calling plan "Family 300", and apply to individual phones based on the total number of minutes for all calls made if the total number of calls is greater than 300 minutes.*

In this example, customers are analogous to master accounts, and phones are equivalent to accounts. During the Business Discovery Process, Customer Attributes *Calling Plan* and *Billed Amount* were identified to the software through metadata. Phones contain calling events which are called Call-Detail-Records (CDRs), and the number of minutes per phone call is an attribute of a CDR.

In processing this Rule, the software uses the *Billed Amount* attribute of a customer as the source for the money being allocated. However, the SQL Generator must first find in the data only those customers with the specified *Calling Plan* = "Family 300." Once these customers have been identified, the SQL Generator must find all phones belonging to these customers and aggregate the number of minutes of phone calls (based on the CDRs). Where this total is greater than 300 minutes, a percentage of the customer *Billed Amount* will be applied.

Aaron Borrowman

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Subject: NCR's Value Analyzer: D tails, details....

from url: <http://www.teradata.com/t/go.aspx?id=114539>

Applied Solutions

DETAILS, DETAILS

How much are your customers worth? The answer is in their actions.

by Barb Swartz

AS AN INVESTOR IN TODAY'S STOCK MARKET, you know you can't make a wise decision without considering a company's annual and quarterly reports, its past stock performance, independent reviews of its market share and more. For instance, two popular U.S.-based retail companies reported comparable revenue figures in their 2002 high-level financial reports, but a little research revealed that one corporation actually had a stronger balance sheet and accompanying stock price, while the other was experiencing higher growth.

Investors look for the details that can help them make informed decisions. By the same token, businesses must demand details when they evaluate the profitability and value of their investment in their customer base.

Most companies say they know who their most valuable customers are, but their view is often based on simplistic measurements like average revenue per user, miles flown, number of products owned, number of accounts, purchase frequency or average number of stays. With a more detailed, behavior-based measure of profitability, businesses can feel confident that they are optimizing their investments in customers, products and channels.

By the numbers

The marketplace abounds with profitability systems. Most of them use data that has already been summarized by source systems of record, e.g. by transaction type or by the number of occurrences of that transaction type in the last period. These summaries, or proxies, are then multiplied by the cost per transaction type to arrive at the customer expense or direct cost.

Most profitability systems are unable to process high volumes of data, so proxies are used

Most companies say they know who their most valuable customers are, but their view is often based on flawed data, simplistic

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instead. Proxies serve to condense customer behavior into manageable amounts of information that are useful for a specific time and purpose.

While generally accurate enough to develop relative profitability measures, proxies lack insight into individual customer behavior and are inadequate for companies looking to build a franchise around individual customers. When a company attempts to extrapolate future value from proxies, even the smallest inaccuracies or missing data will have a dramatic impact on the results.



Summarized data presumes that the summary will be used to answer specific questions. Even though the summaries were constructed from actual events, they can't be deconstructed to recreate those events. This impacts not only the calculation of the profitability figures, but also the analysis for an individual customer or group of customers.

A look at behavior

Teradata provides a unique solution for accurately measuring profitability at the lowest level—the basic unit and transaction level. Teradata Value Analyzer, which runs on the Teradata Warehouse, enables multi-dimensional views of profitability, using customer activity as the foundation. This satisfies the need for detailed enterprise profitability reporting and analysis, which leads to better informed decisions that maximize profitability. In other words, the measurement of profitability is driven by the behavior associated with the basic unit instead of summaries or averages—a practice that ensures true cost- and income-drivers can be identified and understood at the most detailed level across the organization.

Teradata Value Analyzer helps users better understand the value of their customers. It measures, in detail, the components of customer revenue and customer expense at the basic unit and transaction level. From this data, companies can develop any number of aggregations, including by customer or household, by channel, by product or by organization. The calculations involve the measurement of each basic unit's profit contribution across five components: base revenue, net interest revenue, direct expense, indirect expense and risk provision. This approach allows easy reconciliation with the general ledger and consistent data analysis—certainly a revolutionary step for many companies.

Case study

Consider the telecommunications industry, which often uses average revenue per user (ARPU) as its measurement for customer value and success. Customer A has an ARPU of \$200 per month, and Customer B has an ARPU of \$100 per month. At face value, Customer A is twice as valuable as Customer B. However, things are not always as they appear.

With Teradata Value Analyzer, the communications service provider (CSP) can incorporate into the profitability calculation variables such as network, call and product mix, along with other behavioral data such as payment history and service calls. The "Customer Profitability/Percent of Revenue" calculation in the chart below yields a value that would cause the CSP to view

Just knowing
profitability by

5/19/2004

customer, account, shipment or flight is not enough to improve financial results. The analysis must result in action.

these customers differently than if they just used the ARPU calculation.

Communications Services Provider		
Monthly Average	Customer A	Customer B
ARPU	\$200	\$100
Network Mix	70% roaming	15% roaming
Call Mix	25% toll	2% toll
Product Mix	4 products	5 products
Payment	10 days late	0 days late
Service Calls	2	0
Credits	\$4	\$0
Longevity	8 months	4 years
Customer Profitability /Percent of Revenue	\$68 / 34%	\$43 / 43%

click to enlarge graphic

Teradata Value Analyzer captures the way the CSP treats the account by defining business rules associated with profitability drivers such as network expense.

The solution also captures the way the customer interacts with their accounts by incorporating actual transactions in the profitability calculation. Therefore, the account-level profit reflects the uniqueness of each customer by the transactions, channels and usage relating to every account owned by the customer.

This process can scale for businesses of any size. Royal Bank of Canada, for example, has 25 million accounts and handles 52 million transactions on a monthly basis. Despite the size of the database, it takes less than eight hours to run the Teradata Value Analyzer process against detail data once a month with nearly 250 business rules.

Analyzing the analyzer

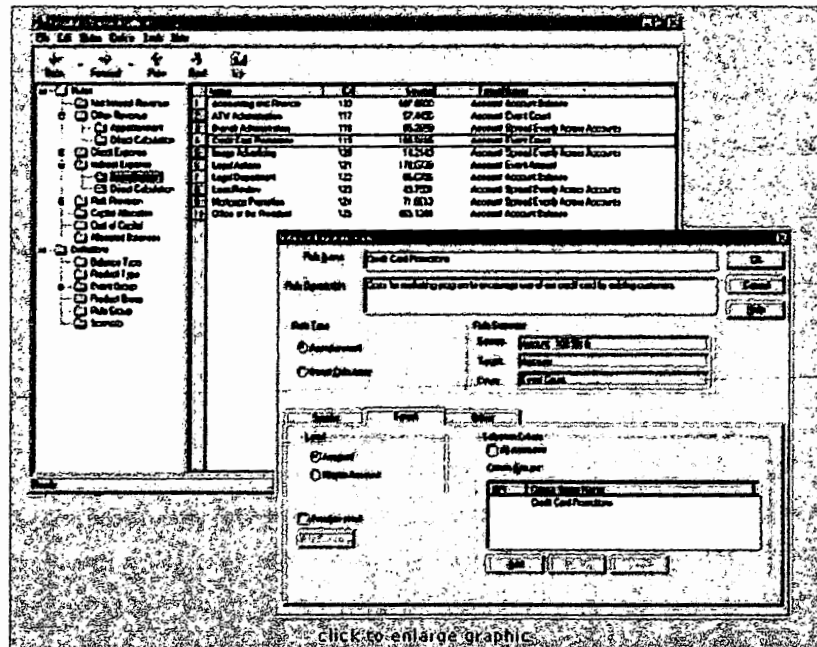
Teradata Value Analyzer has an easy-to-use graphical user interface (GUI) that allows users to set up, define and maintain policies and processes concerning revenue and expense structures as they relate to each component of profitability. The application allows an unlimited number of these "business rules," which are unique to every company.

To set business rules in the application, users must provide input in two main areas. First, they need to define the products and events on which the application will base its modeling. This information is the foundation of the profitability calculation process. Second, users must define the rules relating to each component of profitability. This step is performed by selecting attributes, such as frequent flyer status, and inputting specific data or variables relating to each attribute.

The GUI was designed for business users rather than technical users, making the rules easy to maintain. All data related to the rules of the profitability model are stored in the database and can be retrieved. In addition, the front-end screens remain set up from the previous run of the model, allowing users to see how the model was defined in the last cycle and giving them the option to simply re-run the next month's data without changing any parameters.

The next step in the Teradata Value Analyzer process is to invoke the profitability engines that run

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Call to action

Customer profitability measurement is a three-step exercise. The first step is to understand what the customer's profit-ability level is. The second step is to analyze why that level is what it is. Finally, the third step is to take action, based on the analysis, to improve the customer's value to the organization.

To properly understand why a customer is profitable, analysts must have access to the information that was used to calculate the value. Behind every value calculated by Teradata Value Analyzer are the five components mentioned earlier. This information needs to be calculated and stored to understand trends and anomalies.

To illustrate this, consider a financial services institution. It studied a segment of customers with a particular service package that, while valuable due to their overall relationship, including mortgages and investments, were not contributing to profit as a result of the current service package. In analyzing the actual transactions performed by this customer segment, the bank found that a high percentage of them used the bill payment function at the ATM. This type of transaction was expensive for the bank and was determined to be draining profitability from this segment.

The bank needed to influence the behavior of these valuable customers so they would migrate to a more cost-effective means of performing the same transaction. There were three options.

Option 1: Introduce a fee for paying bills at the ATM. **Projected response:** Negative public relations move that would penalize customers and could potentially cause a retention problem.

Option 2: Introduce "Web-enabled ATMs" that would read and process bill payments electronically. **Projected Response:** Further decline in profitability, as this option costs more than ATM bill payment.

Option 3: Introduce telephone and Internet banking access into the package. **Projected Response:** Clients would see this option as an added convenience, thus increasing the bank's perceived value.

The bank initiated Option 3. As a result they saw very positive results in both financial performance and customer satisfaction. Over time, as bill payment transactions migrated to the Web, the costs to serve this customer segment dropped significantly, and fewer than 10% of these packages were loss leaders. After 24 months, an additional package enhancement for increased transactions each month and a small increase in the monthly fee eliminated these losses. The package is now fully profitable and, much more importantly, the clients using the package are very satisfied and well-anchored with little incentive to move to another bank's Internet service.

CRM's the thing

Just knowing profitability by customer, account, shipment or flight is not enough to improve financial results. The analysis must result in an action taken to improve results. Any complete customer relationship management (CRM) initiative will recognize the need for detailed and accurate profitability calculations. A CRM-oriented profitability measurement process has to meet the needs of CRM managers by providing:

- > **Enough detail** to explain how the customer comes into contact with the company and the expense and revenue associated with each of those contacts;
- > **A comprehensive view** of the customer's relationship with the business so that the true contribution or cost of the relationship is understood;
- > **A consistent view** so that changes in the relationship can be properly understood;
- > Timely information so that the enterprise can act before the opportunity is lost or risk has been fully realized;
- > **Credible results** that reflect the company's own costs and unique business practices; and
- > **Flexibility** so that the measurement process can easily change as the business environment changes.

In profitability, actionable information is found either hidden in the bits that go into the calculation or in the ways the information can be combined with other information unrelated to profit. But, without a doubt, truly actionable information is what management wants and needs. **T**

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ILLUSTRATION BY JOYCE HESSELBERTH

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Teradata Profitability Analytics Solutions

There's more. Because it operates on the Teradata Database, Teradata Value Analyzer delivers detailed information with unmatched speed. That means you can quickly complete even the most complex profitability calculations – then analyze those calculations to determine the best steps toward improving profitability.

Lifetime values are estimated by calculating the Present Value of objects, such as customers, accounts, products, cash flows, households, and channels, as well as estimating the value of the object in the future. The process of calculating the present value of the current object is referred to as the Net Present Value (NPV); the process of determining the current value of the object in the future is referred to as the Future Value (FV). Both of these components are used to indicate the Lifetime Value of any object.

Teradata Lifetime Value

Teradata Lifetime Value is the first business intelligence software that lets you and your business predict the ongoing value of any object. In fact, by basing all its calculations on the object, Teradata Lifetime Value can measure anything you can define: customers, products, and delivery channels, as well as your sales force, geographic regions, or customer service centers.

Teradata Lifetime Value lets you look toward tomorrow. It brings together the results and trends of the past – everything you're using to determine current value – and blends them with future metrics, including propensities, attrition rates, and current value information. The result is a single version of the truth, a detailed look at the future that will help you pave the way to profitable performance in the months and years ahead.

“If used in combination with Teradata's platform, Teradata Value Analyzer is able to analyze enormous volumes of customer behavior data in hours rather than days. The resulting data can then be used to improve decision-making in many areas, including channel migration initiatives, price setting, and identifying under-served customer segments. And because the calculation is based on actual customer transaction volumes, it is more accurate than software packages that use estimations.”

– Andreas Kolind, Industry Analyst, The Datamonitor Group

The Power to Predict

Teradata Lifetime Value is a set of complex mathematical models that runs inside your Teradata Database. The results of the calculations are placed directly into Teradata tables. The application applies the models to detailed behavior data, which in turn uncovers patterns and trends. Those patterns and trends are linked to customer attrition projections, demographics, and propensity to buy data. The result: a powerful insight into lifetime value easily accessed by any OLAP tool or through a query.

Whatever the activity or application, the result is the same – a clearer picture for designing strategies and tactics that support the expected values of products, offers, customers, or channels.

Build a Better Business

Teradata Lifetime Value results will help you make more informed decisions about a wide range of activities, including:

Marketing

- > Identify long-term targets
- > Determine optimal customer mix
- > Attract, retain, and maintain profitable relationships
- > Target intelligent offers to specific customers

Product Management

- > Support product design, pricing, packaging, and relationships
- > Assist in future product and offer development and testing

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Distribution

- > Calculate channel lifetime value
- > Improve customer service, relationship management, and migration

Build on Your Teradata Foundation

We engineered Teradata Value Analyzer and Teradata Lifetime Value for your data warehouse environment. The Teradata Warehouse has an underlying philosophy of "load once, use many." This enables you to use existing data in the warehouse, for example, customer management data for other solutions, such as Profitability Analytics. And Teradata profitability analytics leverage the parallelism of the Teradata Warehouse – they're 100% scalable. So the applications grow right along with your business. And no other database's performance can match the speed of Teradata. Profitability calculations that might take other databases days to run can be completed in Teradata in a

What is Lifetime Value?

Traditionally, companies have measured success through profit and loss (P&L) statements. This traditional P&L approach captures revenues, factors in costs and expenses, and determines a bottom line: net income. While the P&L will continue to be the foundation for businesses, an evolution is occurring that will change the measurement process forever. More and more, businesses are looking for ways to strengthen their profitability measurements, to translate the activities and values of the past into future – lifetime – calculations.

matter of hours or even minutes. And we give you fast, accurate access to detailed event and transactional information – anywhere in your organization.

The Teradata Advantage

Teradata has a rich history of providing analytical solutions that solve real-world problems for companies in many industries. We've given businesses like yours the knowledge and technology to drive strategic and operational decisions and to create

close, personal relationships with every customer. Teradata has the power to help you make better, faster decisions so you can manage your business and drive growth.

In addition, our services professionals can offer consulting, integration, management, and maintenance services, as well as vital support in data mining, analytics, and customer education. These experts are trained in your industry and are ready to go to work for you on day one. They can help you deliver the results you're looking for and will answer your business and technical questions.

For More Information

To learn more about how a Teradata Profitability Analytics solution can expand and enhance your data warehouse and your ability to build a better, stronger business, contact your Teradata representative or visit us at Teradata.com.

"Lifetime Value helps with our understanding of how investments made today pay out over time, and explains how profitability and customer behaviors are related. It's not just response rates or cross-sell ratios that count, but how they contribute to building customer equity over time. Without lifetime value analysis, you simply won't know."

– Tom Richards, Meridien Research

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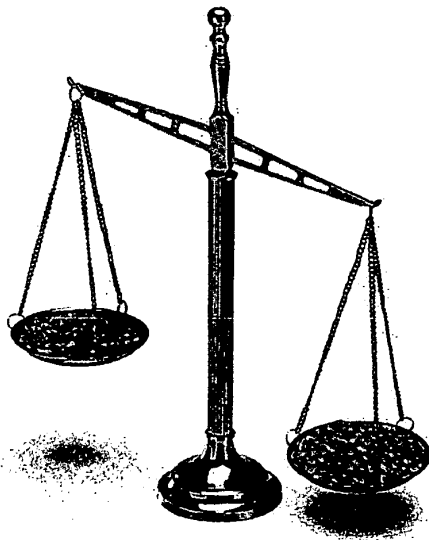
Teradata Profitability Analytics Solutions

Applications > Profitability Analytics

Understanding business performance is more crucial than ever in today's tough economic climate. And the way you view your business is also undergoing critical change. But before allocating resources to any strategy, you must understand the value of your customers, not just your product and delivery channels.

As products and services become commodities, and market penetration rates begin to peak, it's important for you to implement new strategies...knowing who your most profitable customers are and why.

Maybe you're currently using techniques, such as revenue or propensity modeling, to target those customers you believe to be most profitable. But are your measurement models based on actual customer behavior? Or are they general ledger and product/profit-based models that may be giving you an inaccurate or misleading picture of a customer's value?



Conducting Business around Customer Behavior

Prior to implementing Teradata Value Analyzer, RBC (formerly Royal Bank of Canada) conducted customer value analysis using sophisticated methodologies developed at the institution.

It used a system of deciles to classify customers according to their calculated value. However, once RBC implemented Teradata Value Analyzer, the deciles changed dramatically.

Using Teradata Value Analyzer, analyses showed that 75% of the bank's clients shifted two or more deciles. That's three out of four accounts. The bank used this critical information to decide how and where to invest marketing dollars, how to develop new pricing strategies, and how to determine RBC's greatest challenges – and greatest opportunities.

Your best strategy is to implement a profitability analysis solution that provides measurements based on a single, consistent view of your business. You need a solution that lets you view profitability across multiple dimensions so that you can make accurate, informed decisions based on detailed data from across your entire enterprise. That means moving beyond traditional methods of measuring value toward a behavioral approach to profitability. And toward a solution that lets you use the details in your profitability calculation to solve your business problems.

A Behavioral-Based Approach to Profitability

Teradata, a division of NCR, has created a comprehensive portfolio of profitability products designed to help companies like yours look beyond profitability models that

are based solely on summary information due to application and/or technology limitations. Teradata Profitability Analytics solutions enable you to calculate both the current and lifetime value of your customers, products, services, channels, and offers in any dimension you choose. It's a unique behavioral approach that provides accurate assessments of the value of every facet of your business.

Teradata Profitability Analytics solutions include Teradata Value Analyzer and Teradata Lifetime Value. Both products calculate profitability at the most basic profit object and interaction level specific to your industry. In telecommunications, that profit object might be the subscriber; in banking, the account; in transportation, the shipment; and in travel, the reservation record. Because the calculation includes

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Teradata Profitability Analytics Solutions

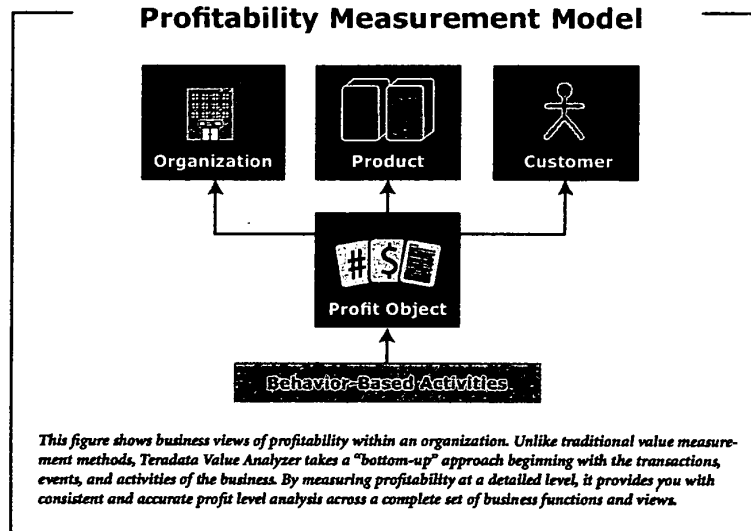
actual transactions, behaviors, and activities – not averages – you receive a more consistent, more detailed, and accurate profit-level analysis across your entire enterprise.

Teradata Value Analyzer

Teradata Value Analyzer is a current value measurement tool providing you with multi-dimensional views of profitability. Using behavioral-based activity as the foundation, in addition to your distinct business rules, it lets you focus on profit measures driven by relationships. The result? A solution that satisfies your need for detailed enterprise profitability reporting and analysis. A solution that leads to more informed marketing, sales, and service decisions that can help you maximize profitability.

This dynamic profitability measurement solution is an essential element for your Customer Management strategy. Why? Because Teradata Value Analyzer does more than merely calculate profitability numbers – it provides the necessary details behind the metrics to answer the question WHY? The profitability calculation looks at profit contribution across six components:

- > Direct and indirect revenue
- > Interest and other revenue
- > Direct expenses – costs that apply to behaviors or events
- > Indirect expenses – the overhead costs of doing business
- > Risk and loss provisions – applying the cost of potential risks and fraud
- > Capital allocations – applying the cost of capital



A Different Viewpoint

Unlike traditional value measurement methods, Teradata Value Analyzer takes a bottom-up approach that begins with a base profit object and provides you with consistent and accurate profit-level analysis across a complete set of business functions. This approach provides you with a deeper understanding of the cost and return you receive from each account, customer, subscriber, shipment, policy, or any profit object you want to measure. From this base profit object of measure, you can develop any number of profitability aggregations: by customer, channel, product, or organization. The results of Teradata Value Analyzer can be easily reconciled with the general ledger giving you the confidence that your results are accurate. It provides consistent analysis across the enterprise of customer,

product, or channel effectiveness, as well as organization historical profitability.

Results You Can Use

The result is information you can use to support an array of strategic and tactical decisions concerning:

- > Channel migration initiatives
- > Relationship pricing
- > Targeting campaigns to the right customers
- > Cost management
- > Service levels
- > Structuring of products and services
- > Identifying under-served customer segments
- > Customer management

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Teradata Value Analyzer

Applications > Profitability Analytics

A Behavioral-Based Approach to Profitability Measurement



Understanding profitability is fundamental to the growth of any business. But all too often, companies fail to accurately assess what is driving the profit, or lack of profit, of their customers, products, services, or channels. That's because, traditionally, businesses have based their profitability calculations on averages and assumptions derived from the financial systems of record, particularly general ledgers.

Unfortunately, this limited value measurement creates a summary picture of revenues and expenses that can grossly misstate profitability across dimensions. Why? Because it's a value measurement built on a cornerstone of aggregated information, a measurement that leads to misguided business decisions. You simply can't make sound, strategic decisions

around targeted marketing, sales and service alignment, and pricing if you are basing them on inaccurate premises. The results can erode your profit. What if, for example, you discover that 75% of your customer population has been classified into the wrong profitability decile?

To answer that question, you must first understand the dynamics behind customer profitability and the true drivers of profit and loss. Your financial statements may provide a summary of revenue, cost, and expenses, but how do you bridge the gap between the summary and the

individual customer? Not by using averages and assumptions. But by considering individual behavior – everything from transactional frequency to channels used. It's behavior that ultimately impacts profitability – and your bottom line.

Detailed Flow of Revenue and Expense

To help bring behavior into your profitability measurements, Teradata, a division of NCR, developed a dynamic solution called Teradata Value Analyzer. It's a solution that addresses the converging demands of two distinct facets of your organization: financial management's need for organizational profitability and

Business Area	Specific Benefits
Marketing	> enhance high value customer base through appropriate services, products and relationships > increase wallet share with effective targeting of campaigns and customers > strengthen accuracy of segmentation methods
Product Management	> combat competition through relevant products and relationship pricing > increase product bottom line performance > design cost-effective, customer-centric offers
Distribution	> align investment in customer servicing and relationship management > access channel value, usage, and optimization > investment or disinvestment in channels
Finance	> clarity of cost and expense drivers for improved cost management > performance assessment, process management and planning > risk-adjusted assessment of value
IT	> improve the quality of information in the Teradata Warehouse > single, detailed view of profitability for the entire organization

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EXHIBIT I

Teradata Value Analyzer

customer management's requirements for detailed, behavior-based profitability. We engineered Teradata Value Analyzer to provide the answers to key questions about why aspects of your enterprise are or are not profitable. It lets you identify individual differences between customers, products, and organization by looking at concerns such as: how revenue is generated, how costs are incurred, or the impact of a specific customer using a specific channel.

Teradata Value Analyzer establishes the foundation of a customer management strategy by precisely measuring profitability at a detailed level. Unlike traditional value measurement methods, Teradata Value Analyzer takes a "bottom-up" approach beginning with the transactions, events, and activities of the business. It provides you with consistent and accurate profit level analysis across a complete set of business functions and views.

You can use Teradata Value Analyzer to generate insight from profitability information to impact marketing, distribution, product, and risk management decisions. And, just as important, you can use the profitability data proactively as a powerful tool for building a better, more profitable business.

Total Account Analysis Factors	
Operational Revenue	All revenue streams relating to your business.
Net Interest Revenue	Represents all revenue accrued through your balance sheet activities.
Direct Expense	Represents costs that apply to customer behavior or events through various channels at various locations and times.
Indirect Expense	Relates to the costs of doing business that are not driven by transaction activity of customers, e.g. overhead expense.
Risk Provision	Reflects the analysis of an individual customer for risk, fraud, loss provisioning, and exposure management.
Capital	Reflects capital allocation down to the customer or account level. Useful in calculating shareholder value.

Every calculation cycle, Teradata Value Analyzer produces a P&L statement by profit object. It breaks down total profit into a number of "factors." These factors and the supporting detail enable the answer to the question, "Why is this object profitable or unprofitable?"

Teradata Value Analyzer allows you to define the object of measurement, also known as profit object. Using transactions, events, and activities, it compiles detailed Profit and Loss (P&L) statements that can include six critical components of a complete financial model: operational and interest revenue, direct and indirect expenses, risk, and capital provisions. When the calculation engine runs, Teradata Value Analyzer links the appropriate revenues and expenses to every transaction from the object of measurement. Once complete, this detailed information can be aggregated to the views required by the business including customer, product, and channel – across your entire organization.

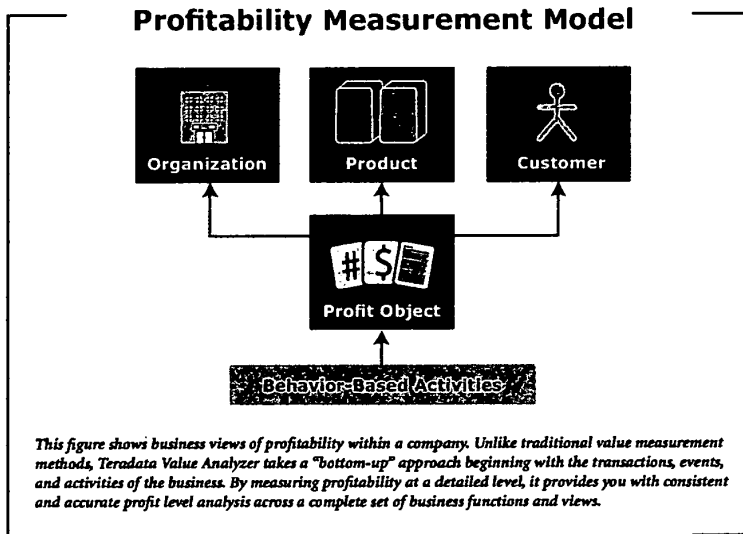
The result? Information you can use to support an array of strategic and tactical decisions concerning:

- > Channel migration initiatives
- > Relationship pricing
- > Targeting campaigns to the right customers
- > Cost management
- > Service levels
- > Structuring of products and services
- > Identifying under-served customer segments
- > Customer management

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Teradata Value Analyzer



Converging Needs

Teradata Value Analyzer provides an important link between organizational profitability and detailed, behavior-based profitability. Modeling the relationships of the organization, it can capture expense and revenue flows among all entities. Supporting a flexible and complex modeling environment, Teradata Value Analyzer focuses on creating behavior-based profitability information and provides modeling support for costing and organizational profitability.

A Blend of Speed and Accuracy

We've built the Teradata Value Analyzer solution on the powerful Teradata Relational Database Management System, the foundation for maximum scalability. Teradata Value Analyzer completes all processes and calculations, and stores all data, right in the warehouse. Teradata Value Analyzer also delivers usable information with unmatched speed, despite the complexity of the profitability calculations and the vast amount of data processed. Once the calculations are complete, you can quickly understand the results and take action to improve profitability.

Of course, accuracy of data is just as vital as speed when it comes to making swift, sound business decisions. Working in a single integrated database, Teradata allows for an exhaustive review of all data, not just a sample that may offer misleading clues to profitability behavior.

Easy to Manage and Enhance

Teradata Value Analyzer is also adaptable, ready to accommodate change in your business, from cost updates to new products to expanded channels. It's a dynamic solution that you can use to define and support a roadmap for changes in your measurement practices.

A Graphical User Interface provides you with a link between your profitability measurement methodology and the data available to define and further enhance the scope and precision of your profitability model.

Rules based and data driven, Teradata Value Analyzer performs calculations based on user-defined rules. That means its rules and the resulting calculations are driven by the specifics of your data. What's more, you can customize Teradata Value Analyzer to fit your unique requirements without changing the application software.

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Teradata Value Analyzer

Teradata.com

Put Your Profitability Intelligence to Work

Teradata can show you how to build a better business by converting a combination of your customer data and your business methodology into profitability intelligence.

That's because we've had a long and successful track record of helping companies – in industries ranging from retail, financial services and telecommunications to travel, transportation logistics and e-commerce – apply customer management techniques. And because we offer a spectrum of services customized to your business needs. Everything from consulting services and data mining to advanced analytics, education programs, and project management support. Our consulting services personnel are support specialists who focus exclusively on data warehousing and are available to you around the clock.

We understand the unique challenges you face every day. And we bring you the power to proactively manage business relationships to drive growth. As a division of NCR, Teradata has a built-in foundation of industry knowledge, consulting

Conducting Business around Detailed Profitability

Prior to implementing Teradata Value Analyzer, RBC, formerly Royal Bank of Canada, conducted customer value analysis using sophisticated methodologies developed at the institution. They used a system of deciles to classify customers according to their calculated value. However, once the bank implemented the Teradata Value Analyzer application, its results were altered drastically. Using Teradata Value Analyzer, subsequent analyses showed that 75% of the bank's clients shifted two or more deciles. Why is this important? Because this information was extremely valuable to the bank as it made decisions about how and where to invest marketing dollars, how to develop new pricing strategies, and how to determine what were the best opportunities and greatest challenges.

expertise, global customer support services, and world-leading hardware technology – a combination of strengths unmatched in the industry, a combination of strengths ready to go to work for you.

For more information about how Teradata Value Analyzer can help you determine the true value of your customers to grow a more profitable business, contact your Teradata representative or visit Teradata.com.

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RBC Royal Bank



RBC Royal Bank uses a Teradata Warehouse and Teradata Value Analyzer to realize its CRM strategy

The Customer

RBC Royal Bank is Canada's largest bank and global financial services organization with assets of CAN\$294 billion. RBC Royal Bank serves more than 11 million personal and commercial banking customers through 1,300 retail branches, more than 4,800 ATMs, telephone and Internet banking, and point-of-sale terminals. It provides personal and commercial banking, credit card services, wealth management services, insurance, corporate and investment banking, and transaction processing on a global basis.

Business Objectives

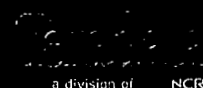
Unlike most banks, RBC Royal Bank has well understood the need to leverage the economic value of customer information for many years. Since the late 1970's, the bank has searched for and found innovative ways to use its customer data to improve its business performance and better serve clients. In fact, RBC Royal Bank was one of the first to realize the powerful capabilities of data warehousing and by the early 1990's it had implemented a first-generation Teradata® Warehouse solution.

- > **By differentiating between the current and potential value of clients, the bank uses CRM to better manage customer relationships by ensuring the right products are available at the right times in each customer's life.**
- > **Revenue per marketing dollar has shown double-digit growth each year for the past three years.**
- > **Direct marketing campaign response rates are up dramatically, as high as 40% in some cases – compared to an industry average response rate of 2 – 4%.**
- > **A targeted marketing program led to a 51% increase in deposits for Registered Retirement Savings Plans.**
- > **Sales personnel proactively pursue opportunities with clients, enabling true account management that generates greater customer loyalty through relevant product offers.**

The data warehouse effectively captured millions of daily client transactions, and performed broad client segmentation, but Royal, always on the leading edge, sought new ways to assess and manage customer relationships – at the individual client level. Royal's emerging CRM vision was confirmed by a 1997 study that challenged conventional thinking – that key differentiating factors for banks amounted to a 24/7 call center and a branch on every corner. The study revealed that customers wanted a banking relationship where they were well understood, their needs anticipated and their business was valued. In this environment, mass marketing to huge customer segments simply wouldn't work.

To RBC Royal Bank, the future became clear: the bank would find ways to be increasingly responsive and client-focused in a competitive environment where banking services were largely undifferentiated. This meant

Customer Success Stories



RBC Royal Bank

establishing an aggressive, one-to-one CRM strategy. RBC Royal Bank knew its enterprise data warehouse would serve as the core CRM information engine. Yet they also knew they would need a powerful analytical application to score and manage millions of individual clients by value – and enable one-to-one CRM dialogues across all customer touch points.

Kevin Purkiss, manager, customer analytics, summarizes its CRM focus. “True sustainable advantage will only be created by successfully integrating client information, sales processes

across all channels and technology platforms into a comprehensive solution for clients – no matter where, when or how they interact with the bank. And central to the realization of this customer-centric strategy is the ability to measure client value accurately, efficiently and on a continuing basis.”

The Teradata Decision

In its drive to further refine service and product offerings, cost management, pricing initiatives and marketing programs, the bank began work to upgrade its existing

profitability prototype so it could gain a more granular measure of client profitability. To augment its existing client-value model and support its CRM strategy, the bank knew it needed a solution that would be:

- behavioral-based and customer-centric;
- integrated with its CRM strategy;
- flexible enough to aggregate profitability according to user-defined units within the bank, such as the entire spectrum of business units, products and product groups, client segments, geographical regions and distribution channels; and,
- scalable to evolve with the bank's business direction and strategy

With a view to finding the best technology platform for measuring profitability, RBC Royal Bank set about evaluating the third-party products and vendors that seemed best able to meet all of its criteria. In the end, the bank chose the option that offered the best all-around solution: Teradata's Value Analyzer.”

By adding Teradata's Value Analyzer to its existing data warehouse platform, the bank could move from product portfolio reporting to client segment reporting. Initial design to full operation was completed in only a little more than six months, including fully defining business requirements and an extensive data verification process.

Business Insights

RBC Royal Bank's ten million retail customers are grouped into discrete segments based on such factors as current and potential profitability and channel preferences. Strategies are then developed for each segment, and

Hardware

- 10-node, 5250 Intel-based server
- 15TB of disk space
- Raid 1 with 6.9TB of usable space

Software

- Teradata Database Version 2 Release 3 running on UNIX
- Teradata Value Analyzer 2.0 with Windows/NT
- FastLoad
- MultiLoad
- FastExport

Professional Services

- Data sourcing and transformation for the profitability model
- Business consulting on profitability methodologies as well as transformation of the business rules defined into a general profit model

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RBC Royal Bank

for thousands of micro-segments within each segment. Individual treatment strategies are tested on small cells of clients to establish what works and what doesn't work.

"We recalculated customer profitability using the account level metric produced by Teradata's Value Analyzer, which showed that 75 percent of our customers moved two or more deciles," says Purkiss.

With the re-defined client value measures, the bank makes strategic investments in relationships for their future potential profitability.

"We streamlined decision-making and reporting for all marketing and sales initiatives with this accurate and concise assessment of client portfolios and their values," says Purkiss.

RBC Royal Bank knew it also needed to integrate the application of client value metrics into the day-to-day activities of the front line staff. The bank's client sales and service system (CSS) enables sales personnel to proactively pursue opportunities with clients, enabling true account management that generates greater customer loyalty through relevant product offers.

The use of current and historical client value measures lets Royal Bank assess client segmentation in a more sophisticated way, by taking into account factors such as life stage changes.

"From current value, we have progressed to potential value," says Ted Brewer, vice president, CRM and information management. "It is critically important to differentiate between the current and potential value of clients. In this way, we can manage a relationship, actualizing CRM by ensuring the right product is available at the right time in the customer's life."

We recalculated customer profitability
using the account level metric produced
by Teradata's Value Analyzer, which showed
that 75 percent of our customers moved two
or more deciles.

- Kevin Purkiss, Manager, Customer Analytics,
RBC Royal Bank

And that's showing in the bank's direct marketing campaigns, where response rates are up dramatically, as high as 40 percent in some cases – compared to an industry average response rate of two to four percent. For its Registered Retirement Savings Plans (similar to Individual Retirement Accounts), RBC Royal Bank used its CRM solution to execute a marketing program targeted to specific investment styles. The result? An 11 percent increase in RSP deposits.

For its Royal Certified Service (RCS) everyday banking package, the bank determined that 90 percent of the accounts of customers using the service were unprofitable. By drilling into the transaction data that supports Value Analyzer's account level calculation, the bank identified that a large proportion of customers' account transactions were higher cost bill payments at Automatic Banking Machines.

Recognizing that most of these customers represented valuable overall relationships, RBC Royal Bank did not want to increase the

package price. Instead, the bank introduced fuller channel access to the package, including telephone (IVR) and Internet at no added cost to the customer. The enhanced convenience and access were promoted for existing package clients. Over the next 18 to 24 months, the clients' migrated their bill payment methods to a more convenient channel for them, and a more cost-effective channel for the bank.

The re-packaged Royal Certified Service was then promoted to non-users, targeting clients with a high volume of checks and withdrawals. To lessen potential negative impact on short-term revenue, the bank also targeted clients paying less than the monthly package fee for RCS. Within 12 months, RBC Royal Bank generated CAN \$21 million in additional revenue and increased this "satisfied" client base of everyday banking package users by 50% over two years.

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RBC Royal Bank

After a complete analysis and complete review of the marketplace, we chose Teradata and have never looked back. Teradata's single-minded focus on data warehousing and providing solutions, and expertise within those solutions, really set them apart from everyone else we looked at.

– Ted Brewer, Vice President, CRM and Information Management, RBC Royal Bank

The Teradata Warehouse and Value Analyzer are proving their ability to scale as RBC Royal Bank has begun incorporating an additional 500,000 small business customers into the warehouse.

"Each year for the past three years, the amount of revenue per marketing dollar has shown double digit growth," says Brewer.

Why Teradata?

"After a complete analysis and complete review of the marketplace, we chose Teradata and have never looked back," says Brewer.

"Teradata's single-minded focus on data warehousing and providing solutions, and expertise within those solutions, really set them apart from everyone else we looked at."

RBC Royal Bank's enhanced Teradata Warehouse and the Client Current Value Measurement model (Value Analyzer) have delivered award-winning results and have proven to be business-critical tools that will continue to bring RBC Royal Bank ever closer to Zen (or peak-level) CRM – where one-to-one technology enables one-to-one customer relationship management.

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Customer Value Measurement

*Using a Data Warehouse to Determine Customer Profitability,
Customer Tenure and Lifetime Value — Mobile Market*



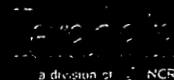
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February 2003

A Teradata White Paper



Customer Value Measurement

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Summary

Introduction

The mobile market is undergoing a major transition. In many countries, penetration rates are beginning to peak, and therefore, the operators are moving from a strategy of new customer acquisition to one of retention and increasing customer spending and profitability.

Several operators are seeing their stock prices fall due to analysts' reports that the number of new subscribers is declining. The move towards measuring an operator's performance based on average revenue per user (ARPU) is a step in the right direction. ARPU only represents revenues. It can portray a false economy if an operator needs to increase marketing and systems spend by €30 per user to see an increase in ARPU of €15.

In most mobile operators, customer value is determined by revenue. However, this does not consider the true cost of providing service to the subscriber. The major drivers of costs such as call behaviour and customer care usage are not taken into account. The obvious flaw in using revenue to determine customer value is the cost of providing service is not necessarily proportional to revenue. Using revenue to make decisions about retention and acquisition can result in poor decisions being made. This can drive up cost and reduce margins.

The market is now at a mature stage of development whereby the true measurement of a company's performance should be average margin per user (AMPU). By having the complete view of revenue and costs, operators will be in a much stronger position to develop marketing, pricing,

network roll out, and IT strategies. Strategic and tactical decisions can be made with the underlying ethos of profitability driving the business.

Using profitability as the key metric when determining the value of customers involves being able to calculate the actual margin for individual users, corporate customers, across product offerings, and by many different market segments. Only when an operator has this information will they be able to roll out new, targeted marketing and CRM campaigns. This would seem the best foundation when deciding on which targets should get subsidised GPRS and 3G handsets. Using existing information to maximise return on investment (ROI) by implementing value-based marketing plans would seem the optimal way to go. Having customer profitability measurements involves using customer value measurement as the basis for driving behaviour.

Many mobile operators already have the data in their systems. This data can be used to implement a move to measuring customer profitability and thus reporting company performance not on new subscriber additions, not on average revenue per user, but moving to a more meaningful metric of measuring customer profitability. As stated, the data, in many cases, already exists. It is a matter of knowing where to look for it, what to look for, and using data warehousing and reporting methodologies to present the information. This can have a dramatic effect on marketing, CRM, partner management, network building, roll out, and enhancement as strategic and tactical budgetary spending decisions are made with the solid foundation of profitability measurement which can optimise ROI on operational spending.

Customer Value Measurement

A key performance indicator of many companies is customer Lifetime Value (LTV). However, many mobile customers are not tied into a time sensitive fixed-term contract (e.g., pre-paid), and the length of current contract is not a practical guide to the lifetime tenure of a post-paid customer. Some advanced operators have adopted a statistical analysis technique called Survival Analysis to provide Customer Lifetime / Tenure forecasts to determine the expected lifetime of customers. This involves analysing behaviour to determine the expected lifetime of a customer. Since this is based on customer behaviour and not contracts then it is equally applicable for both pre- and post-paid customers.

The combination of customer tenure based on customer lifetime analysis and customer profitability measurement gives a view of customer LTV based on profitability and behaviour.

Sample Financial Impact of Customer Profitability Measurement

The rationale associated with creating a customer profitability measurement solution for a customer is based on developing cost and spend allocation plans that are built on the premise of maximising ROI. The following marketing and CRM example uses industry figures to highlight the financial benefits that can be gained.

Marketing, CRM — Customer Retention, Growth, and Acquisition

The pressure from the market to acquire new customers could be reduced. Churn, decreasing ARPU, and increasing cost of acquiring new subscribers (Cost Per Gross Addition — CPGA) are forcing operators to chase new, often non-profitable customers, sometimes at the expense of spending money retaining their most profitable customers. If we take an example from the U.S. long distance market, we can see the results of consistent pressure to measure performance of new subscribers. The U.S. long distance industry boasts revenues of around \$110B from approximately 230 million accounts with an ARPU of just over \$40 per month. The long distance CPGA averages between \$250 and \$400. Assuming a low-end churn rate of 25%, more than \$27B of industry revenue shifted among carriers in the last year. For a major carrier with a 38% market share, churn costs them around \$10B in lost revenue. That's the equivalent of 21 million average revenue subscribers (accounts). At a \$250 CPGA, it will cost that carrier more than \$5B to replace those accounts. That's \$15B, or more than 41% of their gross long distance revenue.

By adopting a performance and measurement metric of customer profitability, operators can see where to allocate their marketing, CRM, and customer retention spending. This can have significant implications on the financial performance of an operator. Going back to the U.S. long distance market example, if we assume a high-end

retention cost of \$100 per account, this carrier would have saved more than \$13B in lost revenue and acquisition costs avoided with the right retention efforts by knowing which customers they did not want to lose. This may never be 100% achievable, but even if only 10% of this is achievable, it represents a \$1.3B in savings. Relating this figure to stock market performance, assuming a total of 3.5 billion shares outstanding, this \$1.3B equates to 37 gross cents per share. Assuming a 40% bottom line impact (gross less taxes and other expenses) this would yield 17 cents per share or more than four cents per quarter.

One more point on the U.S. long distance market example. With a \$20 per month profit, at best it will take 12.5 months just to recoup the acquisition cost. Based on this and a variety of other factors, most industry estimates indicate two to four years to attain account profitability. Unfortunately as market pressure increases and operators scramble for new subscribers, there is a good chance that many of those new accounts will not be around after two years.

Although the above example covers the U.S. long distance market, there are many parallels that can be drawn on the European mobile market. For example, who's going to pay for the handset when migrating an existing second-generation GSM customer to third generation? Subsidising handsets for everyone may not be cost effective. Pro-actively subsidising handsets to the most profitable customers could, on the other hand, be a worthwhile investment.

Customer Value Measurement

Marketing and CRM are only two areas that can benefit. Others can include network optimization, whereas the implementation of this solution will provide significant customer value, in that it enables customer profitability to be taken into account when deciding on network build and roll out. Operators can manage and prioritize network infrastructure investments based on high-value customer locations.

Solution Concept

The proposed solution would be based on the following concept. Customer behaviour event data from a data warehouse is used to allocate major cost categories based on customer behaviour patterns. For example, one major expense category is network expense. This would be allocated based on call behaviour. This can include voice calls, messaging, data calls and IP-based browsing, content purchasing, and exposure to advertising on mobile portals on 3G services. An example of call type profitability measurement could be SMS users sending a high volume of messages between 3pm and 4pm. This could be children getting home from school. SMS is relatively inexpensive (about 10c per message), but it is also highly profitable for the operators.

In addition to this, call types must be analysed for profitability by customer.

Sample call types include:

- Mobile to mobile (on net and off net)
- Fixed to mobile
- Mobile to fixed (local, long distance, international)
- Messaging — SMS (short message service), MMS (multi-media messaging service)

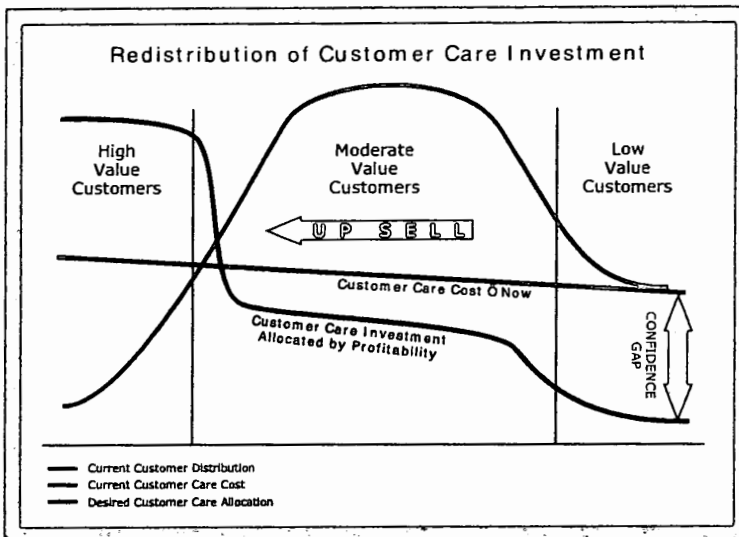


Figure 1: Customer Care Investment

- Data — mobile to fixed
- Data — mobile to mobile
- Content — browsing
- Content — with purchase (value variables will apply)
- Content — access to 'sponsored' advertising
- Roaming (all variables as above)

Variables that can affect the costing of a call include:

- Network usage — optimal capacity
- Time of day
- Roaming network
- Routing of calls
- Interconnect pricing agreements (for transit and off net terminated calls)
- QoS, Latency, and SLA for IP calls
- Call discounts based on promotions (e.g., friends and family type discounts)

Customer Types can include:

- Pre-paid: by numerous market segments
- Post-paid: contract type and package subscribed to, also by numerous market segments

The above list is not exhaustive. It intends to give only a sample. Different operators will have their own definitions, terminology, and ability to capture and analyse different costs. When implementing a customer profitability measurement solution, a key point to remember is operators will vary and there is no 'one-size-fits-all' approach.

Customer Value Measurement

Sample use of Customer Profitability Information — Maximising ROI from CRM

While operators look to offer less expensive methods of CRM than dealing with a customer service representative (CSR) for low profitability customers, in reality this is not happening on a global basis. Figure 1 indicates that CRM spend per customer is roughly the same for ALL customers.

Low profitability customers should be directed to integrated voice response (IVR), computer telephony interaction (CTI), and web-based CRM solutions. With the advent of 3G and content services, the types and levels of questions a CSR may face will increase. This may result in an operator making additional human and training investment in CSR resources. Such resources must be used in a profit-oriented, optimum fashion.

How to Get There

How an operator reaches the point where they can have the processes and solutions in place to be able to measure customer profitability will depend on where they start. There are certain basic processes that must be in place to embark on the road to using profitability as the main measurement metric on which to develop and implement operational plans. This roadmap will be different for operators depending on their circumstances.

Figure 2 illustrates a sample roadmap for an operator's implementation of a customer profitability measurement solution, whereby different revenues and costs can be captured and measured over planned time periods. As can be seen from Figure 2, the goal is to be calculating customer lifetime value, using profitability and not just revenues. However, to

measure lifetime value, there must be two basic metrics — customer value and customer lifetime. We will discuss how to measure customer lifetime in a later section of this paper.

One of the crucial points is that it is up to the operators to define profitability. Different operators will have different measurements and definitions of profitability.

Solution for Customer Profitability Analysis

Revenue data and cost data exist in your business support and financial systems. It is a question of collecting this data in a data warehouse and turning the combination of data into actionable information. However, many operators have individual data marts for each business support system (BSS) 'source system' (e.g., a separate data mart for retail billing, a separate data mart for customer care, and so on). Several leading operators are now adopting data mart consolidation (DMC) as they look to gain an enterprise view of their customers. DMC has also been proven to reduce total operational and data management cost.

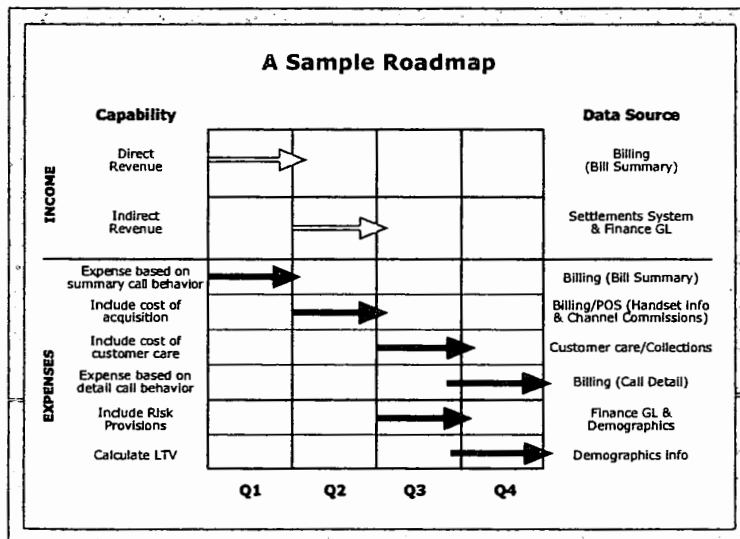


Figure 2: A Sample Roadmap

Customer Value Measurement

The enterprise data warehouse collects data from numerous different systems to build up a picture of all relevant customer revenues and costs. The data is transformed into information by the data warehouse and can be accessed by the relevant departments and management and transformed into strategic and tactical actions.

Figure 3 represents the proposed solution architecture.

Determining Customer Profitability

Revenues

Retail Bill

The immediate assumption is to look at the retail billing system. The higher the retail bill, the more revenue a customer is generating. However, there are other elements to consider.

Interconnect for Incoming Mobile Calls

How much interconnect revenue is a customer responsible for? If a mobile user only rarely makes calls, we must not overlook the fact that calls to the user's mobile phone may be generating interconnect revenue for calls made from fixed line phones. For example, a user offering an "out of office" business service (e.g., plumbers or electricians). By the nature of their professions these people are 'on the road' all the time. Their mobile phone is their office phone, and for all fixed to mobile calls, the mobile operator will receive a percentage of the retail call value in interconnect settlement.

Other Third-Party Settlements

Other third-party settlements could include content purchases, which are made with an electronic purse or a credit

card. Under a content value chain agreement, the mobile operator may be entitled to a percentage of the value of the content transaction in return for hosting the content on their mobile portal. These transactions could involve low-value content (e.g., browsing local weather) or high-value transactions (e.g., buying a last minute plane ticket en route to the airport). For high-value transactions it may not be prudent to put them on the retail bill at the month end, so the transaction data will not appear on the bill. Likewise an operator could host advertising on their mobile portals. An advertiser may pay the operator a fixed fee per month and/or a percentage of all subsequent purchases and visits to the advertiser's home site via the operator's mobile portal. Again, this information will not appear on the retail bill, but needs to be taken into account when determining the revenue element of the profitability equation for each customer.

Expense Categories

Overview

This section provides an overview of the expense categories that will be used. It also provides a recommended approach for allocating expenses on a per-event basis.

At a high level it can be seen that calls made during the peak busy hour would be assigned a heavy share of network costs, whereas calls that are made during off-peak periods would be assigned a lighter share of costs. As shown in Figure 4, the other cost categories that are allocated by behaviour include, Call Centre operations, billing, collections, and customer acquisition costs, which would include channel commissions and subsidised equipment.

Cost data is aggregated to the customer level and stored in the data warehouse. Profitability data can then be used to segment customers. This would allow

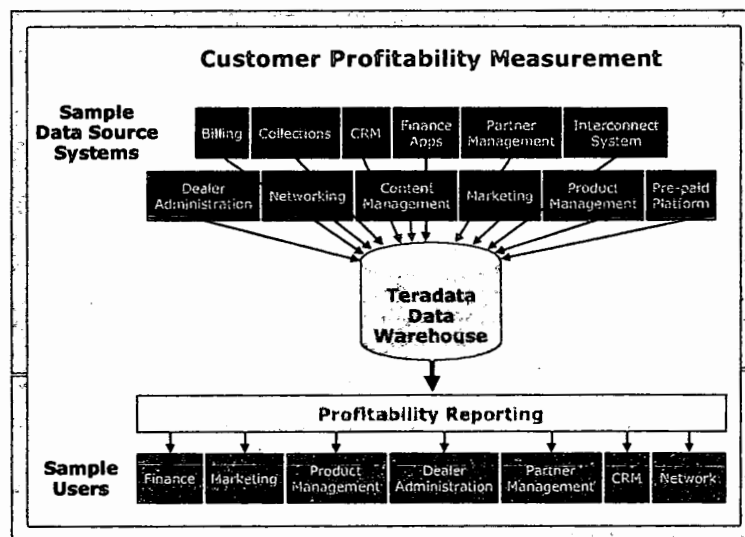


Figure 3: Solution Architecture Overview

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Customer Value Measurement

marketing to focus retention campaigns on highly profitable customers. Acquisition campaigns would be focused on the profile of customers who are most profitable. The net result would be a shift to a mix of customers that yield greater margins at the same level of cost.

Expenses can be analysed further, and will include the following categories:

Overhead Expense

Overhead expenses will consist of all expenses not specifically broken out in the remainder of this section. In general, overhead is considered to be fixed expenses that will not increase as a function of the number of subscribers, the number of calls handled, etc. There may be, in fact, some expenses that do increase as a function of the number of subscribers and the number of calls that are lumped into this category. This is done to make the expense allocation model simpler. For the purpose of this paper we are considering the effect of this allocation rule to be minor in the overall scheme of things. Overhead expenses will be allocated evenly to all active subscribers.

Network Expense

Overview

Network cost represents one of the most significant categories of expense for a mobile operator. The network is engineered to handle peak call volumes. If peak call volumes are increased the network must be expanded in order to prevent call blocking during the peak period. For purposes of allocating network costs, we have divided the cost into three different categories: Mobile Network and Interconnect Transport expense.

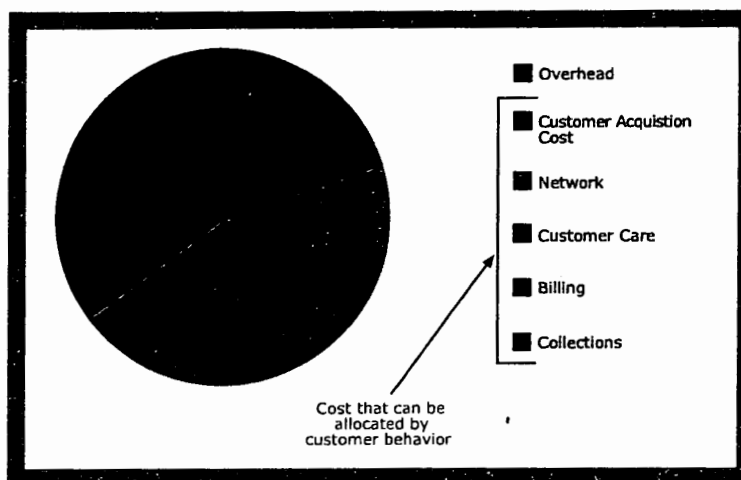


Figure 4: Costs that can be Allocated Based on Customer Behavior

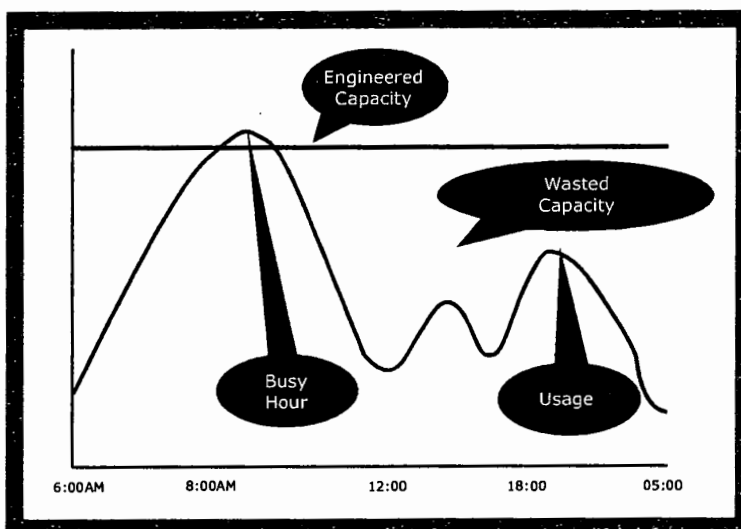


Figure 5: Mobile Network Utilisation

As can be seen from Figure 5, a mobile operator may have a large amount of dormant capacity dependent of usage by time of day.

Once customer behaviour is understood, you would like to acquire more customers with a similar behaviour through targeted marketing campaigns and price-plans

Customer Value Measurement

designed to attract the right kind of customers and to stimulate the right kind of calling behaviour. Figure 6 illustrates how this can be done.

Mobile Network Expense

This expense category includes the vast majority of network costs. This includes switches, cell sites, and leased lines that connect cell sites to the switch. This also includes central office expense, right-of-ways and land associated with the network, and any other miscellaneous network expenses. When doing new network build out and planning additional capacity, operators can prioritise roll out based on the geographic usage patterns of their most profitable customers. For example, if an operator finds that the majority of their high profit traffic is generated from a specific geographic location (down to cell site ID) then, build out should be concentrated in those areas. This will optimise usage based on return over network enhancement expense.

Interconnect Transport Expense

This expense category includes the cost of transit and terminating portions of a call that traverse or terminate on a third party's network. Optimised routing of calls can be based on customer profitability, routing cost, and interconnect partner agreement. For example, transit calls are cheaper from Ireland to Germany if the call is routed via Operator A as opposed to operator B. With the introduction of voice and data over IP, operators must ensure that customer profitability is not penalised by interconnect charges being greater than the retail bills for certain types of calls. This could happen if the mobile operator has introduced service level agreements (SLAs) with some customer groups. As a result of these SLAs, pricing can be carried out based on, among other variables, quality of service (QoS) of the call. If these SLAs are not enforced on interconnect partners at a wholesale level, the operators may have to discount a call because of a poor QoS. However, they may still face the full wholesale bill from

their interconnect partner. This would show the retail customer as non-profitable, which is not the case and could lead to poor decisions being made.

In the case of roaming calls, operators must account for different roaming agreements and the interconnect portions of roaming calls when determining the profitability of the calls made.

Billing Expense

Overview

Billing costs represent the second biggest cost category behind network costs. Billing costs have been divided into two basic categories: call record processing and invoice processing. The rationale behind this breakdown is to reflect the high cost of capturing, guiding, rating, and posting calls to a customer invoice. The CDR process in billing occurs for each call made, whereas invoice processing need be done only once per month.

Billing Call Record Process Expense

This expense category includes the cost of CDR recording, processing, and storage for both pre- and post-billing. Processing includes guiding, rating, and invoice posting. The rationale behind this cost category is to reflect the billing expense associated with invoicing calls. Thus a subscriber that makes a lot of short calls will carry a higher cost than a subscriber that uses the same number of minutes with fewer calls.

Billing Invoice Processing Expense

This expense category includes the processing needed to create a billing invoice. This includes bill calculation, invoice formatting, printing, mailing/handling, and payment processing. The rationale behind this

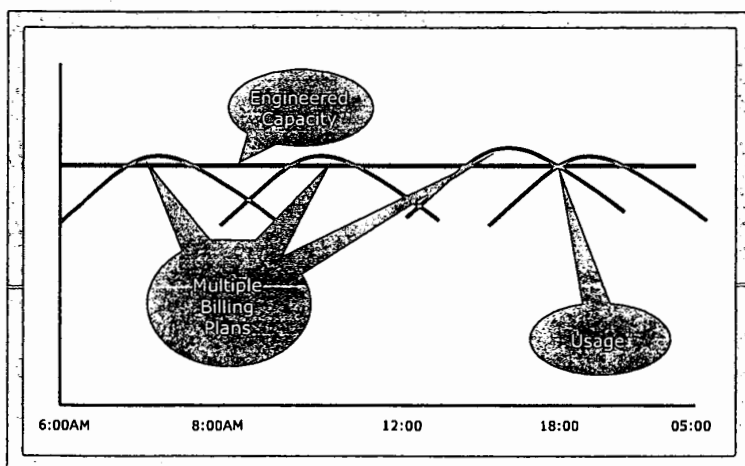


Figure 6: Using Price Plans to Stimulate Desired Mobile Network Utilisation

Customer Value Measurement

cost category is to reflect the expense of producing a billing invoice each month. A subscriber that has a very inexpensive plan and produces little revenue will have a high billing cost as a percent of revenue since this cost is fixed each month for each subscriber.

Customer Care Expense

This expense category includes all costs associated with handling an in-bound customer contact. This includes the cost of labour, facilities, and communications. The rationale behind this cost category is to reflect the expense of supporting subscribers that make an excessive number of calls to customer care to get credits, report problems, or to get general support.

Collections and Past Due Expense

This expense category includes all costs associated with collection of past due accounts. The rationale behind this cost category is to reflect the expense of carrying accounts receivables for those who pay late.

Sales & Marketing Expense

This is the expense to acquire and retain customers. The customer acquisition expense normally comes in the form of a commission that is paid to a sales channel. This customer profile should contain information about the channel that acquired the customer and the amount of the commission paid, as well as subsidies paid on handset upgrades.

Customer Lifetime and Lifetime Value

Survival Analysis — Providing the Tenure Element in Calculating Lifetime Value

Survival Analysis utilises statistical modelling based on customer behaviour that will help operators understand how

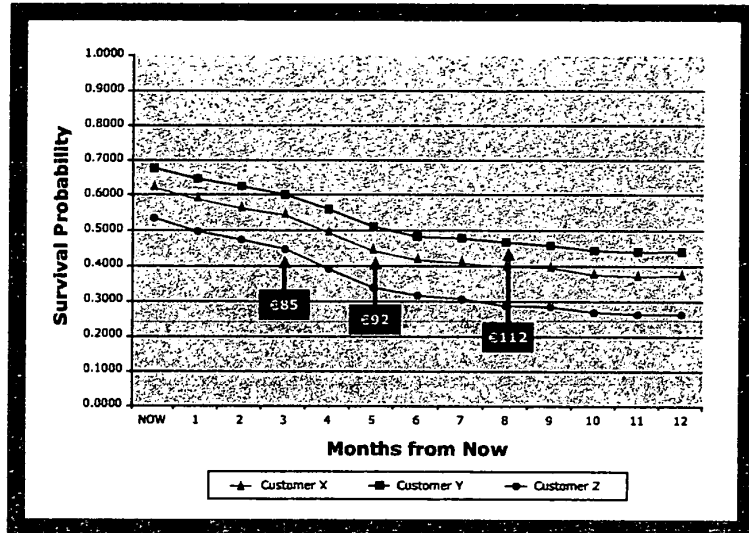


Figure 7: Survival Scores of Three Different Mobile Customers

long they can expect to keep a customer. As well as the factors that can affect longevity, survival analysis provides valuable insights into how operators can:

- Keep customers longer;
- Provide a better resource planning;
- Have a more profitable relationship with customers.

Survival analysis is designed to complement traditional churn modelling, and there are several ways survival models predicting length of time as a customer can be used by businesses. We will discuss these next.

Customer Planning and Management Applications.

A customer planning and management application has three parts to it:

1. Identifying timing of survival risk;
2. Profiling customers;
3. Performing “what if” analysis to help drive appropriate marketing actions.

Survival analysis enables the business to identify timing of “risky behaviour patterns” that lead to reduced survival probability in the future. The timing can be used as a way of staging marketing actions, as well as their expenditure. If a valuable customer is expected to churn next month, then aggressive action is warranted. If the company has six months, they can try less expensive alternatives first.

Figure 7 shows an example of three mobile prepay customers, with their monthly value to the company, as well as when they are likely to churn.

A mobile operator would typically spend as much as several hundred Euros to keep customers as valuable as these from churning. That is, however, if churn were imminent. In this case, the company has as much as eight months before one of these customers is at high risk. This allows the potential to try less expensive retention programs.

Customer Value Measurement

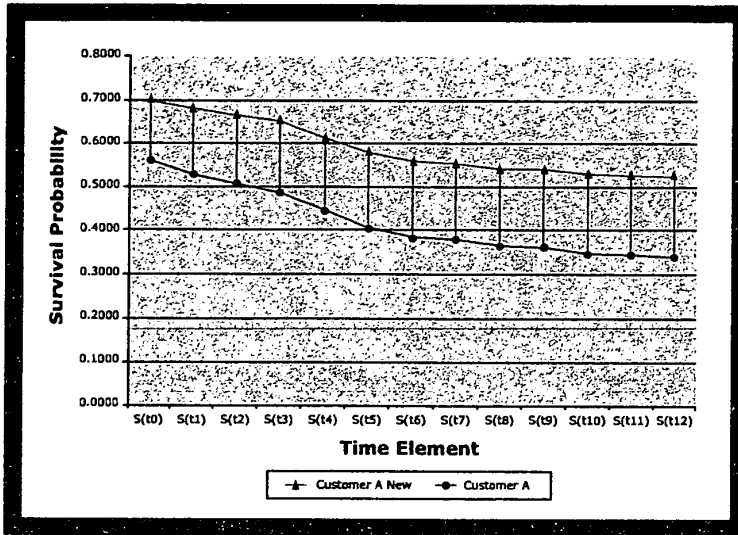


Figure 8: Survival Probability Change Based on Change in Customer Behaviour

Customers with different survival prospects can also be grouped together and profiled to see differences. Customers can be grouped based on their time as customer, similar demographics, or any other attributes of interest. These profiles can then show differences in calling patterns, topups, and network service problems.

Survival analysis applications can also be used to perform what if analysis to determine what the impact on survival probability over time would be from modifying a customer's, or group of customers, behaviour over time. This can be used to drive appropriate marketing actions, including call centre activities.

In Figure 8, we show the predicted impact on a customer's survival probability over the next year if the customer changes his behaviour from making low-value prepayments to making medium-value prepayments. This would increase his survival probability such that he would probably be retained as a customer. Exploring the impact of different factors on customers, or groups of customers, allows the marketer to plan marketing communications and offers so as to best maximise long-term customer retention.

Customer Survival Change Application

This application looks for changes in customers' survival scores, then uses important changes in scores to help drive appropriate marketing actions. The application works as follows.

1. Score customers monthly on the Survival model. Save score history.
2. Track scores over time.
3. If a customer's score decreases more than some, set threshold and the customer's value is greater than a set amount, then schedule a marketing action.
4. Marketing action is a call from the call centre where the application provides information about the factor(s) that caused the drop in score, as well as the urgency of timing in terms of survival probability.

Lifetime Value and Business Planning Framework

Another application of survival modelling is within the customer value management and business planning framework where survival modelling is combined with customer value to provide the basis for calculating customer lifetime value. This application enables a company to project expected profits, revenue, (or losses), or any other business metric, based on predicted survival rates of customer segments over time.

Customer value estimates are multiplied by predicted survival rates for the segments to derive forecasts that can be used for business planning purposes. This can also

Customer Value Measurement

be extended to a customer lifetime value application, where value scores are derived from a statistical model. Monthly deseasonalised scores are multiplied by predicted survival rates for the segments to derive forecasts for lifetime value adjusted for survival probabilities.

Input to the application is a segment definition and the scores and projected survival probabilities of the customers within the segment. As in the customer planning and management application, segments can be groups of customers who are similar in terms of their time as customer, similar demographics, or any other attributes of interest.

For mobile operators, survival modelling is especially interesting for pre-pay customers, as well analysing the tenure for customers beyond a one-year contract term. Models can be built using detailed data representing such things as calling patterns, top-up behaviour (for pre-pay), abnormal call termination patterns, and customer service information. Customers can be scored based on the model. These scores can then be used to identify and analyse longevity problems with profitable customers. Over time, score histories can be saved to quickly spot those customers who have had a sudden shift in their predicted *lifespan*. Sensitivity analysis can be done using key factors known to influence customer survival. This helps the company make better use of resources and plan its marketing and customer service activities.

Summary

Developing a customer profitability measurement model can provide dividends to mobile operators. The mobile industry is still less than twenty years old, and as such is moving from a growth to a maturity stage. Like many other industries, different performance measurement metrics are used depending on the stage of evolution. The days when mobile operators are judged on the number of new subscribers are over. It is essential that this metric is not used as the driving force to determine the success of 3G, otherwise operators could find themselves being pressured to subsidise users, including the non-profitable users in order to provide market analysts with 'easy' figures. The market and the industry have evolved.

Developing average margin per user (AMPU) figures based on customer profitability measurement is the optimal way forward. It provides more accurate measures, and it can be used to show the market is now at a mature stage of development where the true measurement of a company's performance should be based on customer value. By having the complete view of revenue and costs, operators will be in a much stronger position to develop marketing, pricing, network roll out, and IT strategies. Strategic and tactical decisions can be made with the underlying ethos of profitability driving the business. However, many profitability measurements only provide the current picture of profitability.

In order to get an understanding of the expected lifetime value of a customer an operator must be able to forecast the expected tenure of a customer. Survival analysis provides a statistical modelling technique based on constant analysis of customer behaviour to provide the time element in calculating customer lifetime value. The current and historical profitability measures can be used to provide the 'value' element in this forecast.

Using profitability as the key metric when determining the value of customers involves being able to calculate the actual margin for individual users, corporate customers, across product offerings, and by many different market segments. Only when operators have this information will they be able to roll out new, targeted marketing and outbound CRM campaigns. This would seem the best foundation when deciding on which targets should get subsidised GPRS and 3G handsets. Using existing information to maximise ROI by implementing value-based marketing plans would seem the optimal way to go. Understanding customer profitability is more than about corporate reporting — it involves using customer value measurement as the basis for driving behaviour and profitability figures by individual customers, groups, segments, product lines, and so on. This is the key to unlocking customer value and ensuring that all strategic and tactical decisions are based on a strong financial foundation.

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Patricia Seybold Group

E-Business Consultants & Thought Leaders

Teradata Value Analyzer

A Tool for Determining Customer Value and
CRM Performance

By Lynne Harvey

This report is a reprint from the June 7, 2001 Patricia Seybold Group's *Customers.com*® *Customer Planning Seminar*
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EXHIBIT L

Teradata Valu Analyzer

A Tool for Determining Customer Value and CRM Performance

By Lynne Harvey

June 7, 2001

NETTING IT OUT

NCR's Teradata Value Analyzer helps companies in the financial services and insurance industries understand the value of their customer relationships and their CRM efforts.

Value Analyzer calculates profitability along several dimensions including overall transaction value, the cost to serve, and profitability by specific product lines. Teradata Value Analyzer displays the results and lets you see how the results were calculated as well as access the data used in the analysis. This level of flexibility results mainly from Value Analyzer's integration with NCR's Teradata data warehouse and CRM solutions.

When used with Teradata CRM, Value Analyzer helps marketers create personalized offers based on customer value and determines specific actions such as when to waive fees or waive a prequalification or preapproval process when interacting with customers.

As NCR's Teradata division attempts to broaden its range of customer intelligence functionality in its Teradata CRM suite, it will incorporate Value Analyzer into the fold and will extend Value Analyzer's analytic functionality to other vertical industries.

THE CHALLENGE OF UNDERSTANDING CUSTOMER VALUE

Understanding customer value is an essential part of succeeding in business today, especially in the

financial services sector. It is ironic that companies which exist to serve the financial needs of their customers often have a difficult time assessing customer value. Nevertheless, these companies frequently have a tough time assessing how customers are profitable to their enterprise, determining the life-time value of their customers, and assessing how much they own of the customer's share of wallet.

Profitability, especially, is a tricky thing to estimate. In banks, lending institutions, and financial service corporations, there can be as many assessments about the profitability of a customer as there are departments within the organization. In addition, these assessments can have a ripple-like effect in helping companies better understand what's driving corporate profitability. For example, if finance executives have the ability to determine the value of their customers, they also have the ability to understand the cost-based accounting measurements that drive profitability and can communicate this information better to the corporation's shareholders. Executives can also improve upon the costs to develop, market, and sell products and improve the optimal price point of their products.

In the financial services industry, understanding customer value and CRM performance can have a tremendous effect on the strategies companies use in managing the customer assets, especially in the areas of portfolio management tactics and CRM strategies. For years, banks and financial service companies have believed that CRM and account aggregation tactics are the basics for building customer loyalty and corporate profitability but are difficult to put into practice and assess. In theory, customer value and account aggregation have a synergistic relationship throughout an enterprise. After all, if you know more about how valuable a customer is, you can offer better services and products, build the relation-

ship, and increase value and profitability in each department. But many financial service firms have created Chinese walls around their product lines making it difficult, if not impossible, to assess customer value. In some cases, SEC regulations prohibit companies from sharing customer-related data between different types of funds (such as 401K funds and the retail brokerage accounts). However, companies can compute customer value through specific life-event related scenarios, such as retirement re-allocations after the age 70 and funds transfer pricing for mortgages and automobile and small business loans.

Technology plays a critical role in helping companies gather the right information that can be measured using the right kinds of tools to process and analyze the customer data. The technology, moreover, is not your father's Chrysler. New kinds of technology solutions are needed to gather, store, and, especially, analyze customer information. These technologies, which often fall under the category of customer value analysis solutions, provide companies with the ability to calibrate complex value-based measurements such as lifetime value, behavior-based customer profitability, and share of wallet as well as determining how customer value relates to corporate profitability.

TERADATA VALUE ANALYZER

Value Analyzer, a solution from Teradata, a division of NCR, is a solution that helps companies in the financial services and insurance industries assess customer value and CRM performance. It helps companies like the Royal Bank of Canada measure how profitable each customer is to their enterprises. Value Analyzer leverages the data gathered and stored in an NCR Teradata data warehouse to provide insight into customer value. Teradata CRM can then leverage the analysis provided by Value Analyzer to provide targeted campaigns and personalized customer interactions.

Value Analyzer offers a broad range of customer value analytics and predictive modeling environment for companies to assess customer value and CRM performance.

Key Features and Functionality

Teradata Value Analyzer offers a broad range of customer value analytics and a predictive modeling environment for assessing customer value and CRM performance. Teradata Value Analyzer can determine customer value and CRM performance along several dimensions:

- By the transactional value of an individual customer account in relation to the enterprise
- By the cost to serve and interact with customers at each touchpoint
- By specific product lines
- By the relationships of the customer with a company's functional departments.

So, for example, if Mary Sue Jones is a customer of Our-Bank, Value Analyzer can help the bank understand: how profitable Mary Sue is for the company, how profitable is Mary Sue in relation to the different touchpoints that she interacts with (which can also show the relationship between the value Mary Sue generates and the average costs of interaction at each touchpoint), how profitable Mary Sue is based on the kinds of investment and banking products that she's purchased and based on her interaction history, and even how profitable Mary Sue is to a particular department like customer service. Value Analyzer's analytics and predictive modeling environment can leverage the Teradata data warehouse and feed Teradata CRM components. Leveraging the Teradata data warehouse platform provides complete scalability, enabling Value Analyzer to process hundreds of millions of transactions for millions of accounts with hundreds of products.

Using Value Analyzer

When used with Teradata CRM, Value Analyzer helps marketers create personalized offers based on customer value and determines specific actions, such as when to waive fees and eliminate (or shorten) the

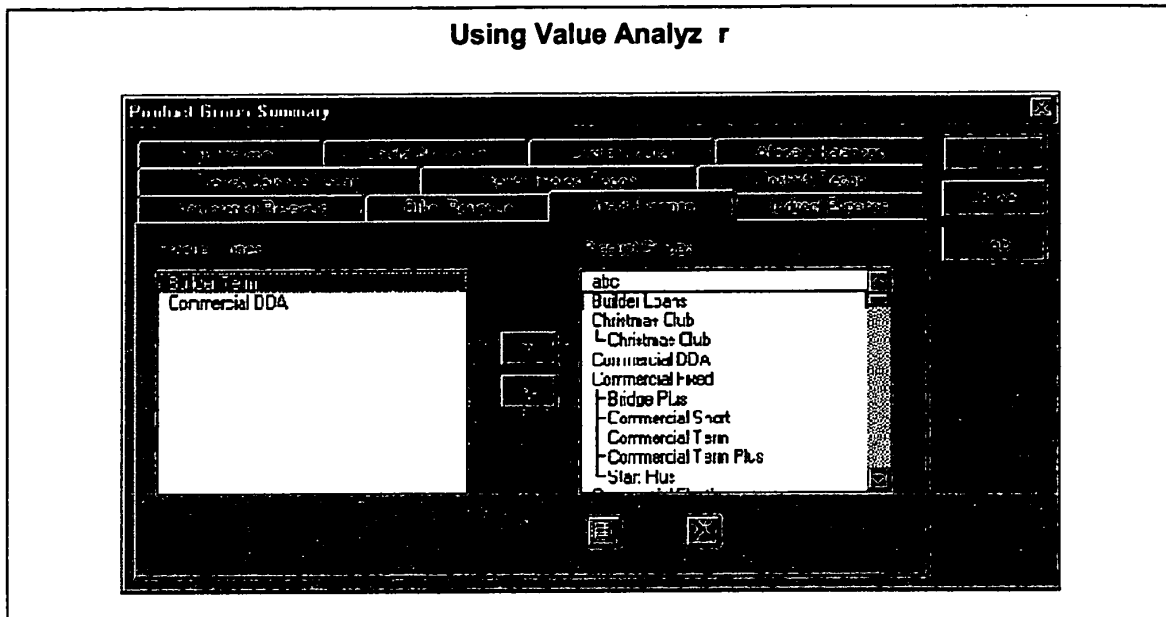


Illustration. Value Analyzer lets you define business rules to customer account profitability measurements including net interest revenue, direct and indirect expenses, risk provision, and capital allocation.

approval process when interacting with established customers. Marketers and financial service representatives typically use Value Analyzer to build profit and product-based customer segmentation models in which Value Analyzer identifies the customer segments with the highest transactional values and related products with the most profitability. Then, to gain the full view of customer value, companies can evaluate customer segments against customer behavior information and touchpoint usage. When the analysis is applied against Teradata CRM's business rules framework, users can determine the appropriate actions and offers to make to the customer.

Teradata Value Analyzer can also help portfolio managers build funds transfer pricing models and financial services companies calculate the costs to serve their customers with different mortgage and loan rates. For example, Value Analyzer can help a bank determine the cost of a 30-year mortgage and determine to the cost of providing the mortgage versus other kinds of loans. It can also factor in risk, especially in determining the net effect of a customer's ability to pay off a loan. A financial services

company can even use Value Analyzer to determine the optimum interest rate for a specific loan amount.

In terms of analyzing customer value and profitability, Value Analyzer has a broader range of functionality than many of the homegrown solutions that have been used over the years. For example, Value Analyzer's dynamic modeling environment (shown in the illustration) can support the complex business rules framework that companies use to grow the value of their customer relationships.

Custom solutions, in contrast, tend to be more departmentally focused on specific issues rather than on providing analytics that could be applied across the entire enterprise. Because of this broader focus, Value Analyzer makes its analysis accessible to everyone in the organization. Moreover, custom solutions typically feed their results to individuals through a portal or dashboard, masking the analysis behind the results. Thus, there's often no way to determine how a particular result was calculated.

Integration and Architecture

Teradata Value Analyzer, on the other hand, displays its results, lets you see how the results were

calculated, and provides access to the data used in the analysis. This level of flexibility results mainly from Value Analyzer's integration with NCR's Teradata data warehouse and CRM solutions. Value Analyzer not only draw on the relevant data sources for analysis across the enterprise, but it can also offer the appropriate environment for multidimensional predictive modeling. Additionally, it can easily be used in tandem with some of Teradata's other customer intelligence analysis tools, such as Behavior Explorer for the financial services industry and Teradata Churn Management for the communications industry.

Value Analyzer's flexibility, moreover, goes hand in hand with scalability, which, as mentioned earlier, is one of the main benefits of being architected on the Teradata data warehouse platform. Teradata is also equipped to concurrently support and prioritize mixed workloads of strategic, tactical, and event-driven decision-making, thereby enabling end users to access the same data for their strategic predictive analysis as well as their more time-sensitive operational analysis.

Pricing

Pricing for Teradata Value Analyzer is tiered based on the number of accounts that are processed, starting at \$200,000 and increasing in price based on increments of two to four million accounts.

Competition and the Road Ahead

Since its release in December 1999, Value Analyzer has been implemented in 15 financial services institutions worldwide. As NCR's Teradata division attempts to broaden its range of customer intelligence functionality in its Teradata CRM suite, it will incorporate Value Analyzer into the fold and will extend Value Analyzer's analytic functionality to other vertical industries.

In the meantime, Teradata will face competition from several areas, including the following:

- CRM vendors that provide their solutions as add-on components to their CRM platforms, such as Oracle's Financial Services application and PeopleSoft's Customer Profitability Management application
- ECRM vendors, such as E.piphany, Xchange, Unica, and Kana Communications (formerly Broadbase Software), which provide some customer valuation functionality in their predefined reporting templates
- Custom solutions developed with analytic platforms such as SPSS and SAS
- Specialized banking tools that leverage other data storage platforms, such as HNC Software's ProfitVision, Fiserv IPS-Sendero's Customer Profitability System, ABC Technologies Oros Solution, Metavante's Relationship Profitability, and PMG Systems' TruCUSTOMER applications

With the practice of customer valuation still in its early stages of development, we expect consolidation to take place among these vendors within the next two years. As part of the Teradata CRM solution, NCR is well positioned to become a dominant player, going head-to-head with the CRM and eCRM players rather than the specialized banking tool providers, as they broaden Value Analyzer's applicability to other industries.

The Bottom Line

For companies in the financial services or insurance industries, NCR's Teradata Value Analyzer is an important solution to add to their CRM and customer intelligence framework to help them understand the value of their customer relationships.

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As competition intensifies in the retail financial services marketplace, accurate measures of customer value down to the account level are becoming increasingly pivotal to success at the retail end of the market. This applies both to established players and new entrants.

CUSTOMER VALUE: GAINING THE COMPETITIVE EDGE

> Simon Doherty
> NCR

The fact is that the pressures that have made profitability measures a prerequisite in the corporate marketplace are now increasingly present in the retail sector. Individual consumers are becoming ever more demanding, both on price and service. At the same time, institutions are looking to gain a competitive edge by establishing one-to-one relationships with customers and a higher degree of personalisation in their services. Significantly, the one factor which had previously hampered the application of profitability measures to individual accounts — the sheer volumes of data involved — has been addressed by advances in technology.

New technology, new insight

While the concept of establishing customer profitability is being imported from the corporate market, the systems to handle the measurement are not. Traditionally, banks used to measure customer value by building bespoke systems, generally developed in-house on the mainframe. This would be a massive application, pulling in data from a whole range of operational systems. As customers, circumstances and requirements changed, these applications became increasingly complex, due to the original design being overlaid with a rolling series of piecemeal changes.

The underlying problem with these mainframe-based approaches to measuring retail customer profitability was that it is a dynamic, fast-changing and fluid area where flexibility is key. This is especially true given that measurement must be conducted right down to the account level if the real benefits are to be realised. Experience has shown that the 'half-way house' approach of analysing profitability on the basis of sample accounts or high-level averages, or only down to the level of branches or products, is too limited

and rigid to deliver the degree of flexibility, responsiveness and functionality now required.

In contrast, by establishing the value of each account to its business, the institution gets all the benefits of detailed data, plus the ability to aggregate this data in an infinite variety of ways. The value of this capability is reflected by the wide range of functions across the institution which queue up to make use of aggregated account data as soon as it becomes available. In fact, our experience with financial services institutions worldwide — who have adopted NCR's Value Analyzer solution to drill down to account-level profitability information — shows that virtually every department benefits directly.

Direct benefits across the organisation

The most immediate advantages arise in marketing and customer management. For any marketing initiative, it is crucial to understand what products are important and attractive to which customers, and which customer groups are likely to use a product in a way that is profitable to the provider. With products such as banking current accounts, where profitability is determined by customer behaviour, account-level information may be decisive in determining both the target market and the pricing.

Customer retention and incentivisation can be similarly transformed by the detailed data on customer profitability. Using the information to focus on profitable customers, in a way which matches their behaviour, can result in substantial savings on the retention budget — while also delivering better bottom-line results for the institution in the long-term. Incentives to encourage customers to stay, or to move to new products, can also be applied more effectively and efficiently.

Everywhere you look, the benefits are equally

dramatic. For example, the profitability of various channels can be notoriously difficult to ascertain accurately. But the profitability of individuals using a particular ATM could be established very easily, aiding any decision on whether that equipment was worth retaining or even upgrading. Similarly, the data might indicate that a particular product is being used by a large number of customers in a very unprofitable way. This situation might be addressed — and the profitability of the product improved — either by redesigning the product, or by incentivising customers to use it more appropriately.

Looking forward, the benefits are likely to increase still further. Relationship pricing — one of the original drivers behind customer profitability measures in the corporate banking sector — is beginning to emerge as a key aspiration for retail financial services providers. Now retail customer value data opens the way for it to become a reality. As banks move to a customer-focused basis for their organisational structure, dynamically generated customer profitability figures can form the ideal basis for defining the scope of each business unit. And in sales and service, a customer value system can provide an objective and ongoing basis for allocating staff rewards and defining 'banded' customer service levels.

Moving to customer value systems

Given the potential effects across the business, it is hardly surprising that the move towards account-level customer profitability measurement is accelerating rapidly — and institutions that hang back are clearly risking being left behind. NCR's experience among its own global financial services clients demonstrates the speed with which the benefits can flow through, and their applicability to institutions at each stage of development.

For example, NCR recently advised a major new UK-based entrant to the banking sector, which was taking on massive numbers of new accounts at a very rapid rate. These circumstances made it crucial for the bank to establish the profitability of these accounts at the earliest possible stage, in order to meet its business plan and justify its business model. Customer value analysis provided the answer. At the same time, moving straight to customer value analysis enabled this new player to leap-frog an entire stage of development and experience, giving it the tools needed to make informed decisions

without first having to build up years of retail banking knowledge.

At the other end of the scale, the well-established Royal Bank of Canada recently conducted an exercise that demonstrated the improved accuracy available from measuring profit at the account level and using this as input into customer segmentation. The bank took a sample set of clients and measured their value using an in-house product profitability model comparable to NCR's account-based profitability model (aggregated to the customer level). The result was that 75 per cent of clients moved two or more deciles — with the result that the bank redirected its marketing efforts towards the redefined segments that reflected the behavioural-based calculations of NCR's Value Analyzer.

Another NCR customer, a UK high-street bank, developed its own tactical customer value application and wanted to move to a sustainable strategic platform. The potential problems of maintainability over time with such a system meant it decided to combine its existing learnings with the flexibility and adaptability of NCR's Value Analyzer. The result was a system able to handle the dynamic nature of retail customer value analysis (and this in turn will enable the bank to take on new types of products, and also to respond to new product portfolios arising through acquisition or organic growth).

Conclusion: the organisational challenge

From such examples, it is clear that financial institutions are now seizing the opportunities presented by customer value systems. Interestingly, the fact that the application and demonstrable benefits of the data are so widespread across the business means the initial challenges in making the move may appear to be organisational rather than technological. Getting all the different areas of a bank to agree on precisely how the data should be collected and used can be difficult.

However, such disagreements are actually illusory. By capturing the smallest possible item of data, and combining it with the capability to aggregate and analyse it in an infinite variety of different ways, a customer value system brings the flexibility to give everyone in the organisation precisely what they want. Which means the organisation as a whole gets the real commercial benefits that it — and its shareholders — require. >

Biography

Simon Doherty, a career banker and a qualified accountant, joined NCR's Financial Solutions Group in 1997 to work in their data warehousing area, focusing on financial services organisations. Simon is currently responsible for NCR's customer value practice in the UK and the Nordic Region. In this role he has been closely involved in the development of the corporation's global customer value solution 'Value Analyzer™' and its promotion and implementation in a number of major retail banks. Prior to this, Simon worked in the financial and management information area of NatWest between 1986 and 1997. He was involved in management information projects in various parts of the NatWest Group including the UK retail, corporate and international divisions, Lombard North Central, Ulster Bank and Courts.

For further information, you can email: michelle.houreaud@ncr.com or visit NCR's website: www.ncr.com

I hereby certify that this correspondence is being deposited with the United States Postal Service as first class mail in an envelope addressed to Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450 on May 26, 2004.

Scott W. Kelley, Reg. No. 30,762

May 26, 2004
Date

PATENT



IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of)

Group Art Unit: 3627

Richard Tad Lepman)

Examiner: Rudy

Serial No. 09/545,628)

Filed: April 7, 2000)

Docket No. BERK-37617

For: PROCESS FOR DETERMINING)
OBJECT LEVEL PROFITABILITY)

RECEIVED
JUN 7 2004
GROUP 3600

REQUEST FOR EXTENSION OF TIME

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

Applicant respectfully petitions for a One-month extension of time to file a Response to the Office Action dated January 26, 2004. A check for \$55.00, as prescribed in 37 C.F.R. §1.136(a) is submitted herewith.

06/03/2004 MGE BREM1 00000005 09545628

03 FC:2251

55.00 OP

Respectfully submitted,

KELLY LOWRY & KELLEY, LLP

Scott W. Kelley
Registration No. 30,762
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BERK-37618
SN: 09/545,628
REQ EXT OF TIME

PATENT APPLICATION FEE DETERMINATION RECORD Effective December 29, 1999

Application or Docket Number

09/545,628

CLAIMS AS FILED - PART I

FOR	(Column 1) NUMBER FILED	(Column 2) NUMBER EXTRA
BASIC FEE		
TOTAL CLAIMS	43 minus 20=	23
INDEPENDENT CLAIMS	3 minus 3=	
MULTIPLE DEPENDENT CLAIM PRESENT		

* If the difference in column 1 is less than zero, enter "0" in column 2

CLAIMS AS AMENDED - PART II

	(Column 1) CLAIMS REMAINING AFTER AMENDMENT	(Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR	(Column 3) PRESENT EXTRA
AMENDMENT A			
Total	43	43	=
Independent	3	3	=
FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM			

	(Column 1) CLAIMS REMAINING AFTER AMENDMENT	(Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR	(Column 3) PRESENT EXTRA
AMENDMENT B			
Total	43	43	=
Independent	3	3	=
FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM			

	(Column 1) CLAIMS REMAINING AFTER AMENDMENT	(Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR	(Column 3) PRESENT EXTRA
AMENDMENT C			
Total	53	43	= 10
Independent	7	3	= 4
FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM			

* If the entry in column 1 is less than the entry in column 2, write "0" in column 3.
 ** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, enter "20."
 *** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 3, enter "3."
 The "Highest Number Previously Paid For" (Total or Independent) is the highest number found in the appropriate box in column 1.

SMALL ENTITY
TYPE: ☒ OR

OTHER THAN
SMALL ENTITY

RATE	FEE
	345.00
X\$ 9=	201.00
X39=	
+130=	
TOTAL	582.00

RATE	FEE
	690.00
X\$18=	
X78=	
+260=	
TOTAL	

SMALL ENTITY OR

OTHER THAN
SMALL ENTITY

RATE	ADDI- TIONAL FEE
X\$ 9=	
X39=	
+130=	
TOTAL	
ADDIT. FEE	

RATE	ADDI- TIONAL FEE
X\$18=	
X78=	
+260=	
TOTAL	
ADDIT. FEE	

RATE	ADDI- TIONAL FEE
X\$ 9=	
X39=	
+130=	
TOTAL	
ADDIT. FEE	

RATE	ADDI- TIONAL FEE
X\$18=	
X78=	
+260=	
TOTAL	
ADDIT. FEE	

RATE	ADDI- TIONAL FEE
X\$ 9=	90.00
X39=	172.00
+130=	80.00
TOTAL	262.00
ADDIT. FEE	

RATE	ADDI- TIONAL FEE
X\$18=	
X78=	
+260=	
TOTAL	
ADDIT. FEE	

FORM PTO-875
(Rev. 12/99)

Patent and Trademark Office, U.S. DEPARTMENT OF COMMERCE
 *U.S. GPO: 2000-483-433/29044

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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/545,628	04/07/2000	Richard Tad Lepman	Berk-37617	2145

7590

08/31/2004

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EXAMINER

RUDY, ANDREW J

ART UNIT	PAPER NUMBER

3627

DATE MAILED: 08/31/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/545,628	LEPMAN, RICHARD TAD	
	Examiner	Art Unit	
	Andrew Joseph Rudy	3627	

VB

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 1 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 01 June 2004.
- 2a) ☐ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-9,11-13 and 16-59 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☐ Claim(s) _____ is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)	4) ☐ Interview Summary (PTO-413)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)	Paper No(s)/Mail Date. _____
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)	5) ☐ Notice of Informal Patent Application (PTO-152)
Paper No(s)/Mail Date _____	6) ☐ Other: _____

DETAILED ACTION

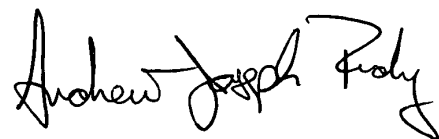
1. The reply filed on June 1, 2004 is not fully responsive to the prior Office Action because of the following omission(s) or matter(s): The proposed additional subject matter added to the descriptive portion of the specification does not have support therefore. Thus, it is objected to as new matter. Though Applicant stated no new matter has been entered by this proposed Amendment, support for such is not clear from the original specification. Applicant must specifically point out where such support for the proposed material is located from the original disclosure. See 37 CFR 1.111. Since the above-mentioned reply appears to be *bona fide*, applicant is given **ONE (1) MONTH or THIRTY (30) DAYS** from the mailing date of this notice, whichever is longer, within which to supply the omission or correction in order to avoid abandonment. **EXTENSIONS OF THIS TIME PERIOD MAY BE GRANTED UNDER 37 CFR 1.136(a).**

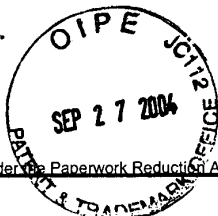
2. Claims 1-9, 11-13 and 16-59 are pending. It is noted that the newly presented claims 44-59 will be subject to a restriction requirement as these claims appear drawn to a non-elected invention. Applicant's Amendment and associated REMARKS will be reviewed in due course.

3. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Andrew Joseph Rudy whose telephone number is 703-308-7808. The examiner can normally be reached on Tuesday thru Friday, 7:30 a.m until 6 p.m..

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Mr. Robert Olszewski can be reached on (703) 308-5183. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

A handwritten signature in black ink, reading "Andrew Joseph Fialy". The signature is written in a cursive, flowing style.



3627
JFW

PTO/SB/21 (09-04)
Approved for use through 07/31/2006. OMB 0651-0031
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
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TRANSMITTAL FORM (to be used for all correspondence after initial filing)	Application Number	09/545,628
	Filing Date	April 7, 2000
	First Named Inventor	Richard Tad Lepman
	Art Unit	3627
	Examiner Name	Andrew J. Rudy
Total Number of Pages in This Submission	Attorney Docket Number	BERK-37617

ENCLOSURES (Check all that apply)		
☐ Fee Transmittal Form	☐ Drawing(s)	☐ After Allowance Communication to TC
☐ Fee Attached	☐ Licensing-related Papers	☐ Appeal Communication to Board of Appeals and Interferences
☒ Amendment/Reply	☐ Petition	☐ Appeal Communication to TC (Appeal Notice, Brief, Reply Brief)
☐ After Final	☐ Petition to Convert to a Provisional Application	☐ Proprietary Information
☐ Affidavits/declaration(s)	☐ Power of Attorney, Revocation Change of Correspondence Address	☐ Status Letter
☐ Extension of Time Request	☐ Terminal Disclaimer	☒ Other Enclosure(s) (please identify below):
☐ Express Abandonment Request	☐ Request for Refund	Return Receipt Postcard
☐ Information Disclosure Statement	☐ CD, Number of CD(s) _____	
	☐ Landscape Table on CD	
☐ Certified Copy of Priority Document(s)	Remarks	
☐ Reply to Missing Parts/Incomplete Application		
☐ Reply to Missing Parts under 37 CFR 1.52 or 1.53		

SIGNATURE OF APPLICANT, ATTORNEY, OR AGENT			
Firm Name	Kelley Lowry & Kelley, LLP		
Signature			
Printed name	Scott W. Kelley		
Date	September 22, 2004	Reg. No.	30,762

CERTIFICATE OF TRANSMISSION/MAILING			
I hereby certify that this correspondence is being facsimile transmitted to the USPTO or deposited with the United States Postal Service with sufficient postage as first class mail in an envelope addressed to: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450 on the date shown below:			
Signature			
Typed or printed name	Scott W. Kelley	Date	September 22, 2004

This collection of information is required by 37 CFR 1.5. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to 2 hours to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.

If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.



I hereby certify that this correspondence is being deposited with the United States Postal Service as first class mail in an envelope addressed to Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22318-1450 on September 22, 2004.

Scott W. Kelley September 22, 2004
Scott W. Kelley, Reg. No. 30,762 Date

PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of

RICHARD TAD LEPMAN

Serial No. 09/545,628

Filed: April 7, 2000

For: PROCESS FOR DETERMINING
OBJECT LEVEL PROFITABILITY

Group Art Unit: 3627

Examiner: Andrew J. Rudy

Docket No. BERK-37617

SUPPLEMENTAL RESPONSE

Commissioner for Patents
P.O. Box 1450
Alexandria, Virginia 22313-1450

Dear Sir:

In response to an Office Action dated August 31, 2004, please see:
Remarks begin on page 2 of this paper.

REMARKS

In response to an Office Action mailed August 31, 2004, wherein the Examiner questioned whether the proposed additional subject-matter added to the descriptive portion of the Specification had adequate support, Applicant provides the following in response:

With respect to the added material on page 3, Applicant merely added reference numeral "10", originally illustrated in FIG. 1, as indicated by the amendment.

With respect to the addition of "11" on line 1, page 4, this addition is merely to refer the reader to the pertinent portion of original FIG. 1, as well.

With respect to the modification on page 7, Applicant was merely correcting a grammatical error to alter "Books" to "books".

With respect to the additional material added as the last paragraph of page 11 to the first full paragraph of page 12, adequate support for this paragraph is found in original FIG. 2, as well as in the Summary of Invention section found on pages 7-10 of the original Specification.

With respect to the additions in the first full paragraph of page 12, the added material finds support in original FIG. 3.

With respect to the last paragraph on page 12, extending to the second full paragraph on page 13, this newly added matter finds support in FIG. 4, as well as in the Summary of Invention section, pages 7-10 of the Specification, and particularly pages 9-10 of the Specification.

Various reference numbers have been added, where appropriate, in the Specification on pages 13-19 so that the description in the Specification properly refers to the diagram in FIG. 4. Thus, FIG. 4 provides the support for these modifications.

With respect to the modification on page 20, line 7, Applicant took the opportunity to correct a grammatical error. No new matter was added.

With respect to the paragraph added at line 18, page 20, the support for this paragraph is found in the flow-chart of FIG. 5.

Furthermore, support for this paragraph is found on pages 20-54, which describes these steps in detail.

Reference numbers have been added at the end of page 20 and top of page 21, which find support in FIG. 6.

In the first full paragraph on page 21, Applicant has taken the opportunity to correct two grammatical errors. On the remaining changes on page 21, include reference numbers to FIG. 7 and find their support in FIG. 7.

On pages 22-28, reference numbers referring to FIG. 8, have been added as appropriate, the support being found in FIG. 8.

On pages 29-33, reference numbers have been added referring to FIG. 9, having their support in FIG. 9.

On pages 34 and 35, Applicant has added reference numbers referring to FIG. 10, where appropriate.

On pages 35 and 36, Applicant has added reference numbers referring to FIG. 11, where appropriate.

On page 38 and 40, Applicant has added reference numbers referring to FIG. 12, where appropriate.

At the bottom of page 52, Applicant has taken an opportunity to correct a misspelling.

Towards the bottom of page 53, Applicant has taken an opportunity to correct a misspelling.

Applicant believes that the foregoing addresses each modification to the Specification, as shown in the May 26, 2004 Amendment. Each modification has support in the originally-filed drawings and Specification. No new matter has been added. Instead, reference numbers have been assigned to the figures and incorporated into the Detailed Description section of the Specification, along with a description of the figure (pulled from the figure itself and Summary of Invention, for example) where necessary to adequately describe the content of the figure while actually referring to the individual boxes or step within the figure. Applicant respectfully asserts that this disclosure and information was contained within the original Specification and no new matter has been added to the

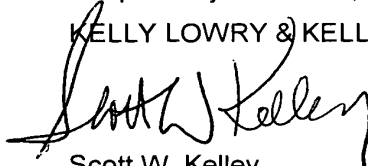
Application due to the Amendment. Instead, the amendments were made to satisfy the objection in the previous Office Action, and to provide a clarification and organization to the Specification.

With respect to the Examiner's assertion that claims 44-59 appear subject to the restriction requirement, and drawn to non-elected invention, Applicant respectfully disagrees. These new claims are merely various combinations of the subject matter recited in claims 1-15. The claims are directed to a relational data base used to calculate object level profitability, including preparing information and calculating a fully absorbed profit adjustment value. Thus, with the exceptions of claims 49, 56 and 59, Applicant respectfully asserts that the remaining new claims are directed to subject-matter which has been elected pursuant to the Restriction Requirement, namely, claims 1-15.

Applicant notes that the preceding two Office Actions have been directed to rejecting claims 1-15. Accordingly, Applicant respectfully asserts that searches have already been conducted with respect to the subject matter of each of these claims without undue hardship on the Examiner. As claim 1 is generic to all claims, Applicant respectfully asserts that all claims should be considered.

Respectfully submitted,

KELLY LOWRY & KELLEY, LLP



Scott W. Kelley
Registration No. 30,762

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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/545,628	04/07/2000	Richard Tad Lepman	Berk-37617	2145

7590 12/20/2004

Scott W Kelley
Kelly Bauersfeld Lowry & Kelly LLP
6320 Canoga Avenue
Suite 1650
Woodland Hills, CA 91367

EXAMINER

RUDY, ANDREW J

ART UNIT	PAPER NUMBER

3627

DATE MAILED: 12/20/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

m

Office Action Summary	Application No.	Applicant(s)	
	09/545,628	LEPMAN, RICHARD	
	Examiner	Art Unit	
	Andrew Joseph Rudy	3627	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 1 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 27 September 2004.
- 2a) ☐ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-9, 11-13 and 16-59 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☐ Claim(s) _____ is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)	4) ☐ Interview Summary (PTO-413)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)	Paper No(s)/Mail Date. _____
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)	5) ☐ Notice of Informal Patent Application (PTO-152)
Paper No(s)/Mail Date _____	6) ☐ Other: _____

DETAILED ACTION

Response to Amendment

1. The amendment filed June 1, 2004 is objected to under 35 U.S.C. 132 because it does not completely clarify the introduction of new matter into the disclosure identified from the previously Office Action. 35 U.S.C. 132 states that no amendment shall introduce new matter into the disclosure of the invention. The added material which is not supported by the original disclosure is as follows:

The material from the last paragraph of page 11 to the first full paragraph page 12, does not have adequate support from pages 7-10 of the original specification, nor from Fig. 2. Applicant's September 27, 2004 REMARKS have been reviewed, but are not convincing. A review of the specification does not support such a statement.

The material from the first full paragraph page 12, does not have adequate support from Fig. 3 of the original specification, e.g. "from the lowest level of profit detail" and "smallest common component of profit measurement," do not have support from the original specification.

The other subject matter that has been added appears acceptable as Applicant's September 27, 2004 REMARKS appear convincing.

Applicant is given one last opportunity to provide detailed support for the aforementioned objected material. Generalizations of where support may be found will not likely be persuasive. Otherwise, Applicant is required to cancel the new matter in the reply to this Office Action.

2. Claims 1-9, 11-13 and 16-59 are pending. Claims 1-9 and 11-13 remain rejected pursuant to the non-final Office Action (Paper No. 9) mailed January 26, 2004. Claims 44-59 have not been acted upon pending resolution of the objected subject matter. Applicant appears to admit that claims 49, 56 and 59 are separate inventive processes not previously considered. However, Applicant's September 27, 2004 REMARKS regarding the other claims have been noted and do not appear convincing as they provide a different scope the previously claimed invention.

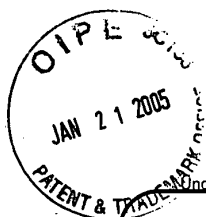
3. Thus, the reply filed on September 27, 2004 is not fully responsive to the prior Office Action because of the following omission(s) or matter(s): See above. See 37 CFR 1.111. Since the above-mentioned reply appears to be *bona fide*, applicant is given **ONE (1) MONTH or THIRTY (30) DAYS** from the mailing date of this notice, whichever is longer, within which to supply the omission or correction in order to avoid abandonment. EXTENSIONS OF THIS TIME PERIOD MAY BE GRANTED UNDER 37 CFR 1.136(a).

4. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Andrew Joseph Rudy whose telephone number is 703-308-7808. The examiner can normally be reached on Monday thru Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Robert P. Olszewski can be reached on 703-308-5183. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

A handwritten signature in black ink, reading "Andrew Joseph Fichy". The signature is written in a cursive, flowing style with a large initial 'A' and 'F'.



3627
JFE

PTO/SB/21 (09-04)

Approved for use through 07/31/2006. OMB 0651-0031

U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE

Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

TRANSMITTAL FORM (to be used for all correspondence after initial filing)	Application Number	09/545,628
	Filing Date	04-07-2000
	First Named Inventor	Richard Tad Lepman
	Art Unit	3627
	Examiner Name	Rudy, Andrew J.
Total Number of Pages in This Submission	Attorney Docket Number	BERK-37617

ENCLOSURES (Check all that apply)		
☐ Fee Transmittal Form ☐ Fee Attached ☒ Amendment/Reply ☐ After Final ☐ Affidavits/declaration(s) ☐ Extension of Time Request ☐ Express Abandonment Request ☐ Information Disclosure Statement ☐ Certified Copy of Priority Document(s) ☐ Reply to Missing Parts/ Incomplete Application ☐ Reply to Missing Parts under 37 CFR 1.52 or 1.53	☐ Drawing(s) ☐ Licensing-related Papers ☐ Petition ☐ Petition to Convert to a Provisional Application ☐ Power of Attorney, Revocation Change of Correspondence Address ☐ Terminal Disclaimer ☐ Request for Refund ☐ CD, Number of CD(s) _____ ☐ Landscape Table on CD	☐ After Allowance Communication to TC ☐ Appeal Communication to Board of Appeals and Interferences ☐ Appeal Communication to TC (Appeal Notice, Brief, Reply Brief) ☐ Proprietary Information ☐ Status Letter ☒ Other Enclosure(s) (please identify below): Return Receipt Postcard
Remarks		

SIGNATURE OF APPLICANT, ATTORNEY, OR AGENT			
Firm Name	KELLY LOWRY & KELLEY, LLP		
Signature			
Printed name	Scott W. Kelley		
Date	01-17-2005	Reg. No.	30,762

CERTIFICATE OF TRANSMISSION/MAILING			
I hereby certify that this correspondence is being facsimile transmitted to the USPTO or deposited with the United States Postal Service with sufficient postage as first class mail in an envelope addressed to: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450 on the date shown below:			
Signature			
Typed or printed name	Scott W. Kelley	Date	01-17-2005

This collection of information is required by 37 CFR 1.5. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to 2 hours to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.

If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.



I hereby certify that this correspondence is being deposited with the United States Postal Service as first class mail in an envelope addressed to Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450 on January 17, 2005.

Scott W. Kelley, Reg. No. 30,762

January 17, 2005
Date

PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of

RICHARD TAD LEPMAN

Serial No. 09/545,628

Filed: April 7, 2000

For: PROCESS FOR DETERMINING
OBJECT LEVEL PROFITABILITY

Group Art Unit: 3627

Examiner: Rudy, Andrew J.

Docket No. BERK-37617

RESPONSE

Commissioner for Patents
P.O. Box 1450
Alexandria, Virginia 22313-1450

Dear Sir:

In response to an Office Action dated December 20, 2004, please amend the above-identified application as follows:

Remarks/Arguments begin on page 2 of this paper.

- 1 -

BERK-37617
S/N: 09/545,628
RSP TO 122004 OA

REMARKS/ARGUMENT

This Response is responsive to the December 20, 2004 Office Action Summary, wherein the amendment filed June 1, 2004 was objected to under 35 U.S.C. §132 based upon the assertion that it did not completely clarify the introduction of new matter into the disclosure identified from the previously [filed] Office Action.

In particular, the Examiner questioned whether the material from the last paragraph of page 11 to the first full paragraph of page 12 had adequate support from pages 7-10 of the original specification or FIG. 2. The paragraph in question is as follows:

"With reference to FIG. 2, the present invention's method of apportionment of non-object related profit measure specifies a method or allocation model (25) which will not change the ordinal or cardinal profit contribution ranking when only marginal profit measures are counted. This specification is what makes it possible to apply marginal measurement rules or models(20) with macro economic principals. The invention decomposes profit measurement and analytical calculations into five classifications, namely:

Marginal profit measures or funds transfer pricing (21) associated with use of the business' balance sheet resources;

Marginal cost measures or event costing (22);

Marginal measures or non-interest revenues (23) (non-interest or balance sheet related revenue);

Marginal measures of expected costs or revenues, also referred to as provisioning (24); and

Apportioned costs or indirect costing (26). These profit measurement analytical calculations result in a detailed profit measure (27)."

Applicant derived this "new" paragraph from the first and second paragraphs of page 8 of the Summary of the Invention as follows:

"The invention's method of apportionment of non-object related profit measures specifies a method which will not change the ordinal or cardinal profit contribution ranking when only marginal profit measures are counted. This specification is what makes it possible to apply marginal measurement rules (see Micro-economic theory literature) with macro economic principals; namely the sum-of-the-parts equals the whole criterion which is the basis of financial accounting theory and practice.

The invention decomposes profit measurement analytical calculations into five classifications:

1. Marginal profit measures associated with use of the business' balance sheet resources;
2. Marginal measures of non-balance oriented revenues;
3. Marginal cost measures;
4. Marginal measures of expected costs or revenues;
and,
5. Apportioned cost measures."

FIG. 2 is directed to such a method of apportionment of non-object related profit measure and specifies or allocation model (25) which arrives at a detailed profit measure (27) by considering indirect costing (26) and marginal models (20) including funds transfer pricing (21), event costing (22), non-interest revenue (23) and provisioning (24). These classifications (21-24 and 26) correspond with the five classifications listed on page 8 of the Summary of the Invention. The new paragraph extending from page 11 to page 12 is merely a melding of the originally filed paragraph on page 8 and that disclosed in FIG. 2. For the most part, it is verbatim. Accordingly,

applicant once again asserts that this new paragraph does indeed have basis in the disclosure filed originally and does not introduce new matter.

The Examiner also questioned whether the material from the first full paragraph of page 12 has adequate support from FIG. 3 of the original specification. The portion in question extending from the first paragraph of page 12 through the first paragraph of page 13 is as follows:

"With reference now to FIG. 3, once all five profit component measures are summed from the lowest level of profit detail (the "profit object"), a consistent set of profit values for all types of aggregations (30) are possible. DPM is based on object level detail sourced from a business systems of record's cash flows (31), sourced from of customer's transactions, (object oriented events) (33) and sourced from management allocations of profit arising from non-customer related events (34). DPM provides both marginally and or fully absorbed profit measures using activity based costing techniques(35), something traditional "general ledger" based profit accounting systems can not accomplish due to reliance on aggregate debit and credit amounts (see Figs. 2-4.)—This results in the smallest common component of profit measurement desired – the profit object (32) common to the business' organizations, products or customers."

Applicant previously indicated that all of the information in this paragraph was derived from FIG. 3. In fact, the information which was amended into this paragraph was also obtained from the Summary of the Invention, and finds support in other portions of the specification as well. For example, at the end of the first paragraph of page 8 of the Summary of the Invention states:

"This invention does this through a consistent application of measures to a class of business entities which represent the smallest common component of profit measurement desired - the Profit Object."

Thus, the object (32) of FIG. 3 is in fact the profit object, or the smallest, component of profit measurement desired, as stated in the original specification as indicated above.

The "from the lowest level of profit detail" addition on page 12 which the Examiner specifically referred to as not having support from the original specification is found on page 8, final paragraph, as follows:

"This classification provides for additive profit measures across the five components. The calculation process is designed to be independent across classes 1, 2, 3, & 4 above with the addition of class five to preserve sum-of-the-parts integrity without simultaneous calculations typically found in profit measurement processes. **When all five profit measures are summed at the lowest level of profit detail, a consistent set of profit values for all types of aggregations are possible** - all profit measurement then originates from the same point in a profit database."
(Emphasis added.)

The aggregation (30) portion of FIG. 3, is thus supported in the Summary of the Invention of the original Specification. The remaining amendments were simply the inclusion of all of the steps or boxes of FIG. 3, which would have been reasonably understood by one skilled in the art and not introducing "new" matter.

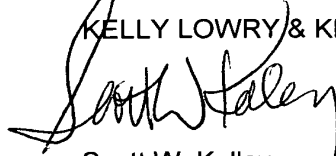
With respect to claims 49, 56 and 59, these are dependent claims which are substantially similar or identical to claims which were restricted from the application previously. However, the remaining claims, 44-48, 50-

55, 57 and 58 are of a scope as previously discussed in Applicant's September 22, 2004 Supplemental Response and are not directed to different inventions, rather, but are merely various combinations of the subject-matter recited in claims 1-15, which had been previously considered and are not subject as to the restriction requirement.

Applicant reasserts that claims 1-9, 11-13, 16-59 are patentable for the reasons discussed in the May 26, 2004 Amendment.

Respectfully submitted,

KELLY LOWRY & KELLEY, LLP

A handwritten signature in black ink, appearing to read "Scott W. Kelley", is written over the printed name and firm name.

Scott W. Kelley
Registration No. 30,762

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(818) 347-7900



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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/545,628	04/07/2000	Richard Tad Lepman	Berk-37617	2145
7590 05/19/2005			EXAMINER	
Scott W Kelley Kelly Bauersfeld Lowry & Kelly LLP 6320 Canoga Avenue Suite 1650 Woodland Hills, CA 91367			RUDY, ANDREW J	
			ART UNIT	PAPER NUMBER
			3627	

DATE MAILED: 05/19/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/545,628	LEPMAN, RICHARD	
	Examiner	Art Unit	
	Andrew Joseph Rudy	3627	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 1 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 21 January 2005.
 2a) ☐ This action is **FINAL**. 2b) ☐ This action is non-final.
 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-43 is/are pending in the application.
 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
 5) ☐ Claim(s) _____ is/are allowed.
 6) ☐ Claim(s) _____ is/are rejected.
 7) ☐ Claim(s) _____ is/are objected to.
 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
 Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
 Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
 a) ☐ All b) ☐ Some * c) ☐ None of:
 1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)	4) ☐ Interview Summary (PTO-413)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)	Paper No(s)/Mail Date. _____
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)	5) ☐ Notice of Informal Patent Application (PTO-152)
Paper No(s)/Mail Date _____	6) ☐ Other: _____

DETAILED ACTION

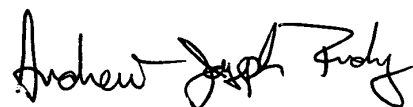
Response to Amendment

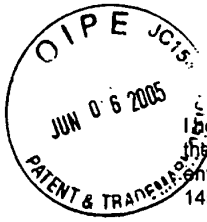
1. The reply filed on January 21, 2005 is not fully responsive to the prior Office Action because of the following omission(s) or matter(s): The status identifiers are not all in conformance with the Revised Amendment Practice recently promulgated by the USPTO. See claim 16. Also, Applicant is advised that an election by original presentation may be imposed upon Applicant with regards to the proposed new claims 44-59. See 37 CFR 1.111. Since the above-mentioned reply appears to be *bona fide*, applicant is given **ONE (1) MONTH or THIRTY (30) DAYS** from the mailing date of this notice, whichever is longer, within which to supply the omission or correction in order to avoid abandonment. EXTENSIONS OF THIS TIME PERIOD MAY BE GRANTED UNDER 37 CFR 1.136(a). It is noted that the previous Office Action stating that claims 1-9, 11-13 and 16-59 were pending is in error as the added claims were not formally entered, due to the non-responsive Amendment. Thus, claims 1-43 are pending until the formal matters are properly addressed.

2. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Andrew Joseph Rudy whose telephone number is 571-272-6789. The examiner can normally be reached on Monday thru Friday.

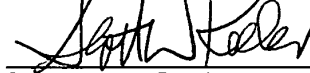
If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Robert P. Olszewski can be reached on 571-272-6788. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

A handwritten signature in black ink, appearing to read "Andrew Joseph Fudy". The signature is written in a cursive, flowing style.



I hereby certify that this correspondence is being deposited with the United States Postal Service as first class mail in an envelope addressed to Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450 on June 2, 2005



Scott W. Kelley, Reg. No. 30,762

June 2, 2005
Date

PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of

RICHARD TAD LEPMAN

Serial No. 09/545,628

Filed: April 7, 2000

For: PROCESS FOR DETERMINING
OBJECT LEVEL PROFITABILITY

Group Art Unit: 3627

Examiner: Rudy, Andrew J.

Docket No. BERK-37617

THIRD SUPPLEMENTAL RESPONSE

Commissioner for Patents
P.O. Box 1450
Alexandria, Virginia 22313-1450

Dear Sir:

In response to an Office Action dated May 19, 2005 (which addresses issues presented in an original amendment/Response, dated May 26, 2004), please amend the above-identified application as follows:

Amendments to the Specification begin on page 2 of this paper. Replacement Sheets begin on page 80 of this paper.

Amendments to the Claims are reflected in the listing of claims which begins on page 56 of this paper.

Remarks/Arguments begin on page 64 of this paper.

BERK-37617
S/N: 09/545,628
THIRD SUPP'L RSP TO 051905 OA

Amendments to the Specification:

Please replace the entire Specification with the following (a clean copy being attached hereto):

PROCESS FOR DETERMINING OBJECT

LEVEL PROFITABILITY

RELATED APPLICATION

This application claims priority from provisional patent application Serial No. 60/128,769, filed April 9, 1999.

BACKGROUND OF THE INVENTION

The process of measuring profit is an important business activity. Profit measures are the primary basis for understanding financial performance and value creation in a business. Once a business is owned publicly, an independent review of a firm's financial position becomes a mandatory process well known as measuring profit according to "generally accepted accounting principals" (GAAP.) While these standards and regulations are adequate for an external view of a company's financial condition, the measurement of profit contribution amongst the business is required for proper management of the franchise. Internal financial performance measurement is especially complex for a multi-product, multi-location, and/or large customer based businesses. The use of internal financial performance measures drives most businesses planning processes, management incentive processes and control processes. Many businesses have found that internal profit measures can be consistent with the external financial statement measures. These businesses implement internal accounting processes consistent with external measures using common metrical units similar to a GAAP Financial Statement presentation - a consistent metric or "yard stick" (i.e. numerically the sum-of-the-profit-parts equals the whole company's profit according to GAAP.)

Many businesses today are struggling to accurately measure profit contribution at a level necessary to accurately measure profit contribution of individual customer interactions. The reason for dilemma is found in the manner in which generally accepted accounting principles are applied. Fundamental accounting theory takes lumpy cash flows that occur in the day-to-day management of a business conducted with its customers and transform them into smoothed income or expense items (known as accruals.) At the end of every profit reporting cycle these income and expense items are consolidated into a period end balance sheet and income statements. Reports on the state of the business can then be presented by accountants in formats necessary for the independence of ownership and management that is the basis of capital markets. Indeed, most businesses today would call its accounting process critical for survival. Unfortunately, the complexity of maintaining an accurate financial accounting process has obscured the measurement of profit contribution at a very detailed level. While the aggregate cash flows of a large company are relatively stable the individual customer-to-business cash flows are very volatile. Accounting practice to date has been comfortable with using aggregate cash flow information for the accrual accounting process(10), as illustrated in FIG. 1. The accounting process based on aggregates has lead to blindness by businesses of incremental customer profit contribution measures necessary to implement customer level decision making, particularly in large businesses with many millions of customers.

General Ledgers (double entry book keeping systems)(11) were early adapters of automated data processing solutions due to the match between computing capabilities of computers and the execution of the accounting process. The benefit, from reduced cost for accounting processes easily justified large expenditures in information processing technology; both in hardware and in software development. The complexity of today's general ledger applications and the age of these systems have retarded the innovation of new automated techniques taking

advantage of technological advances in massively parallel computing capability.

References describing generally accepted accounting principals and procedures are listed below, and are incorporated by reference herein:

The money market /, Marcia Stigum. 3rd ed. Homewood, Ill. :
Dow Jones-Irwin, c1990.

Money market and bond calculations /, Marcia Stigum and
Franklin L. Robinson. Chicago : Irwin Professional Publ., c1996.

Money market calculations : yields, break-evens, and
arbitrage /, Marcia Stigum, in collaboration with John Mann. Homewood, Ill.
:
Dow Jones-Irwin, c1981.

The money market : myth, reality, and practice /, Marcia
Stigum. Homewood, Ill. : Dow Jones-Irwin, c1978

Quantifying the market risk premium phenomenon for investment
decision making: September 26-27, 1989, New York, New York /; Keith P.
Ambachtsheer ... [et al.] ; edited by William F. Sharpe and Katrina F.
Sherrerd ; sponsored by the Institute of Chartered Financial Analysts.
Charlottesville, VA : CFA : May be ordered from Association for Investment
Management and Research, c1990

Fundamentals of investments /, Gordon J.
Alexander, William F. Sharpe, Jeffery V. Bailey. 2nd ed. Englewood Cliffs,
N.J. : Prentice Hall, c1993.

Microeconomics /, Richard G. Lipsey . [et al.]. 9th ed. New York :
Harper & Row, c1990.

Economics of the firm : theory and practice /, Arthur A. Thompson,
Jr., John P. Formby. 6th ed. Englewood Cliffs, N.J. : Prentice Hall, c1993.

The FASB conceptual framework project, 1973-1985 : an analysis /,
Pelham Gore. Manchester, UK ; New York : Manchester University Press ;
New York, NY, USA : Distributed exclusively in the USA and Canada by St.
Martin's Press, c1992.

Statement of financial accounting standards no. 5 : impact
on corporate risk and insurance management /, Robert C. Goshay.
Stamford,
Conn. : Financial Accounting Standards Board of the Financial Accounting
Foundation, 1978.

Common cents : the ABC performance breakthrough : how to
succeed with activity-based costing /, Peter B.B. Turney. Hillsboro, OR :
Cost
Technology, 1991.

A guide to the SQL standard; a user's guide to the standard
relational language SQL /, Date, C. J. :Addison-Wesley Pub. Co., 1987.

Accountants SEC practice manual, Kellogg, Howard L. :Commerce
Clearing House, 1971.

Risk theory; the stochastic basis of insurance / , Beard, R. E.
(Robert Eric): 3rd ed., Chapman and Hall, 1984.

Practical risk theory for actuaries / , Daykin, C. D. (Chris D.): 1st ed.,
Chapman & Hall, 1994.

Actuarial mathematics / :2nd ed., Society of Actuaries, 1997.

Objectives and concepts underlying financial statements / United
Nations, 1989.

Cost accounting for factory automation / National Association of
Accountants, 1987.

Interest rate risk models ;; theory and practice / : Glenlake Publ. Co.
- Fitzroy Dearborn, 1997.

Economic analysis for management decisions, Elliott, Jan Walter: R.
D. Irwin, 1973.

Microeconomic theory /, Ferguson, C. E. (Charles E.): 4th ed. R. D.
Irwin, 1975.

Planning and measurement in your organization of the future /, Sink,
D. Scott.: Industrial Engineering and Management Press, 1989.

Economics /, Paul A. Samuelson, William D.

Nordhaus. 16th ed. Boston, Mass : Irwin/McGraw-Hill, c1998.

Setting intercorporate pricing policies /, Business International Corporation, New York : Business International Corporation, 1973.

Controversies on the theory of the firm, overhead allocation, and transfer pricing /, Murry C. Wells, editor. New York : Arno Press, 1980.

The transfer pricing problem : a theory for practice /, Robert G. Eccles. Lexington, Mass. : Lexington Books, 1985.

Transfer pricing /, Clive R. Emmanuel and Messaoud Mehafdi. London ; San Diego : Academic Press, 1994.

Internal transfer pricing of bank funds /, by Valerie Giardini. Rolling Meadows, Ill. : Bank Administration Institute, 1983.

Transfer pricing : economic, managerial, and accounting principles /, by Clark J. Chandler ... [et al.] Washington, D.C. : Tax Management, Inc., 1995.

International intracorporate pricing; non-American systems and views, Jeffrey S. Arpan. New York, Praeger Publishers, 1971.

There remains, however, a need to resolve profit measures at a detailed level without using analytical models or statistical extrapolation(12). Such a process should utilize rule driven and data base measurement processes which will give large scale businesses a lower cost of maintenance and a technologically scalable tool to measure profit at a level of precision or resolution not possible in prior financial performance measurement processes. The present invention fulfills this need and provides other related advantages.

SUMMARY OF THE INVENTION

Prior approaches to management's desire for an accurate measure of individual decisions (incremental or marginal) profit impact have been solved by automating the accounting process for implementing accounting

methods. Cash flows are transformed into two parts, a debit part or credit part, according to an accounting rule. Other non-cash accounting rules are implemented to create "accrual" debits and credits smoothing income and expenses and adjusting for future contingencies. (see Management Accounting Theory ~~Books~~books or any source of accounting theory, where the balance sheet equation and the consolidation process, the combination of flows and stocks of financial data, are developed.) The first large scale use of automated computing technology is frequently found to be the automation of the financial control or accounting processes, since it is easy to develop software to implement accountancy rules and there were large benefits in staff productivity easily observable. For businesses to observe marginal profit contributions it was necessary to use accounting information and make reasoned conclusion on how to apportion or extrapolate this information into incremental customer, product or organizational profit detail. (See Fig. 1)

What these methods of profit measurement lack are the adequate level of detail to measure an individual or incremental decision's impact on profit. To gain this new level of profit resolution this invention is designed to use micro profit measurement rules applied at a granular level consistent with standard accounting practice using a combination of actuarial science and mathematical set theory. The invention is designed to utilize massively parallel computing operations using relational database management techniques enabling profit measurement at a level not available today in a large individual customer scale business. This invention does this through a consistent application of measures to a class of business entities which represent the smallest common component of profit measurement desired - the Profit Object.

The invention's method of apportionment of non-object related profit measures specifies a method which will not change the ordinal or cardinal profit contribution ranking when only marginal profit measures are counted. This specification is what makes it possible to apply marginal measurement

rules (see Micro-economic theory literature) with macro economic principals; namely the sum-of-the-parts equals the whole criterion which is the basis of financial accounting theory and practice.

The invention decomposes profit measurement analytical calculations into five classifications:

1. Marginal profit measures associated with use of the business' balance sheet resources;
2. Marginal measures of non-balance oriented revenues;
3. Marginal cost measures;
4. Marginal measures of expected costs or revenues; and,
5. Apportioned cost measures.

This classification provides for additive profit measures across the five components. The calculation process is designed to be independent across classes 1, 2, 3, & 4 above with the addition of class five to preserve sum-of-the-parts integrity without simultaneous calculations typically found in profit measurement processes. When all five profit measures are summed at the lowest level of profit detail, a consistent set of profit values for all types of aggregations are possible - all profit measurement then originates from the same point in a profit database. The simultaneous use of these five analytical frameworks makes possible a detailed level of profit calculation consistent with GAAP.

In particular, the present invention relates to a process for determining object level profitability. In its basic form the process includes the steps of:

1. Preparing information to be accessed electronically;
2. Establishing rules for processing the prepared information;
3. Calculating at least one marginal value of profit using established rules as applied to a selected set of prepared information;
4. Calculating a fully absorbed value of profit adjustment using established rules as applied to the selected set of prepared information; and,

5. Combining the at least one marginal value of profit and fully absorbed value of profit adjustment to create a measure for object level of profitability.

More specifically in the step of preparing information to be accessed electronically, the database is prepared, object attributes are extracted, conditioned and loaded into the database, and financial statement attributes are extracted, conditioned and loaded into the database. If desired the step may also include extracting, conditioning and loading the event attributes into the database, and calculating funds transfer treatment rates.

In the step of establishing for processing the prepared information for rule establishment providing the information necessary to select objects and perform the correct profit calculus is accomplished. The step of calculating at least one marginal value of profit using established rules as applied to a selected set of prepared information includes calculating net interest, other revenue, direct expense, and/or provision for the selected set of prepared information. Net Interest (NI) is the summation of interest income, value of funds provided and earnings on equity funds used less the sum of interest expense and cost of funds used. Other Revenues (OR) is a measure of profit contribution from non-interest related sources. Direct Expense (DE) is the profit value reduction due to marginal resource consumption by the object. Provisioning (P) is the expected profit value adjustment for future outcomes related to the object.

The step of fully absorbed profit adjustment, Indirect Expense (IE), is an apportioned profit value adjustment for all non-object related resource consumption by the business.

In the step of combining the five profit values, $NI + OR - DE - P - IE$, may be adjusted for taxes and/or object economic value.

The foregoing elements of the invention, which have been explained at a micro elemental level can be advantageously employed in massive

amounts and parallel process power. For example, in the macro perspective of the invention the basic steps can be utilized.

The present invention gives management profit measures tailored to its need for accurate decision oriented profit information required to manage a large organization based on profit measurement. This invention gives businesses the ability to resolve profit measures at a level of detail necessary for all types of application of profit oriented performance measurement.

Other features and advantages of the present invention will become apparent from the following more detailed description, taken in conjunction with the accompanying drawings which illustrated, by way of example, the principles of the invention.

BRIEF DESCRIPTION OF THE DRAWINGS

The accompanying drawings illustrate the invention. In such drawings:

FIGURE 1 shows existing profit calculation process flow.

FIGURE 2 shows analytical processing relationships.

FIGURE 3 shows the invention's information flow.

FIGURE 4 shows the invention's data relationships.

FIGURE 5 shows the invention's process flow.

FIGURE 6 shows the invention's database preparation process step detail.

FIGURE 7 shows the rule maintenance process.

FIGURE 8 shows the net interest measuring process

FIGURE 9 shows the other revenue measuring process.

FIGURE 10 shows the direct expense measuring process.

FIGURE 11 shows the provision measuring process.

FIGURE 12 shows the indirect expense measuring process.

FIGURE 13 shows the profit component aggregation and adjustment process.

FIGURE 14 shows a partial relational database schema for an airline industry example.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

As shown in the accompanying drawings for purposes of illustration, the present invention is concerned with a detail profit metric (DPM) designed to be a computer database application (i.e. software) for profitability measurement. DPM's profit measurement system is fundamentally different from the common profit measurement system used by regulators and public accountancy - yet, it is consistent with generally accepted accounting principals.

With reference to FIG. 2, the present invention's method of apportionment of non-object related profit measure specifies a method or allocation model (25) which will not change the ordinal or cardinal profit contribution ranking when only marginal profit measures are counted. This specification is what makes it possible to apply marginal measurement rules or models(20) with macro economic principals. The invention decomposes profit measurement and analytical calculations into five classifications, namely:

Marginal profit measures or funds transfer pricing (21) associated with use of the business' balance sheet resources;

Marginal cost measures or event costing (22);

Marginal measures or non-interest revenues (23) (non-interest or balance sheet related revenue);

Marginal measures of expected costs or revenues, also referred to as provisioning (24); and

Apportioned costs or indirect costing (26). These profit measurement analytical calculations result in a detailed profit measure (27).

With reference now to FIG. 3, once all five profit component measures are summed from the lowest level of profit detail (the "profit object"), a consistent set of profit values for all types of aggregations (30) are possible. DPM is based on object level detail sourced from a business systems of record's cash flows (31), sourced from a customer's transactions, (object oriented events) (33) and sourced from management allocations of profit arising from non-customer related events (34). DPM provides both marginally and or fully absorbed profit measures using activity based costing techniques(35), something traditional "general ledger" based profit accounting systems can not accomplish due to reliance on aggregate debit and credit amounts (see Figs. 2-4.)—This results in the smallest common component of profit measurement desired – the profit object (32) common to the business' organizations, products or customers.

More specifically, with reference to FIG. 4, in the step of preparing information to be input (40) to be accessed electronically, a database is prepared. Object attributes are extracted, conditioned, and loaded into the database (43), and financial statement attributes are extracted, conditioned and loaded into the database (45). If desired, the method may also include extracting, conditioning and loading the event attributes into the database (44) and calculating funds transfer treatment rates and activity based costing rates (46).

In the step of establishing for processing (41) the prepared information information on how to select objects and perform the correct profit calculus rule mapping (47) is accomplished. The step of calculating (48) at least one marginal value of profit using establishment rules as applied to a selected set of prepared information includes calculating net interest (NI), other revenue (OR), direct expense (DE), and/or provision for the selected set of prepared information. Provisioning (P) is expected profit

value adjustment for future outcomes related to the object. The step of fully absorbed profit adjustment, Indirect expense (IE), is an apportioned profit value adjustment for a non-object related resource consumption by the business. The foregoing elements of the invention, which have been explained at a micro-elemental level, can be advantageously employed in massive amounts and parallel processing power (41). The present invention gives businesses the ability to resolve profit measures at a level of detail (49) necessary for all types of applications of profit oriented performance measurement or detailed profitability data as an output (42) for enabling aggregation to a particular customer, product or organization within a business.

The following is a definition of the inputs (attributes or measurement parameters), the method of processing and the output of the DPM process.

Definitions

Object Attributes (43)

These are data about the object being measured. Different businesses have different objects of detailed profit measurement. Examples of profit measurement objects include an airline using "seat" as the profit object, an insurance company using a "policy" object or a bank use an "account" object - these objects represent the lowest level of detail required for consistent internal multi-dimensional internal profit analyses. Types of data attributes associated with these objects include: balances, rates (or interest accrued), product identification, exposures, expected loss frequency, and various dates (e.g., start, finish, rate reset, last payment, next payment, life, etc.)

Event Attributes (44)

These data are about events (a resource consuming activity) related to the object being measured. Data found here include object identification, transaction amounts, quantities, event location, event

time, counter-party identification, event type (e.g., payments, interest paid or earned, purchases, refunds, etc.) At least one of these attributes must relate the event to at least one Object.

Financial Statement Attributes (45)

These are data about the company's financial statement. Data found here include balance sheet and profit statement amounts usually aggregated by the legal or management entities that own a group of objects being measured. These data will be current accounting period either actual or planned.

Profit Measurement Parameters (46)

These data include parameter values necessary to perform the object or event level profit calculations. The major classifications of these data are:

- Funds valuing rates ("Treatment Rates") - DPM's funds transfer pricing method uses maturity opportunity rates used in valuing each object's marginal use or source of internal funds (balance sheet resources).
- Unit Costs - DPM's Direct Expense calculations require unit cost parameters. DPM can calculate unit costs, when unit cost data are not available; in these instances, if the total cost is provided a financial statement attribute and then unit cost is derived by dividing total cost by an appropriate attribute quantity amount.
- Allocated Amounts - In both Other Revenue and Indirect Expense calculations this amount is apportioned amongst all objects in a group.
- Miscellaneous Calculation Values - Some of DPM's calculations require non-system of record values. For example, number of days in profit measurement period or equity allocation weighting. These values are known as "modeling" parameters.

- Amortization Parameters - Interest amortization requires an interest rate and expected life attributes. Straight line and declining balance methods of amortization require expected life values.
- Expected Profit Adjustment Measurement Parameters - Provision calculations require appropriate attributes, such as: expected loss rates, reserve percentages, exposure factors, recovery rates, default probabilities and collection costs.
- Tax Rates - Tax rates are required for after-tax profit calculation. DPM is designed to calculate pre-tax income on a taxable equivalent basis (where a single effective tax rate is all that is required to transform pre-tax income into after tax earnings.)

Profit Measurement Rule Specification

DPM's processing approach is to combine profit measurement techniques with (non-modeled) data and calculation parameters. Each application of this calculus is called a rule 47. DPM is designed to allow the user the freedom to associate a group of objects with a rule and to use object-level information in combination with rule parameters to calculate profit values. The DPM invention uses profit measurement rules separate from, but applied to, object data and the use of relational database concepts, giving the user a flexibility in both the assignment and depth of definition of measurement rules and measurement resolution. Use of this method is especially suited for massively parallel computing technology where linear scaleable capital investment in processing technology is possible vis-à-vis object and event count and rule complexity.

The types of calculation (Rule types) are:

- Funds Treatment - Every object with cash flows affecting a financial statement's balance sheet requires a method of valuing an object's use or source of funds. The common name for this approach to valuing is known as "Matched Maturity Funds Transfer Pricing." DPM uses a

canonical representation an object's funding characteristics for computational performance. DPM's methodology requires effective yield adjustment to eliminate the allocation of interest payable / receivable required by GAAP. A value, based on effective yield adjusted market price (the yield curve), is then determined by DPM for each instance that requires an interest rate transfer prices to calculate an object's marginal Net Interest (NI).

- Equity Allocation - In order for precise net interest revenue or economic value adjusting calculations the amount of equity funds required at an object level must be determined. DPM's equity allocation to the object level calculations may use any of the following methods: simple ratios; regulatory definitions; economic allocations based on econometric modeling (see book on Modern Portfolio Theory) methodologies; or, as statically defined allocations.
- Balance Sheet Allocations – Complete calculation of Net Interest may require an object level allocation of some financial statement balance sheet amounts.
- Apportionment - In both Other Revenue, Provision and Indirect Expense calculations are applied at the object level using Financial Statement Attributes which are not related directly to an object. These profit adjustments are made so that the sum of all object profit equals the whole enterprise's profit - an important property of DPM's output. Accountants refer to this profit measurement technique as "full allocation of profit." DPM's approach is to pool indirect costs and revenues and then apportion them. Apportionment rules specify how the pool is completely allocated to appropriate objects. DPM uses a specific closed form (mathematical formula that require only information known in the current period and no iterative computation) allocation rules.
- Amortization - Some types of income or expense are deferred or accrued over multiple periods including and subsequent to the current

accounting period. This is common to accrual accounting methods used in financial statement profit presentation and give rise to timing differences between cash flows and their related profit as presented in a financial statement in any accounting period. Since DPM is designed to mirror a financial statement's profit measure it must support deferral and accrual accounting principals. Amortization methods are included in DPM to reflect these GAAP concepts. DPM's amortization methods include: interest method of amortization (used for interest income and expense accruals and for deferral of fees that are in lieu of interest); and, straight line or declining balance amortization methods (used for cost or income deferrals and capitalized investment depreciation.)

- Other Revenue Pricing - In situations where object and event activity can be used to derive object level income or fees DPM provides for the calculation of these drivers of profitability in Other Revenue profit calculations. These calculations take the mathematical form of a linear combination of event or object values and modeled coefficients.
- Direct Expense - Calculation of object profit adjustment due to object related activity requires rules that take the form of linear combinations of event or object values and modeled coefficients.
- Indirect Expense - In situations where expense apportionment or amortization amounts are aggregated the user may want different rules applied depending on the path (or dimension) of aggregation. These rules allow for multiple profit calculations rules to be applied to derive multiple object level indirect expense amounts.
- Provision - Adjusting current profit for expected future value changes is known as "actuarial" profit provisioning. The technique is well known by the financial industry's accounting practice. DPM applies actuarial based methods in its object level profit calculations where the Provision pre-adjusts profit for contingent or known exposures to future profit.
- Taxable Equivalent Gross-up - Profit is usually an after-tax measure. Some events or portions of some object profit may be excluded from

normal taxation. DPM's approach is to adjust these pre-tax values so that a singular tax rate can be used to convert pre-tax profit into after-tax values, known as taxable equivalent adjustment. For the purpose of the remaining detailed description all profit and loss profit measures are tax equivalent amounts (e.g., TEG * Amount.) These rules use object and event attributes to drive an adjustment for each of the five classes of profit amounts to a taxable equivalent basis.

- Interest Yield Adjustments - Since DPM can derive profit for any length of accounting period from daily to annual, the adjustment of cash interest payments and the financial statement's accrual or smoothed representation of interest related Profit, DPM requires a method for converting cash interest amounts to financial statement accrual amounts. DPM implements the mathematical concept of "effective interest rate" conversion to accomplish this type of calculation.

Before the calculation rules can be applied at the object or event level a calculation rule must be associated with an object, designating the methods DPM will use to calculate components of profit at the object level. An object grouping is designed to associate objects having common and defined set of object attributes for similar processing (note that a group may consist of one object). The association of a group of objects with a calculation rule is referred here as a Rule Map (47).

Inheritance Functionality

In nature the concept of inheritance is where a descendant receives properties of its predecessors, in computer science inheritance is defined in "Object Oriented" software development theory as the ability to increase function without loss of function using the same data. In DPM the concept of inheritance is applied and in essence it means that an implementation can change Rules (change profit calculus) without losing any profit measurement capabilities of the preceding state(s). This feature allows DPM users a unique ability to apply techniques of differing levels of

sophistication to different sets of objects according to the trade-off between the value of more accurate object-focused profit measures and the cost of obtaining and populating data and maintaining Rule Maps.

The DPM system is designed for Rules to be applied to any object without loss of integrity of output. This design feature allows the user to incrementally migrate objects to increased measurement precision as justified. This valuable piecewise increase in functionality is possible due to DPM's combination of rules and data in a mathematical set theoretic framework. (41) This approach allows for a relational database management system implementation (42). It is nearly impossible develop and maintain procedural based software with as much flexibility and with the capability to simultaneously support the number of calculation permutations required by DPM .

Restatement Functionality

Since DPM is a rule based system the ability to restate prior period's Profit calculations are systematically possible providing historical data exists. DPM's design of object level profit measurement enables a unique historical profit restatement capability. Three features of DPM's restatement capability are:

1. Produces a mathematically consistent time series (i.e. no measurement bias) of object level Profit. DPM restatement functionality is designed to apply the same Rules to all available historical object or event level data.
2. DPM's restatement functionality preserves object accrual objecting integrity when the object history is restated for different length accounting periods. Implementations of daily, weekly, monthly, quarterly, semi-annual, or annual profit calculations and mixing different periodicity in historical data without loss of analytical integrity.
3. Capable of object's profit history restatement. If a DPM user changes Rules or Rule Maps and/or changes the way a subset of object's Profit are

calculated and if the historical data is available per the new set of Rules then the user can restate historical profit measures for these subset of objects.

Processing (see Fig. 5)

With reference to FIG. 5, the database is first populated (50). Rules are maintained (51), as will be more fully discussed herein, and the NI, OR, DE, and P are calculated (52-55). Next, the IE is calculated (56) to arrive at a calculation of the object profitability (57). This process is repeated for all objects. After the last object (58), the process is finished as the detail profitability data is obtained. FIGS. 6-13 describe in more detail the steps taken in FIG. 5 in accordance with the present invention.

1. *Populate Database (see Fig. 6)*

Perform standard database administration actions to initialize data for the required calculations:

1. Perform database Initialization (60)
2. Extract, condition & load object attributes (61)
3. Extract, condition & load event attributes (62)
4. Extract, condition & load financial statement attributes (63)
5. Calculate and populate NI treatment rate attributes (64)

2. *MAINTAIN OBJECT GROUPS AND RULE MAPS (SEE FIG.*

7)

Populate or edit Rule parameters necessary to perform calculations. Rules definition is by association of specific, non-iterative calculation, as described below, with a set of object or event attributes defined as a data filter (see Relational Data Base Management System ~~textbook~~ textbooks). Rules have two pieces:

1. Parameters to drive the object selection or data filter for calculations (70); and,
2. Parameters specific to the appropriate calculation methodology (71).

An easy-to-use graphical user interface can be used to maintain these data for all rules (72).

The following processing steps. Steps 3 through 6 perform object and event level profit calculations. Steps 3, 4, 5, and 6 can be processed independently, step 7 requires values derived in step 3, 4, 5, and 6 and therefore occurs sequentially.

3. Calculate Net Interest for All Objects (see Fig. 8)

Net Interest is:

$$NI = \text{Interest Income} - \text{Cost of Funds} + \text{Value of Funds} - \text{Interest Expense} + \text{Earning on Allocated Equity}$$

Correct interest rates for calculation of interest income or expense depend on the length of the profit measurement period. Using actuarial mathematical techniques the bookkeeping required by GAAP for interest receivables and Payables can be avoided in NI calculus. A known technique (see M Stigum, Money Markets) to accomplish this adjustment for profit measurement according to GAAP (i.e. accruals) the following calculation is used to convert interest rates:

Let r_{new} = annualized rate with new
compounding factor

r = annualized rate with old compounding
factor

m = number of old compounding periods per
year

n = number of new compounding periods per
year

Then
$$r_{\text{new}} = \left[\left(1 + \frac{r}{m} \right)^{m/n} - 1 \right] * n$$

NI CALCULATION RULE TYPE I (80)

The object balance is either an asset or a liability amount for Type I calculation.

Let $AAB(o_i)$ = Average Asset Balance of the object o_i
 $ALB(o_i)$ = Average Liability Balance of the object o_i
 $rate_{asset}(o_i)$ = Effective interest rate for object o_i as an asset
balance

$rate_{liability}(o_i)$ = Effective interest rate for object o_i as a liability
balance

R_t = Treatment rate based on the identified treatment for
the object's product attributes

$Int\ Inc(o_i)$ = Interest Income of object o_i
 $COF(o_i)$ = Cost of funds used by object o_i
 $Int\ Exp(o_i)$ = Interest Expense for object o_i
 $VOF(o_i)$ = Value of funds provided by object o_i

Then,

$Int\ Inc(o_i) = AAB(o_i) * rate_{asset}(o_i)$
{Compute only if object attribute doesn't exist}
 $COF(o_i) = AAB(o_i) * R_t$
 $Int\ Exp(o_i) = ALB(o_i) * rate_{liability}(o_i)$
{Compute only if object attribute doesn't exist}

$VOF(o_i) = ALB(o_i) * R_t$

NI CALCULATION RULE TYPE II (81)

Let $AB_{(c,t)}(o_i)$ = Average Balances of the object o_i
 $rate_{(c,t)}(o_i)$ = Effective interest rate for the corresponding balance
asset or liability
 $R_t(o)$ = Object o's product type/group as needed to identify
treatment rate
 $R_{(c,t)}(pt(o))$ = Rate (treatment rate) for objects of this product
type/group, given the balance class, and tier

$\text{Int Inc}(o_i)$ = Interest Income of object o_i
 $\text{COF}(o_i)$ = Cost of funds used by object o_i
 $\text{Int Exp}(o_i)$ = Interest Expense for object o_i
 $\text{VOF}(o_i)$ = Value of funds provided by object o_i

Then, where summations are over the possible balance variables (class, tier) for the object,

$$\text{Int Inc}(o_i) = \sum_{\forall c,t} \text{AB}_{(\text{asset } c,t)}(o_i) * \text{rate}_{(\text{asset } c,t)}(o_i)$$

{calculate only if object attribute doesn't

exist}

$$\text{COF}(o_i) = \sum_{\forall c,t} \text{AB}_{(\text{asset } c,t)}(o_i) * R_{(\text{asset } c,t)} R_{(c,t)}(\text{pt}(o))$$

$$\text{Int Exp}(o_i) = \sum_{\forall c,t} \text{AB}_{(\text{liability } c,t)}(o_i) * \text{rate}_{(\text{liability } c,t)}(o_i)$$

{calculate only if object attribute doesn't

exist}

$$\text{VOF}(o_i) = \sum_{\forall c,t} \text{AB}_{(\text{liability } c,t)}(o_i) * R_{(\text{liability } c,t)} R_{(c,t)}(\text{pt}(o))$$

Allocated Balances

Let Total Amount = Balance Sheet amount to be allocated to object
 Rule = Rule for allocating Amount

Then, DPM calculates the allocation to object o to determine the allocated balance:

$$\begin{aligned}
 B(o_i) &= \text{Rule applied to (Total Amount)} \\
 &= \text{The Allocated Balance}
 \end{aligned}$$

Treat this balance as any one of the average balances associated with the object, where class is specified by users, tier is "allocated". Thus, $B_i(o_i)$ is one of the $\text{AB}_{(c,t)}(o_i)$ defined above.

NI CALCULATION RULE TYPE III (82)

Let $AB_{(c,t)}(o_i)$ = Average Balances of the object o_i
 $rate_{(c,t)}(o_i)$ = Effective interest rate for the corresponding
balance

$Type_{p,a}(o_i)$ = Object o_i 's product and object attributes as
needed to identify treatment

$R_{(c,t)}(type_{p,a}(o_i))$ = Rate (treatment rate) for this object's product
type, given the balance class, and tier/tenor

$Int\ Inc(o_i)$ = Interest Income of object o_i

$COF(o_i)$ = Cost of funds used by object o_i

$Int\ Exp(o_i)$ = Interest Expense for object o_i

$VOF(o_i)$ = Value of funds provided by object o_i

Then, where summations are over the possible balance attributes
(state, tier) for the object,

$$Int\ Inc(o_i) = \sum_{\forall c,t} AB_{(asset\ c,t)}(o_i) * rate_{(asset\ c,t)}(o_i)$$

{calculate only if object attribute doesn't exist}

$$COF(o_i) = \sum_{\forall c,t} AB_{(asset\ c,t)}(o_i) * R_{(asset\ c,t)}(type_{p,a}(o_i))$$

$$Int\ Exp(o_i) = \sum_{\forall c,t} AB_{(liability\ c,t)}(o_i) * rate_{(liability\ ,t)}(o_i)$$

{calculate only if object attribute doesn't exist}

$$VOF(o_i) = \sum_{\forall c,t} AB_{(liability\ c,t)}(o_i) * R_{(c,t)}(type_{p,a}(o_i))$$

NI CALCULATION RULE TYPE IV (83)

Let $AB_{(c,t)}(o_i)$	= Average Balances of the object
$rate_{(c,t)}(o_i)$	= Effective interest rate for the corresponding balance amounts
$type_{p,a,b}(o_i)$	= Object o_i 's product, object attribute, and behavior types as needed to identify treatment rate
$R_{(c,t)}(type_{p,a,b}(o_i))$	= Rate (treatment rate) for objects of this product type, balance class, and tier/tenor
$Int\ Inc(o_i)$	= Interest Income of object o_i
$COF(o_i)$	= Cost of funds used by object o_i
$Int\ Exp(o_i)$	= Interest Expense for object o_i
$VOF(o_i)$	= Value of funds provided by object o_i

Then, where summations are over the possible balance variables
(state, tier) for the object,

$$Int\ Inc(o_i) = \sum AB_{(asset\ c,t)}(o_i) * rate_{(asset\ c,t)}(o_i)$$

{calculate only if object attribute

doesn't exist}

$$COF(o_i) = \sum AB_{(asset\ c,t)}(o_i) * R_{(asset,t)}(type_{p,a,b}(o_i))$$

$$Int\ Exp(o_i) = \sum AB_{(liability,t)}(o_i) * rate_{(liability,t)}(o_i)$$

{calculate only if object attribute doesn't exist}

$$VOF(o_i) = \sum AB_{(liability,t)}(o_i) * R_{(liability,t)}(type_{p,a,b}(o_i))$$

NI CALCULATION RULE TYPE V (84)

Any Net Interest calculation that is non-iterative, canonical, and
represents the marginal GAAP valuation of an object's balance sheet
resource related revenues or expenses for each (o_i) .

Note that in firms that are highly leveraged, the use of COF/VOF separation leads to a significant and volatile piece of NI, the net difference between to sum of COF and the sum of VOF (after adjusting for EOAE per the following section) and the firm's total NI. This is known by a banker as "mismatch profits arising from the difference in tenors" (duration) of the assets and liabilities. If VOF and COF rates are based on matched maturity of objects then the difference between the firms total NI and the sum of the objects is the profit arising from the firm having different duration of balance sheet related objects. Since this profit is not related to a specific object, but the combination of objects in the enterprise, a separate profit measure is appropriate and possible using DPM's approach. The use of the rules above allow for a novel method of calculating funds transfer pricing, since the rules are based on sets, the processing can be preformed in parallel. Further, since the rules are canonical this approach leads to a computationally efficient method of calculating these types of profit values.

NI CALCULATIONS OF EOAE

Since GAAP financial statement's balance sheet is based on the balancing equation Assets equals Liabilities plus Equity, NI should be adjusted for the value of the Equity resource consumed by each Asset or Liability object. Calculating Earnings on Allocated Equity as part of an object's NI:

Four exclusive options are provided for allocating equity to objects. DPM's options are as follows:

- Option 1 No calculation of EOAE.
- Option 2 EOAE calculation based on a simple equity ratio.
- Option 3 Equity allocation for all assets following regulatory standards.

- Option 4 Equity allocation using an economic allocation rule, based on object cohorts and modern portfolio theory's capital asset pricing model.

Option 1 (85)

$$EOAE(o_i) = 0$$

Option 2 (86)

Let $AB_{(asset, t)}(o_i)$ = Average Asset balances of the object o_i , including any allocated asset balances

ER = Equity Ratio

R_{equity} = Treatment Rate for equity

$$\text{Then, } EOAE(o_i) = R_{equity} * ER * \sum AB_{(asset, t)}(o_i)$$

where the summation is taken over all asset balances.

Option 3 (87)

Let $Amount(o_i)$ = Amount(s) associated with object 'a' This may be the average asset balances of the object ' o_i ' including any allocated asset balances, or may be an object parameter, etc.

$Wt(type(o_i))$ = Code needed to identify the weight for object o_i balances, at the object-type level

$W(Wt(type(o_i)))$ = determined by the weight code

$Cap\ Ratio$ = An appropriate risk-weighted capital ratio chosen

R_{equity} = Treatment Rate for equity

$$\text{Then, } EOAE(o_i) = R_{equity} * \sum [Amount(o_i) * W(Wt(o_i)) * Cap$$

Ratio]

where the summation is taken over all balances of o_i if there are multiple amounts.

Option 4 (88)

Let $\text{Amount}(o_i)$ = An amount or amounts related to the object, such as average balances of the object (denoted $\text{AB}_{(c,s,t)}(o_i)$)

$\text{Cohort}(o_i)$ = The cohort of objects in which object o is a member

$\text{E}_{\text{cohort}}(o_i)$ = The equity allocation rule for the cohort of object o . This is a linear (two-valued) function that operates on $\text{Amount}(o_i)$ of the form $\alpha + \beta * \text{Amount}(o)$.

R_{equity} = Treatment Rate(s) for equity for the $\text{Amount}(o_i)$ value(s)

$$\begin{aligned} \text{Then, } \text{EOAE}(o_i) &= \sum R_{\text{equity}} * \text{E}_{\text{cohort}}(o)(\text{Amount}(o_i)) \\ &= \sum R_{\text{equity}} * [\alpha + \beta * \text{Amount}(o_i)] \end{aligned}$$

where summation occurs if $\text{Amount}(o_i)$ is a set of values (such as the object and allocated balances related to the object).

4. Calculate Other Revenue for All Objects (see Fig. 9)

OR Calculation Rule Type I (90)

Let OR_i = Financial Statement Other Revenue attribute subset ,
 $\text{OR}_i(o_i)$ = The amount of OR_i apportioned to object o_i ,
 $O(\text{OR}_i)$ = the objects that map to OR_i .

Let M be an OR calculation method, where M is dependent upon the OR subset under consideration. We then have the following.

If $M(\text{OR}_i)$ = a "balance" attribute method.

Define

$M(OR_i)(o_i)$ = An average balance method for calculating o_i 's OR

$$\text{and } OR_i(o_i) = OR_i * \frac{\text{Balance}(o_i)}{\sum_j (\text{Balance}(o_j))}$$

where the summation is over all o_j in $o_i(OR_i)$.

If $M(OR_i)$ = A "count" method for calculating o_i 's OR

Define

$$M(OR_i)(o_i) = 1$$

$$\text{and } OR_i(o_i) = OR_i * \frac{1}{(\text{count}(a_j) \text{ in } O(OR_i))}$$

where the count is over all o_j in $o_i(OR_i)$.

If $M(OR_i)$ = "event count," we can define

$M(OR_i)(o_i)$ = Count of events in profit measurement period for object o_i

$$\text{and } OR_i(o_i) = OR_i * \frac{\text{count of events for object } o_i}{\sum_j (\text{count of events for object } (o_j))}$$

where the summation is over all o_j in $o_i(OR_i)$.

If $M(OR_i)$ = "event amount"

$$\text{Define } M(OR_i)(o_i) = \sum_{\text{events over the period}} (\text{event amounts for } o_i)$$

$$\text{and } OR_i(o_i) = OR_i * \frac{\sum_{\text{events over the period}} (\text{event amounts for object } o_i)}{\sum_j \sum_{\text{events over the period}} (\text{event amounts for object } o_i)}$$

where the summation is over all events in $o_i(OR_i)$,

and the events are restricted to a class of event type. Then, we have the total OR for object o given by the sum of these allocations for all sets for which a has an association:

$$OR(o_i) = \sum (OR_i(o_i)), \text{ summing over } i.$$

As a generalization, these formulas can be written in shorthand

where $M(OR)$ is the corresponding function of 'o' above, as:

$$OR_i(o_i) = OR_i * \frac{M(OR_i)(o_i)}{\sum_j M(OR_i)(o_i)}$$

and

$$OR(o_i) = \sum_i^{o_i \in O(OR_i)} \left[OR_i * \frac{M(OR_i)(o_i)}{\sum_j M(OR_i)(o_i)} \right]$$

OR Calculation Rule Type II (91)

The formula for OR calculation is given as follows:

Let o_i = Object being considered

$OR_i(o_i)$ = OR apportioned to a (if any) from a set OR_i

$Event(t)_i(o_i)$ = The event reflecting the activity of object o_i in the period restricted to a given event type t .

$Amount(Event(o_i))$ = An event amount

$Rev(Evt_i(o_i))$ = The revenue amount associated with this event.

This is

assumed to be of the form

$$= \sum_{type\ t} \sum_i \left[x_i * Count(Event(t)_i(o)) + \beta_i * Amt(Event(t)_i(o)) \right]$$

where α , β are pre-entered values.

$OR(o_i)$ = Total OR apportioned to object o_i

Then $OR(o_i)$ = $\sum_{type\ t} \sum_i (Rev(Event(t)_i(a))$ summed over all the events of o_i

+ apportioned revenue as in the Type I case.

$$= \sum_{type\ t} \sum_i \left[x_i * Count(Event(t)_i(a)) + \beta_i * Amt(Event(t)_i(a)) \right] +$$

$$\sum_i (OR_i(o_i))$$

OR Calculation Rule Type II (92)

Let o_i = Object being considered

$OR_i(o_i)$ = OR apportioned to the object (if any) from a set OR_i

$Event(t)_i(o_i)$ = The events reflecting the activity of object o in the period

restricted to a given event type t

$Amount(Event(t)_i(o_i))$ = The event amount

$Rev(Event(t)_i(o_i))$ = The revenue amount associated with this event.

This is assumed to be of the form

$$= \sum_{type t} \sum_i [x_i * Count(Event(t)_i(o)) + \beta_i * Amt(Event(t)_i(o))] \text{ where } \alpha, \beta$$

are pre-entered values based on event type. For completeness, $\alpha = \beta = 0$ in the event amount is null.

AM = The method of amortization = cash, SL, DB, interest

$AM_k \{amount\}$ = Deferral on amount, using method AM , at time k (= 0 if $k > \text{life}$);

and life = 1 if cash basis is selected

$AM_{now} \{amount\}$ = Deferral on amount, using method M , at this period now; note

that this is at various points of life for various amounts

Let $OR(o_i)$ = Total OR apportioned to object o_i .

Then $OR(o_i)$ = Amortized amounts in their first amortization period
+ amortized amounts in their higher amortization periods

+ amounts not amortized but apportioned from a pool as in Type I

We take this step at a time. First, consider the amounts in their first amortization period. These are calculated as follows, using the formula generated in Type II:

$$\begin{aligned} \text{Then } OR(o_i) &= \sum_{\text{type } t} \sum_i (\text{Rev}(\text{Event}(t)_i(o_i)) \text{ summed over all the} \\ &\quad \text{transactions of} \\ &\quad + \text{apportioned revenue as in the Type I case.} \\ &= \sum_{\text{type } t} \sum_i \left[x_i * \text{Count}(\text{Event}(t)_i(o_i)) + \beta_i * \text{Amt}(\text{Event}(t)_i(o_i)) \right] \\ &+ \sum_i (OR_i(o_i)) \end{aligned}$$

where the AM_1 methods vary with the event types. We can group the amounts being amortized by their amortization characteristics. For this purpose, let

$\text{Pool}_1(L, M)$ = the pools of amounts amortizing in this period for the first time according to life L and amortization method M . The new amortizing amounts can be rewritten as follows:

$$\text{New amortized amounts} = \sum_{L, M} \text{Pool}_1(L, M)$$

Similarly, define

$\text{Pool}_k(L, M)$ = the pools of amounts amortizing in this period for the k^{th} time according to life L and amortization method M , where $L \leq k$. N.B. any amortization calculation can be used if the calculation can be derived using known Object Attributes.

Then, the total OR for object o_i in this period is computed as follows:

$$\begin{aligned}
OR(o_i) &= \sum_{type} \sum_i \left[x_i * Count(Event(t)_i(o_i)) + \beta_i * Amt(Event(t)_i(o_i)) \right] \\
&\quad + \sum_{k>1} \sum_{L,M} Pool_k(L, M) \\
&\quad + \sum_i (OR_i(o_i)) \\
&= \sum_k \sum_{L,M} Pool_k(L, M) + \sum_i (OR_i(o_i))
\end{aligned}$$

OR Calculation Rule Type IV (93)

Foregone OR:

Let Actual OR for object $o_i = OR_{actual}(o_i)$ - CASH AMOUNTS

Let Expected OR for object $o_i = OR_{expected}(o_i)$

Then, Foregone OR for object $o_i = OR_{foregone}(o_i) = OR_{expected}(o_i) -$

$OR_{actual}(o_i)$ - CASH AMOUNTS

OR Calculation Rule Type V (94)

Any Other Revenue calculation that is non-iterative, canonical, and represents the entire GGAP valuation of non-balance sheet resource related revenues or expenses.

5. Calculate Direct Expense for All Objects (see Fig. 10)

DE Calculation Rule Type I (100)

None directly specified - use IE calculation rules (any type). For each IE rule used in this way, substitute $DE(o_i)$ for $IE(o_i)$ in any IE calculations used as DE.

DE Calculation Rule Type II (101)

Direct expense will be a variable dependent upon the object and the event being costed. These determine the unit cost to be used and the

calculation type, along with the multiplier rule being used if external amounts are needed. Thus, using subscripts to indicate variables used,

$DE_{\text{object, event-type}}$

= unit cost_{event type} * (no. of events of this type in the period)

+ amounts taken from an event file

+ costs calculated as a

percentage of Event Amount Where the unit costs, and revenue

percentage by event type, are all entered by the user as pre-processing inputs.

Then, $DE_{\text{object}} = \sum_{\text{event types}} DE_{\text{object, event-type}}$ where the summation is over event

types.

DE Calculation Rule Type III (102)

$DE_{\text{object, event-type, event-sub}}$

= unit cost_{event type} * (no. of events of this type in the period)

+ amounts taken from an event file

+ costs calculated as a percentage of event amount

DE Calculation Rule Type IV (103)

Two calculations are made, each one using the above calculations, processing two independent DE attributes for each object. DE is calculated twice for each object, allowing for comparison of plan to actual values or standard to actual values or any scenario to scenario comparison.

DE Calculation Rule Type V (104)

Any Direct Expense calculation that is non-iterative, canonical, and represents the entire GGAP valuation of costs related to object or sub-object level details.

6. Calculate Provision for All Objects (see Fig. 11)

P Calculation Rule Type I (110)

The formula for calculating P of Object i is as follows, where PG(o_i) denotes the P group in which o_i is a member:

$$P(o_i) = PG(o_i) * \frac{\text{Balance of } o_i}{\sum_{o_k \in RPG(o_i)} \text{Balance } o_k}.$$

P Calculation Rule Type II (111)

The formula for calculating P of o_i is as follows, using the same symbols as above and RF(o_i) denotes the expected adjustment factor for o_i:

$$P(o_i) = PG(o_i) * \frac{\text{Balance}(o_i) * RF(o_i)}{\sum_{o_k \in RPG(o_i)} [\text{Balance}(o_k) * RF(o_k)]}.$$

P Calculation Rule Type III (112)

The formula for calculating P of object "o_i" is as follows, where Pr(o_i) is a probability for object o_i.

$$P(o_i) = \text{Exposure}(o_i) * Pr(o_i) * \text{Expected Value Adjustment}(o_i) * \frac{1}{L_i}$$

Where L is the expected number of reporting periods during the life of o_i.

P Calculation Rule Type IV (113)

The addition of any of the Type I, II or III P rules applicable to an object i.

$$P(o_i) = P(o_i)_{P \text{ Type I}} + P(o_i)_{P \text{ Type II}} + P(o_i)_{P \text{ Type III}} + P(o_i)_{P \text{ Type IV}}$$

P Calculation Rule Type V (114)

Any Provision calculation that is non-iterative, canonical, and represents the entire GGAP valuation of expected costs related to future events, contingencies, timing effects.

7. Calculate Indirect Expense for All Objects (see Fig. 12)

Indirect expense, by its nature is not related directly to an Object, therefore apportionment techniques are used to allocate indirect expense to an Object. Any apportionment function is allowed as long as it is derivable at the object level using ratios of attributes available at the object level to the summation of this available attribute across all objects receiving the apportioned expense. Examples of this type of ratio calculation (the function "F" used in the IE calculation types) are:

- Ratio 1: Balance-based apportionment of IE.
Define Apportionment ratio using Current Balance of (o_i).

Thus, the allocation of Indirect Expense k becomes (function $F(IE_k)(o_i)$ in IE rules below):

$$IE_k * \frac{\text{Current Balance of } o_i}{\sum_j (\text{Current Balance of } o_j)}, \text{ summed over all objects in grouping } j.$$

- Ratio 2: Count-based apportionment of IE

Thus, the allocation of Indirect Expense k becomes (function $F(IE_k)(o_i)$ in IE rules below):

$$IE_k * \frac{1}{(\text{count of } o_j \text{ in } O(IE_k))}, \text{ for all objects in grouping } j.$$

- Ratio 3: Revenue-based apportionment of IE
Define $NI(o_i) + OR(o_i) = \text{Total Revenue}$ (using NI & OR rules above) for (o_i).

Thus, the allocation of Indirect Expense k becomes (function $F(IE_k)(o_i)$ in IE rules below):

$$IE_k * \frac{NIR(o_i) + OR(o_i)}{\sum_j (NIR(o_j) + OR(o_j))}, \text{ summed over all objects in grouping } j$$

- Ratio 4: Event Count apportionment of IE
Count of events for (o_i) are restricted to an event type.

Thus, the allocation of Indirect Expense k becomes (function F(IE_k)(o_i) in IE rules below):

$$IE_k * \frac{\text{count of event for object } o_i}{\sum_j (\text{count of event for object } (o_j))}$$

for some event type, summed over all objects in grouping j.

- Ratio 5: Transaction Amount apportionment of IE
Summation of event amounts for (o_i), restricted to an event type.

Thus, the allocation of Indirect Expense k becomes (function F(IE_k)(o_i) in IE rules below):

$$IE_k * \frac{\sum_{\text{event over the period}} (\text{event amounts for object } (o_i))}{\sum_j \sum_{\text{event over the period}} (\text{event amounts for object } (o_j))},$$

for some event type, summed over all objects in grouping j.

- Ratio 6: Direct Expense apportionment of IE
Using DE rules above for O_i.

Thus, the allocation of Indirect Expense k becomes (function F(IE_k)(o_i) in IE rules below):

$$IE_k * \frac{DE(o_i)}{\sum_j (DE(o_j))}, \text{ summed over all objects in grouping } j.$$

- Ratio 7: Normalized (averaged) apportionment of IE

Thus, the allocation of Indirect Expense k becomes in IE rules below:

$$F(IE_k)(o_i) = [IE \text{ using Ratio 1 } F(IE_k)(o_i) + IE \text{ using Ratio 3 } F(IE_k)(o_i) + IE \text{ using Ratio 6 } F(IE_k)(o_i)] \div 3.$$

IE Calculation Rule Type I (120)

Indirect expense is apportioned to accounts using one of the first three apportionment ratios above. Accordingly, using the nomenclatures above,

$$IE(o_i) = (\text{Total IE to be apportioned}) * \frac{F(IE_k)(o_i)}{\sum_k F(IE_k)(o_i)}$$

IE Calculation Rule Type II (121)

The rules for partitioning IE and defining corresponding object groups are based on product and event attributes. The calculation of $IE(o_i)$ is exactly as described above, and is given by the following, where the F 's are the given apportionment ratios (any of the seven apportionment ratios are permitted for any partition O or groupings of objects).

$$IE(o_i) = \sum_k^{o_i \in O(IE)} \left(IE_k * \frac{F(IE_k)(o_i)}{\sum_j^{o_j \in O(IE)} F(IE_k)(o_j)} \right)$$

IE Calculation Rule Type III (122)

For Indirect Expense before deferral calculations, the process is similar to that as listed for the Type II Level, where:

$$IE(o_i) = \begin{aligned} & \text{New amounts in their first period of amortization} \\ & + \text{Amounts not being amortized (cash basis)} \\ & + \text{Amounts in their 2}^{nd} \text{ through last amortization period.} \end{aligned}$$

Since we include non-amortized amounts (cash basis) to be considered as amortized with only one period, this is re-written as follows:

$IE(o_i) =$ New amounts in their first period of amortization (including cash-basis)

+ Amounts in their 2nd through last amortization period.

Note that non-amortized amounts are made to fit this equation by considering them to be an amortization of one profit reporting period only. Each IE set can have a different amortization type or period, though all objects receiving a specific apportionment will share the same amortization Rule.

The new amounts to be deferred are computed, therefore, as the following:

$$\text{Before deferral } IE(o_i) = IE_k * \frac{F(IE_k)(o_i)}{\sum_{o_j \in O(IE)} F(IE_k)(o_j)} \text{ added over each set } IE_k \text{ to}$$

which o_i is related.

$$= \sum_k^{o_i \in O(IE)} \left(IE_k * \frac{F(IE_k)(o_i)}{\sum_{o_j \in O(IE)} F(IE_k)(o_j)} \right)$$

Each of these terms may be deferred over its amortization period according to any of the amortization rules (cash, straight line, declining balance, or interest amortization calculations). Since amortization methods may vary by set, we have the following, where $AM_1(L,R)$ is used to denote the amortization rule and its life:

$$IE(o_i) = \sum_k^{o_i \in O(IE)} AM_1(L,R) \left(IE_k * \frac{F(IE_k)(o_i)}{\sum_{o_j \in O(IE)} F(IE_k)(o_j)} \right)$$

To this is added the amounts with remaining amortization life for which amortization was begun in earlier periods.

IE Calculation Rule Type IV (123)

Multiple combinations of the any of the above IE type rules I, II, or III are calculated per object.

IE Calculation Rule Type V (124)

Any Indirect Expense apportionment calculation that is non-iterative, canonical, and represents the GAAP evaluation of indirect costs.

8. Calculate After-Tax Object Profit for All Objects (130)(see Fig. 13)

$$\text{Profit}(o_i) = [\text{NIR}(o_i) + \text{OR}(o_i) - \text{DE}(o_i) - \text{IE}(o_i) - \text{P}(o_i)] * (1 - \text{EffectiveTaxRate})$$

where, for a two tier taxation system, Effective Tax Rate is calculated as:

$$\text{Effective Tax Rate} = (1 - \text{tax rate 2}) * (\text{tax rate 1}) + \text{tax rate 2}.$$

In the calculation of Effective Tax Rate, this formula assumes the two rates are effective rates which apply to the business conditions (not the nominal statutory rates), and that tax rate can be deducted from income in the calculation of tax rate. Then,

$$\text{Total Profit} = \sum_i [\text{Profit}(o_i)]$$

For those companies which use economic profit value calculations, the formula changes to:

$$\text{Profit}(o_i) = \{[\text{NIR}(o_i) + \text{OR}(o_i) - \text{DE}(o_i) - \text{IE}(o_i) - \text{P}(o_i)] * (1 - \text{EffectiveTaxRate})\} - \text{SVA}(o_i)$$

where

$$\text{SVA}(o_i) = \alpha(o_i) + \beta(o_i) * \text{Amount}(o_i)$$

and

$\alpha(o_i)$, $\beta(o_i)$ are functions for a cohort of objects in which o_i is a member, and $\text{Amount}(o_i)$ is given by a rule which maps o_i to a data value (such as balance, or allocated equity) also defined at the cohort level. (A cohort defined here represents a grouping of objects with

similar risk characteristics, consistent with Modern Portfolio Theory and the Capital Asset Pricing Model.)

Shareholder Value Add (SVA) is a method financial analysts use to adjust profit measures for risk. The idea is to subtract from the profit measure the cost of the equity required to support whatever is being measured. Companies use this risk adjustment measure essentially to burden the profit for risk being taken with the equity funds used by the object. These institutions will classify cohorts of risk and the risk cost equivalent as a percentage of account balance or allocated equity (i.e., "Hurdles").

DPM Example

In the airline industry a need for detailed customer profitability can be measured using DPM. Here the fundamental object is the seat, allowing consistent profitability values aggregated by route, aircraft type, as well as customer dimensions using data warehousing technology. The need for detailed customer profitability is being driven by the business impact analysis required to support loyalty and alliance strategic decisions. The following is a DPM profit calculation for a seat, with real profit measurement parameters simplified (not all aspects of true airline business is demonstrated) and where examples of each type of rule are utilized in DPM processing.

Flight: Air101

Date: 7/1/1998

From: London

To: New York

Equipment: Boeing 747-400

Classes: First (20 Seats); Business (80 Seats); Economy(300 seats)

DETAILED PROFIT METRIC PROCESSING

Step 1: Populate Database – assuming a relational database management system and terminology.

- Initialize database;
Extract, Condition, and Load the following tables: Planes, Flights, Customers, Employees, Locations; The net balances in the Planes entity can be maintained by use of DPM amortization IE calculation from the prior period.
- Extract, Condition, and Load the following tables: Financial Transactions, Events; Manifest (occupant, seat, flight, date attributes);
- Extract, Condition, and Load the Financial Statement table;
- Calculate and populate Rate table;

Figure 14 shows a partial relational database schema showing the entities and attributes used in the example's processing.

Step 2: Maintain Object Groups and Rule Maps – a database processing routine is run creating the following groupings:
Class to Seat

- Flight to Locations
- Seat to Plane

For ease in understanding the rule the specifications used to populate the database with rule parameters the processing instructions are shown below in the Rules. Also, most rules group by plane – the rule discussion below assumes this grouping without reference.

Step 3: Calculate Net Interest for Seat – Four types of NIR rules are processed - type I, II, III, IV for each seat. Interest rates are matched to plane purchase date for initial plane investments, and interest rates for plane net capitalizable improvements are funded with a 5 year pool of rates. Plane asset balances are kept in the Plane table maintained in Step 1.2 above.

NIR Type I: Carry cost of plane asset by seat is determined.

Rule

Populated in Step 2 are:

- The AAB(seat) parameter is Plane: net__orig_bal * (1/total seats on plane)
- The rt parameter is Treatment_rts: 25_yr_rate (maintained for each plane) There is no need for liability rates.

Calculate COF(seat) = AAB(seat) * rt for all seats on flight.

All other attributes are NI Type I calculations results are null.

No grouping.

NIR Type II : Allocate net receivable/payable to seat for carry cost profit adjustment. This adjusts profitability for the impact of cash flows vs. accounting flows. This airline wants to apportion this cost across all revenue seats based on class_wt, a modelling parameter. Total weighted seats (twS) for the accounting period is a modelling parameter. Where the seat factor is determined as a ratio of seat footprint to class portion of the plane's seat revenue space. (e.g. 1st = 15%, 2nd = 25% & 3rd = 60% of plane's seat revenue space with each seat evenly apportioned in class – 1/20, 1/80, 1/300 respectively, in this case.)

Rule

Populated in Step 2 are:

- The AB(seat) parameter is Financial: net_recv'ble * (1 / twS)
- The rt parameter is Treatment_rts: pool (for null plane row) There is no need for liability rates.

Calculate COF(seat) = AB(seat) * rt * class_wt

Grouped by class all seats, so no_seats??? is no_seats1st value in the plane entity for first class seats on this plane, and

so on for 2nd & 3rd class seat groups. The net recv'ble column is derived from the difference between sum of period_amts for the receivables minus sum of payable rows for this profit period.

All other attributes and NI Type II calculations results are null.

NIR Type III : Calculate the NI value of the customer mileage benefit payable for each seat.

Rule

Populated in Step 2 are:

- The AB(seat) parameter is Customer: bene_miles * loyalty factor
- The rt parameter is Treatment_rts: pool (for null plane row) There is no need for an asset rate.

Calculate COF(seat) = AB(seat) * rt

Since a customer can only occupy one seat, no groupings are used in this rule map.

All other attributes and NI Type III calculations results are null.

NIR Type IV : Calculate the NI impact of the plane's improvements for each seat. Upper classes interior, customer electronics and seating are improved faster during the life of the plane. Management strategy is for these improvements to be loyalty program related; they are amortized quicker and hence shorter funding requirement with less certain life. Management wants the loyal customers to pay proportionately more of the funding costs of improvement assets.

Rule

Populated in Step 2 are:

- The AB(seat) parameter is Plane:imp_net_bal * (1/tsw)

- The rt parameter is Treatment_rts: pool (for plane row)
* Customer: loyalty_rtn

There is no need for a liability rate.

Calculate COF(seat) = AB(seat) * rt * class_fac

The unique class_fac values sum to 1. The rule map is grouped by classes (or class_fac).

All other attributes and NI Type IV calculations results are null.

NI EOAE- Option 4: Allocate equity based on mileage benefit and have it reduce NI by the weighted average cost of capital for the airline.

Rule

Populated in Step2 are:

- The Amount(seat) parameter is Customer:bene_miles
- The equity rate is 9.75%

Calculate EOAE(seat) = Amount(seat) * equity_rate * cohort_wt

The cohort is based groups of each instance of loyalty_rtn and class of seat paired. Cohort_wt is "beta" and no "alpha."

All other attributes and EOAE calculations results are null.

Step 4: Calculate Other Revenues for each Seat – Revenue arises from ticket fares, duty free sales on board aircraft, excess baggage penalties collected, alliance code sharing license and multiple leg customer trips.

OR Type I : Apportion revenue from code sharing with alliance.
Apportion revenue by seat allocated to alliance passenger.

Rule

Populated in Step 2 are:

- Flight:period_amt is alliance revenue per flight plus the sum of all flight/date alliance financial transactions.

Calculate $OR(seat) = \text{sum of Flight:period\_amt} \times$

$(1 / \text{no alliance seats available on flight})$

Only for seats occupied by an alliance customer or a seat that is empty.

OR Type II: Use Transaction table to find direct passenger revenue by seat.

Rule

Populated in Step 2 are:

- Transaction:* (amounts, seats, flight, date, transaction type) are populated for events, financial or non-financial.

Calculate $OR(seat) = \text{sum of Transaction:trn\_amt}$

where type = "passenger_payment" for each seat.

No seat grouping in rule map.

OR Type III: Apportion flight freight revenue amongst all seats, weighted by class_wt.

Rule

Calculate $OR(seat) = \text{sum of Transaction:trn\_amt} \times \text{class\_wt}$

*

$(1 / (\text{no\_seats}???)$

where type "freight" for each seat.

Group seats by class (??? Is 1st, 2nd, 3rd.) Class_wt is a normalized weight for apportioning revenue amongst classes.

OR Type IV: Calculate the loyalty mileage benefit by seat.

Rule

Calculate Forgone $OR(seat) = \text{Flight: ???\_fare} - \text{sum of Transactions:trn\_amt}$ where type = "passenger_payment" for each seat.

Group by class for loyalty passenger occupied seats only.

Step 5: Calculate Direct Expenses for each Seat –

Compute the direct cost of using the seat. This is true for both occupied and unoccupied seats. Fuel and flight deck crew are costs of all seats, while cost of duty free goods sold and meals are a function of occupied seats. Some costs are a function of the plane taking off, no matter the duration of the flight (e.g., maintenance.) Some costs are a function of class, such as cabin crew expense and customer consumables.

DE Type I: Show direct cost of non-food materials consumed in flight.

Rule

Populated in Step 2 are:

- Transactions:* is populated based on these direct costs.

Calculate DE(seat) = Transactions:trn_amt for all flight and date rows where type = direct_exp for each seat.

No grouping in rule map.

DE Type II: Show direct cost duty free goods sold by seat.

Rule

Populated in Step 2 are:

- Transactions:* are populated based on these direct costs.

Calculate DE(seat) = Transactions:trn_amt for all flight and date rows where type = duty_free for each seat.

No grouping in rule map.

DE Type III: Show direct cost of food and beverage consumed.

Rule

Populated in Step 2 are:

- Transactions:* are populated based on these direct costs
- Loading is calculated as the ratio of occupied to total class seats by class (cl_load) using manifest table and plane configuration values.

Calculate DE(seat) = Flight: catering_cost * class_wt * cl_load
for each seat.

Grouped by class in rule map.

DE Type IV: The staffing of each cabin has a maximum count with a minimum of 1 per 50 passengers. The air deck crew must fly the plane even if there are no passengers. Calculate DE twice, once for based on a labor cost per seat based on total crew cost and total seats; and calculate DE a second time with actual staff apportioned to actual passengers.

Rule

Populated in Step 2 are:

- Total crew cost (tcc1) parameter is derived using the employee entity for all crew on flight. $Tcc = \text{Employee:salary+bene} * (\text{Flight:schd\_hours} + 1.5) / 110$
- Total crew cost (tcc2) parameter is derived using the employee entity for all crew on flight by class. $Tcc??? = \text{Employee:salary+bene} * (\text{Flight:schd\_hours} + 1.5) / 110$

Note: $tcc = tcc1st + tcc2nd + tcc3rd$

Calculate DE1(seat) = $tcc * (1/(\text{total no. of seats on plane}))$

Calculate DE2(seat) = $tcc?? * (1/(\text{no. of seats occupied in class}))$

for each seat.

Grouped by class in rule map.

Step 6: Calculate Provisions for each Seat – The cost of expected future events are measured here. The airline self insures property, casualty and miscellaneous insurance premiums on a per flight basis. And a provision for future loyalty benefit, a function of loyalty rating, claimed is made in step 6.

P Type I: - The cost of the flight's insurance premium is apportioned to each seat.

Rule

Populated in Step 2 are:

- Insurance premium is maintained in the flight entity (total PG)

Calculate $P(\text{seat}) = \text{Flight:ins\_prem} * 1/(\text{total no. seats on plane})$

No grouping in rule map.

P Type II: Provision for unusual maintenance cost is made on a function of the inverse of flight time and takeoffs in the last 12 months.

Rule

Populated in Step 2 are:

- Financial:period_amt is maintained in the financial entity by equipment type.
- Total flight hours and last 12 months take-offs are accumulated each month, their product is to_hrs parameter.

Calculate $P(\text{seat}) = \text{Financial:period\_amt} * 1/(\text{total no. of seats on plane}) * (\text{Plane:to\_last12} * \text{Flight:schd\_hrs}) / \text{to\_hrs}$

No seat grouping in rule map.

P Type III: Providing for future loyalty benefit.

Rule

Populated in Step 2 are:

- Customer:bene_miles is maintained using prior periods provision for benefit miles by loyalty customer
- A parameter estimating the usage rate by loyalty cohort called burn factor

Calculate $P(\text{seat}) = \text{Flight:distance} * \text{burn}(\text{loyalty\_rating})$

Grouping by loyalty rating in rule map.

P Type IV: Future order cancellation reserve.

Rule

Populated in Step 2 are:

- Future airplane order cancellation penalty (pen) and order size (fut_planes) is maintained in the financial entity
- Last 12 months loading is calculated by plane

Calculate $P(\text{seat}) = \text{pen} * (\text{Plane:orig\_bal} / \text{fut\_planes}) * 1 / (\text{total no. seats on plane}) * 1/24$. where last 12 months loading less than 75%.

Only seats on where last 12 months loading less than 75%.

Step 7: Calculate Indirect Expenses for each Seat – The calculation of indirect expense is the final step of detailed level profit calculation. Here remaining cost measures that are not differentiable by seat are measured. Fuel and oil, ground costs, regular aircraft maintenance, overheads, and general marketing expenses are apportioned in IE. The airline also wants to view customer profitability loaded with the cost of unoccupied seats.

IE Type I: General and administrative costs are apportioned to a seat in this rule.

Rule

Populated in Step 2 are:

- The periods financial entity is populated with all of the airlines G&A expenses (e.g., type of G&A are passenger services, navigation licenses, rentals, miscellaneous costs, premises and property taxes.) Allocate these costs based on seat revenue (NI + OR.)

Calculate $IE(seat) = \frac{\text{sum}(\text{Financial:trn\_amt})}{(\text{sum}(\text{NI}(seat)) + \text{sum}(\text{OR}(seat)))} \times (\text{Total OR} + \text{NI for period})$

No seat grouping in rule map for all Financial:type = "G&A".

IE Type II: Ground location costs, airport specific and gate expenses are apportioned by flight.

Rule

Populated in Step 2 are:

- Populate all of these expenses for the period Transactions:trn_amt with the type being the three letter international airport identifier.
- Calculate the number of seats flown to the flight airports during the profit period (tfc)

Calculate $IE(seat) = \frac{\text{sum of Transactions:trn\_amt}}{(1 / \text{tfc}) / 2}$

Group transactions by pair of airports in flight row for rule map, where only these types of expenses are included in the tuple.

IE Type III: Fixed asset depreciation is allocated to a seat.

Rule

Populated in Step 2 are:

- The net plane balances (Plane:net_orig_bal & Plane:imp_net_bal) are updated for last period's amortization or write-off.

- The amortization factor (function of amortization) given age of asset (for both original investment and improvements) is amfo and amfi for each plane.
- The tax planning estimate for taxable equivalent gross-up, due to accelerated tax amortization, is .8 = teg (less than 1 since a tax credit)

Calculate IE(seat) = ((Plane:net_orig_bal - Plane:orig_bal) * amfo) + (Plane:imp_org_bal - Plane: imp_org_bal) * amfi)) * teg *
(1 /(total no. seats on plane)) * (Flight:schd_hrs / Plane:hrs_last_12 / 12)

No grouping of seats in rule map.

IE Type IV: Indirect marketing expenses are apportioned by loyalty class for customer profit aggregations and by seat for other aggregations.

Rule

Populated in Step 2 are:

- Indirect marketing expense per loyalty tier per flight is ~~parameterized~~ parameterized as mef???, where ??? is 1st, 2nd, 3rd class.

Calculate IE(seat) = mef??? * (1 / (no. of occupied seats in ???))

Group seats by class in rule map.

IE Type V: For loyalty investment analysis, allocate all DE for empty seats to occupied seats equally.

- Populated, after all prior steps are ~~calculated~~ calculated, are the total DE less OR for each flight during the period, idef.

Calculate IE(seat) = idef / (total no. of occupied seats)

Only calculate for occupied seats.

Step 8: Calculate After-tax Seat Profit – The

After-tax Profit:

Rule

Populated in Step 2 are:

- The effective tax rate (etr) for the airline is maintained in the database.

Calculate Profit(seat) = sum(NI(seat) + OR(seat)
+DE(seat) + IE(seat) + P(seat)) * (1-etr)

Each seat is calculated individually, no grouping is used.

Shareholder Value-add: The airline has determined that some routes have a greater risk of loss due to the volatility of loading factors. Therefore each route is given a risk factor based on the last 12 months standard deviation of loading.

Rule

Populated in Step 2 are:

- Flight:risk_factor is maintained here
- Economic equity per average seat parameter (Flight:risk_factor) per route
- Cost of capital rate is ~~parameterized~~ parameterized (eqrt)

Calculate SHV(seat) = Profit(seat) – (Flight:risk_factor *
eqrt)

Each seat is calculated.

From the foregoing, it will be appreciated that DPM provides a metric of profit measurement consistent with GAAP at a level of detail that has not been accomplished using the traditional General Ledger based data with analytical and/or sample survey based information.

This new ability to resolve profit measures at a detailed level without using analytical models or statistical extrapolation is a capability needed throughout industries that find their ability to determine a marginal decision's profit impact inadequate for optimization of ownership value. The use of rule driven and database measurement processes will give large scale businesses a lower cost of maintenance and technologically

scaleable tool to measure profit at a level of precision or resolution not possible in prior financial performance measurement processes.

Although a particular embodiment of the invention has been described in detail for purposes of illustration, various modifications may be made without departing from the spirit and scope of the invention. Accordingly, the invention is not to be limited, except as by the appended claims.

ABSTRACT OF THE DISCLOSURE

A process for determining object level profitability includes the steps of (1) preparing information to be accessed electronically, (2) establishing rules for processing the prepared information, (3) calculating at least one marginal value of profit using established rules as applied to a selected set of prepared information, (4) calculating a fully absorbed value of profit adjustment using established rules as applied to the selected set of prepared information, and (5) combining the at least one marginal value of profit and fully absorbed value of profit adjustment to create a measure for object level profitability. The inventive process gives management profit measures tailored to its need for accurate decision oriented profit information required to manage a large organization based on profit measurement.

3

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

1. (Currently Amended) A process for determining object level profitability in a relational database management system, comprising the steps of:

providing an electronic relational database;

preparing information to be accessed electronically through the relational database management system by extracting, conditioning and loading object attribute values, financial statement attribute values and event attribute values into the relational database;

establishing, in the relational database, rules for processing the prepared information;

in the relational database, simultaneously and independently calculating independently in parallel at least one marginal value of profit for each object being measured using the established rules as applied to a selected set of prepared information;

in the relational database, calculating a fully absorbed profit adjustment value for each object being measured; and

combining the at least one marginal value of profit and the fully absorbed profit adjustment value to create a measure for object level profitability.

2. (Original) The process of claim 1, wherein the relational database comprises a structured query language (SQL).

3.-5. Canceled.

6. (Original) The process of claim 1, wherein the preparing step further includes the step of calculating opportunity values of funds used or supplied by each object being measured.

7. (Original) The process of claim 1, wherein the establishing step includes the steps of providing the information necessary to select objects, and performing the correct profit calculus.

8. (Original) The process of claim 1, wherein the step of calculating at least one marginal value of profit includes the steps of calculating net interest (NI), other revenue (OR) and direct expense (DE), wherein net interest (NI) is the summation of interest income, value of funds provided and earnings on equity funds used less the sum of interest expense and costs of funds used, other revenue (OR) is a measure of profit contribution from non-interest related sources, and direct expense (DE) is the profit value reduction due to marginal resource consumption by the object.

9. (Original) The process of claim 1, wherein the step of calculating at least one marginal value of profit includes the step of provisioning (P) for the selected set of prepared information, provisioning being the expected profit value adjustment for future outcomes related to the object.

10. Canceled

11. (Currently Amended) The process of claim 8-40, wherein the step of calculating a fully absorbed profit adjustment value includes the step of calculating the value for indirect expense (IE) which is an apportioned profit value adjustment for all non-object related resource consumption.

12. (Original) The process of claim 11, wherein the combining step includes the steps of adding net interest (NI) and other revenues (OR), and subtracting therefrom direct expense (DE), provisioning (P) and indirect expense (IE).

13. (Original) The process of claim 12, including the step of adjusting the measure for object level profitability for taxes and/or object economic value.

14.-15. (Canceled)

16.-43. (Withdrawn)

44. (New) A process determining object level profitability in a relational database management system, comprising the steps of:

providing a structured query language relational database;

preparing information to be accessed electronically through the relational database management system by extracting, conditioning and loading object attribute values, financial statement attribute values and event attribute values into the relational database;

establishing, in the relational database, rules for processing the prepared information;

in the relational database, simultaneously and independently calculating in parallel at least one marginal value of profit for each object being measured using the established rules as applied to a selected set of prepared information, including the steps of calculating net interest (NI), other revenue (OR) and direct expense (DE), wherein net interest (NI) is the summation of interest income, value of funds provided and earnings on equity funds used less the sum of interest expense and costs of funds used, other revenue (OR) is a measure of profit contribution from non-

interest related sources, and direct expense (DE) is the profit value reduction due to marginal resource consumption by the object;

in the relational database, calculating a fully absorbed profit adjustment value for each object being measured, including the step of calculating the value for indirect expense (IE) which is an apportioned profit value adjustment for all non-object related resource consumption; and

combining the at least one marginal value of profit and the fully absorbed profit adjustment value to create a measure for object level profitability.

45. (New) The process of claim 44, wherein the preparing step further includes the step of calculating opportunity values of funds used or supplied by each object being measured.

46. (New) The process of claim 44, wherein the establishing step includes the steps of providing the information necessary to select objects, and performing the correct profit calculus.

47. (New) The process of claim 44, wherein the step of calculating at least one marginal value of profit includes the step of provisioning (P) for the selected set of prepared information, provisioning being the expected profit value adjustment for future outcomes related to the object.

48. (New) The process of claim 47, wherein the combining step includes the steps of adding net interest (NI) and other revenues (OR), and subtracting therefrom direct expense (DE), provisioning (P) and indirect expense (IE).

49. (New) The process of claim 48, including the step of adjusting the measure for object level profitability for taxes and/or object economic value.

50. (New) A relational computation process measuring an individual or incremental decisions impact on profit, or fundamental object profitability, elemental to multiple business dimensions consistent with independently calculated total profit, the process comprising the steps of:

providing an electronic relational database;

preparing information to be accessed electronically through the relational database management system by extracting, conditioning and loading object attribute values, financial statement attribute values and event attribute values into the relational database;

establishing, in the relational database, rules for processing the prepared information;

in the relational database, simultaneously and independently calculating in parallel marginal profit measures using the established rules, including:

- a) marginal profit measures associated with balance sheet resources;
- b) marginal measures of non-balanced oriented revenues;
- c) marginal cost measures; or
- d) marginal measures of expected costs or revenues;

in the relational database, using the calculated marginal profit measures to calculate a fully absorbed profit adjustment value for each fundamental object being measured, including the step of calculating the value for an apportioned profit value adjustment for all non-object related resource consumption; and

combining the at least one marginal value of profit and the fully absorbed profit adjustment value to create a measure for fundamental object profitability.

51. (New) The process of claim 50, wherein the relational database comprises a structured query language (SQL).

52. (New) The process of claim 50, wherein the preparing step further includes the step of calculating opportunity values of funds used or supplied by each object being measured.

53. (New) The process of claim 50, wherein the establishing step includes the steps of providing the information necessary to select objects, and performing the correct profit calculus.

54. (New) The process of claim 50, wherein the step of calculating at least one marginal value of profit includes the step of provisioning (P) for the selected set of prepared information, provisioning being the expected profit value adjustment for future outcomes related to the object.

55. (New) The process of claim 50, including the step of adjusting the measure for object level profitability for taxes and/or object economic value.

56. (New) A relational computation process measuring an individual or incremental decisions impact on profit, or fundamental object profitability, elemental to multiple business dimensions consistent with independently calculated total profit, the process comprising the steps of:

providing an electronic structured query language relational database;

preparing information to be accessed electronically through the relational database management system by extracting, conditioning and loading object attribute values, financial statement attribute values and event attribute values into the relational database;

calculating opportunity values of funds used or supplied by each object being measured;

establishing, in the relational database, rules for processing the prepared information, including providing the information necessary to select objects, and performing the correct profit calculus;

in the relational database, simultaneously and independently calculating in parallel marginal profit measures using the established rules, including:

- a) marginal profit measures associated with balance sheet resources;
- b) marginal measures of non-balanced oriented revenues;
- c) marginal cost measures; and
- d) marginal measures of expected costs or revenues;

in the relational database, using the calculated marginal profit measures to calculate a fully absorbed profit adjustment value for each fundamental object being measured, including the step of calculating the value for an apportioned profit value adjustment for all non-object related resource consumption;

combining the at least one marginal value of profit and the fully absorbed profit adjustment value to create a measure for fundamental object profitability; and

adjusting the measure for object level profitability for taxes and/or object economic value.

57. (New) A relational computation process measuring an individual or incremental decisions impact on profit, or fundamental object profitability, elemental to multiple business dimensions consistent with independently calculated total profit, the process comprising the steps of:

providing an electronic structured query language relational database;

preparing information to be accessed electronically through the relational database management system by extracting, conditioning and

loading object attribute values, financial statement attribute values and event attribute values into the relational database;

establishing, in the relational database, rules for processing the prepared information, including providing the information necessary to select objects, and performing the correct profit calculus;

in the relational database, simultaneously and independently calculating in parallel marginal profit measures using the established rules, including:

- a) marginal profit measures associated with balance sheet resources;
- b) marginal measures of non-balanced oriented revenues;
- c) marginal cost measures;
- d) marginal measures of expected costs or revenues; calculating the marginal profit measures; and
- e) fully absorbed indirect expense.

58. (New) The process of claim 57, wherein the preparing step further includes the step of calculating opportunity values of funds used or supplied by each object being measured.

59. (New) The process of claim 57, including the step of adjusting the measure for object level profitability for taxes and/or object economic value.

REMARKS/ARGUMENTS

This Response is directed to the May 19, 2005 Office Action. This Office Action is one of a series of Office Actions, beginning with the January 26, 2004 Office Action. Applicant responded to the January 26, 2004 Office Action on May 26, 2004. In response, the Examiner mailed another Office Action on August 31, 2004, questioning whether the proposed additional subject-matter added to the descriptive portion of the Specification had adequate support. On September 22, 2004, Applicant responded to the August 31, 2004 Office Action, describing the support for the modifications to the Specification. On December 20, 2004, yet another Office Action was mailed from the Examiner. Once again, objecting to the May 26, 2004 Amendment, asserting once again that the Applicant did not completely clarify the introduction of new matter into the disclosure identified from the previously filed Office Action. On January 17, 2005, Applicant filed his response to the December 20, 2004 Office Action, completely clarifying the amendments to the Specification, and providing support for an amendment from the other portions of the written Specification and/or drawing figures. On May 19, 2005, the Examiner mailed another Office Action Summary indicating that the January 17, 2005 Response was not fully responsive as the status identifiers were not all in conformance with the Revised Amendment Practice recently promulgated by the U.S.P.T.O., and advising Applicant that an election by original presentation may be imposed on applicant with regards to the proposed new claims 44-59. Although claims 1-9, 11-13 and 56-59 were indicated as pending in a previous Office Action, in the latest Office Action Summary, the Examiner indicated that the claims were not formally entered due to non-responsive amendment. Thus, only claims 1-43 were pending until the former matters were properly addressed. This Supplemental Response is intended to address the May 19, 2005 Office Action Summary, and in an effort to be fully responsive, Applicant has not only attempted to comply

with the Revised Amendment Practice of the U.S.P.T.O., but also include all of the previous amendments to the Specification, support for the same, arguments with respect to the cited references, etc., presented in all of the Responses/Amendments since the January 26, 2004 Office Action. If this Supplementary Response is not fully and completely responsive, Applicant requests that the Examiner contact the undersigned by telephone to discuss further.

In the January 26, 2004 Office Action, the drawings/specification was objected to once again. The restriction of claims 16-43 was maintained. The Declaration filed on December 8, 2003 was indicated as being sufficient to overcome Curley reference. However, claims 1-31 were rejected under 35 USC §103(a) as being unpatentable over Price et al. "College Accounting, 7th Edition" in combination with an "Official Notice". On May 5, 2004, Applicant, his attorney and the Examiner conducted an interview regarding the rejections. An agreement with respect to the claims and the relevance of the reference was not reached during this interview.

In response to the above-identified Office Action, Applicant has amended the Specification to conform with the previously submitted formal drawings. Applicant has also amended claims 1 and 11, cancelled claims 3-5, 10 and 14-15, and added new claims 44-59. Reexamination and reconsideration of the application, as amended, is respectfully requested.

DRAWING OBJECTIONS

The drawings were objected to under 37 CFR §1.83(a) in the August 4, 2003 Office Action based upon the assertion that they failed to describe FIGS. 2-5 as described in the Specification, and that FIG. 7 did not describe steps 3-6 as detailed from page 17 of the application. Furthermore, FIG. 1 failed to be labeled as prior art. In the August 4, 2003 Office Action, it was requested that any structural detail that was essential for a proper understanding of the disclosed invention should be shown in the drawing.

In the December 8, 2003 Response, Applicant provided a revised set of drawings which labeled steps and components of the drawings with reference numbers and labeled FIG. 1 (prior art). Portions of the Specification were amended to incorporate the reference numbers, provide added description of the figures, and correct deficiencies such as grammar or spelling deficiencies.

However, in the January 26, 2004 Office Action, the drawings were once again objected to as not being acceptable based upon the assertion that the drawings do not correspond to the descriptive portion of the Specification, pointing out various perceived inconsistencies.

In Response, Applicant submits herewith a substitute Specification incorporating changes in the Specification such that the Specification reflects the reference numbers in the drawings. Paragraphs have also been inserted to the Detailed Description of the Preferred Embodiment section having a basis in the original Specification and drawings to overcome the objections. No new matter has been added to the application. Applicant has taken the opportunity to correct a few misspellings as well. With these amendments, Applicant believes that there are no inconsistencies between the drawings and the revised Specification.

In response to an Office Action mailed August 31, 2004, wherein the Examiner questioned whether the proposed additional subject-matter added to the descriptive portion of the Specification had adequate support, Applicant provides the following in response:

With respect to the added material on page 3, Applicant merely added reference numeral "10", originally illustrated in FIG. 1, as indicated by the amendment.

With respect to the addition of "11" on line 1, page 4, this addition is merely to refer the reader to the pertinent portion of original FIG. 1, as well.

With respect to the modification on page 7, Applicant was merely correcting a grammatical error to alter "Books" to "books".

With respect to the additional material added as the last paragraph of page 11 to the first full paragraph of page 12, adequate support for this paragraph is found in original FIG. 2, as well as in the Summary of Invention section found on pages 7-10 of the original Specification.

With respect to the additions in the first full paragraph of page 12, the added material finds support in original FIG. 3.

With respect to the last paragraph on page 12, extending to the second full paragraph on page 13, this newly added matter finds support in FIG. 4, as well as in the Summary of Invention section, pages 7-10 of the Specification, and particularly pages 9-10 of the Specification.

Various reference numbers have been added, where appropriate, in the Specification on pages 13-19 so that the description in the Specification properly refers to the diagram in FIG. 4. Thus, FIG. 4 provides the support for these modifications.

With respect to the modification on page 20, line 7, Applicant took the opportunity to correct a grammatical error. No new matter was added.

With respect to the paragraph added at line 18, page 20, the support for this paragraph is found in the flow-chart of FIG. 5. Furthermore, support for this paragraph is found on pages 20-54, which describes these steps in detail.

Reference numbers have been added at the end of page 20 and top of page 21, which find support in FIG. 6.

In the first full paragraph on page 21, Applicant has taken the opportunity to correct two grammatical errors. On the remaining changes on page 21, include references numbers to FIG. 7 and find their support in FIG. 7.

On pages 22-28, reference numbers referring to FIG. 8, have been added as appropriate, the support being found in FIG. 8.

On pages 29-33, reference numbers have been added referring to FIG. 9, having their support in FIG. 9.

On pages 34 and 35, Applicant has added reference numbers referring to FIG. 10, where appropriate.

On pages 35 and 36, Applicant has added reference numbers referring to FIG. 11, where appropriate.

On page 38 and 40, Applicant has added reference numbers referring to FIG. 12, where appropriate.

At the bottom of page 52, Applicant has taken an opportunity to correct a misspelling.

Towards the bottom of page 53, Applicant has taken an opportunity to correct a misspelling.

Applicant believes that the foregoing addresses each modification to the Specification, as shown in the May 26, 2004 Amendment. Each modification has support in the originally-filed drawings and Specification. No new matter has been added. Instead, reference numbers have been assigned to the figures and incorporated into the Detailed Description section of the Specification, along with a description of the figure (pulled from the figure itself and Summary of Invention, for example) where necessary to adequately describe the content of the figure while actually referring to the individual boxes or step within the figure. Applicant respectfully asserts that this disclosure and information was contained within the original Specification and no new matter has been added to the Application due to the Amendment. Instead, the amendments were made to satisfy the objection in the previous Office Action, and to provide a clarification and organization to the Specification.

In the December 20, 2004 Office Action Summary, the Examiner questioned whether the material from the last paragraph of page 11 to the first full paragraph of page 12 had adequate support from pages 7-10 of the original specification or FIG. 2. The paragraph in question is as follows:

"With reference to FIG. 2, the present invention's
method of apportionment of non-object related profit measure

specifies a method or allocation model (25) which will not change the ordinal or cardinal profit contribution ranking when only marginal profit measures are counted. This specification is what makes it possible to apply marginal measurement rules or models(20) with macro economic principals. The invention decomposes profit measurement and analytical calculations into five classifications, namely:

Marginal profit measures or funds transfer pricing (21) associated with use of the business' balance sheet resources;

Marginal cost measures or event costing (22);

Marginal measures or non-interest revenues (23) (non-interest or balance sheet related revenue);

Marginal measures of expected costs or revenues, also referred to as provisioning (24); and

Apportioned costs or indirect costing (26). These profit measurement analytical calculations result in a detailed profit measure (27)."

Applicant derived this "new" paragraph from the first and second paragraphs of page 8 of the Summary of the Invention as follows:

"The invention's method of apportionment of non-object related profit measures specifies a method which will not change the ordinal or cardinal profit contribution ranking when only marginal profit measures are counted. This specification is what makes it possible to apply marginal measurement rules (see Micro-economic theory literature) with macro economic principals; namely the sum-of-the-parts equals the whole criterion which is the basis of financial accounting theory and practice.

The invention decomposes profit measurement analytical calculations into five classifications:

6. Marginal profit measures associated with use of the business' balance sheet resources;
7. Marginal measures of non-balance oriented revenues;
8. Marginal cost measures;
9. Marginal measures of expected costs or revenues;
- and,
10. Apportioned cost measures."

FIG. 2 is directed to such a method of apportionment of non-object related profit measure and specifies or allocation model (25) which arrives at a detailed profit measure (27) by considering indirect costing (26) and marginal models (20) including funds transfer pricing (21), event costing (22), non-interest revenue (23) and provisioning (24). These classifications (21-24 and 26) correspond with the five classifications listed on page 8 of the Summary of the Invention. The new paragraph extending from page 11 to page 12 is merely a melding of the originally filed paragraph on page 8 and that disclosed in FIG. 2. For the most part, it is verbatim. Accordingly, applicant once again asserts that this new paragraph does indeed have basis in the disclosure filed originally and does not introduce new matter.

The Examiner also questioned whether the material from the first full paragraph of page 12 has adequate support from FIG. 3 of the original specification. The portion in question extending from the first paragraph of page 12 through the first paragraph of page 13 is as follows:

"With reference now to FIG. 3, once all five profit component measures are summed from the lowest level of profit detail (the "profit object"), a consistent set of profit values for all types of aggregations (30) are possible. DPM is

based on object level detail sourced from a business systems of record's cash flows (31), sourced from of customer's transactions, (object oriented events) (33) and sourced from management allocations of profit arising from non-customer related events (34). DPM provides both marginally and or fully absorbed profit measures using activity based costing techniques(35), something traditional "general ledger" based profit accounting systems can not accomplish due to reliance on aggregate debit and credit amounts (see Figs. 2-4.) This results in the smallest common component of profit measurement desired – the profit object (32) common to the business' organizations, products or customers."

Applicant previously indicated that all of the information in this paragraph was derived from FIG. 3. In fact, the information which was amended into this paragraph was also obtained from the Summary of the Invention, and finds support in other portions of the specification as well. For example, at the end of the first paragraph of page 8 of the Summary of the Invention states:

"This invention does this through a consistent application of measures to a class of business entities which represent the smallest common component of profit measurement desired - the Profit Object."

Thus, the object (32) of FIG. 3 is in fact the profit object, or the smallest, component of profit measurement desired, as stated in the original specification as indicated above.

The "from the lowest level of profit detail" addition on page 12 which the Examiner specifically referred to as not having support from the original specification is found on page 8, final paragraph, as follows:

"This classification provides for additive profit measures across the five components. The calculation process is designed to be independent across classes 1, 2, 3, & 4 above with the addition of class five to preserve sum-of-the-parts integrity without simultaneous calculations typically found in profit measurement processes. **When all five profit measures are summed at the lowest level of profit detail, a consistent set of profit values for all types of aggregations are possible** - all profit measurement then originates from the same point in a profit database." (Emphasis added.)

The aggregation (30) portion of FIG. 3, is thus supported in the Summary of the Invention of the original Specification. The remaining amendments were simply the inclusion of all of the steps or boxes of FIG. 3, which would have been reasonably understood by one skilled in the art and not introducing "new" matter.

CLAIM OBJECTIONS

In the May 19, 2005 Office Action, the claims were objected to for failing to conform to the Revised Amendment Practice of the U.S.P.T.O. Applicant believes that this is due to the Examiner's previous Restriction Requirement. Accordingly, claims 16-43 have been indicated as "withdrawn" as claims 16-31 are subject to a Restriction Requirement. However, Applicant once again asserts that claim 1 is generic, and reserves the right to re-introduce these claims if a generic claim is allowed. Claims 44-59 have once again been added and indicated as "New", as the May 19, 2005 Office Action indicated that they were not previously entered. As indicated in the previous Responses, claims 44-48, 50-55, 57 and 58 are of a scope which are merely combinations of the subject-matter recited

in claims 1-15, which have been previously considered and are not subject to the Restriction Requirement. Claims 49, 56 and 59 are dependent claims which are not merely combinations of the subject matter recited in claims 1-15. Accordingly, Applicant believes that the claim objections have been overcome, but once again invites the Examiner to contact the undersigned directly by telephone if this is not the case.

CLAIM REJECTIONS

As indicated above, claims 16-31 are subject to a Restriction Requirement. The remaining claims (1-15) were rejected as being obvious in light of the Price publication and the Examiner's "Official Notice" regarding performing financial processing using computer software.

As part of the May 5, 2004 Interview with the Examiner, Applicant submitted a Declaration (which Examiner indicated would be entered into the record so as to be a part of this Response). In the Declaration, Applicant provided his expertise in this field, addressed the fact that the Price publication does not teach what is claimed in the present invention, and states the non-obviousness of the invention due to the benefits achieved by the present invention and the commercial success that it has attained.

During the Interview, the Examiner indicated that there might be an "intended use" concern with independent claim 1 due to the word "for" in the preamble. Applicant has amended claim 1 to delete "for" in the preamble to alleviate any such concern. During the Interview, Applicant explained the benefits derived by conducting the present invention in a relational database management system. The Examiner indicated that he was giving this consideration very little patentable weight as it was recited only in the preamble. Applicant has amended independent claim 1 to positively recite that a relational database is provided and that various steps are conducted within the relational database. Contrary to the statement in the May 7, 2004 Interview Summary, the Examiner maintained

his assertion that claim 1 did not define over the Price reference; and Applicant maintained his assertion that the Price reference did not teach Applicant's invention, as claimed in independent claim 1. The Examiner indicated that it was the Group Art Unit's policy that a "relational database" consisted of any group of information which was interrelated. Applicant has amended independent claim 1 to positively recite an electronic relational database as well as to positively recite that many of the steps, including the preparing, establishing and calculating steps be performed within the electronic relational database. Applicant respectfully asserts that this is simply not addressed in either the Price or "Official Notice" rejections.

As indicated above, claim 1 is directed to a process that determines object level profitability in a relational database management system. An electronic relational database is provided and information to be accessed electronically through the relational database management system is prepared by extracting, conditioning and loading object attribute values, financial statement attribute values and event attribute values into the relational database. Rules are established in the relational database for processing the prepared information. Within the relational database, at least one marginal value of profit for each object being measured is simultaneously and independently calculated in parallel using the established rules. In the relational database, a fully absorbed profit adjustment value for each object being measured is then calculated. Finally, the at least one marginal value of profit and the full absorbed profit adjustment value are combined to create a measure for object level profitability.

New independent claim 44 specifies that the relational database is a structured query language relational database. The at least one marginal value of profit calculation is defined as calculating net interest, other revenue and direct expense. The calculation of the fully absorbed profit adjustment value for each object being measured is recited as including the

step of calculating the value for indirect expense. Otherwise, independent claim 44 contains the same recitations as independent claim 1.

While a single reference may serve as the basis of a rejection under 35 USC §103, that single reference must still disclose all the features of the claimed invention. To establish *prima facie* obviousness of a claimed invention, all the claim limitations must be taught or suggested by the prior art. M.P.E.P. §2143.03 (citing In re Royka, 180 USPQ 580 (CCPA 1974). All words in a claim must be considered in judging the patentability of that claim against the prior art. In re Wilson, 165 USPQ 494, 496 (CCPA 1970).

Although Price may disclose a method of measuring profit based on factors of revenues, direct expenses, indirect expenses, and risk, as stated in the Declaration of Tad Lepman, dated April 27, 2004 (copy attached). Price actually discloses what is referred to in the present application as being "prior art", as illustrated in FIG. 1 and discussed in the background section of the present application. Price covers the basics of transactional accounting, or bookkeeping. Price does not discuss methods of marginal pricing necessary for object profit measures which are more detailed than departmental or business segments. In contrast to the present invention, Price states that interest income and interest expense are not allocated in responsibility accounting. Price's scope is financial bookkeeping and not economic theory or market based financial concepts, and thus it is silent on the concepts of fund transfer pricing or of risk base adjustment to profit measures.

In particular, there is no discussion whatsoever in Price as to preparing information to be accessed electronically through a relational database, or establishing the rules necessary in a relational database for processing and preparing information. Price's accounting rules do not lead to relational database formulation or mathematical rules making parallel computer financial calculation possible.

As stated in paragraphs 6-8 of Mr. Lepman's Declaration, the steps of extracting, conditioning and loading object attribute values, financial

statement attribute values and event attribute values into a relational database is not discussed whatsoever in Price. Moreover, as Mr. Lepman states, Price would consider it completely unnecessary for transactional accounting or marginal valuing attributes. Thus, Price teaches away from these recitations, which are now in independent claim 1 (as well as new independent claims 44, 50, 56 and 57).

Claims 6, 45, 52 and 58 recite that the preparing step includes a step of calculating opportunity values of funds used or supplied by each object being measured. Mr. Lepman, in paragraph 9 of his Declaration, states that Price is totally silent on how to properly value balance sheet dynamics in responsibility accounting and thus completely ignores this step.

With respect to claims 7, 36 and 53, Mr. Lepman, in paragraph 10 of his Declaration, states that Price is completely silent on establishing steps of providing the information necessary to select objects, and performing correct profit calculus.

With respect to claims 1, 8, 11, 12, 44, 50, 56 and 57, Mr. Lepman, in his Declaration, states that Price does not mention the profit calculation recited in these claims which is required to value a financial objects balance sheet dynamic. Mr. Lepman states that due to the fact that Price is directed to the creation of financial statements in a traditional accounting sense, Price simply does not imply the use of expected valuing in risk provisioning or combining at least one marginal value of calculated profit and fully absorbed profit adjustment values to create a measure for object level profitability.

With respect to claims 13, 48, 54 and 59, no economic adjustment is proscribed for taxes and/or object economic value in Price.

In light of the foregoing, Applicant respectfully submits that Price does not teach or suggest all of the claim limitations of the present application.

In the above-identified Office Action, the Examiner took "official notice" that performing financial processing using computer software is common knowledge in the art. Moreover, the Examiner asserted that "to have provided a method of performing a financial process for an account using software for a computer measuring profit based on the factors of net interest revenue, other revenues, direct expenses, indirect expenses and risks, also have to take advantage of flexible business rules to calculate known variations of one of the factors e.g. net interest revenue, would have been obvious to one of ordinary skill in the art". Applicant respectfully disagrees and traverses this basis of rejection. Applicant is not merely claiming financial processing using computer software. Instead, Applicant is claiming a process for determining object level profitability in a relational database management system. Utilizing an electronic relational database in accordance with the present invention allows at least one marginal value of profit for each object being measured to be simultaneously and independently calculated in parallel. As stated by Mr. Lepman, in paragraph 14 of his Declaration, although account level profitability has been attempted with limited success using computer software, object level profitability using a relational database management system was not in place before his invention and provides many benefits over prior methodologies and systems. Calculating in parallel in accordance with the present invention allows "bottoms up" or behaviorally based calculation in determination of object level profitability in a manner which has been heretofore unattainable. The Examiner simply has not provided supporting documentation to show that such calculations would have been obvious to have been performed in a relational database using parallel computations in the manner recited in Applicant's independent claims at the time the application was filed.

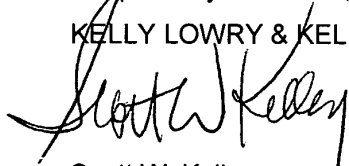
Tad Lepman, in paragraphs 15-26 (referring to Exhibits B-M) points to the problem of companies who were unable to figure out how profitable their customers were. Mr. Lepman also describes the success that the

present invention has attained, as well as the awards that it has won. Such success in the industry is evidence of the non-obviousness of the invention and counters the "official notice" that the invention is merely performing financial processing using computer software that is common knowledge in the art.

The United States Supreme Court in Graham v. John Deere Co., 383 U.S. 1 (1966) required that to make out a case of obviousness, one must: (a) determine the scope and contents of the prior art; (b) ascertain the differences between the prior art and the claims in issue; (c) determine the level of skill in the pertinent art; and (d) evaluate any evidence of secondary considerations. MPEP §716 et. seq. and §2144 et. seq. require the Examiner to consider such secondary considerations such as commercial success in determining obviousness. Mr. Lepman's Declaration specifically discusses the previous unsolved need of companies who are unable to figure out how profitable their customers were (see Lepman Declaration, paragraph 15 and Exhibit B). Mr. Lepman, in his Declaration, has also shown the commercial success of his invention due to the embracing of the invention by many major companies and the awards that it has received (see Lepman Declaration, paragraphs 16-26). Such secondary considerations must be given substantial weight in the determination of obviousness or non-obviousness. See e.g. United States v. Adams, 383 U.S. 39 (1966); and In re Piasecki, 745 F.2d 1468 (Fed. Cir. 1984). Applicant respectfully asserts that when given the proper weight and consideration, such secondary considerations overcome the "official notice" and evidence the fact that the present invention was not obvious at the time of invention and filing of the present application.

Thus, Applicant respectfully asserts, that the "official notice" combined with Price still fail to teach or suggest the present invention, as recited in the currently pending claims. Accordingly, Applicant believes that the application is in condition for allowance, notice of which is hereby respectfully requested.

Respectfully submitted,
KELLY LOWRY & KELLEY, LLP

A handwritten signature in black ink, appearing to read "Scott W. Kelley", is written over the printed name.

Scott W. Kelley
Registration No. 30,762

SWK/maf
Attachments: Replacement Sheets - Specification

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REPLACEMENT SHEETS - SPECIFICATION

PROCESS FOR DETERMINING OBJECT LEVEL PROFITABILITY

RELATED APPLICATION

This application claims priority from provisional patent application Serial No. 60/128,769, filed April 9, 1999.

BACKGROUND OF THE INVENTION

The process of measuring profit is an important business activity. Profit measures are the primary basis for understanding financial performance and value creation in a business. Once a business is owned publicly, an independent review of a firm's financial position becomes a mandatory process well known as measuring profit according to "generally accepted accounting principals" (GAAP.) While these standards and regulations are adequate for an external view of a company's financial condition, the measurement of profit contribution amongst the business is required for proper management of the franchise. Internal financial performance measurement is especially complex for a multi-product, multi-location, and/or large customer based businesses. The use of internal financial performance measures drives most businesses planning processes, management incentive processes and control processes. Many businesses have found that internal profit measures can be consistent with the external financial statement measures. These businesses implement internal accounting processes consistent with external measures using common metrical units similar to a GAAP Financial Statement presentation - a consistent metric or "yard stick" (i.e. numerically the sum-of-the-profit-parts equals the whole company's profit according to GAAP.)

Many businesses today are struggling to accurately measure profit contribution at a level necessary to accurately measure profit contribution of individual customer interactions. The reason for dilemma is found in the manner in which generally accepted accounting principles are applied. Fundamental accounting theory takes lumpy cash flows that occur in the day-to-day management of a business conducted with its customers and transform them into smoothed income or expense items (known as accruals.) At the end of every profit reporting cycle these income and expense items are consolidated into a period end balance sheet and income statements. Reports on the state of the business can then be presented by accountants in formats necessary for the independence of ownership and management that is the basis of capital markets. Indeed, most businesses today would call its accounting process critical for survival. Unfortunately, the complexity of maintaining an accurate financial accounting process has obscured the measurement of profit contribution at a very detailed level. While the aggregate cash flows of a large company are relatively stable the individual customer-to-business cash flows are very volatile. Accounting practice to date has been comfortable with using aggregate cash flow information for the accrual accounting process(10), as illustrated in FIG. 1. The accounting process based on aggregates has lead to blindness by businesses of incremental customer profit contribution measures necessary to implement customer level decision making, particularly in large businesses with many millions of customers.

General Ledgers (double entry book keeping systems)(11) were early adapters of automated data processing solutions due to the match between computing capabilities of computers and the execution of the accounting process. The benefit, from reduced cost for accounting processes easily justified large expenditures in information processing technology, both in hardware and in software development. The complexity of today's general ledger applications and the age of these systems have retarded the innovation of new automated techniques taking

advantage of technological advances in massively parallel computing capability.

References describing generally accepted accounting principals and procedures are listed below, and are incorporated by reference herein:

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There remains, however, a need to resolve profit measures at a detailed level without using analytical models or statistical extrapolation(12). Such a process should utilize rule driven and data base measurement processes which will give large scale businesses a lower cost of maintenance and a technologically scalable tool to measure profit at a level of precision or resolution not possible in prior financial performance measurement processes. The present invention fulfills this need and provides other related advantages.

SUMMARY OF THE INVENTION

Prior approaches to management's desire for an accurate measure of individual decisions (incremental or marginal) profit impact have been solved by automating the accounting process for implementing accounting

methods. Cash flows are transformed into two parts, a debit part or credit part, according to an accounting rule. Other non-cash accounting rules are implemented to create "accrual" debits and credits smoothing income and expenses and adjusting for future contingencies. (see Management Accounting Theory books or any source of accounting theory, where the balance sheet equation and the consolidation process, the combination of flows and stocks of financial data, are developed.) The first large scale use of automated computing technology is frequently found to be the automation of the financial control or accounting processes, since it is easy to develop software to implement accountancy rules and there were large benefits in staff productivity easily observable. For businesses to observe marginal profit contributions it was necessary to use accounting information and make reasoned conclusion on how to apportion or extrapolate this information into incremental customer, product or organizational profit detail. (See Fig. 1)

What these methods of profit measurement lack are the adequate level of detail to measure an individual or incremental decision's impact on profit. To gain this new level of profit resolution this invention is designed to use micro profit measurement rules applied at a granular level consistent with standard accounting practice using a combination of actuarial science and mathematical set theory. The invention is designed to utilize massively parallel computing operations using relational database management techniques enabling profit measurement at a level not available today in a large individual customer scale business. This invention does this through a consistent application of measures to a class of business entities which represent the smallest common component of profit measurement desired - the Profit Object.

The invention's method of apportionment of non-object related profit measures specifies a method which will not change the ordinal or cardinal profit contribution ranking when only marginal profit measures are counted. This specification is what makes it possible to apply marginal measurement

rules (see Micro-economic theory literature) with macro economic principals; namely the sum-of-the-parts equals the whole criterion which is the basis of financial accounting theory and practice.

The invention decomposes profit measurement analytical calculations into five classifications:

11. Marginal profit measures associated with use of the business' balance sheet resources;
12. Marginal measures of non-balance oriented revenues;
13. Marginal cost measures;
14. Marginal measures of expected costs or revenues; and,
15. Apportioned cost measures.

This classification provides for additive profit measures across the five components. The calculation process is designed to be independent across classes 1, 2, 3, & 4 above with the addition of class five to preserve sum-of-the-parts integrity without simultaneous calculations typically found in profit measurement processes. When all five profit measures are summed at the lowest level of profit detail, a consistent set of profit values for all types of aggregations are possible - all profit measurement then originates from the same point in a profit database. The simultaneous use of these five analytical frameworks makes possible a detailed level of profit calculation consistent with GAAP.

In particular, the present invention relates to a process for determining object level profitability. In its basic form the process includes the steps of:

1. Preparing information to be accessed electronically;
2. Establishing rules for processing the prepared information;
3. Calculating at least one marginal value of profit using established rules as applied to a selected set of prepared information;
4. Calculating a fully absorbed value of profit adjustment using established rules as applied to the selected set of prepared information; and,

5. Combining the at least one marginal value of profit and fully absorbed value of profit adjustment to create a measure for object level of profitability.

More specifically in the step of preparing information to be accessed electronically, the database is prepared, object attributes are extracted, conditioned and loaded into the database, and financial statement attributes are extracted, conditioned and loaded into the database. If desired the step may also include extracting, conditioning and loading the event attributes into the database, and calculating funds transfer treatment rates.

In the step of establishing for processing the prepared information for rule establishment providing the information necessary to select objects and perform the correct profit calculus is accomplished. The step of calculating at least one marginal value of profit using established rules as applied to a selected set of prepared information includes calculating net interest, other revenue, direct expense, and/or provision for the selected set of prepared information. Net Interest (NI) is the summation of interest income, value of funds provided and earnings on equity funds used less the sum of interest expense and cost of funds used. Other Revenues (OR) is a measure of profit contribution from non-interest related sources. Direct Expense (DE) is the profit value reduction due to marginal resource consumption by the object. Provisioning (P) is the expected profit value adjustment for future outcomes related to the object.

The step of fully absorbed profit adjustment, Indirect Expense (IE), is an apportioned profit value adjustment for all non-object related resource consumption by the business.

In the step of combining the five profit values, $NI + OR - DE - P - IE$, may be adjusted for taxes and/or object economic value.

The foregoing elements of the invention, which have been explained at a micro elemental level can be advantageously employed in massive

amounts and parallel process power. For example, in the macro perspective of the invention the basic steps can be utilized.

The present invention gives management profit measures tailored to its need for accurate decision oriented profit information required to manage a large organization based on profit measurement. This invention gives businesses the ability to resolve profit measures at a level of detail necessary for all types of application of profit oriented performance measurement.

Other features and advantages of the present invention will become apparent from the following more detailed description, taken in conjunction with the accompanying drawings which illustrated, by way of example, the principles of the invention.

BRIEF DESCRIPTION OF THE DRAWINGS

The accompanying drawings illustrate the invention. In such drawings:

FIGURE 1 shows existing profit calculation process flow.

FIGURE 2 shows analytical processing relationships.

FIGURE 3 shows the invention's information flow.

FIGURE 4 shows the invention's data relationships.

FIGURE 5 shows the invention's process flow.

FIGURE 6 shows the invention's database preparation process step detail.

FIGURE 7 shows the rule maintenance process.

FIGURE 8 shows the net interest measuring process

FIGURE 9 shows the other revenue measuring process.

FIGURE 10 shows the direct expense measuring process.

FIGURE 11 shows the provision measuring process.

FIGURE 12 shows the indirect expense measuring process.

FIGURE 13 shows the profit component aggregation and adjustment process.

FIGURE 14 shows a partial relational database schema for an airline industry example.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

As shown in the accompanying drawings for purposes of illustration, the present invention is concerned with a detail profit metric (DPM) designed to be a computer database application (i.e. software) for profitability measurement. DPM's profit measurement system is fundamentally different from the common profit measurement system used by regulators and public accountancy - yet, it is consistent with generally accepted accounting principals.

With reference to FIG. 2, the present invention's method of apportionment of non-object related profit measure specifies a method or allocation model (25) which will not change the ordinal or cardinal profit contribution ranking when only marginal profit measures are counted. This specification is what makes it possible to apply marginal measurement rules or models(20) with macro economic principals. The invention decomposes profit measurement and analytical calculations into five classifications, namely:

Marginal profit measures or funds transfer pricing (21) associated with use of the business' balance sheet resources;

Marginal cost measures or event costing (22);

Marginal measures or non-interest revenues (23) (non-interest or balance sheet related revenue);

Marginal measures of expected costs or revenues, also referred to as provisioning (24); and

Apportioned costs or indirect costing (26). These profit measurement analytical calculations result in a detailed profit measure (27).

With reference now to FIG. 3, once all five profit component measures are summed from the lowest level of profit detail (the "profit object"), a consistent set of profit values for all types of aggregations (30) are possible. DPM is based on object level detail sourced from a business systems of record's cash flows (31), sourced from customer's transactions, (object oriented events) (33) and sourced from management allocations of profit arising from non-customer related events (34). DPM provides both marginally or fully absorbed profit measures using activity based costing techniques(35), something traditional "general ledger" based profit accounting systems can not accomplish due to reliance on aggregate debit and credit amounts. This results in the smallest common component of profit measurement desired – the profit object (32) common to the business' organizations, products or customers.

More specifically, with reference to FIG. 4, in the step of preparing information to be input (40) to be accessed electronically, a database is prepared. Object attributes are extracted, conditioned, and loaded into the database (43), and financial statement attributes are extracted, conditioned and loaded into the database (45). If desired, the method may also include extracting, conditioning and loading the event attributes into the database (44) and calculating funds transfer treatment rates and activity based costing rates (46).

In the step of establishing for processing (41) the prepared information information on how to select objects and perform the correct profit calculus rule mapping (47) is accomplished. The step of calculating (48) at least one marginal value of profit using establishment rules as applied to a selected set of prepared information includes calculating net interest (NI), other revenue (OR), direct expense (DE), and/or provision for the selected set of prepared information. Provisioning (P) is expected profit

value adjustment for future outcomes related to the object. The step of fully absorbed profit adjustment, Indirect expense (IE), is an apportioned profit value adjustment for a non-object related resource consumption by the business. The foregoing elements of the invention, which have been explained at a micro-elemental level, can be advantageously employed in massive amounts and parallel processing power (41). The present invention gives businesses the ability to resolve profit measures at a level of detail (49) necessary for all types of applications of profit oriented performance measurement or detailed profitability data as an output (42) for enabling aggregation to a particular customer, product or organization within a business.

The following is a definition of the inputs (attributes or measurement parameters), the method of processing and the output of the DPM process.

Definitions

Object Attributes (43)

These are data about the object being measured. Different businesses have different objects of detailed profit measurement. Examples of profit measurement objects include an airline using "seat" as the profit object, an insurance company using a "policy" object or a bank use an "account" object - these objects represent the lowest level of detail required for consistent internal multi-dimensional internal profit analyses. Types of data attributes associated with these objects include: balances, rates (or interest accrued), product identification, exposures, expected loss frequency, and various dates (e.g., start, finish, rate reset, last payment, next payment, life, etc.)

Event Attributes (44)

These data are about events (a resource consuming activity) related to the object being measured. Data found here include object identification, transaction amounts, quantities, event location, event

time, counter-party identification, event type (e.g., payments, interest paid or earned, purchases, refunds, etc.) At least one of these attributes must relate the event to at least one Object.

Financial Statement Attributes (45)

These are data about the company's financial statement. Data found here include balance sheet and profit statement amounts usually aggregated by the legal or management entities that own a group of objects being measured. These data will be current accounting period either actual or planned.

Profit Measurement Parameters (46)

These data include parameter values necessary to perform the object or event level profit calculations. The major classifications of these data are:

- Funds valuing rates ("Treatment Rates") - DPM's funds transfer pricing method uses maturity opportunity rates used in valuing each object's marginal use or source of internal funds (balance sheet resources).
- Unit Costs - DPM's Direct Expense calculations require unit cost parameters. DPM can calculate unit costs, when unit cost data are not available; in these instances, if the total cost is provided a financial statement attribute and then unit cost is derived by dividing total cost by an appropriate attribute quantity amount.
- Allocated Amounts - In both Other Revenue and Indirect Expense calculations this amount is apportioned amongst all objects in a group.
- Miscellaneous Calculation Values - Some of DPM's calculations require non-system of record values. For example, number of days in profit measurement period or equity allocation weighting. These values are known as "modeling" parameters.

- Amortization Parameters - Interest amortization requires an interest rate and expected life attributes. Straight line and declining balance methods of amortization require expected life values.
- Expected Profit Adjustment Measurement Parameters - Provision calculations require appropriate attributes, such as: expected loss rates, reserve percentages, exposure factors, recovery rates, default probabilities and collection costs.
- Tax Rates - Tax rates are required for after-tax profit calculation. DPM is designed to calculate pre-tax income on a taxable equivalent basis (where a single effective tax rate is all that is required to transform pre-tax income into after tax earnings.)

Profit Measurement Rule Specification

DPM's processing approach is to combine profit measurement techniques with (non-modeled) data and calculation parameters. Each application of this calculus is called a rule 47. DPM is designed to allow the user the freedom to associate a group of objects with a rule and to use object-level information in combination with rule parameters to calculate profit values. The DPM invention uses profit measurement rules separate from, but applied to, object data and the use of relational database concepts, giving the user a flexibility in both the assignment and depth of definition of measurement rules and measurement resolution. Use of this method is especially suited for massively parallel computing technology where linear scaleable capital investment in processing technology is possible vis-à-vis object and event count and rule complexity.

The types of calculation (Rule types) are:

- Funds Treatment - Every object with cash flows affecting a financial statement's balance sheet requires a method of valuing an object's use or source of funds. The common name for this approach to valuing is known as "Matched Maturity Funds Transfer Pricing." DPM uses a

canonical representation an object's funding characteristics for computational performance. DPM's methodology requires effective yield adjustment to eliminate the allocation of interest payable / receivable required by GAAP. A value, based on effective yield adjusted market price (the yield curve), is then determined by DPM for each instance that requires an interest rate transfer prices to calculate an object's marginal Net Interest (NI).

- Equity Allocation - In order for precise net interest revenue or economic value adjusting calculations the amount of equity funds required at an object level must be determined. DPM's equity allocation to the object level calculations may use any of the following methods: simple ratios; regulatory definitions; economic allocations based on econometric modeling (see book on Modern Portfolio Theory) methodologies; or, as statically defined allocations.
- Balance Sheet Allocations – Complete calculation of Net Interest may require an object level allocation of some financial statement balance sheet amounts.
- Apportionment - In both Other Revenue, Provision and Indirect Expense calculations are applied at the object level using Financial Statement Attributes which are not related directly to an object. These profit adjustments are made so that the sum of all object profit equals the whole enterprise's profit - an important property of DPM's output. Accountants refer to this profit measurement technique as "full allocation of profit." DPM's approach is to pool indirect costs and revenues and then apportion them. Apportionment rules specify how the pool is completely allocated to appropriate objects. DPM uses a specific closed form (mathematical formula that require only information known in the current period and no iterative computation) allocation rules.
- Amortization - Some types of income or expense are deferred or accrued over multiple periods including and subsequent to the current

accounting period. This is common to accrual accounting methods used in financial statement profit presentation and give rise to timing differences between cash flows and their related profit as presented in a financial statement in any accounting period. Since DPM is designed to mirror a financial statement's profit measure it must support deferral and accrual accounting principals. Amortization methods are included in DPM to reflect these GAAP concepts. DPM's amortization methods include: interest method of amortization (used for interest income and expense accruals and for deferral of fees that are in lieu of interest); and, straight line or declining balance amortization methods (used for cost or income deferrals and capitalized investment depreciation.)

- Other Revenue Pricing - In situations where object and event activity can be used to derive object level income or fees DPM provides for the calculation of these drivers of profitability in Other Revenue profit calculations. These calculations take the mathematical form of a linear combination of event or object values and modeled coefficients.
- Direct Expense - Calculation of object profit adjustment due to object related activity requires rules that take the form of linear combinations of event or object values and modeled coefficients.
- Indirect Expense - In situations where expense apportionment or amortization amounts are aggregated the user may want different rules applied depending on the path (or dimension) of aggregation. These rules allow for multiple profit calculations rules to be applied to derive multiple object level indirect expense amounts.
- Provision - Adjusting current profit for expected future value changes is known as "actuarial" profit provisioning. The technique is well known by the financial industry's accounting practice. DPM applies actuarial based methods in its object level profit calculations where the Provision pre-adjusts profit for contingent or known exposures to future profit.
- Taxable Equivalent Gross-up - Profit is usually an after-tax measure. Some events or portions of some object profit may be excluded from

normal taxation. DPM's approach is to adjust these pre-tax values so that a singular tax rate can be used to convert pre-tax profit into after-tax values, known as taxable equivalent adjustment. For the purpose of the remaining detailed description all profit and loss profit measures are tax equivalent amounts (e.g., TEG * Amount.) These rules use object and event attributes to drive an adjustment for each of the five classes of profit amounts to a taxable equivalent basis.

- Interest Yield Adjustments - Since DPM can derive profit for any length of accounting period from daily to annual, the adjustment of cash interest payments and the financial statement's accrual or smoothed representation of interest related Profit, DPM requires a method for converting cash interest amounts to financial statement accrual amounts. DPM implements the mathematical concept of "effective interest rate" conversion to accomplish this type of calculation.

Before the calculation rules can be applied at the object or event level a calculation rule must be associated with an object, designating the methods DPM will use to calculate components of profit at the object level. An object grouping is designed to associate objects having common and defined set of object attributes for similar processing (note that a group may consist of one object). The association of a group of objects with a calculation rule is referred here as a Rule Map (47).

Inheritance Functionality

In nature the concept of inheritance is where a descendant receives properties of its predecessors, in computer science inheritance is defined in "Object Oriented" software development theory as the ability to increase function without loss of function using the same data. In DPM the concept of inheritance is applied and in essence it means that an implementation can change Rules (change profit calculus) without losing any profit measurement capabilities of the preceding state(s). This feature allows DPM users a unique ability to apply techniques of differing levels of

sophistication to different sets of objects according to the trade-off between the value of more accurate object-focused profit measures and the cost of obtaining and populating data and maintaining Rule Maps.

The DPM system is designed for Rules to be applied to any object without loss of integrity of output. This design feature allows the user to incrementally migrate objects to increased measurement precision as justified. This valuable piecewise increase in functionality is possible due to DPM's combination of rules and data in a mathematical set theoretic framework. (41) This approach allows for a relational database management system implementation (42). It is nearly impossible develop and maintain procedural based software with as much flexibility and with the capability to simultaneously support the number of calculation permutations required by DPM .

Restatement Functionality

Since DPM is a rule based system the ability to restate prior period's Profit calculations are systematically possible providing historical data exists. DPM's design of object level profit measurement enables a unique historical profit restatement capability. Three features of DPM's restatement capability are:

3. Produces a mathematically consistent time series (i.e. no measurement bias) of object level Profit. DPM restatement functionality is designed to apply the same Rules to all available historical object or event level data.
4. DPM's restatement functionality preserves object accrual integrity when the object history is restated for different length accounting periods. Implementations of daily, weekly, monthly, quarterly, semi-annual, or annual profit calculations and mixing different periodicity in historical data without loss of analytical integrity.
3. Capable of object's profit history restatement. If a DPM user changes Rules or Rule Maps and/or changes the way a subset of object's Profit are

calculated and if the historical data is available per the new set of Rules then the user can restate historical profit measures for these subset of objects.

Processing (see Fig. 5)

With reference to FIG. 5, the database is first populated (50). Rules are maintained (51), as will be more fully discussed herein, and the NI, OR, DE, and P are calculated (52-55). Next, the IE is calculated (56) to arrive at a calculation of the object profitability (57). This process is repeated for all objects. After the last object (58), the process is finished as the detail profitability data is obtained. FIGS. 6-13 describe in more detail the steps taken in FIG. 5 in accordance with the present invention.

1. *Populate Database (see Fig. 6)*

Perform standard database administration actions to initialize data for the required calculations:

6. Perform database Initialization (60)
7. Extract, condition & load object attributes (61)
8. Extract, condition & load event attributes (62)
9. Extract, condition & load financial statement attributes (63)
10. Calculate and populate NI treatment rate attributes (64)

2. *MAINTAIN OBJECT GROUPS AND RULE MAPS (SEE FIG. 7)*

Populate or edit Rule parameters necessary to perform calculations. Rules definition is by association of specific, non-iterative calculation, as described below a set of object or event attributes defined as a data filter (see Relational Data Base Management System textbooks). Rules have two pieces:

3. Parameters to drive the object selection or data filter for calculations (70); and,
4. Parameters specific to the appropriate calculation methodology (71).

An easy-to-use graphical user interface can be used to maintain these data for all rules (72).

The following processing steps, Steps 3 through 6 perform object and event level profit calculations. Steps 3, 4, 5, and 6 can be processed independently, step 7 requires values derived in step 3, 4, 5, and 6 and therefore occurs sequentially.

3. *Calculate Net Interest for All Objects (see Fig. 8)*

Net Interest is:

$$NI = \text{Interest Income} - \text{Cost of Funds} + \text{Value of Funds} - \text{Interest Expense} + \text{Earning on Allocated Equity}$$

Correct interest rates for calculation of interest income or expense depend on the length of the profit measurement period. Using actuarial mathematical techniques the bookkeeping required by GAAP for interest receivables and Payables can be avoided in NI calculus. A known technique (see M Stigum, Money Markets) to accomplish this adjustment for profit measurement according to GAAP (i.e. accruals) the following calculation is used to convert interest rates:

Let r_{new} = annualized rate with new
compounding factor

r = annualized rate with old compounding
factor

m = number of old compounding periods per
year

n = number of new compounding periods per
year

Then
$$r_{\text{new}} = \left[\left(1 + \frac{r}{m} \right)^{m/n} - 1 \right] * n$$

NI CALCULATION RULE TYPE I (80)

The object balance is either an asset or a liability amount for Type I calculation.

Let $AAB(o_i)$ = Average Asset Balance of the object o_i
 $ALB(o_i)$ = Average Liability Balance of the object o_i
 $rate_{asset}(o_i)$ = Effective interest rate for object o_i as an asset
balance
 $rate_{liability}(o_i)$ = Effective interest rate for object o_i as a liability
balance
 R_t = Treatment rate based on the identified treatment for
the object's product attributes
 $Int\ Inc(o_i)$ = Interest Income of object o_i
 $COF(o_i)$ = Cost of funds used by object o_i
 $Int\ Exp(o_i)$ = Interest Expense for object o_i
 $VOF(o_i)$ = Value of funds provided by object o_i

Then,

$Int\ Inc(o_i) = AAB(o_i) * rate_{asset}(o_i)$
{Compute only if object attribute doesn't exist}
 $COF(o_i) = AAB(o_i) * R_t$
 $Int\ Exp(o_i) = ALB(o_i) * rate_{liability}(o_i)$
{Compute only if object attribute doesn't exist}

$VOF(o_i) = ALB(o_i) * R_t$

NI CALCULATION RULE TYPE II (81)

Let $AB_{(c,t)}(o_i)$ = Average Balances of the object o_i
 $rate_{(c,t)}(o_i)$ = Effective interest rate for the corresponding balance
asset or liability
 $R_t(o)$ = Object o's product type/group as needed to identify
treatment rate
 $R_{(c,t)}(pt(o))$ = Rate (treatment rate) for objects of this product
type/group, given the balance class, and tier

$\text{Int Inc}(o_i)$ = Interest Income of object o_i
 $\text{COF}(o_i)$ = Cost of funds used by object o_i
 $\text{Int Exp}(o_i)$ = Interest Expense for object o_i
 $\text{VOF}(o_i)$ = Value of funds provided by object o_i

Then, where summations are over the possible balance variables (class, tier) for the object,

$$\text{Int Inc}(o_i) = \sum_{\forall c, t} \text{AB}_{(\text{asset } c, t)}(o_i) * \text{rate}_{(\text{asset } c, t)}(o_i)$$

{calculate only if object attribute doesn't

exist}

$$\text{COF}(o_i) = \sum_{\forall c, t} \text{AB}_{(\text{asset } c, t)}(o_i) * R_{(\text{asset } c, t)} R_{(c, t)}(\text{pt}(o))$$

$$\text{Int Exp}(o_i) = \sum_{\forall c, t} \text{AB}_{(\text{liability } c, t)}(o_i) * \text{rate}_{(\text{liability } c, t)}(o_i)$$

{calculate only if object attribute doesn't

exist}

$$\text{VOF}(o_i) = \sum_{\forall c, t} \text{AB}_{(\text{liability } c, t)}(o_i) * R_{(\text{liability } c, t)} R_{(c, t)}(\text{pt}(o))$$

Allocated Balances

Let Total Amount = Balance Sheet amount to be allocated to object
 Rule = Rule for allocating Amount

Then, DPM calculates the allocation to object o to determine the allocated balance:

$$\begin{aligned}
 B(o_i) &= \text{Rule applied to (Total Amount)} \\
 &= \text{The Allocated Balance}
 \end{aligned}$$

Treat this balance as any one of the average balances associated with the object, where class is specified by users, tier is "allocated". Thus, $B_i(o_i)$ is one of the $\text{AB}_{(c, t)}(o_i)$ defined above.

NI CALCULATION RULE TYPE III (82)

Let $AB_{(c,t)}(o_i)$ = Average Balances of the object o_i
 $rate_{(c,t)}(o_i)$ = Effective interest rate for the corresponding
balance

$Type_{p,a}(o_i)$ = Object o_i 's product and object attributes as
needed to identify treatment

$R_{(c,t)}(type_{p,a}(o_i))$ = Rate (treatment rate) for this object's product
type, given the balance class, and tier/tenor

$Int\ Inc(o_i)$ = Interest Income of object o_i

$COF(o_i)$ = Cost of funds used by object o_i

$Int\ Exp(o_i)$ = Interest Expense for object o_i

$VOF(o_i)$ = Value of funds provided by object o_i

Then, where summations are over the possible balance attributes
(state, tier) for the object,

$$Int\ Inc(o_i) = \sum_{\forall c,t} AB_{(asset\ c,t)}(o_i) * rate_{(asset\ c,t)}(o_i)$$

{calculate only if object attribute doesn't exist}

$$COF(o_i) = \sum_{\forall c,t} AB_{(asset\ c,t)}(o_i) * R_{(asset\ c,t)}(type_{p,a}(o_i))$$

$$Int\ Exp(o_i) = \sum_{\forall c,t} AB_{(liability\ c,t)}(o_i) * rate_{(liability\ ,t)}(o_i)$$

{calculate only if object attribute doesn't exist}

$$VOF(o_i) = \sum_{\forall c,t} AB_{(liability\ c,t)}(o_i) * R_{(c,t)}(type_{p,a}(o_i))$$

NI CALCULATION RULE TYPE IV (83)

Let $AB_{(c,t)}(o_i)$ = Average Balances of the object
 $rate_{(c,t)}(o_i)$ = Effective interest rate for the corresponding
balance amounts
 $type_{p,a,b}(o_i)$ = Object o_i 's product, object attribute, and
behavior types as needed to identify treatment
rate
 $R_{(c,t)}(type_{p,a,b}(o_i))$ = Rate (treatment rate) for objects of this product
type, balance class, and tier/tenor
 $Int\ Inc(o_i)$ = Interest Income of object o_i
 $COF(o_i)$ = Cost of funds used by object o_i
 $Int\ Exp(o_i)$ = Interest Expense for object o_i
 $VOF(o_i)$ = Value of funds provided by object o_i

Then, where summations are over the possible balance variables
(state, tier) for the object,

$$Int\ Inc(o_i) = \sum AB_{(asset\ c,t)}(o_i) * rate_{(asset\ c,t)}(o_i)$$

{calculate only if object attribute

doesn't exist}

$$COF(o_i) = \sum AB_{(asset\ c,t)}(o_i) * R_{(asset,t)}(type_{p,a,b}(o_i))$$

$$Int\ Exp(o_i) = \sum AB_{(liability,t)}(o_i) * rate_{(liability,t)}(o_i)$$

{calculate only if object attribute doesn't exist}

$$VOF(o_i) = \sum AB_{(liability,t)}(o_i) * R_{(liability,t)}(type_{p,a,b}(o_i))$$

NI CALCULATION RULE TYPE V (84)

Any Net Interest calculation that is non-iterative, canonical, and
represents the marginal GAAP valuation of an object's balance sheet
resource related revenues or expenses for each (o_i) .

Note that in firms that are highly leveraged, the use of COF/VOF separation leads to a significant and volatile piece of NI, the net difference between the sum of COF and the sum of VOF (after adjusting for EOAE per the following section) and the firm's total NI. This is known by a banker as "mismatch profits arising from the difference in tenors" (duration) of the assets and liabilities. If VOF and COF rates are based on matched maturity of objects then the difference between the firm's total NI and the sum of the objects is the profit arising from the firm having different duration of balance sheet related objects. Since this profit is not related to a specific object, but the combination of objects in the enterprise, a separate profit measure is appropriate and possible using DPM's approach. The use of the rules above allow for a novel method of calculating funds transfer pricing, since the rules are based on sets, the processing can be performed in parallel. Further, since the rules are canonical this approach leads to a computationally efficient method of calculating these types of profit values.

NI CALCULATIONS OF EOAE

Since GAAP financial statement's balance sheet is based on the balancing equation Assets equals Liabilities plus Equity, NI should be adjusted for the value of the Equity resource consumed by each Asset or Liability object. Calculating Earnings on Allocated Equity as part of an object's NI:

Four exclusive options are provided for allocating equity to objects. DPM's options are as follows:

- Option 1 No calculation of EOAE.
- Option 2 EOAE calculation based on a simple equity ratio.
- Option 3 Equity allocation for all assets following regulatory standards.

- Option 4 Equity allocation using an economic allocation rule, based on object cohorts and modern portfolio theory's capital asset pricing model.

Option 1 (85)

$$EOAE(o_i) = 0$$

Option 2 (86)

Let $AB_{(asset, t)}(o_i)$ = Average Asset balances of the object o_i , including any allocated asset balances

ER = Equity Ratio

R_{equity} = Treatment Rate for equity

$$\text{Then, } EOAE(o_i) = R_{equity} * ER * \sum AB_{(asset, t)}(o_i)$$

where the summation is taken over all asset balances.

Option 3 (87)

Let $Amount(o_i)$ = Amount(s) associated with object 'a' This may be the average asset balances of the object ' o_i ' including any allocated asset balances, or may be an object parameter, etc.

$Wt(type(o_i))$ = Code needed to identify the weight for object o balances, at the object-type level

$W(Wt(type(o_i)))$ = determined by the weight code

$Cap\ Ratio$ = An appropriate risk-weighted capital ratio chosen

R_{equity} = Treatment Rate for equity

$$\text{Then, } EOAE(o_i) = R_{equity} * \sum [Amount(o_i) * W(Wt(o_i)) * Cap$$

Ratio]

where the summation is taken over all balances of o_i if there are multiple amounts.

Option 4 (88)

Let $\text{Amount}(o_i)$ = An amount or amounts related to the object, such as average balances of the object (denoted $\text{AB}_{(c,s,t)}(o_i)$)

$\text{Cohort}(o_i)$ = The cohort of objects in which object o is a member

$E_{\text{cohort}}(o_i)$ = The equity allocation rule for the cohort of object o . This is a linear (two-valued) function that operates on $\text{Amount}(o_i)$ of the form $\alpha + \beta * \text{Amount}(o)$.

R_{equity} = Treatment Rate(s) for equity for the $\text{Amount}(o_i)$ value(s)

$$\begin{aligned} \text{Then, } \text{EOAE}(o_i) &= \sum R_{\text{equity}} * E_{\text{cohort}}(o)(\text{Amount}(o_i)) \\ &= \sum R_{\text{equity}} * [\alpha + \beta * \text{Amount}(o_i)] \end{aligned}$$

where summation occurs if $\text{Amount}(o_i)$ is a set of values (such as the object and allocated balances related to the object).

4. Calculate Other Revenue for All Objects (see Fig. 9)

OR Calculation Rule Type I (90)

Let OR_i = Financial Statement Other Revenue attribute subset ,
 $\text{OR}_i(o_i)$ = The amount of OR_i apportioned to object o_i ,
 $O(\text{OR}_i)$ = the objects that map to OR_i .

Let M be an OR calculation method, where M is dependent upon the OR subset under consideration. We then have the following.

If $M(\text{OR}_i)$ = a "balance" attribute method.

Define

$M(OR_i)(o_i)$ = An average balance method for calculating o_i 's
OR

$$\text{and } OR_i(o_i) = OR_i * \frac{\text{Balance}(o_i)}{\sum_j (\text{Balance}(o_j))}$$

where the summation is over all o_i in $o_i(OR_i)$.

If $M(OR_i)$ = A "count" method for calculating o_i 's OR

Define

$$M(OR_i)(o_i) = 1$$

$$\text{and } OR_i(o_i) = OR_i * \frac{1}{(\text{count}(a_j) \text{ in } O(OR_i))}$$

where the count is over all o_i in $o_i(OR_i)$.

If $M(OR_i)$ = "event count," we can define

$M(OR_i)(o_i)$ = Count of events in profit measurement period for
object o_i

$$\text{and } OR_i(o_i) = OR_i * \frac{\text{count of events for object } o_i}{\sum_j (\text{count of events for object } (o_j))}$$

where the summation is over all o_i in $o_i(OR_i)$.

If $M(OR_i)$ = "event amount"

$$\text{Define } M(OR_i)(o_i) = \sum_{\text{events over the period}} (\text{event amounts for } o_i)$$

$$\text{and } OR_i(o_i) = OR_i * \frac{\sum_{\text{events over the period}} (\text{event amounts for object } o_i)}{\sum_j \sum_{\text{events over the period}} (\text{event amounts for object } o_i)}$$

where the summation is over all events in $o_i(OR_i)$,

and the events are restricted to a class of event type. Then, we have the
total OR for object o given by the sum of these allocations for all sets for
which a has an association:

$$OR(o_i) = \sum (OR_i(o_i)), \text{ summing over } i.$$

As a generalization, these formulas can be written in shorthand

where $M(OR)$ is the corresponding function of 'o' above, as:

$$OR_i(o_i) = OR_i * \frac{M(OR_i)(o_i)}{\sum_j M(OR_j)(o_i)}$$

and

$$OR(o_i) = \sum_i^{o_i \in O(OR_i)} \left[OR_i * \frac{M(OR_i)(o_i)}{\sum_j M(OR_j)(o_i)} \right]$$

OR Calculation Rule Type II (91)

The formula for OR calculation is given as follows:

Let o_i = Object being considered

$OR_i(o_i)$ = OR apportioned to a (if any) from a set OR_i

$Event(t)_i(o_i)$ = The event reflecting the activity of object o_i in the period restricted to a given event type t .

$Amount(Event(o_i))$ = An event amount

$Rev(Evt_i(o_i))$ = The revenue amount associated with this event.

This is

assumed to be of the form

$$= \sum_{type\ i} \sum_i \left[x_i * Count(Event(t)_i(o)) + \beta_i * Amt(Event(t)_i(o)) \right]$$

where α , β are pre-entered values.

$OR(o_i)$ = Total OR apportioned to object o_i

Then $OR(o_i)$ = $\sum_{type\ i} \sum_i (Rev(Event(t)_i(a)))$ summed over all the events of o_i

+ apportioned revenue as in the Type I case.

$$= \sum_{type\ i} \sum_i \left[x_i * Count(Event(t)_i(a)) + \beta_i * Amt(Event(t)_i(a)) \right] +$$

$$\sum_i (OR_i(o_i))$$

OR Calculation Rule Type II (92)

Let o_i = Object being considered
 $OR_i(o_i)$ = OR apportioned to the object (if any) from a set OR_i
 $Event(t)_i(o_i)$ = The events reflecting the activity of object o in the period

restricted to a given event type t

$Amount(Event(t)_i(o_i))$ = The event amount

$Rev(Event(t)_i(o_i))$ = The revenue amount associated with this event.

This is assumed to be of the form

$$= \sum_{type} \sum_i [x_i * Count(Event(t)_i(o)) + \beta_i * Amt(Event(t)_i(o))] \text{ where } \alpha, \beta$$

are pre-entered values based on event type. For completeness, $\alpha = \beta = 0$ in the event amount is null.

AM = The method of amortization = cash, SL, DB,
interest

$AM_k \{amount\}$ = Deferral on amount, using method AM , at time k (= 0 if $k > \text{life}$);

and life = 1 if cash basis is selected

$AM_{now} \{amount\}$ = Deferral on amount, using method M , at this period now; note

that this is at various points of life for various amounts

Let $OR(o_i)$ = Total OR apportioned to object o_i .

Then $OR(o_i)$ = Amortized amounts in their first amortization period
+ amortized amounts in their higher amortization

periods

+ amounts not amortized but apportioned from a pool

as in Type I

We take this step at a time. First, consider the amounts in their first amortization period. These are calculated as follows, using the formula generated in Type II:

$$\begin{aligned} \text{Then } OR(o_i) &= \sum_{\text{type } t} \sum_i (\text{Rev}(\text{Event}(t)_i(o_i)) \text{ summed over all the} \\ &\quad \text{transactions of} \\ &\quad + \text{apportioned revenue as in the Type I case.} \\ &= \sum_{\text{type } t} \sum_i \left[x_i * \text{Count}(\text{Event}(t)_i(o_i)) + \beta_i * \text{Amt}(\text{Event}(t)_i(o_i)) \right] \\ &+ \sum_i (OR_i(o_i)) \end{aligned}$$

where the AM_1 methods vary with the event types. We can group the amounts being amortized by their amortization characteristics. For this purpose, let

$\text{Pool}_1(L, M)$ = the pools of amounts amortizing in this period for the first time according to life L and amortization method M . The new amortizing amounts can be rewritten as follows:

$$\text{New amortized amounts} = \sum_{L, M} \text{Pool}_1(L, M)$$

Similarly, define

$\text{Pool}_k(L, M)$ = the pools of amounts amortizing in this period for the k^{th} time according to life L and amortization method M , where $L \leq k$. N.B. any amortization calculation can be used if the calculation can be derived using known Object Attributes.

Then, the total OR for object o_i in this period is computed as follows:

$$\begin{aligned}
OR(o_i) &= \sum_{type} \sum_i \left[x_i * Count(Event(t)_i(o_i)) + \beta_i * Amt(Event(t)_i(o_i)) \right] \\
&\quad + \sum_{k>1} \sum_{L,M} Pool_k(L, M) \\
&\quad + \sum_i (OR_i(o_i)) \\
&= \sum_k \sum_{L,M} Pool_k(L, M) + \sum_i (OR_i(o_i))
\end{aligned}$$

OR Calculation Rule Type IV (93)

Foregone OR:

Let Actual OR for object $o_i = OR_{actual}(o_i)$ - CASH AMOUNTS

Let Expected OR for object $o_i = OR_{expected}(o_i)$

Then, Foregone OR for object $o_i = OR_{foregone}(o_i) = OR_{expected}(o_i) -$

$OR_{actual}(o_i)$ - CASH AMOUNTS

OR Calculation Rule Type V (94)

Any Other Revenue calculation that is non-iterative, canonical, and represents the entire GGAP valuation of non-balance sheet resource related revenues or expenses.

5. Calculate Direct Expense for All Objects (see Fig. 10)

DE Calculation Rule Type I (100)

None directly specified - use IE calculation rules (any type). For each IE rule used in this way, substitute $DE(o_i)$ for $IE(o_i)$ in any IE calculations used as DE.

DE Calculation Rule Type II (101)

Direct expense will be a variable dependent upon the object and the event being costed. These determine the unit cost to be used and the

calculation type, along with the multiplier rule being used if external amounts are needed. Thus, using subscripts to indicate variables used,

$DE_{\text{object, event-type}}$
 = unit cost_{event type} * (no. of events of this type in the period)
 + amounts taken from an event file
 + costs calculated as a
 percentage of Event Amount Where the unit costs, and revenue
 percentage by event type, are all entered by the user as pre-processing
 inputs.

Then, $DE_{\text{object}} = \sum_{\text{event types}} DE_{\text{object, event-type}}$ where the summation is over event
 types.

DE Calculation Rule Type III (102)

$DE_{\text{object, event-type, event-sub}}$
 = unit cost_{event type} * (no. of events of this type in the period)
 + amounts taken from an event file
 + costs calculated as a percentage of event amount

DE Calculation Rule Type IV (103)

Two calculations are made, each one using the above calculations, processing two independent DE attributes for each object. DE is calculated twice for each object, allowing for comparison of plan to actual values or standard to actual values or any scenario to scenario comparison.

DE Calculation Rule Type V (104)

Any Direct Expense calculation that is non-iterative, canonical, and represents the entire GGAP valuation of costs related to object or sub-object level details.

6. Calculate Provision for All Objects (see Fig. 11)

P Calculation Rule Type I (110)

The formula for calculating P of Object i is as follows, where PG(o_i) denotes the P group in which o_i is a member:

$$P(o_i) = PG(o_i) * \frac{\text{Balance of } o_i}{\sum_{o_k \in RPG(o_i)} \text{Balance } o_k}.$$

P Calculation Rule Type II (111)

The formula for calculating P of o_i is as follows, using the same symbols as above and RF(o_i) denotes the expected adjustment factor for o_i:

$$P(o_i) = PG(o_i) * \frac{\text{Balance}(o_i) * RF(o_i)}{\sum_{o_k \in RPG(o_i)} [\text{Balance}(o_k) * RF(o_k)]}.$$

P Calculation Rule Type III (112)

The formula for calculating P of object "o_i" is as follows, where Pr(o_i) is a probability for object o_i.

$$P(o_i) = \text{Exposure}(o_i) * Pr(o_i) * \text{Expected Value Adjustment}(o_i) * \frac{1}{L_i}$$

Where L is the expected number of reporting periods during the life of o_i.

P Calculation Rule Type IV (113)

The addition of any of the Type I, II or III P rules applicable to an object i.

$$P(o_i) = P(o_i)_{P \text{ Type I}} + P(o_i)_{P \text{ Type II}} + P(o_i)_{P \text{ Type III}} + P(o_i)_{P \text{ Type IV}}$$

P Calculation Rule Type V (114)

Any Provision calculation that is non-iterative, canonical, and represents the entire GGAP valuation of expected costs related to future events, contingencies, timing effects.

7. Calculate Indirect Expense for All Objects (see Fig. 12)

Indirect expense, by its nature is not related directly to an Object, therefore apportionment techniques are used to allocate indirect expense to an Object. Any apportionment function is allowed as long as it is derivable at the object level using ratios of attributes available at the object level to the summation of this available attribute across all objects receiving the apportioned expense. Examples of this type of ratio calculation (the function "F" used in the IE calculation types) are:

- Ratio 1: Balance-based apportionment of IE.
Define Apportionment ratio using Current Balance of (o_i).

Thus, the allocation of Indirect Expense k becomes (function $F(IE_k)(o_i)$ in IE rules below):

$$IE_k * \frac{\text{Current Balance of } o_i}{\sum_j (\text{Current Balance of } o_j)}, \text{ summed over all objects in grouping } j.$$

- Ratio 2: Count-based apportionment of IE

Thus, the allocation of Indirect Expense k becomes (function $F(IE_k)(o_i)$ in IE rules below):

$$IE_k * \frac{1}{(\text{count of } o_j \text{ in } O(IE_k))}, \text{ for all objects in grouping } j.$$

- Ratio 3: Revenue-based apportionment of IE
Define $NI(o_i) + OR(o_i) = \text{Total Revenue}$ (using NI & OR rules above) for (o_i).

Thus, the allocation of Indirect Expense k becomes (function $F(IE_k)(o_i)$ in IE rules below):

$$IE_k * \frac{NIR(o_i) + OR(o_i)}{\sum_j (NIR(o_j) + OR(o_j))}, \text{ summed over all objects in grouping } j$$

- Ratio 4: Event Count apportionment of IE
Count of events for (o_i) are restricted to an event type.

Thus, the allocation of Indirect Expense k becomes (function F(IE_k)(o_i) in IE rules below):

$$IE_k * \frac{\text{count of event for object } o_i}{\sum_j (\text{count of event for object } (o_j))}$$

for some event type, summed over all objects in grouping j.

- Ratio 5: Transaction Amount apportionment of IE
Summation of event amounts for (o_i), restricted to an event type.

Thus, the allocation of Indirect Expense k becomes (function F(IE_k)(o_i) in IE rules below):

$$IE_k * \frac{\sum_{\text{event over the period}} (\text{event amounts for object } (o_i))}{\sum_j \sum_{\text{event over the period}} (\text{event amounts for object } (o_j))},$$

for some event type, summed over all objects in grouping j.

- Ratio 6: Direct Expense apportionment of IE
Using DE rules above for O_i.

Thus, the allocation of Indirect Expense k becomes (function F(IE_k)(o_i) in IE rules below):

$$IE_k * \frac{DE(o_i)}{\sum_j (DE(o_j))}, \text{ summed over all objects in grouping } j.$$

- Ratio 7: Normalized (averaged) apportionment of IE

Thus, the allocation of Indirect Expense k becomes in IE rules below:

$$F(IE_k)(o_i) = [IE \text{ using Ratio 1 } F(IE_k)(o_i) + IE \text{ using Ratio 3 } F(IE_k)(o_i) + IE \text{ using Ratio 6 } F(IE_k)(o_i)] \div 3.$$

IE Calculation Rule Type I (120)

Indirect expense is apportioned to accounts using one of the first three apportionment ratios above. Accordingly, using the nomenclatures above,

$$IE(o_i) = (\text{Total IE to be apportioned}) * \frac{F(IE_k)(o_i)}{\sum_k F(IE_k)(o_i)}$$

IE Calculation Rule Type II (121)

The rules for partitioning IE and defining corresponding object groups are based on product and event attributes. The calculation of $IE(o_i)$ is exactly as described above, and is given by the following, where the F 's are the given apportionment ratios (any of the seven apportionment ratios are permitted for any partition O or groupings of objects).

$$IE(o_i) = \sum_k^{o_i \in O(IE)} \left(IE_k * \frac{F(IE_k)(o_i)}{\sum_j^{o_j \in O(IE)} F(IE_k)(o_j)} \right)$$

IE Calculation Rule Type III (122)

For Indirect Expense before deferral calculations, the process is similar to that as listed for the Type II Level, where:

$$IE(o_i) = \begin{aligned} & \text{New amounts in their first period of amortization} \\ & + \text{Amounts not being amortized (cash basis)} \\ & + \text{Amounts in their 2}^{nd} \text{ through last amortization period.} \end{aligned}$$

Since we include non-amortized amounts (cash basis) to be considered as amortized with only one period, this is re-written as follows:

$IE(o_i) =$ New amounts in their first period of amortization (including cash-basis)

+ Amounts in their 2nd through last amortization period.

Note that non-amortized amounts are made to fit this equation by considering them to be an amortization of one profit reporting period only. Each IE set can have a different amortization type or period, though all objects receiving a specific apportionment will share the same amortization Rule.

The new amounts to be deferred are computed, therefore, as the following:

$$\text{Before deferral } IE(o_i) = IE_k * \frac{F(IE_k)(o_i)}{\sum_{o_j \in O(IE)} F(IE_k)(o_j)} \text{ added over each set } IE_k \text{ to}$$

which o_i is related.

$$= \sum_k^{o_i \in O(IE)} \left(IE_k * \frac{F(IE_k)(o_i)}{\sum_{o_j \in O(IE)} F(IE_k)(o_j)} \right)$$

Each of these terms may be deferred over its amortization period according to any of the amortization rules (cash, straight line, declining balance, or interest amortization calculations). Since amortization methods may vary by set, we have the following, where $AM_1(L,R)$ is used to denote the amortization rule and its life:

$$IE(o_i) = \sum_k^{o_i \in O(IE)} AM_1(L,R) \left(IE_k * \frac{F(IE_k)(o_i)}{\sum_{o_j \in O(IE)} F(IE_k)(o_j)} \right)$$

To this is added the amounts with remaining amortization life for which amortization was begun in earlier periods.

IE Calculation Rule Type IV (123)

Multiple combinations of the any of the above IE type rules I, II, or III are calculated per object.

IE Calculation Rule Type V (124)

Any Indirect Expense apportionment calculation that is non-iterative, canonical, and represents the GAAP evaluation of indirect costs.

8. Calculate After-Tax Object Profit for All Objects (130)(see Fig. 13)

$$\text{Profit}(o_i) = [\text{NIR}(o_i) + \text{OR}(o_i) - \text{DE}(o_i) - \text{IE}(o_i) - \text{P}(o_i)] * (1 - \text{EffectiveTaxRate})$$

where, for a two tier taxation system, Effective Tax Rate is calculated as:

$$\text{Effective Tax Rate} = (1 - \text{tax rate 2}) * (\text{tax rate 1}) + \text{tax rate 2}.$$

In the calculation of Effective Tax Rate, this formula assumes the two rates are effective rates which apply to the business conditions (not the nominal statutory rates), and that tax rate can be deducted from income in the calculation of tax rate. Then,

$$\text{Total Profit} = \sum_i [\text{Profit}(o_i)]$$

For those companies which use economic profit value calculations, the formula changes to:

$$\text{Profit}(o_i) = \{[\text{NIR}(o_i) + \text{OR}(o_i) - \text{DE}(o_i) - \text{IE}(o_i) - \text{P}(o_i)] * (1 - \text{EffectiveTaxRate})\} - \text{SVA}(o_i)$$

where

$$\text{SVA}(o_i) = \alpha(o_i) + \beta(o_i) * \text{Amount}(o_i)$$

and

$\alpha(o_i)$, $\beta(o_i)$ are functions for a cohort of objects in which o_i is a member, and $\text{Amount}(o_i)$ is given by a rule which maps o_i to a data value (such as balance, or allocated equity) also defined at the cohort level. (A cohort defined here represents a grouping of objects with

similar risk characteristics, consistent with Modern Portfolio Theory and the Capital Asset Pricing Model.)

Shareholder Value Add (SVA) is a method financial analysts use to adjust profit measures for risk. The idea is to subtract from the profit measure the cost of the equity required to support whatever is being measured. Companies use this risk adjustment measure essentially to burden the profit for risk being taken with the equity funds used by the object. These institutions will classify cohorts of risk and the risk cost equivalent as a percentage of account balance or allocated equity (i.e., "Hurdles").

DPM Example

In the airline industry a need for detailed customer profitability can be measured using DPM. Here the fundamental object is the seat, allowing consistent profitability values aggregated by route, aircraft type, as well as customer dimensions using data warehousing technology. The need for detailed customer profitability is being driven by the business impact analysis required to support loyalty and alliance strategic decisions. The following is a DPM profit calculation for a seat, with real profit measurement parameters simplified (not all aspects of true airline business is demonstrated) and where examples of each type of rule are utilized in DPM processing.

Flight: Air101

Date: 7/1/1998

From: London

To: New York

Equipment: Boeing 747-400

Classes: First (20 Seats); Business (80 Seats); Economy(300 seats)

DETAILED PROFIT METRIC PROCESSING

Step 1: Populate Database – assuming a relational database management system and terminology.

- Initialize database;
Extract, Condition, and Load the following tables: Planes, Flights, Customers, Employees, Locations; The net balances in the Planes entity can be maintained by use of DPM amortization IE calculation from the prior period.
- Extract, Condition, and Load the following tables: Financial Transactions, Events; Manifest (occupant, seat, flight, date attributes);
- Extract, Condition, and Load the Financial Statement table;
- Calculate and populate Rate table;

Figure 14 shows a partial relational database schema showing the entities and attributes used in the example's processing.

Step 2: Maintain Object Groups and Rule Maps – a database processing routine is run creating the following groupings:
Class to Seat

- Flight to Locations
- Seat to Plane

For ease in understanding the rule the specifications used to populate the database with rule parameters the processing instructions are shown below in the Rules. Also, most rules group by plane – the rule discussion below assumes this grouping without reference.

Step 3: Calculate Net Interest for Seat – Four types of NIR rules are processed - type I, II, III, IV for each seat. Interest rates are matched to plane purchase date for initial plane investments, and interest rates for plane net capitalizable improvements are funded with a 5 year pool of rates. Plane asset balances are kept in the Plane table maintained in Step 1.2 above.

NIR Type I: Carry cost of plane asset by seat is determined.

Rule

Populated in Step 2 are:

- The AAB(seat) parameter is Plane: net__orig_bal * (1/total seats on plane)
- The rt parameter is Treatment_rts: 25_yr_rate (maintained for each plane) There is no need for liability rates.

Calculate COF(seat) = AAB(seat) * rt for all seats on flight.

All other attributes are NI Type I calculations results are null.

No grouping.

NIR Type II : Allocate net receivable/payable to seat for carry cost profit adjustment. This adjusts profitability for the impact of cash flows vs. accounting flows. This airline wants to apportion this cost across all revenue seats based on class_wt, a modelling parameter. Total weighted seats (twS) for the accounting period is a modelling parameter. Where the seat factor is determined as a ratio of seat footprint to class portion of the plane's seat revenue space. (e.g. 1st = 15%, 2nd = 25% & 3rd = 60% of plane's seat revenue space with each seat evenly apportioned in class – 1/20, 1/80, 1/300 respectively, in this case.)

Rule

Populated in Step 2 are:

- The AB(seat) parameter is Financial: net_recv'ble * (1 / twS)
- The rt parameter is Treatment_rts: pool (for null plane row) There is no need for liability rates.

Calculate COF(seat) = AB(seat) * rt * class_wt

Grouped by class all seats, so no_seats??? is no_seats1st value in the plane entity for first class seats on this plane, and

so on for 2nd & 3rd class seat groups. The net recv'ble column is derived from the difference between sum of period_amts for the receivables minus sum of payable rows for this profit period.

All other attributes and NI Type II calculations results are null.

NIR Type III : Calculate the NI value of the customer mileage benefit payable for each seat.

Rule

Populated in Step 2 are:

- The AB(seat) parameter is Customer: bene_miles * loyalty factor
- The rt parameter is Treatment_rts: pool (for null plane row) There is no need for an asset rate.

Calculate COF(seat) = AB(seat) * rt

Since a customer can only occupy one seat, no groupings are used in this rule map.

All other attributes and NI Type III calculations results are null.

NIR Type IV : Calculate the NI impact of the plane's improvements for each seat. Upper classes interior, customer electronics and seating are improved faster during the life of the plane. Management strategy is for these improvements to be loyalty program related; they are amortized quicker and hence shorter funding requirement with less certain life. Management wants the loyal customers to pay proportionately more of the funding costs of improvement assets.

Rule

Populated in Step 2 are:

- The AB(seat) parameter is Plane:imp_net_bal * (1/tsw)

- The rt parameter is Treatment_rts: pool (for plane row)
* Customer: loyalty_rtng

There is no need for a liability rate.

Calculate COF(seat) = AB(seat) * rt * class_fac

The unique class_fac values sum to 1. The rule map is grouped by classes (or class_fac).

All other attributes and NI Type IV calculations results are null.

NI EOAE- Option 4: Allocate equity based on mileage benefit and have it reduce NI by the weighted average cost of capital for the airline.

Rule

Populated in Step2 are:

- The Amount(seat) parameter is Customer:bene_miles
- The equity rate is 9.75%

Calculate EOAE(seat) = Amount(seat) * equity_rate * cohort_wt

The cohort is based groups of each instance of loyalty_rtng and class of seat paired. Cohort_wt is "beta" and no "alpha."

All other attributes and EOAE calculations results are null.

Step 4: Calculate Other Revenues for each Seat – **Revenue arises from ticket fares, duty free sales on board aircraft, excess baggage penalties collected, alliance code sharing license and multiple leg customer trips.**

OR Type 1 : Apportion revenue from code sharing with alliance.
Apportion revenue by seat allocated to alliance passenger.

Rule

Populated in Step 2 are:

- Flight:period_amt is alliance revenue per flight plus the sum of all flight/date alliance financial transactions.

Calculate $OR(seat) = \text{sum of Flight:period\_amt} \times$

$(1 / \text{no alliance seats available on flight})$

Only for seats occupied by an alliance customer or a seat that is empty.

OR Type II: Use Transaction table to find direct passenger revenue by seat.

Rule

Populated in Step 2 are:

- Transaction:* (amounts, seats, flight, date, transaction type) are populated for events, financial or non-financial.

Calculate $OR(seat) = \text{sum of Transaction:trn\_amt}$

where type = "passenger_payment" for each seat.

No seat grouping in rule map.

OR Type III: Apportion flight freight revenue amongst all seats, weighted by class_wt.

Rule

Calculate $OR(seat) = \text{sum of Transaction:trn\_amt} \times \text{class\_wt}$

*

$(1 / (\text{no\_seats???}))$

where type "freight" for each seat.

Group seats by class (??? Is 1st, 2nd, 3rd.) Class_wt is a normalized weight for apportioning revenue amongst classes.

OR Type IV: Calculate the loyalty mileage benefit by seat.

Rule

Calculate Forgone $OR(seat) = \text{Flight: ???\_fare} - \text{sum of Transactions:trn\_amt}$ where type = "passenger_payment" for each seat.

Group by class for loyalty passenger occupied seats only.

Step 5: Calculate Direct Expenses for each Seat –

Compute the direct cost of using the seat. This is true for both occupied and unoccupied seats. Fuel and flight deck crew are costs of all seats, while cost of duty free goods sold and meals are a function of occupied seats. Some costs are a function of the plane taking off, no matter the duration of the flight (e.g., maintenance.) Some costs are a function of class, such as cabin crew expense and customer consumables.

DE Type I: Show direct cost of non-food materials consumed in flight.

Rule

Populated in Step 2 are:

- Transactions:* is populated based on these direct costs.

Calculate DE(seat) = Transactions:trn_amt for all flight and date rows where type = direct_exp for each seat.

No grouping in rule map.

DE Type II: Show direct cost duty free goods sold by seat.

Rule

Populated in Step 2 are:

- Transactions:* are populated based on these direct costs.

Calculate DE(seat) = Transactions:trn_amt for all flight and date rows where type = duty_free for each seat.

No grouping in rule map.

DE Type III: Show direct cost of food and beverage consumed.

Rule

Populated in Step 2 are:

- Transactions:* are populated based on these direct costs
- Loading is calculated as the ratio of occupied to total class seats by class (cl_load) using manifest table and plane configuration values.

Calculate DE(seat) = Flight: catering_cost * class_wt * cl_load
for each seat.

Grouped by class in rule map.

DE Type IV: The staffing of each cabin has a maximum count with a minimum of 1 per 50 passengers. The air deck crew must fly the plane even if there are no passengers. Calculate DE twice, once for based on a labor cost per seat based on total crew cost and total seats; and calculate DE a second time with actual staff apportioned to actual passengers.

Rule

Populated in Step 2 are:

- Total crew cost (tcc1) parameter is derived using the employee entity for all crew on flight. $Tcc = \text{Employee:salary+bene} * (\text{Flight:schd\_hours} + 1.5) / 110$
- Total crew cost (tcc2) parameter is derived using the employee entity for all crew on flight by class. $Tcc??? = \text{Employee:salary+bene} * (\text{Flight:schd\_hours} + 1.5) / 110$

Note: $tcc = tcc1st + tcc2nd + tcc3rd$

Calculate DE1(seat) = $tcc * (1/(\text{total no. of seats on plane}))$

Calculate DE2(seat) = $tcc?? * (1/(\text{no. of seats occupied in class}))$

for each seat.

Grouped by class in rule map.

Step 6: Calculate Provisions for each Seat – The cost of expected future events are measured here. The airline self insures property, casualty and miscellaneous insurance premiums on a per flight basis. And a provision for future loyalty benefit, a function of loyalty rating, claimed is made in step 6.

P Type I: - The cost of the flight's insurance premium is apportioned to each seat.

Rule

Populated in Step 2 are:

- Insurance premium is maintained in the flight entity (total PG)

Calculate $P(\text{seat}) = \text{Flight:ins\_prem} * 1/(\text{total no. seats on plane})$

No grouping in rule map.

P Type II: Provision for unusual maintenance cost is made on a function of the inverse of flight time and takeoffs in the last 12 months.

Rule

Populated in Step 2 are:

- Financial:period_amt is maintained in the financial entity by equipment type.
- Total flight hours and last 12 months take-offs are accumulated each month, their product is to_hrs parameter.

Calculate $P(\text{seat}) = \text{Financial:period\_amt} * 1/(\text{total no. of seats on plane}) * (\text{Plane:to\_last12} * \text{Flight:schd\_hrs}) / \text{to\_hrs}$

No seat grouping in rule map.

P Type III: Providing for future loyalty benefit.

Rule

Populated in Step 2 are:

- Customer:bene_miles is maintained using prior periods provision for benefit miles by loyalty customer
- A parameter estimating the usage rate by loyalty cohort called burn factor

Calculate $P(\text{seat}) = \text{Flight:distance} * \text{burn}(\text{loyalty\_rating})$

Grouping by loyalty rating in rule map.

P Type IV: Future order cancellation reserve.

Rule

Populated in Step 2 are:

- Future airplane order cancellation penalty (pen) and order size (fut_planes) is maintained in the financial entity
- Last 12 months loading is calculated by plane

Calculate $P(\text{seat}) = \text{pen} * (\text{Plane:orig\_bal} / \text{fut\_planes}) * 1 / (\text{total no. seats on plane}) * 1/24$. where last 12 months loading less than 75%.

Only seats on where last 12 months loading less than 75%.

Step 7: Calculate Indirect Expenses for each Seat – The calculation of indirect expense is the final step of detailed level profit calculation. Here remaining cost measures that are not differentiable by seat are measured. Fuel and oil, ground costs, regular aircraft maintenance, overheads, and general marketing expenses are apportioned in IE. The airline also wants to view customer profitability loaded with the cost of unoccupied seats.

IE Type I: General and administrative costs are apportioned to a seat in this rule.

Rule

Populated in Step 2 are:

- The periods financial entity is populated with all of the airlines G&A expenses (e.g., type of G&A are passenger services, navigation licenses, rentals, miscellaneous costs, premises and property taxes.) Allocate these costs based on seat revenue (NI + OR.)

Calculate $IE(seat) = \frac{\text{sum}(\text{Financial:trn\_amt}) * (\text{sum}(\text{NI}(seat)) + \text{sum}(\text{OR}(seat)))}{(\text{Total OR} + \text{NI for period})}$

No seat grouping in rule map for all Financial:type = "G&A".

IE Type II: Ground location costs, airport specific and gate expenses are apportioned by flight.

Rule

Populated in Step 2 are:

- Populate all of these expenses for the period Transactions:trn_amt with the type being the three letter international airport identifier.
- Calculate the number of seats flown to the flight airports during the profit period (tfc)

Calculate $IE(seat) = \frac{\text{sum of Transactions:trn\_amt} * (1 / \text{tfc})}{2}$

Group transactions by pair of airports in flight row for rule map, where only these types of expenses are included in the tuple.

IE Type III: Fixed asset depreciation is allocated to a seat.

Rule

Populated in Step 2 are:

- The net plane balances (Plane:net_orig_bal & Plane:imp_net_bal) are updated for last period's amortization or write-off.

- The amortization factor (function of amortization) given age of asset (for both original investment and improvements) is amfo and amfi for each plane.
- The tax planning estimate for taxable equivalent gross-up, due to accelerated tax amortization, is .8 = teg (less than 1 since a tax credit)

Calculate IE(seat) = ((Plane:net_orig_bal - Plane:orig_bal) * amfo) + (Plane:imp_org_bal - Plane: imp_org_bal) * amfi)) * teg * (1 /(total no. seats on plane)) * (Flight:schd_hrs / Plane:hrs_last_12 / 12)

No grouping of seats in rule map.

IE Type IV: Indirect marketing expenses are apportioned by loyalty class for customer profit aggregations and by seat for other aggregations.

Rule

Populated in Step 2 are:

- Indirect marketing expense per loyalty tier per flight is parameterized as mef???, where ??? is 1st, 2nd, 3rd class.

Calculate IE(seat) = mef??? * (1 / (no. of occupied seats in ???))

Group seats by class in rule map.

IE Type V: For loyalty investment analysis, allocate all DE for empty seats to occupied seats equally.

- Populated, after all prior steps are calculated, are the total DE less OR for each flight during the period, idef.

Calculate IE(seat) = idef / (total no. of occupied seats)

Only calculate for occupied seats.

Step 8: Calculate After-tax Seat Profit – The

After-tax Profit:

Rule

Populated in Step 2 are:

- The effective tax rate (etr) for the airline is maintained in the database.

Calculate $\text{Profit}(\text{seat}) = \text{sum}(\text{NI}(\text{seat}) + \text{OR}(\text{seat}) + \text{DE}(\text{seat}) + \text{IE}(\text{seat}) + \text{P}(\text{seat})) * (1 - \text{etr})$

Each seat is calculated individually, no grouping is used.

Shareholder Value-add: The airline has determined that some routes have a greater risk of loss due to the volatility of loading factors. Therefore each route is given a risk factor based on the last 12 months standard deviation of loading.

Rule

Populated in Step 2 are:

- Flight:risk_factor is maintained here
- Economic equity per average seat parameter (Flight:risk_factor) per route
- Cost of capital rate is parameterized_(eqrt)

Calculate $\text{SHV}(\text{seat}) = \text{Profit}(\text{seat}) - (\text{Flight:risk\_factor} * \text{eqrt})$

Each seat is calculated.

From the foregoing, it will be appreciated that DPM provides a metric of profit measurement consistent with GAAP at a level of detail that has not been accomplished using the traditional General Ledger based data with analytical and/or sample survey based information.

This new ability to resolve profit measures at a detailed level without using analytical models or statistical extrapolation is a capability needed throughout industries that find their ability to determine a marginal decision's profit impact inadequate for optimization of ownership value. The use of rule driven and database measurement processes will give large scale businesses a lower cost of maintenance and technologically

scaleable tool to measure profit at a level of precision or resolution not possible in prior financial performance measurement processes.

Although a particular embodiment of the invention has been described in detail for purposes of illustration, various modifications may be made without departing from the spirit and scope of the invention. Accordingly, the invention is not to be limited, except as by the appended claims.

ABSTRACT OF THE DISCLOSURE

A process for determining object level profitability includes the steps of (1) preparing information to be accessed electronically, (2) establishing rules for processing the prepared information, (3) calculating at least one marginal value of profit using established rules as applied to a selected set of prepared information, (4) calculating a fully absorbed value of profit adjustment using established rules as applied to the selected set of prepared information, and (5) combining the at least one marginal value of profit and fully absorbed value of profit adjustment to create a measure for object level profitability. The inventive process gives management profit measures tailored to its need for accurate decision oriented profit information required to manage a large organization based on profit measurement.



JPW
3627

PTO/SB/21 (09-04)
Approved for use through 07/31/2006. OMB 0651-0031
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TRANSMITTAL FORM (to be used for all correspondence after initial filing)	Application Number	09/545,628
	Filing Date	April 7, 2000
	First Named Inventor	Richard Tad Lepman
	Art Unit	3627
	Examiner Name	Andrew J. Rudy
Total Number of Pages in This Submission	Attorney Docket Number	BERK-37617

ENCLOSURES (Check all that apply)		
☐ Fee Transmittal Form	☐ Drawing(s)	☐ After Allowance Communication to TC
☐ Fee Attached	☐ Licensing-related Papers	☐ Appeal Communication to Board of Appeals and Interferences
☒ Amendment/Reply	☐ Petition	☐ Appeal Communication to TC (Appeal Notice, Brief, Reply Brief)
☐ After Final	☐ Petition to Convert to a Provisional Application	☐ Proprietary Information
☐ Affidavits/declaration(s)	☐ Power of Attorney, Revocation Change of Correspondence Address	☐ Status Letter
☐ Extension of Time Request	☐ Terminal Disclaimer	☒ Other Enclosure(s) (please identify below):
☐ Express Abandonment Request	☐ Request for Refund	Replacement Sheets - Specification
☐ Information Disclosure Statement	☐ CD, Number of CD(s) _____	Return Receipt Postcard
☐ Certified Copy of Priority Document(s)	☐ Landscape Table on CD	
☐ Reply to Missing Parts/Incomplete Application	Remarks	
☐ Reply to Missing Parts under 37 CFR 1.52 or 1.53		

SIGNATURE OF APPLICANT, ATTORNEY, OR AGENT			
Firm Name	KELLY LOWRY & KELLEY, LLP		
Signature			
Printed name	Scott W. Kelley		
Date	06-02-2005	Reg. No.	30.762

CERTIFICATE OF TRANSMISSION/MAILING			
I hereby certify that this correspondence is being facsimile transmitted to the USPTO or deposited with the United States Postal Service with sufficient postage as first class mail in an envelope addressed to: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450 on the date shown below:			
Signature			
Typed or printed name	Scott W. Kelley	Date	06-02-2005

This collection of information is required by 37 CFR 1.5. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to 2 hours to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.

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PATENT APPLICATION FEE DETERMINATION RECORD

Substitute for Form PTO-875

Application or Docket Number

09/545,628

CLAIMS AS FILED - PART I

(Column 1)

(Column 2)

SMALL ENTITY

OR

OTHER THAN
SMALL ENTITY

FOR	NUMBER FILED	NUMBER EXTRA
BASIC FEE (37 CFR 1.16(a))		
TOTAL CLAIMS (37 CFR 1.16(c))	minus 20 =	*
INDEPENDENT CLAIMS (37 CFR 1.16(b))	minus 3 =	*
MULTIPLE DEPENDENT CLAIM PRESENT (37 CFR 1.16(d))		

RATE	FEE
	\$
X \$	=
X \$	=
+ \$	=
TOTAL	

RATE	FEE
	\$
X \$	=
X \$	=
+ \$	=
TOTAL	

* If the difference in column 1 is less than zero, enter "0" in column 2.

CLAIMS AS AMENDED - PART II

(Column 1)

(Column 2)

(Column 3)

SMALL ENTITY

OR

OTHER THAN
SMALL ENTITY

6/6/05

	CLAIMS REMAINING AFTER AMENDMENT		HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA
Total (37 CFR 1.16(c))	25	Minus	53	=
Independent (37 CFR 1.16(b))	5	Minus	7	=
FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(d))				

RATE	ADDITIONAL FEE
X \$	=
X \$	=
+ \$	=
TOTAL ADD'L FEE	

RATE	ADDITIONAL FEE
X \$	=
X \$	=
+ \$	=
TOTAL ADD'L FEE	

	CLAIMS REMAINING AFTER AMENDMENT		HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA
Total (37 CFR 1.16(c))	*	Minus	**	=
Independent (37 CFR 1.16(b))	*	Minus	***	=
FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(d))				

RATE	ADDITIONAL FEE
X \$	=
X \$	=
+ \$	=
TOTAL ADD'L FEE	

RATE	ADDITIONAL FEE
X \$	=
X \$	=
+ \$	=
TOTAL ADD'L FEE	

	CLAIMS REMAINING AFTER AMENDMENT		HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA
Total (37 CFR 1.16(c))	*	Minus	**	=
Independent (37 CFR 1.16(b))	*	Minus	***	=
FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(d))				

RATE	ADDITIONAL FEE
X \$	=
X \$	=
+ \$	=
TOTAL ADD'L FEE	

RATE	ADDITIONAL FEE
X \$	=
X \$	=
+ \$	=
TOTAL ADD'L FEE	

* If the entry in column 1 is less than the entry in column 2, write "0" in column 3.

** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, enter "20".

*** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 3, enter "3".

The "Highest Number Previously Paid For" (Total or Independent) is the highest number found in the appropriate box in column 1.

This collection of information is required by 37 CFR 1.16. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.

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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/545,628	04/07/2000	Richard Tad Lepman	Berk-37617	2145
7590 07/20/2005 Scott W Kelley Kelly Bauersfeld Lowry & Kelly LLP 6320 Canoga Avenue Suite 1650 Woodland Hills, CA 91367		EXAMINER RUDY, ANDREW J		
		ART UNIT 3627 PAPER NUMBER		

DATE MAILED: 07/20/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No. 09/545,628	Applicant(s) LEPMAN, RICHARD TAD	
	Examiner Andrew Joseph Rudy	Art Unit 3627	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 1 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on June 6, 2005.
- 2a) ☐ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-9, 11-13 and 16-59 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☐ Claim(s) _____ is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)	4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)	5) ☐ Notice of Informal Patent Application (PTO-152)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____	6) ☐ Other: _____

DETAILED ACTION

Response to Amendment

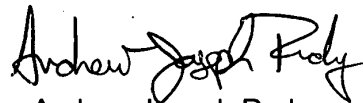
1. The reply filed on June 6, 2005 is not fully responsive to the prior Office Action because of the following omission(s) or matter(s): Pursuant to the Revised amendment Practice – Amendment to Claims, the full text of the withdrawn claims must be submitted along with the other claims. See 37 CFR 1.111. Since the above-mentioned reply appears to be *bona fide*, applicant is given **ONE (1) MONTH or THIRTY (30) DAYS** from the mailing date of this notice, whichever is longer, within which to supply the omission or correction in order to avoid abandonment. EXTENSIONS OF THIS TIME PERIOD MAY BE GRANTED UNDER 37 CFR 1.136(a).
2. Claims 1-9, 11-13 and 16-59 remain pending.

Conclusion

3. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Andrew Joseph Rudy whose telephone number is 571-272-6789. The examiner can normally be reached on Monday thru Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Alexander G. Kalinowski can be reached on 571-272-6771. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

A handwritten signature in black ink, appearing to read "Andrew Joseph Rudy". The signature is fluid and cursive, with the first and last names being more prominent.

Andrew Joseph Rudy
Primary Examiner
Art Unit 3627



IR 3627

PTO/SB/21 (09-04)
Approved for use through 07/31/2006. OMB 0651-0031
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE

Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

TRANSMITTAL FORM (to be used for all correspondence after initial filing)	Application Number	09/545,628	
	Filing Date	April 7, 2000	
	First Named Inventor	Richard Tad Lepman	
	Art Unit	3627	
	Examiner Name	Andrew J. Rudy	
Total Number of Pages in This Submission	75	Attorney Docket Number	BERK-37617

ENCLOSURES (Check all that apply)		
☐ Fee Transmittal Form ☐ Fee Attached ☒ Amendment/Reply ☐ After Final ☐ Affidavits/declaration(s) ☐ Extension of Time Request ☐ Express Abandonment Request ☐ Information Disclosure Statement ☐ Certified Copy of Priority Document(s) ☐ Reply to Missing Parts/Incomplete Application ☐ Reply to Missing Parts under 37 CFR 1.52 or 1.53	☐ Drawing(s) ☐ Licensing-related Papers ☐ Petition ☐ Petition to Convert to a Provisional Application ☐ Power of Attorney, Revocation ☐ Change of Correspondence Address ☐ Terminal Disclaimer ☐ Request for Refund ☐ CD, Number of CD(s) _____ ☐ Landscape Table on CD	☐ After Allowance Communication to TC ☐ Appeal Communication to Board of Appeals and Interferences ☐ Appeal Communication to TC (Appeal Notice, Brief, Reply Brief) ☐ Proprietary Information ☐ Status Letter ☒ Other Enclosure(s) (please identify below): Return Receipt Postcard
Remarks		

SIGNATURE OF APPLICANT, ATTORNEY, OR AGENT			
Firm Name	KELLY, LOWRY & KELLEY, LLP		
Signature			
Printed name	Scott W. Kelley		
Date	07-27-2005	Reg. No.	30,762

CERTIFICATE OF TRANSMISSION/MAILING			
I hereby certify that this correspondence is being facsimile transmitted to the USPTO or deposited with the United States Postal Service with sufficient postage as first class mail in an envelope addressed to: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450 on the date shown below:			
Signature			
Typed or printed name	Scott W. Kelley	Date	07-27-2005

This collection of information is required by 37 CFR 1.5. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to 2 hours to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.

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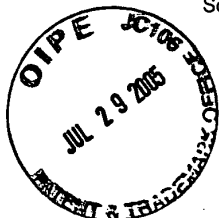
I hereby certify that this correspondence is being deposited with the United States Postal Service as first class mail in an envelope addressed to Mail Stop Amendment, Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450 on July 27, 2005.


Scott W. Kelley, Reg. No. 30,762

July 27, 2005

Date

PATENT



IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Group Art Unit: 3627

Examiner: Rudy, Andrew J.

In re Application of

Richard Tad Lepman

Serial No. 09/545,628

Docket No. BERK-37617

Filed: April 7, 2000

FOR: PROCESS FOR
DETERMINING OBJECT LEVEL
PROFITABILITY

AMENDMENT

Mail Stop Amendment
Commissioner for Patents
P.O. Box 1450
Alexandria, Virginia 22313-1450

Dear Sir:

In response to Office Actions dated January 26, 2004 and July 20, 2005, please amend the above-identified application as follows:

Amendments to the Specification begin on page 2 of this paper.

Amendments to the Claims begin on page 56 of this paper.

Remarks/Arguments begin on page 68 of this paper.

Amendments to the Specification:

Please replace the entire Specification with the following (a clean copy being attached hereto):

PROCESS FOR DETERMINING OBJECT

LEVEL PROFITABILITY

RELATED APPLICATION

This application claims priority from provisional patent application Serial No. 60/128,769, filed April 9, 1999.

BACKGROUND OF THE INVENTION

The process of measuring profit is an important business activity. Profit measures are the primary basis for understanding financial performance and value creation in a business. Once a business is owned publicly, an independent review of a firm's financial position becomes a mandatory process well known as measuring profit according to "generally accepted accounting principals" (GAAP.) While these standards and regulations are adequate for an external view of a company's financial condition, the measurement of profit contribution amongst the business is required for proper management of the franchise. Internal financial performance measurement is especially complex for a multi-product, multi-location, and/or large customer based businesses. The use of internal financial performance measures drives most businesses planning processes, management incentive processes and control processes. Many businesses have found that internal profit measures can be consistent with the external financial statement measures. These businesses implement internal accounting processes consistent with external measures using common metrical units similar to a GAAP Financial Statement presentation - a consistent metric or "yard stick" (i.e.

numerically the sum-of-the-profit-parts equals the whole company's profit according to GAAP.)

Many businesses today are struggling to accurately measure profit contribution at a level necessary to accurately measure profit contribution of individual customer interactions. The reason for dilemma is found in the manner in which generally accepted accounting principles are applied. Fundamental accounting theory takes lumpy cash flows that occur in the day-to-day management of a business conducted with its customers and transform them into smoothed income or expense items (known as accruals.) At the end of every profit reporting cycle these income and expense items are consolidated into a period end balance sheet and income statements. Reports on the state of the business can then be presented by accountants in formats necessary for the independence of ownership and management that is the basis of capital markets. Indeed, most businesses today would call its accounting process critical for survival. Unfortunately, the complexity of maintaining an accurate financial accounting process has obscured the measurement of profit contribution at a very detailed level. While the aggregate cash flows of a large company are relatively stable the individual customer-to-business cash flows are very volatile. Accounting practice to date has been comfortable with using aggregate cash flow information for the accrual accounting process⁽¹⁰⁾, as illustrated in FIG. 1. The accounting process based on aggregates has lead to blindness by businesses of incremental customer profit contribution measures necessary to implement customer level decision making, particularly in large businesses with many millions of customers.

General Ledgers (double entry book keeping systems)⁽¹¹⁾ were early adapters of automated data processing solutions due to the match between computing capabilities of computers and the execution of the accounting process. The benefit, from reduced cost for accounting processes easily justified large expenditures in information processing technology, both in hardware and in software development. The

complexity of today's general ledger applications and the age of these systems have retarded the innovation of new automated techniques taking advantage of technological advances in massively parallel computing capability.

References describing generally accepted accounting principals and procedures are listed below, and are incorporated by reference herein:

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There remains, however, a need to resolve profit measures at a
detailed level without using analytical models or statistical
extrapolation(12). Such a process should utilize rule driven and data base
measurement processes which will give large scale businesses a lower
cost of maintenance and a technologically scalable tool to measure profit
at a level of precision or resolution not possible in prior financial
performance measurement processes. The present invention fulfills this
need and provides other related advantages.

SUMMARY OF THE INVENTION

Prior approaches to management's desire for an accurate measure of individual decisions (incremental or marginal) profit impact have been solved by automating the accounting process for implementing accounting methods. Cash flows are transformed into two parts, a debit part or credit part, according to an accounting rule. Other non-cash accounting rules are implemented to create "accrual" debits and credits smoothing income and expenses and adjusting for future contingencies. (see Management Accounting Theory ~~Books~~books or any source of accounting theory, where the balance sheet equation and the consolidation process, the combination of flows and stocks of financial data, are developed.) The first large scale use of automated computing technology is frequently found to be the automation of the financial control or accounting processes, since it is easy to develop software to implement accountancy rules and there were large benefits in staff productivity easily observable. For businesses to observe marginal profit contributions it was necessary to use accounting information and make reasoned conclusion on how to apportion or extrapolate this information into incremental customer, product or organizational profit detail. (See Fig. 1)

What these methods of profit measurement lack are the adequate level of detail to measure an individual or incremental decision's impact on profit. To gain this new level of profit resolution this invention is designed to use micro profit measurement rules applied at a granular level consistent with standard accounting practice using a combination of actuarial science and mathematical set theory. The invention is designed to utilize massively parallel computing operations using relational database management techniques enabling profit measurement at a level not available today in a large individual customer scale business. This invention does this through a consistent application of measures to a class of business entities which represent the smallest common component of profit measurement desired - the Profit Object.

The invention's method of apportionment of non-object related profit measures specifies a method which will not change the ordinal or cardinal profit contribution ranking when only marginal profit measures are counted. This specification is what makes it possible to apply marginal measurement rules (see Micro-economic theory literature) with macro economic principals; namely the sum-of-the-parts equals the whole criterion which is the basis of financial accounting theory and practice.

The invention decomposes profit measurement analytical calculations into five classifications:

1. Marginal profit measures associated with use of the business' balance sheet resources;
2. Marginal measures of non-balance oriented revenues;
3. Marginal cost measures;
4. Marginal measures of expected costs or revenues; and,
5. Apportioned cost measures.

This classification provides for additive profit measures across the five components. The calculation process is designed to be independent across classes 1, 2, 3, & 4 above with the addition of class five to preserve sum-of-the-parts integrity without simultaneous calculations typically found in profit measurement processes. When all five profit measures are summed at the lowest level of profit detail, a consistent set of profit values for all types of aggregations are possible - all profit measurement then originates from the same point in a profit database. The simultaneous use of these five analytical frameworks makes possible a detailed level of profit calculation consistent with GAAP.

In particular, the present invention relates to a process for determining object level profitability. In its basic form the process includes the steps of:

1. Preparing information to be accessed electronically;
2. Establishing rules for processing the prepared information;

3. Calculating at least one marginal value of profit using established rules as applied to a selected set of prepared information;
4. Calculating a fully absorbed value of profit adjustment using established rules as applied to the selected set of prepared information; and,
5. Combining the at least one marginal value of profit and fully absorbed value of profit adjustment to create a measure for object level of profitability.

More specifically in the step of preparing information to be accessed electronically, the database is prepared, object attributes are extracted, conditioned and loaded into the database, and financial statement attributes are extracted, conditioned and loaded into the database. If desired the step may also include extracting, conditioning and loading the event attributes into the database, and calculating funds transfer treatment rates.

In the step of establishing for processing the prepared information for rule establishment providing the information necessary to select objects and perform the correct profit calculus is accomplished. The step of calculating at least one marginal value of profit using established rules as applied to a selected set of prepared information includes calculating net interest, other revenue, direct expense, and/or provision for the selected set of prepared information. Net Interest (NI) is the summation of interest income, value of funds provided and earnings on equity funds used less the sum of interest expense and cost of funds used. Other Revenues (OR) is a measure of profit contribution from non-interest related sources. Direct Expense (DE) is the profit value reduction due to marginal resource consumption by the object. Provisioning (P) is the expected profit value adjustment for future outcomes related to the object.

The step of fully absorbed profit adjustment, Indirect Expense (IE), is an apportioned profit value adjustment for all non-object related resource consumption by the business.

In the step of combining the five profit values, $NI + OR - DE - P - IE$, may be adjusted for taxes and/or object economic value.

The foregoing elements of the invention, which have been explained at a micro elemental level can be advantageously employed in massive amounts and parallel process power. For example, in the macro perspective of the invention the basic steps can be utilized.

The present invention gives management profit measures tailored to its need for accurate decision oriented profit information required to manage a large organization based on profit measurement. This invention gives businesses the ability to resolve profit measures at a level of detail necessary for all types of application of profit oriented performance measurement.

Other features and advantages of the present invention will become apparent from the following more detailed description, taken in conjunction with the accompanying drawings which illustrated, by way of example, the principles of the invention.

BRIEF DESCRIPTION OF THE DRAWINGS

The accompanying drawings illustrate the invention. In such drawings:

FIGURE 1 shows existing profit calculation process flow.

FIGURE 2 shows analytical processing relationships.

FIGURE 3 shows the invention's information flow.

FIGURE 4 shows the invention's data relationships.

FIGURE 5 shows the invention's process flow.

FIGURE 6 shows the invention's database preparation process step detail.

FIGURE 7 shows the rule maintenance process.

FIGURE 8 shows the net interest measuring process

FIGURE 9 shows the other revenue measuring process.

FIGURE 10 shows the direct expense measuring process.

FIGURE 11 shows the provision measuring process.

FIGURE 12 shows the indirect expense measuring process.

FIGURE 13 shows the profit component aggregation and adjustment process.

FIGURE 14 shows a partial relational database schema for an airline industry example.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

As shown in the accompanying drawings for purposes of illustration, the present invention is concerned with a detail profit metric (DPM) designed to be a computer database application (i.e. software) for profitability measurement. DPM's profit measurement system is fundamentally different from the common profit measurement system used by regulators and public accountancy - yet, it is consistent with generally accepted accounting principals.

With reference to FIG. 2, the present invention's method of apportionment of non-object related profit measure specifies a method or allocation model (25) which will not change the ordinal or cardinal profit contribution ranking when only marginal profit measures are counted. This specification is what makes it possible to apply marginal measurement rules or models(20) with macro economic principals. The invention decomposes profit measurement and analytical calculations into five classifications, namely:

Marginal profit measures or funds transfer pricing (21) associated with use of the business' balance sheet resources;

Marginal cost measures or event costing (22);

Marginal measures or non-interest revenues (23) (non-interest or balance sheet related revenue);

Marginal measures of expected costs or revenues, also referred to as provisioning (24); and

Apportioned costs or indirect costing (26). These profit measurement analytical calculations result in a detailed profit measure (27).

With reference now to FIG. 3, once all five profit component measures are summed from the lowest level of profit detail (the "profit object"), a consistent set of profit values for all types of aggregations (30) are possible. DPM is based on object level detail sourced from a business systems of record's cash flows (31), sourced from a customer's transactions, (object oriented events) (33) and sourced from management allocations of profit arising from non-customer related events (34). DPM provides both marginally and or fully absorbed profit measures using activity based costing techniques(35), something traditional "general ledger" based profit accounting systems can not accomplish due to reliance on aggregate debit and credit amounts (see Figs. 2-4.) This results in the smallest common component of profit measurement desired – the profit object (32) common to the business' organizations, products or customers.

More specifically, with reference to FIG. 4, in the step of preparing information to be input (40) to be accessed electronically, a database is prepared. Object attributes are extracted, conditioned, and loaded into the database (43), and financial statement attributes are extracted, conditioned and loaded into the database (45). If desired, the method may also include extracting, conditioning and loading the event attributes into the database (44) and calculating funds transfer treatment rates and activity based costing rates (46).

In the step of establishing for processing (41) the prepared information information on how to select objects and perform the correct profit calculus rule mapping (47) is accomplished. The step of calculating (48) at least one marginal value of profit using establishment rules as applied to a selected set of prepared information includes calculating net interest (NI), other revenue (OR), direct expense (DE), and/or provision for the selected set of prepared information. Provisioning (P) is expected

profit value adjustment for future outcomes related to the object. The step of fully absorbed profit adjustment, Indirect expense (IE), is an apportioned profit value adjustment for a non-object related resource consumption by the business. The foregoing elements of the invention, which have been explained at a micro-elemental level, can be advantageously employed in massive amounts and parallel processing power (41). The present invention gives businesses the ability to resolve profit measures at a level of detail (49) necessary for all types of applications of profit oriented performance measurement or detailed profitability data as an output (42) for enabling aggregation to a particular customer, product or organization within a business.

The following is a definition of the inputs (attributes or measurement parameters), the method of processing and the output of the DPM process.

Definitions

Object Attributes (43)

These are data about the object being measured. Different businesses have different objects of detailed profit measurement. Examples of profit measurement objects include an airline using "seat" as the profit object, an insurance company using a "policy" object or a bank use an "account" object - these objects represent the lowest level of detail required for consistent internal multi-dimensional internal profit analyses. Types of data attributes associated with these objects include: balances, rates (or interest accrued), product identification, exposures, expected loss frequency, and various dates (e.g., start, finish, rate reset, last payment, next payment, life, etc.)

Event Attributes (44)

These data are about events (a resource consuming activity) related to the object being measured. Data found here include object identification, transaction amounts, quantities, event location,

event time, counter-party identification, event type (e.g., payments, interest paid or earned, purchases, refunds, etc.) At least one of these attributes must relate the event to at least one Object.

Financial Statement Attributes (45)

These are data about the company's financial statement. Data found here include balance sheet and profit statement amounts usually aggregated by the legal or management entities that own a group of objects being measured. These data will be current accounting period either actual or planned.

Profit Measurement Parameters (46)

These data include parameter values necessary to perform the object or event level profit calculations. The major classifications of these data are:

- Funds valuing rates ("Treatment Rates") - DPM's funds transfer pricing method uses maturity opportunity rates used in valuing each object's marginal use or source of internal funds (balance sheet resources).
- Unit Costs - DPM's Direct Expense calculations require unit cost parameters. DPM can calculate unit costs, when unit cost data are not available; in these instances, if the total cost is provided a financial statement attribute and then unit cost is derived by dividing total cost by an appropriate attribute quantity amount.
- Allocated Amounts - In both Other Revenue and Indirect Expense calculations this amount is apportioned amongst all objects in a group.
- Miscellaneous Calculation Values - Some of DPM's calculations require non-system of record values. For example, number of days in profit measurement period or equity allocation weighting. These values are known as "modeling" parameters.

- Amortization Parameters - Interest amortization requires an interest rate and expected life attributes. Straight line and declining balance methods of amortization require expected life values.
- Expected Profit Adjustment Measurement Parameters - Provision calculations require appropriate attributes, such as: expected loss rates, reserve percentages, exposure factors, recovery rates, default probabilities and collection costs.
- Tax Rates - Tax rates are required for after-tax profit calculation. DPM is designed to calculate pre-tax income on a taxable equivalent basis (where a single effective tax rate is all that is required to transform pre-tax income into after tax earnings.)

Profit Measurement Rule Specification

DPM's processing approach is to combine profit measurement techniques with (non-modeled) data and calculation parameters. Each application of this calculus is called a rule 47. DPM is designed to allow the user the freedom to associate a group of objects with a rule and to use object-level information in combination with rule parameters to calculate profit values. The DPM invention uses profit measurement rules separate from, but applied to, object data and the use of relational database concepts, giving the user a flexibility in both the assignment and depth of definition of measurement rules and measurement resolution. Use of this method is especially suited for massively parallel computing technology where linear scaleable capital investment in processing technology is possible vis-à-vis object and event count and rule complexity.

The types of calculation (Rule types) are:

- Funds Treatment - Every object with cash flows affecting a financial statement's balance sheet requires a method of valuing an object's use or source of funds. The common name for this approach to valuing is known as "Matched Maturity Funds Transfer Pricing." DPM uses a

canonical representation an object's funding characteristics for computational performance. DPM's methodology requires effective yield adjustment to eliminate the allocation of interest payable / receivable required by GAAP. A value, based on effective yield adjusted market price (the yield curve), is then determined by DPM for each instance that requires an interest rate transfer prices to calculate an object's marginal Net Interest (NI).

- Equity Allocation - In order for precise net interest revenue or economic value adjusting calculations the amount of equity funds required at an object level must be determined. DPM's equity allocation to the object level calculations may use any of the following methods: simple ratios; regulatory definitions; economic allocations based on econometric modeling (see book on Modern Portfolio Theory) methodologies; or, as statically defined allocations.
- Balance Sheet Allocations – Complete calculation of Net Interest may require an object level allocation of some financial statement balance sheet amounts.
- Apportionment - In both Other Revenue, Provision and Indirect Expense calculations are applied at the object level using Financial Statement Attributes which are not related directly to an object. These profit adjustments are made so that the sum of all object profit equals the whole enterprise's profit - an important property of DPM's output. Accountants refer to this profit measurement technique as "full allocation of profit." DPM's approach is to pool indirect costs and revenues and then apportion them. Apportionment rules specify how the pool is completely allocated to appropriate objects. DPM uses a specific closed form (mathematical formula that require only information known in the current period and no iterative computation) allocation rules.
- Amortization - Some types of income or expense are deferred or accrued over multiple periods including and subsequent to the current accounting period. This is common to accrual accounting methods

used in financial statement profit presentation and give rise to timing differences between cash flows and their related profit as presented in a financial statement in any accounting period. Since DPM is designed to mirror a financial statement's profit measure it must support deferral and accrual accounting principals. Amortization methods are included in DPM to reflect these GAAP concepts. DPM's amortization methods include: interest method of amortization (used for interest income and expense accruals and for deferral of fees that are in lieu of interest); and, straight line or declining balance amortization methods (used for cost or income deferrals and capitalized investment depreciation.)

- Other Revenue Pricing - In situations where object and event activity can be used to derive object level income or fees DPM provides for the calculation of these drivers of profitability in Other Revenue profit calculations. These calculations take the mathematical form of a linear combination of event or object values and modeled coefficients.
- Direct Expense - Calculation of object profit adjustment due to object related activity requires rules that take the form of linear combinations of event or object values and modeled coefficients.
- Indirect Expense - In situations where expense apportionment or amortization amounts are aggregated the user may want different rules applied depending on the path (or dimension) of aggregation. These rules allow for multiple profit calculations rules to be applied to derive multiple object level indirect expense amounts.
- Provision - Adjusting current profit for expected future value changes is known as "actuarial" profit provisioning. The technique is well known by the financial industry's accounting practice. DPM applies actuarial based methods in its object level profit calculations where the Provision pre-adjusts profit for contingent or known exposures to future profit.
- Taxable Equivalent Gross-up - Profit is usually an after-tax measure. Some events or portions of some object profit may be excluded from normal taxation. DPM's approach is to adjust these pre-tax values so that a singular tax rate can be used to convert pre-tax profit into after-

tax values, known as taxable equivalent adjustment. For the purpose of the remaining detailed description all profit and loss profit measures are tax equivalent amounts (e.g., TEG * Amount.) These rules use object and event attributes to drive an adjustment for each of the five classes of profit amounts to a taxable equivalent basis.

- Interest Yield Adjustments - Since DPM can derive profit for any length of accounting period from daily to annual, the adjustment of cash interest payments and the financial statement's accrual or smoothed representation of interest related Profit, DPM requires a method for converting cash interest amounts to financial statement accrual amounts. DPM implements the mathematical concept of "effective interest rate" conversion to accomplish this type of calculation.

Before the calculation rules can be applied at the object or event level a calculation rule must be associated with an object, designating the methods DPM will use to calculate components of profit at the object level. An object grouping is designed to associate objects having common and defined set of object attributes for similar processing (note that a group may consist of one object). The association of a group of objects with a calculation rule is referred here as a Rule Map (47).

Inheritance Functionality

In nature the concept of inheritance is where a descendant receives properties of its predecessors, in computer science inheritance is defined in "Object Oriented" software development theory as the ability to increase function without loss of function using the same data. In DPM the concept of inheritance is applied and in essence it means that an implementation can change Rules (change profit calculus) without losing any profit measurement capabilities of the preceding state(s). This feature allows DPM users a unique ability to apply techniques of differing levels of sophistication to different sets of objects according to the trade-off

between the value of more accurate object-focused profit measures and the cost of obtaining and populating data and maintaining Rule Maps.

The DPM system is designed for Rules to be applied to any object without loss of integrity of output. This design feature allows the user to incrementally migrate objects to increased measurement precision as justified. This valuable piecewise increase in functionality is possible due to DPM's combination of rules and data in a mathematical set theoretic framework. (41) This approach allows for a relational database management system implementation (42). It is nearly impossible develop and maintain procedural based software with as much flexibility and with the capability to simultaneously support the number of calculation permutations required by DPM .

Restatement Functionality

Since DPM is a rule based system the ability to restate prior period's Profit calculations are systematically possible providing historical data exists. DPM's design of object level profit measurement enables a unique historical profit restatement capability. Three features of DPM's restatement capability are:

1. Produces a mathematically consistent time series (i.e. no measurement bias) of object level Profit. DPM restatement functionality is designed to apply the same Rules to all available historical object or event level data.
2. DPM's restatement functionality preserves object accrual objecting integrity when the object history is restated for different length accounting periods. Implementations of daily, weekly, monthly, quarterly, semi-annual, or annual profit calculations and mixing different periodicity in historical data without loss of analytical integrity.
3. Capable of object's profit history restatement. If a DPM user changes Rules or Rule Maps and/or changes the way a subset of object's Profit are calculated and if the historical data is available per the new set of Rules

then the user can restate historical profit measures for these subset of objects.

Processing (see Fig. 5)

With reference to FIG. 5, the database is first populated (50). Rules are maintained (51), as will be more fully discussed herein, and the NI, OR, DE, and P are calculated (52-55). Next, the IE is calculated (56) to arrive at a calculation of the object profitability (57). This process is repeated for all objects. After the last object (58), the process is finished as the detail profitability data is obtained. FIGS. 6-13 describe in more detail the steps taken in FIG. 5 in accordance with the present invention.

1. Populate Database (see Fig. 6)

Perform standard database administration actions to initialize data for the required calculations:

1. Perform database Initialization (60)
2. Extract, condition & load object attributes (61)
3. Extract, condition & load event attributes (62)
4. Extract, condition & load financial statement attributes (63)
5. Calculate and populate NI treatment rate attributes (64)

2. MAINTAIN OBJECT GROUPS AND RULE MAPS (SEE FIG.

7)

Populate or edit Rule parameters necessary to perform calculations. Rules definition is by association of specific, non-iterative calculation, as described below, with a set of object or event attributes defined as a data filter (see Relational Data Base Management System textbooks textbooks). Rules have two pieces:

1. Parameters to drive the object selection or data filter for calculations (70); and,
2. Parameters specific to the appropriate calculation methodology (71).

An easy-to-use graphical user interface can be used to maintain these data for all rules (72).

The following processing steps. Steps 3 through 6 perform object and event level profit calculations. Steps 3, 4, 5, and 6 can be processed

independently, step 7 requires values derived in step 3, 4, 5, and 6 and therefore occurs sequentially.

3. Calculate Net Interest for All Objects (see Fig. 8)

Net Interest is:

NI = Interest Income - Cost of Funds + Value of Funds - Interest Expense + Earning on Allocated Equity

Correct interest rates for calculation of interest income or expense depend on the length of the profit measurement period. Using actuarial mathematical techniques the bookkeeping required by GAAP for interest receivables and Payables can be avoided in NI calculus. A known technique (see M Stigum, Money Markets) to accomplish this adjustment for profit measurement according to GAAP (i.e. accruals) the following calculation is used to convert interest rates:

Let r_{new} = annualized rate with new compounding factor

r = annualized rate with old compounding factor

m = number of old compounding periods per year

n = number of new compounding periods per year

Then $r_{\text{new}} = \left[\left(1 + \frac{r}{m} \right)^{m/n} - 1 \right] * n$

NI CALCULATION RULE TYPE I (80)

The object balance is either an asset or a liability amount for Type I calculation.

Let AAB (o_i) = Average Asset Balance of the object o_i

ALB (o_i) = Average Liability Balance of the object o_i

rate_{asset} (o_i) = Effective interest rate for object o_i as an asset balance

$\text{rate}_{\text{liability}}(o_i) = \text{Effective interest rate for object } o_i \text{ as a liability}$
 balance
 $R_t = \text{Treatment rate based on the identified treatment for}$
 the object's product attributes
 $\text{Int Inc}(o_i) = \text{Interest Income of object } o_i$
 $\text{COF}(o_i) = \text{Cost of funds used by object } o_i$
 $\text{Int Exp}(o_i) = \text{Interest Expense for object } o_i$
 $\text{VOF}(o_i) = \text{Value of funds provided by object } o_i$

Then,

$\text{Int Inc}(o_i) = \text{AAB}(o_i) * \text{rate}_{\text{asset}}(o_i)$
{Compute only if object attribute doesn't exist}
 $\text{COF}(o_i) = \text{AAB}(o_i) * R_t$
 $\text{Int Exp}(o_i) = \text{ALB}(o_i) * \text{rate}_{\text{liability}}(o_i)$
{Compute only if object attribute doesn't exist}

 $\text{VOF}(o_i) = \text{ALB}(o_i) * R_t$

NI CALCULATION RULE TYPE II (81)

Let $\text{AB}_{(c,t)}(o_i) = \text{Average Balances of the object } o_i$
 $\text{rate}_{(c,t)}(o_i) = \text{Effective interest rate for the corresponding balance}$
 asset or liability
 $R_t(o) = \text{Object o's product type/group as needed to identify}$
 treatment rate
 $R_{(c,t)}(\text{pt}(o)) = \text{Rate (treatment rate) for objects of this product}$
 type/group, given the balance class, and tier
 $\text{Int Inc}(o_i) = \text{Interest Income of object } o_i$
 $\text{COF}(o_i) = \text{Cost of funds used by object } o_i$
 $\text{Int Exp}(o_i) = \text{Interest Expense for object } o_i$
 $\text{VOF}(o_i) = \text{Value of funds provided by object } o_i$

Then, where summations are over the possible balance variables
(class, tier) for the object,

$$\text{Int Inc}(o_i) = \sum_{\forall c, t} AB_{(\text{asset } c, t)}(o_i) * \text{rate}_{(\text{asset } c, t)}(o_i)$$

{calculate only if object attribute doesn't

exist}

$$\text{COF}(o_i) = \sum_{\forall c, t} AB_{(\text{asset } c, t)}(o_i) * R_{(\text{asset } c, t)} R_{(c, t)}(\text{pt}(o))$$

$$\text{Int Exp}(o_i) = \sum_{\forall c, t} AB_{(\text{liability } c, t)}(o_i) * \text{rate}_{(\text{liability } c, t)}(o_i)$$

{calculate only if object attribute doesn't

exist}

$$\text{VOF}(o_i) = \sum_{\forall c, t} AB_{(\text{liability } c, t)}(o_i) * R_{(\text{liability } c, t)} R_{(c, t)}(\text{pt}(o))$$

Allocated Balances

Let Total Amount = Balance Sheet amount to be allocated to object

Rule = Rule for allocating Amount

Then, DPM calculates the allocation to object o to determine the allocated
balance:

$B(o_i)$ = Rule applied to (Total Amount)

= The Allocated Balance

Treat this balance as any one of the average balances associated with the
object, where class is specified by users, tier is "allocated". Thus, $B_i(o_i)$ is
one of the $AB_{(c, t)}(o_i)$ defined above.

NI CALCULATION RULE TYPE III (82)

Let $AB_{(c, t)}(o_i)$ = Average Balances of the object o_i

$\text{rate}_{(c, t)}(o_i)$ = Effective interest rate for the corresponding

balance

$\text{Type}_{p,a}(o_i)$ = Object o_i 's product and object attributes as needed to identify treatment
 $R_{(c,t)}(\text{type}_{p,a}(o_i))$ = Rate (treatment rate) for this object's product type, given the balance class, and tier/tenor
 $\text{Int Inc}(o_i)$ = Interest Income of object o_i
 $\text{COF}(o_i)$ = Cost of funds used by object o_i
 $\text{Int Exp}(o_i)$ = Interest Expense for object o_i
 $\text{VOF}(o_i)$ = Value of funds provided by object o_i

Then, where summations are over the possible balance attributes (state, tier) for the object,

$$\text{Int Inc}(o_i) = \sum_{\forall c,t} \text{AB}_{(\text{asset } c, t)}(o_i) * \text{rate}_{(\text{asset } c, t)}(o_i)$$

{calculate only if object attribute doesn't exist}

$$\text{COF}(o_i) = \sum_{\forall c,t} \text{AB}_{(\text{asset } c, t)}(o_i) * R_{(\text{asset } c, t)}(\text{type}_{p,a}(o_i))$$

$$\text{Int Exp}(o_i) = \sum_{\forall c,t} \text{AB}_{(\text{liability } c, t)}(o_i) * \text{rate}_{(\text{liability } c, t)}(o_i)$$

{calculate only if object attribute doesn't exist}

$$\text{VOF}(o_i) = \sum_{\forall c,t} \text{AB}_{(\text{liability } c, t)}(o_i) * R_{(c,t)}(\text{type}_{p,a}(o_i))$$

NI CALCULATION RULE TYPE IV (83)

Let $\text{AB}_{(c,t)}(o_i)$ = Average Balances of the object
 $\text{rate}_{(c,t)}(o_i)$ = Effective interest rate for the corresponding balance amounts
 $\text{type}_{p,a,b}(o_i)$ = Object o_i 's product, object attribute, and behavior types as needed to identify treatment rate
 $R_{(c,t)}(\text{type}_{p,a,b}(o_i))$ = Rate (treatment rate) for objects of this product type, balance class, and tier/tenor

Int Inc(o_i)	= Interest Income of object o_i
COF (o_i)	= Cost of funds used by object o_i
Int Exp (o_i)	= Interest Expense for object o_i
VOF (o_i)	= Value of funds provided by object o_i

Then, where summations are over the possible balance variables (state, tier) for the object,

$$\text{Int Inc}(o_i) = \sum AB_{(\text{asset } c, t)}(o_i) * \text{rate}_{(\text{asset } c, t)}(o_i)$$

{calculate only if object attribute doesn't exist}

$$\text{COF}(o_i) = \sum AB_{(\text{asset } c, t)}(o_i) * R_{(\text{asset}, t)}(\text{type}_{p,a,b}(o_i))$$

$$\text{Int Exp}(o_i) = \sum AB_{(\text{liability}, t)}(o_i) * \text{rate}_{(\text{liability}, t)}(o_i)$$

{calculate only if object attribute doesn't exist}

$$\text{VOF}(o_i) = \sum AB_{(\text{liability}, t)}(o_i) * R_{(\text{liability}, t)}(\text{type}_{p,a,b}(o_i))$$

NI CALCULATION RULE TYPE V (84)

Any Net Interest calculation that is non-iterative, canonical, and represents the marginal GAAP valuation of an object's balance sheet resource related revenues or expenses for each (o_i).

Note that in firms that are highly leveraged, the use of COF/VOF separation leads to a significant and volatile piece of NI, the net difference between to sum of COF and the sum of VOF (after adjusting for EOAE per the following section) and the firm's total NI. This is known by a banker as "mismatch profits arising from the difference in tenors" (duration) of the assets and liabilities. If VOF and COF rates are based on matched maturity of objects then the difference between the firms total NI and the sum of the objects is the profit arising from the firm having different duration of balance sheet related objects. Since this profit is not related to a specific object, but the combination of objects in the enterprise, a separate profit measure is appropriate and possible using DPM's approach. The use of the rules above allow for a novel method of

calculating funds transfer pricing, since the rules are based on sets, the processing can be preformed in parallel. Further, since the rules are canonical this approach leads to a computationally efficient method of calculating these types of profit values.

NI CALCULATIONS OF EOAE

Since GAAP financial statement's balance sheet is based on the balancing equation Assets equals Liabilities plus Equity, NI should be adjusted for the value of the Equity resource consumed by each Asset or Liability object. Calculating Earnings on Allocated Equity as part of an object's NI:

Four exclusive options are provided for allocating equity to objects. DPM's options are as follows:

- Option 1 No calculation of EOAE.
- Option 2 EOAE calculation based on a simple equity ratio.
- Option 3 Equity allocation for all assets following regulatory standards.
- Option 4 Equity allocation using an economic allocation rule, based on object cohorts and modern portfolio theory's capital asset pricing model.

Option 1 (85)

$$EOAE(o_i) = 0$$

Option 2 (86)

Let $AB_{(asset, t)}(o_i)$ = Average Asset balances of the object o_i ,
including any allocated asset
balances

ER = Equity Ratio

R_{equity} = Treatment Rate for equity

$$\text{Then, } \text{EOAE}(o_i) = R_{\text{equity}} * \text{ER} * \sum \text{AB}_{(\text{asset}, t)}(o_i)$$

where the summation is taken over all asset balances.

Option 3 (87)

Let $\text{Amount}(o_i)$ = Amount(s) associated with object 'a' This may be the average asset balances of the object 'o_i' including any allocated asset balances, or may be an object parameter, etc.

$\text{Wt}(\text{type}(o_i))$ = Code needed to identify the weight for object o balances, at the object-type level

$\text{W}(\text{Wt}(\text{type}(o_i)))$ = determined by the weight code

Cap Ratio = An appropriate risk-weighted capital ratio chosen

R_{equity} = Treatment Rate for equity

$$\text{Then, } \text{EOAE}(o_i) = R_{\text{equity}} * \sum [\text{Amount}(o_i) * \text{W}(\text{Wt}(o_i)) * \text{Cap Ratio}]$$

where the summation is taken over all balances of o_i if there are multiple amounts.

Option 4 (88)

Let $\text{Amount}(o_i)$ = An amount or amounts related to the object, such as average balances of the object (denoted $\text{AB}_{(c,s,t)}(o_i)$)

$\text{Cohort}(o_i)$ = The cohort of objects in which object o is a member

$\text{E}_{\text{cohort}}(o_i)$ = The equity allocation rule for the cohort of object o. This is a linear (two-valued) function that operates on $\text{Amount}(o_i)$ of the form $\alpha + \beta * \text{Amount}(o)$.

R_{equity} = Treatment Rate(s) for equity for the $\text{Amount}(o_i)$ value(s)

$$\begin{aligned}\text{Then, } EOAE(o_i) &= \sum R_{equity} * E_{cohort}(o)(\text{Amount}(o_i)) \\ &= \sum R_{equity} * [\alpha + \beta * \text{Amount}(o_i)]\end{aligned}$$

where summation occurs if $\text{Amount}(o_i)$ is a set of values (such as the object and allocated balances related to the object).

4. Calculate Other Revenue for All Objects (see Fig. 9)

OR Calculation Rule Type I (90)

Let OR_i = Financial Statement Other Revenue attribute subset ,
 $OR_i(o_i)$ = The amount of OR_i apportioned to object o_i ,
 $O(OR_i)$ = the objects that map to OR_i .

Let M be an OR calculation method, where M is dependent upon the OR subset under consideration. We then have the following.

If $M(OR_i)$ = a "balance" attribute method.

Define

$M(OR_i)(o_i)$ = An average balance method for calculating o_i 's

OR

$$\text{and } OR_i(o_i) = OR_i * \frac{\text{Balance}(o_i)}{\sum_j (\text{Balance}(o_j))}$$

where the summation is over all o_i in $O(OR_i)$.

If $M(OR_i)$ = A "count" method for calculating o_i 's OR

Define

$M(OR_i)(o_i)$ = 1

$$\text{and } OR_i(o_i) = OR_i * \frac{1}{(\text{count}(a_j) \text{ in } O(OR_i))}$$

where the count is over all o_i in $O(OR_i)$.

If $M(OR_i)$ = "event count," we can define

$M(OR_i)(o_i)$ = Count of events in profit measurement period for object o_i

$$\text{and } OR_i(o_i) = OR_i * \frac{\text{count of events for object } o_i}{\sum_j (\text{count of events for object } (o_j))}$$

where the summation is over all o_i in $o_i(OR_i)$.

$$\text{If } M(OR_i) = \text{"event amount"}$$

$$\text{Define } M(OR_i)(o_i) = \sum_{\text{events over the period}} (\text{event amounts for } o_i)$$

$$\text{and } OR_i(o_i) = OR_i * \frac{\sum_{\text{events over the period}} (\text{event amounts for object } o_i)}{\sum_j \sum_{\text{events over the period}} (\text{event amounts for object } o_i)}$$

where the summation is over all events in $o_i(OR_i)$,

and the events are restricted to a class of event type. Then, we have the total OR for object o given by the sum of these allocations for all sets for which a has an association:

$$OR(o_i) = \sum (OR_i(o_i)), \text{ summing over } i.$$

As a generalization, these formulas can be written in shorthand where $M(OR)$ is the corresponding function of 'o' above, as:

$$OR_i(o_i) = OR_i * \frac{M(OR_i)(o_i)}{\sum_{a_j \in A(OR_i)} M(OR_i)(o_i)}$$

and

$$OR(o_i) = \sum_i^{o_i \in O(OR_i)} \left[OR_i * \frac{M(OR_i)(o_i)}{\sum_j M(OR_i)(o_i)} \right]$$

OR Calculation Rule Type II (91)

The formula for OR calculation is given as follows:

Let o_i = Object being considered

$OR_i(o_i)$ = OR apportioned to a (if any) from a set OR_i

$Event(t)_i(o_i)$ = The event reflecting the activity of object o_i in the period restricted to a given event type t .

$Amount(Event(o_i))$ = An event amount

$Rev(Evt_i(o_i))$ = The revenue amount associated with this event.

This is

assumed to be of the form

$$= \sum_{type\ t} \sum_i [x_i * Count(Event(t)_i(o)) + \beta_i * Amt(Event(t)_i(o))]$$

where α , β are pre-entered values.

$OR(o_i)$ = Total OR apportioned to object o_i

Then $OR(o_i)$ = $\sum_{type\ t} \sum_i (Rev(Event(t)_i(a))$ summed over all the events of o_i

+ apportioned revenue as in the Type I case.

$$= \sum_{type\ t} \sum_i [x_i * Count(Event(t)_i(a)) + \beta_i * Amt(Event(t)_i(a))] +$$

$$\sum_i (OR_i(o_i))$$

OR Calculation Rule Type II (92)

Let o_i = Object being considered

$OR_i(o_i)$ = OR apportioned to the object (if any) from a set

OR_i

$Event(t)_i(o_i)$ = The events reflecting the activity of object o in the period

restricted to a given event type t

$Amount(Event_i(o_i))$ = The event amount

$Rev(Event_i(o_i))$ = The revenue amount associated with this event. This is assumed to be of the form

$$= \sum_{type\ t} \sum_i [x_i * Count(Event(t)_i(o)) + \beta_i * Amt(Event(t)_i(o))] \text{ where } \alpha, \beta$$

are pre-entered values based on event type. For completeness, $\alpha = \beta = 0$

in the event amount is null.

AM = The method of amortization = cash, SL, DB,
interest

$AM_k \{amount\}$ = Deferral on amount, using method AM, at time k (= 0 if $k > life$);

and life = 1 if cash basis is selected

$AM_{now} \{amount\}$ = Deferral on amount, using method M, at this period now; note

that this is at various points of life for various amounts

Let $OR(o_i)$ = Total OR apportioned to object o_i .

Then $OR(o_i)$ = Amortized amounts in their first amortization period
+ amortized amounts in their higher amortization periods

+ amounts not amortized but apportioned from a pool

as in Type I

We take this step at a time. First, consider the amounts in their first amortization period. These are calculated as follows, using the formula generated in Type II:

Then $OR(o_i)$ = $\sum_{type\ t} \sum_i (Rev(Event(t)_i(o_i)))$ summed over all the transactions of

+ apportioned revenue as in the Type I case.

$$= \sum_{type\ t} \sum_i [x_i * Count(Event(t)_i(o_i)) + \beta_i * Amt(Event(t)_i(o_i))] + \sum_i (OR_i(o_i))$$

where the AM_1 methods vary with the event types. We can group the amounts being amortized by their amortization characteristics. For this purpose, let

$Pool_1(L, M)$ = the pools of amounts amortizing in this period for the first time according to life L and amortization method M. The new amortizing amounts can be rewritten as follows:

$$\text{New amortized amounts} = \sum_{L,M} Pool_1(L, M)$$

Similarly, define

$Pool_k(L, M)$ = the pools of amounts amortizing in this period for the k^{th} time according to life L and amortization method M, where $L \leq k$. N.B. any amortization calculation can be used if the calculation can be derived using known Object Attributes.

Then, the total OR for object o_i in this period is computed as follows:

$$\begin{aligned} OR(o_i) &= \sum_{type} \sum_i \left[x_i * Count(Event(t)_i(o_i)) + \beta_i * Amt(Event(t)_i(o_i)) \right] \\ &\quad + \sum_{k>1} \sum_{L,M} Pool_k(L, M) \\ &\quad + \sum_i (OR_i(o_i)) \\ &= \sum_k \sum_{L,M} Pool_k(L, M) + \sum_i (OR_i(o_i)) \end{aligned}$$

OR Calculation Rule Type IV (93)

Foregone OR:

Let Actual OR for object o_i = $OR_{actual}(o_i)$ - CASH AMOUNTS

Let Expected OR for object o_i = $OR_{expected}(o_i)$

Then, Foregone OR for object o_i = $OR_{foregone}(o_i) = OR_{expected}(o_i) -$

$OR_{actual}(o_i) - \text{CASH AMOUNTS}$

OR Calculation Rule Type V (94)

Any Other Revenue calculation that is non-iterative, canonical, and represents the entire GGAP valuation of non-balance sheet resource related revenues or expenses.

5. Calculate Direct Expense for All Objects (see Fig. 10)

DE Calculation Rule Type I (100)

None directly specified - use IE calculation rules (any type). For each IE rule used in this way, substitute $DE(o_i)$ for $IE(o_i)$ in any IE calculations used as DE.

DE Calculation Rule Type II (101)

Direct expense will be a variable dependent upon the object and the event being costed. These determine the unit cost to be used and the calculation type, along with the multiplier rule being used if external amounts are needed. Thus, using subscripts to indicate variables used,

$DE_{\text{object, event-type}}$
= unit cost_{event type} * (no. of events of this type in the period)
+ amounts taken from an event file
+ costs calculated as a
percentage of Event Amount Where the unit costs, and revenue
percentage by event type, are all entered by the user as pre-
processing inputs.

Then, $DE_{\text{object}} = \sum_{\text{event types}} DE_{\text{object, event-type}}$ where the summation is over event types.

DE Calculation Rule Type III (102)

$DE_{\text{object, event-type, event-sub}}$
= unit cost_{event type} * (no. of events of this type in the period)
+ amounts taken from an event file
+ costs calculated as a percentage of event amount

DE Calculation Rule Type IV (103)

Two calculations are made, each one using the above calculations, processing two independent DE attributes for each object. DE is calculated twice for each object, allowing for comparison of plan to actual values or standard to actual values or any scenario to scenario comparison.

DE Calculation Rule Type V (104)

Any Direct Expense calculation that is non-iterative, canonical, and represents the entire GGAP valuation of costs related to object or sub-object level details.

6. Calculate Provision for All Objects (see Fig. 11)

P Calculation Rule Type I (110)

The formula for calculating P of Object i is as follows, where $PG(o_i)$ denotes the P group in which o_i is a member:

$$P(o_i) = PG(o_i) * \frac{\text{Balance of } o_i}{\sum_{o_k \in RPG(o_i)} \text{Balance } o_k}.$$

P Calculation Rule Type II (111)

The formula for calculating P of o_i is as follows, using the same symbols as above and $RF(o_i)$ denotes the expected adjustment factor for o_i :

$$P(o_i) = PG(o_i) * \frac{\text{Balance}(o_i) * RF(o_i)}{\sum_{o_k \in RPG(o_i)} [\text{Balance}(o_k) * RF(o_k)]}.$$

P Calculation Rule Type III (112)

The formula for calculating P of object " o_i " is as follows, where $Pr(o_i)$ is a probability for object o_i .

$$P(o_i) = \text{Exposure}(o_i) * \text{Pr}(o_i) * \text{Expected Value Adjustment}(o_i) * \frac{1}{L_i}$$

Where L is the expected number of reporting periods during the life of o_i .

P Calculation Rule Type IV (113)

The addition of any of the Type I, II or III P rules applicable to an object i.

$$P(o_i) = P(o_i)_{P \text{ Type I}} + P(o_i)_{P \text{ Type II}} + P(o_i)_{P \text{ Type III}} + P(o_i)_{P \text{ Type IV}}$$

P Calculation Rule Type V (114)

Any Provision calculation that is non-iterative, canonical, and represents the entire GGAP valuation of expected costs related to future events, contingencies, timing effects.

7. Calculate Indirect Expense for All Objects (see Fig. 12)

Indirect expense, by its nature is not related directly to an Object, therefore apportionment techniques are used to allocate indirect expense to an Object. Any apportionment function is allowed as long as it is derivable at the object level using ratios of attributes available at the object level to the summation of this available attribute across all objects receiving the apportioned expense. Examples of this type of ratio calculation (the function "F" used in the IE calculation types) are:

- Ratio 1: Balance-based apportionment of IE.

Define Apportionment ratio using Current Balance of (o_i) .

Thus, the allocation of Indirect Expense k becomes (function $F(IE_k)(o_i)$ in IE rules below):

$$IE_k * \frac{\text{Current Balance of } o_i}{\sum_j (\text{Current Balance of } o_j)}, \text{ summed over all objects in grouping } j.$$

- Ratio 2: Count-based apportionment of IE

Thus, the allocation of Indirect Expense k becomes (function $F(IE_k)(o_i)$ in IE rules below):

$$IE_k * \frac{1}{(\text{count of } o_j \text{ in } O(IE_k))}, \text{ for all objects in grouping } j.$$

- Ratio 3: Revenue-based apportionment of IE
Define $NI(o_i) + OR(o_i)$ = Total Revenue (using NI & OR rules above) for (o_i) .

Thus, the allocation of Indirect Expense k becomes (function $F(IE_k)(o_i)$ in IE rules below):

$$IE_k * \frac{NI(o_i) + OR(o_i)}{\sum_j (NI(o_j) + OR(o_j))}, \text{ summed over all objects in grouping } j$$

- Ratio 4: Event Count apportionment of IE
Count of events for (o_i) are restricted to an event type.

Thus, the allocation of Indirect Expense k becomes (function $F(IE_k)(o_i)$ in IE rules below):

$$IE_k * \frac{\text{count of event for object } o_i}{\sum_j (\text{count of event for object } (o_j))}$$

for some event type, summed over all objects in grouping j.

- Ratio 5: Transaction Amount apportionment of IE
Summation of event amounts for (o_i) , restricted to an event type.

Thus, the allocation of Indirect Expense k becomes (function $F(IE_k)(o_i)$ in IE rules below):

$$IE_k * \frac{\sum_{\text{event over the period}} (\text{event amounts for object } (o_i))}{\sum_j \sum_{\text{event over the period}} (\text{event amounts for object } (o_j))},$$

for some event type, summed over all objects in grouping j.

- Ratio 6: Direct Expense apportionment of IE
Using DE rules above for O_i .

Thus, the allocation of Indirect Expense k becomes (function $F(IE_k)(o_i)$ in IE rules below):

$$IE_k * \frac{DE(o_i)}{\sum_j (DE(o_j))}, \text{ summed over all objects in grouping } j.$$

- Ratio 7: Normalized (averaged) apportionment of IE

Thus, the allocation of Indirect Expense k becomes in IE rules below:

$$F(IE_k)(o_i) = [IE \text{ using Ratio 1 } F(IE_k)(o_i) + IE \text{ using Ratio 3 } F(IE_k)(o_i) + IE \text{ using Ratio 6 } F(IE_k)(o_i)] \div 3.$$

IE Calculation Rule Type I (120)

Indirect expense is apportioned to accounts using one of the first three apportionment ratios above. Accordingly, using the nomenclatures above,

$$IE(o_i) = (\text{Total IE to be apportioned}) * \frac{F(IE_k)(o_i)}{\sum_k F(IE_k)(o_i)}$$

IE Calculation Rule Type II (121)

The rules for partitioning IE and defining corresponding object groups are based on product and event attributes. The calculation of $IE(o_i)$ is exactly as described above, and is given by the following, where the F's are the given apportionment ratios (any of the seven apportionment ratios are permitted for any partition O or groupings of objects).

$$IE(o_i) = \sum_k^{o_i \in O(IE)} \left(IE_k * \frac{F(IE_k)(o_i)}{\sum_j^{o \in O(IE)} F(IE_k)(o_j)} \right)$$

IE Calculation Rule Type III (122)

For Indirect Expense before deferral calculations, the process is similar to that as listed for the Type II Level, where:

$$\begin{aligned} \text{IE}(o_i) = & \text{New amounts in their first period of amortization} \\ & + \text{Amounts not being amortized (cash basis)} \\ & + \text{Amounts in their 2}^{\text{nd}} \text{ through last amortization} \end{aligned}$$

period.

Since we include non-amortized amounts (cash basis) to be considered as amortized with only one period, this is re-written as follows:

$$\begin{aligned} \text{IE}(o_i) = & \text{New amounts in their first period of amortization (including} \\ & \text{cash-basis)} \\ & + \text{Amounts in their 2}^{\text{nd}} \text{ through last amortization period.} \end{aligned}$$

Note that non-amortized amounts are made to fit this equation by considering them to be an amortization of one profit reporting period only. Each IE set can have a different amortization type or period, though all objects receiving a specific apportionment will share the same amortization Rule.

The new amounts to be deferred are computed, therefore, as the following:

$$\text{Before deferral } \text{IE}(o_i) = \text{IE}_k * \frac{F(\text{IE}_k)(o_i)}{\sum_{j} F(\text{IE}_k)(o_j)} \text{ added over each set } \text{IE}_k \text{ to}$$

which o_i is related.

$$= \sum_k^{o \in O(\text{IE})} \left(\text{IE}_k * \frac{F(\text{IE}_k)(o_i)}{\sum_{j}^{o_i \in O(\text{IE})} F(\text{IE}_k)(o_j)} \right)$$

Each of these terms may be deferred over its amortization period according to any of the amortization rules (cash, straight line, declining balance, or interest amortization calculations). Since amortization methods

may vary by set, we have the following, where $AM_1(L,R)$ is used to denote the amortization rule and its life:

$$IE(o_i) = \sum_k^{o_i \in O(IE)} AM_1(L,R) \left(IE_k * \frac{F(IE_k)(o_i)}{\sum_j^{o_i \in O(IE)} F(IE_k)(o_j)} \right)$$

To this is added the amounts with remaining amortization life for which amortization was begun in earlier periods.

IE Calculation Rule Type IV (123)

Multiple combinations of the any of the above IE type rules I, II, or III are calculated per object.

IE Calculation Rule Type V (124)

Any Indirect Expense apportionment calculation that is non-iterative, canonical, and represents the GAAP evaluation of indirect costs.

8. Calculate After-Tax Object Profit for All Objects (130)(see Fig. 13)

$$\text{Profit}(o_i) = [\text{NIR}(o_i) + \text{OR}(o_i) - \text{DE}(o_i) - \text{IE}(o_i) - \text{P}(o_i)] * (1 - \text{EffectiveTaxRate})$$

where, for a two tier taxation system, Effective Tax Rate is calculated as:

$$\text{Effective Tax Rate} = (1 - \text{tax rate 2}) * (\text{tax rate 1}) + \text{tax rate 2}.$$

In the calculation of Effective Tax Rate, this formula assumes the two rates are effective rates which apply to the business conditions (not the nominal statutory rates), and that tax rate can be deducted from income in the calculation of tax rate. Then,

$$\text{Total Profit} = \sum_i [\text{Profit}(o_i)]$$

For those companies which use economic profit value calculations, the formula changes to:

$$\text{Profit}(o_i) = \{[\text{NIR}(o_i) + \text{OR}(o_i) - \text{DE}(o_i) - \text{IE}(o_i) - \text{P}(o_i)] * (1 - \text{EffectiveTaxRate})\} - \text{SVA}(o_i)$$

where

$$\text{SVA}(o_i) = \alpha(o_i) + \beta(o_i) * \text{Amount}(o_i)$$

and

$\alpha(o_i)$, $\beta(o_i)$ are functions for a cohort of objects in which o_i is a member, and $\text{Amount}(o_i)$ is given by a rule which maps o_i to a data value (such as balance, or allocated equity) also defined at the cohort level. (A cohort defined here represents a grouping of objects with similar risk characteristics, consistent with Modern Portfolio Theory and the Capital Asset Pricing Model.)

Shareholder Value Add (SVA) is a method financial analysts use to adjust profit measures for risk. The idea is to subtract from the profit measure the cost of the equity required to support whatever is being measured. Companies use this risk adjustment measure essentially to burden the profit for risk being taken with the equity funds used by the object. These institutions will classify cohorts of risk and the risk cost equivalent as a percentage of account balance or allocated equity (i.e., "Hurdles").

DPM Example

In the airline industry a need for detailed customer profitability can be measured using DPM. Here the fundamental object is the seat, allowing consistent profitability values aggregated by route, aircraft type, as well as customer dimensions using data warehousing technology. The need for detailed customer profitability is being driven by the business impact analysis required to support loyalty and alliance strategic decisions. The following is a DPM profit calculation for a seat, with real profit measurement parameters simplified (not all aspects of true airline business is demonstrated) and where examples of each type of rule are utilized in DPM processing.

Flight: Air101

Date: 7/1/1998

From: London

To: New York

Equipment: Boeing 747-400

Classes: First (20 Seats); Business (80 Seats); Economy(300 seats)

DETAILED PROFIT METRIC PROCESSING

Step 1: Populate Database – assuming a relational database management system and terminology.

- Initialize database;
Extract, Condition, and Load the following tables: Planes, Flights, Customers, Employees, Locations; The net balances in the Planes entity can be maintained by use of DPM amortization IE calculation from the prior period.
- Extract, Condition, and Load the following tables: Financial Transactions, Events; Manifest (occupant, seat, flight, date attributes);
- Extract, Condition, and Load the Financial Statement table;
- Calculate and populate Rate table;

Figure 14 shows a partial relational database schema showing the entities and attributes used in the example's processing.

Step 2: Maintain Object Groups and Rule Maps – a database processing routine is run creating the following groupings:
Class to Seat

- Flight to Locations
- Seat to Plane

For ease in understanding the rule the specifications used to populate the database with rule parameters the processing instructions are shown below in the Rules. Also, most rules group by plane – the rule discussion below assumes this grouping without reference.

Step 3: Calculate Net Interest for Seat – Four types of NIR rules are processed - type I, II, III, IV for each seat. Interest rates are matched to

plane purchase date for initial plane investments, and interest rates for plane net capitalizable improvements are funded with a 5 year pool of rates. Plane asset balances are kept in the Plane table maintained in Step 1.2 above.

NIR Type I: Carry cost of plane asset by seat is determined.

Rule

Populated in Step 2 are:

- The AAB(seat) parameter is Plane: net__orig_bal * (1/total seats on plane)
- The rt parameter is Treatment_rts: 25_yr_rate (maintained for each plane) There is no need for liability rates.

Calculate COF(seat) = AAB(seat) * rt for all seats on flight.

All other attributes are NI Type I calculations results are null.

No grouping.

NIR Type II : Allocate net receivable/payable to seat for carry cost profit adjustment. This adjusts profitability for the impact of cash flows vs. accounting flows. This airline wants to apportion this cost across all revenue seats based on class_wt, a modelling parameter. Total weighted seats (tw_s) for the accounting period is a modelling parameter. Where the seat factor is determined as a ratio of seat footprint to class portion of the plane's seat revenue space. (e.g. 1st = 15%, 2nd = 25% & 3rd = 60% of plane's seat revenue space with each seat evenly apportioned in class – 1/20, 1/80, 1/300 respectively, in this case.)

Rule

Populated in Step 2 are:

- The AB(seat) parameter is Financial: net_recv'ble * (1 / tw_s)
- The rt parameter is Treatment_rts: pool (for null plane

row) There is no need for liability rates.

Calculate $COF(seat) = AB(seat) * rt * class\_wt$

Grouped by class all seats, so no_seats??? is no_seats1st value in the plane entity for first class seats on this plane, and so on for 2nd & 3rd class seat groups. The net recv'ble column is derived from the difference between sum of period_amts for the receivables minus sum of payable rows for this profit period.

All other attributes and NI Type II calculations results are null.

NIR Type III : Calculate the NI value of the customer mileage benefit payable for each seat.

Rule

Populated in Step 2 are:

- The AB(seat) parameter is Customer: bene_miles * loyalty factor
- The rt parameter is Treatment_rts: pool (for null plane row) There is no need for an asset rate.

Calculate $COF(seat) = AB(seat) * rt$

Since a customer can only occupy one seat, no groupings are used in this rule map.

All other attributes and NI Type III calculations results are null.

NIR Type IV : Calculate the NI impact of the plane's improvements for each seat. Upper classes interior, customer electronics and seating are improved faster during the life of the plane. Management strategy is for these improvements to be loyalty program related; they are amortized quicker and hence shorter funding requirement with less certain life. Management wants the loyal customers to pay proportionately more of the funding costs of improvement assets.

Rule

Populated in Step 2 are:

- The AB(seat) parameter is $\text{Plane:imp\_net\_bal} * (1/\text{tsw})$
- The rt parameter is $\text{Treatment\_rts: pool (for plane row)} * \text{Customer: loyalty\_rtng}$

There is no need for a liability rate.

Calculate $\text{COF(seat)} = \text{AB(seat)} * \text{rt} * \text{class\_fac}$

The unique class_fac values sum to 1. The rule map is grouped by classes (or class_fac).

All other attributes and NI Type IV calculations results are null.

NI EOAE- Option 4: Allocate equity based on mileage benefit and have it reduce NI by the weighted average cost of capital for the airline.

Rule

Populated in Step2 are:

- The Amount(seat) parameter is $\text{Customer:bene\_miles}$
- The equity rate is 9.75%

Calculate $\text{EOAE(seat)} = \text{Amount(seat)} * \text{equity rate} * \text{cohort\_wt}$

The cohort is based groups of each instance of loyalty_rtng and class of seat paired. Cohort_wt is "beta" and no "alpha."

All other attributes and EOAE calculations results are null.

Step 4: Calculate Other Revenues for each Seat – Revenue arises from ticket fares, duty free sales on board aircraft, excess baggage penalties collected, alliance code sharing license and multiple leg customer trips.

OR Type I : Apportion revenue from code sharing with alliance.
Apportion revenue by seat allocated to alliance passenger.

Rule

Populated in Step 2 are:

- Flight:period_amt is alliance revenue per flight plus the sum of all flight/date alliance financial transactions.

Calculate $OR(seat) = \text{sum of Flight:period\_amt} * (1 / \text{no alliance seats available on flight})$

Only for seats occupied by an alliance customer or a seat that is empty.

OR Type II: Use Transaction table to find direct passenger revenue by seat.

Rule

Populated in Step 2 are:

- Transaction:* (amounts, seats, flight, date, transaction type) are populated for events, financial or non-financial.

Calculate $OR(seat) = \text{sum of Transaction:trn\_amt}$ where type = "passenger_payment" for each seat.

No seat grouping in rule map.

OR Type III: Apportion flight freight revenue amongst all seats, weighted by class_wt.

Rule

Calculate $OR(seat) = \text{sum of Transaction:trn\_amt} * \text{class\_wt}$

*

$(1 / (\text{no\_seats???}))$

where type "freight" for each seat.

Group seats by class (??? Is 1st, 2nd, 3rd.) Class_wt is a normalized weight for apportioning revenue amongst classes.

OR Type IV: Calculate the loyalty mileage benefit by seat.

Rule

Calculate Forgone OR(seat) = Flight: ???_fare – sum of Transactions:trn_amt where type = "passenger_payment" for each seat.

Group by class for loyalty passenger occupied seats only.

Step 5: Calculate Direct Expenses for each Seat –

Compute the direct cost of using the seat. This is true for both occupied and unoccupied seats. Fuel and flight deck crew are costs of all seats, while cost of duty free goods sold and meals are a function of occupied seats. Some costs are a function of the plane taking off, no matter the duration of the flight (e.g., maintenance.) Some costs are a function of class, such as cabin crew expense and customer consumables.

DE Type I: Show direct cost of non-food materials consumed in flight.

Rule

Populated in Step 2 are:

- Transactions:* is populated based on these direct costs.

Calculate DE(seat) = Transactions:trn_amt for all flight and date rows where type = direct_exp for each seat.

No grouping in rule map.

DE Type II: Show direct cost duty free goods sold by seat.

Rule

Populated in Step 2 are:

- Transactions:* are populated based on these direct costs.

Calculate DE(seat) = Transactions:trn_amt for all flight and date rows where type = duty_free for each seat.

No grouping in rule map.

DE Type III: Show direct cost of food and beverage consumed.

Rule

Populated in Step 2 are:

- Transactions:* are populated based on these direct costs
- Loading is calculated as the ratio of occupied to total class seats by class (cl_load) using manifest table and plane configuration values.

Calculate DE(seat) = Flight: catering_cost * class_wt * cl_load
for each seat.

Grouped by class in rule map.

DE Type IV: The staffing of each cabin has a maximum count with a minimum of 1 per 50 passengers. The air deck crew must fly the plane even if there are no passengers. Calculate DE twice, once for based on a labor cost per seat based on total crew cost and total seats; and calculate DE a second time with actual staff apportioned to actual passengers.

Rule

Populated in Step 2 are:

- Total crew cost (tcc1) parameter is derived using the employee entity for all crew on flight. $Tcc = \text{Employee:salary+bene} * (\text{Flight:schd\_hours} + 1.5) / 110$
- Total crew cost (tcc2) parameter is derived using the employee entity for all crew on flight by class. $Tcc??? = \text{Employee:salary+bene} * (\text{Flight:schd\_hours} + 1.5) / 110$

Note: $tcc = tcc1st + tcc2nd + tcc3rd$

Calculate DE1(seat) = $tcc * (1/(\text{total no. of seats on plane}))$

Calculate DE2(seat) = tcc?? * (1/(no. of seats occupied in class))

for each seat.

Grouped by class in rule map.

Step 6: Calculate Provisions for each Seat – The cost of expected future events are measured here. The airline self insures property, casualty and miscellaneous insurance premiums on a per flight basis. And a provision for future loyalty benefit, a function of loyalty rating, claimed is made in step 6.

P Type I: - The cost of the flight's insurance premium is apportioned to each seat.

Rule

Populated in Step 2 are:

- Insurance premium is maintained in the flight entity (total PG)

Calculate P(seat) = Flight:ins_prem * 1/(total no. seats on plane)

No grouping in rule map.

P Type II: Provision for unusual maintenance cost is made on a function of the inverse of flight time and takeoffs in the last 12 months.

Rule

Populated in Step 2 are:

- Financial:period_amt is maintained in the financial entity by equipment type.
- Total flight hours and last 12 months take-offs are accumulated each month, their product is to_hrs parameter.

Calculate P(seat) = Financial:period_amt * 1/(total no. of seats on plane) * (Plane:to_last12 * Flight:schd_hrs) / to_hrs

No seat grouping in rule map.

P Type III: Providing for future loyalty benefit.

Rule

Populated in Step 2 are:

- Customer:bene_miles is maintained using prior periods provision for benefit miles by loyalty customer
- A parameter estimating the usage rate by loyalty cohort called burn factor

Calculate $P(\text{seat}) = \text{Flight:distance} * \text{burn}(\text{loyalty\_rating})$

Grouping by loyalty rating in rule map.

P Type IV: Future order cancellation reserve.

Rule

Populated in Step 2 are:

- Future airplane order cancellation penalty (pen) and order size (fut_planes) is maintained in the financial entity
- Last 12 months loading is calculated by plane

Calculate $P(\text{seat}) = \text{pen} * (\text{Plane:orig\_bal} / \text{fut\_planes}) * 1 / (\text{total no. seats on plane}) * 1/24$. where last 12 months loading less than 75%.

Only seats on where last 12 months loading less than 75%.

Step 7: Calculate Indirect Expenses for each Seat – The calculation of indirect expense is the final step of detailed level profit calculation. Here remaining cost measures that are not differentiable by seat are measured. Fuel and oil, ground costs, regular aircraft maintenance, overheads, and general marketing expenses are apportioned in IE. The airline also wants to view customer profitability loaded with the cost of unoccupied seats.

IE Type I: General and administrative costs are apportioned to a seat in this rule.

Rule

Populated in Step 2 are:

- The periods financial entity is populated with all of the airlines G&A expenses (e.g., type of G&A are passenger services, navigation licenses, rentals, miscellaneous costs, premises and property taxes.) Allocate these costs based on seat revenue (NI + OR.)

Calculate $IE(seat) = \frac{\text{sum}(\text{Financial:trn\_amt})}{(\text{sum}(\text{NI}(seat)) + \text{sum}(\text{OR}(seat)))} \times (\text{Total OR} + \text{NI for period})$

No seat grouping in rule map for all Financial:type = "G&A".

IE Type II: Ground location costs, airport specific and gate expenses are apportioned by flight.

Rule

Populated in Step 2 are:

- Populate all of these expenses for the period Transactions:trn_amt with the type being the three letter international airport identifier.
- Calculate the number of seats flown to the flight airports during the profit period (tfc)

Calculate $IE(seat) = \frac{\text{sum of Transactions:trn\_amt}}{(1 / \text{tfc}) / 2}$

Group transactions by pair of airports in flight row for rule map, where only these types of expenses are included in the tuple.

IE Type III: Fixed asset depreciation is allocated to a seat.

Rule

Populated in Step 2 are:

- The net plane balances (Plane:net_orig_bal & Plane:imp_net_bal) are updated for last period's amortization or write-off.
- The amortization factor (function of amortization) given age of asset

(for both original investment and improvements) is amfo and amfi for each plane.

- The tax planning estimate for taxable equivalent gross-up, due to accelerated tax amortization, is .8 = teg (less than 1 since a tax credit)

Calculate IE(seat) = ((Plane:net_orig_bal - Plane:orig_bal) * amfo) + (Plane:imp_org_bal - Plane: imp_org_bal) * amfi)) * teg *

(1 /(total no. seats on plane)) * (Flight:schd_hrs / Plane:hrs_last_12 / 12)

No grouping of seats in rule map.

IE Type IV: Indirect marketing expenses are apportioned by loyalty class for customer profit aggregations and by seat for other aggregations.

Rule

Populated in Step 2 are:

- Indirect marketing expense per loyalty tier per flight is ~~paramterized~~ parameterized as mef???, where ??? is 1st, 2nd, 3rd class.

Calculate IE(seat) = mef??? * (1 / (no. of occupied seats in ???))

Group seats by class in rule map.

IE Type V: For loyalty investment analysis, allocate all DE for empty seats to occupied seats equally.

- Populated, after all prior steps are ~~caluculated~~ calculated, are the total DE less OR for each flight during the period, idef.

Calculate IE(seat) = idef / (total no. of occupied seats)

Only calculate for occupied seats.

Step 8: Calculate After-tax Seat Profit – The

After-tax Profit:

Rule

Populated in Step 2 are:

- The effective tax rate (etr) for the airline is maintained in the database.

Calculate Profit(seat) = sum(NI(seat) + OR(seat) + DE(seat) + IE(seat) + P(seat)) * (1-etr)

Each seat is calculated individually, no grouping is used.

Shareholder Value-add: The airline has determined that some routes have a greater risk of loss due to the volatility of loading factors. Therefore each route is given a risk factor based on the last 12 months standard deviation of loading.

Rule

Populated in Step 2 are:

- Flight:risk_factor is maintained here
- Economic equity per average seat parameter (Flight:risk_factor) per route
- Cost of capital rate is ~~paramterized~~ parameterized (eqrt)

Calculate SHV(seat) = Profit(seat) – (Flight:risk_factor * eqrt)

Each seat is calculated.

From the foregoing, it will be appreciated that DPM provides a metric of profit measurement consistent with GAAP at a level of detail that has not been accomplished using the traditional General Ledger based data with analytical and/or sample survey based information.

This new ability to resolve profit measures at a detailed level without using analytical models or statistical extrapolation is a capability needed throughout industries that find their ability to determine a marginal decision's profit impact inadequate for optimization of ownership value. The use of rule driven and database measurement processes will give large scale businesses a lower cost of maintenance and technologically scaleable tool to measure profit at a level of precision or resolution not possible in prior financial performance measurement processes.

Although a particular embodiment of the invention has been described in detail for purposes of illustration, various modifications may be made without departing from the spirit and scope of the invention. Accordingly, the invention is not to be limited, except as by the appended claims.

ABSTRACT OF THE DISCLOSURE

A process for determining object level profitability includes the steps of (1) preparing information to be accessed electronically, (2) establishing rules for processing the prepared information, (3) calculating at least one marginal value of profit using established rules as applied to a selected set of prepared information, (4) calculating a fully absorbed value of profit adjustment using established rules as applied to the selected set of prepared information, and (5) combining the at least one marginal value of profit and fully absorbed value of profit adjustment to create a measure for object level profitability. The inventive process gives management profit measures tailored to its need for accurate decision oriented profit information required to manage a large organization based on profit measurement.

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

1. (Currently Amended) A process for determining object level profitability in a relational database management system, comprising the steps of:

providing an electronic relational database;

preparing information to be accessed electronically through the relational database management system by extracting, conditioning and loading object attribute values, financial statement attribute values and event attribute values into the relational database;

establishing, in the relational database, rules for processing the prepared information;

in the relational database, simultaneously and independently calculating independently in parallel at least one marginal value of profit for each object being measured using the established rules as applied to a selected set of prepared information;

in the relational database, calculating a fully absorbed profit adjustment value for each object being measured; and

combining the at least one marginal value of profit and the fully absorbed profit adjustment value to create a measure for object level profitability.

2. (Original) The process of claim 1, wherein the relational database comprises a structured query language (SQL).

3.-5. (Canceled)

6. (Original) The process of claim 1, wherein the preparing step further includes the step of calculating opportunity values of funds used or supplied by each object being measured.

7. (Original) The process of claim 1, wherein the establishing step includes the steps of providing the information necessary to select objects, and performing the correct profit calculus.

8. (Original) The process of claim 1, wherein the step of calculating at least one marginal value of profit includes the steps of calculating net interest (NI), other revenue (OR) and direct expense (DE), wherein net interest (NI) is the summation of interest income, value of funds provided and earnings on equity funds used less the sum of interest expense and costs of funds used, other revenue (OR) is a measure of profit contribution from non-interest related sources, and direct expense (DE) is the profit value reduction due to marginal resource consumption by the object.

9. (Original) The process of claim 1, wherein the step of calculating at least one marginal value of profit includes the step of provisioning (P) for the selected set of prepared information, provisioning being the expected profit value adjustment for future outcomes related to the object.

10. (Canceled)

11. (Currently Amended) The process of claim 8-10, wherein the step of calculating a fully absorbed profit adjustment value includes the step of calculating the value for indirect expense (IE) which is an apportioned profit value adjustment for all non-object related resource consumption.

12. (Original) The process of claim 11, wherein the combining step includes the steps of adding net interest (NI) and other revenues (OR), and subtracting therefrom direct expense (DE), provisioning (P) and indirect expense (IE).

13. (Original) The process of claim 12, including the step of adjusting the measure for object level profitability for taxes and/or object economic value.

14.-15. (Canceled)

16. (Withdrawn) A process for determining object level profitability in a relational database management system, comprising the steps of:

preparing information to be accessed electronically through the relational database management system;

establishing, in the relational database, rules for processing the prepared information;

calculating independently at least one marginal value of profit for each object being measured using the established rules as applied to a selected set of prepared information;

calculating a fully absorbed profit adjustment value including value adjustments for taxes and/or object economic value; and

combining the at least one marginal value of profit and the fully absorbed profit adjustment value to create a measure for object level profitability.

17. (Withdrawn) The process of claim 16, wherein the relational database comprises a structured query language (SQL).

18. (Withdrawn) The process of claim 16, wherein the preparing step includes the step of extracting, conditioning and loading object attribute values into the database.

19. (Withdrawn) The process of claim 18, wherein the preparing step includes the steps of extracting, conditioning and loading financial statement attribute values into the database.

20. (Withdrawn) The process of claim 19, wherein the preparing step includes the steps of extracting, conditioning and loading event attribute values into the database.

21. (Withdrawn) The process of claim 20, wherein the preparing step further includes the step of calculating opportunity values of funds used or supplied by each object being measured.

22. (Withdrawn) The process of claim 16, wherein the establishing step includes the steps of providing the information necessary to select objects, and performing the correct profit calculus.

23. (Withdrawn) The process of claim 16, wherein the step of calculating at least one marginal value of profit includes the steps of calculating net interest (NI), other revenue (OR) and direct expense (DE), wherein net interest (NI) is the summation of interest income, value of funds provided and earnings on equity funds used less the sum of interest expense and costs of funds used, other revenue (OR) is a measure of profit contribution from non-interest related sources, and direct expense (DE) is the profit value reduction due to marginal resource consumption by the object.

24. (Withdrawn) The process of claim 16, wherein the step of calculating at least one marginal value of profit includes the step of provisioning (P) for the selected set of prepared information, provisioning being the expected profit value adjustment for future outcomes related to the object.

25. (Withdrawn) The process of claim 24, wherein the step of calculating at least one marginal value of profit includes the steps of calculating net interest (NI), other revenue (OR) and direct expense (DE), wherein net interest (NI) is the summation of interest income, value of funds provided and earnings on equity funds used less the sum of interest expense and costs of funds used, other revenue (OR) is a measure of profit contribution from non-interest related sources, and direct expense (DE) is the profit value reduction due to marginal resource consumption by the object.

26. (Withdrawn) The process of claim 25, wherein the step of calculating a fully absorbed profit adjustment value includes the step of calculating the value for indirect expense (IE) which is an apportioned profit value adjustment for all non-object related resource consumption.

27. (Withdrawn) The process of claim 26, wherein the combining step includes the steps of adding net interest (NI) and other revenues (OR), and subtracting therefrom direct expense (DE), provisioning (P) and indirect expense (IE).

28. (Withdrawn) The process of claim 16, wherein the at least one marginal value of profit is calculated in parallel.

29. (Withdrawn) The process of claim 16, wherein the fully absorbed profit adjustment value is calculated utilizing the calculated at least one marginal value of profit.

30. (Withdrawn) A process for determining object level profitability in a relational database management system, comprising the steps of:

preparing information to be accessed electronically through the relational database management system, including the step of calculating

opportunity values of funds used or supplied by each object being measured;

establishing, in the relational database, rules for processing the prepared information;

calculating independently at least one marginal value of profit for each object being measured using the established rules as applied to a selected set of prepared information;

calculating a fully absorbed profit adjustment value for each object being measured; and

combining the at least one marginal value of profit and the fully absorbed profit adjustment value to create a measure for object level profitability.

31. (Withdrawn) The process of claim 30, wherein the relational database comprises a structured query language (SQL).

32. (Withdrawn) The process of claim 30, wherein the preparing step includes the step of extracting, conditioning and loading object attribute values into the database.

33. (Withdrawn) The process of claim 32, wherein the preparing step includes the steps of extracting, conditioning and loading financial statement attribute values into the database.

34. (Withdrawn) The process of claim 33, wherein the preparing step includes the steps of extracting, conditioning and loading event attribute values into the database.

35. (Withdrawn) The process of claim 30, wherein the establishing step includes the steps of providing the information necessary to select objects, and performing the correct profit calculus.

36. (Withdrawn) The process of claim 30, wherein the step of calculating at least one marginal value of profit includes the steps of calculating net interest (NI), other revenue (OR) and direct expense (DE), wherein net interest (NI) is the summation of interest income, value of funds provided and earnings on equity funds used less the sum of interest expense and costs of funds used, other revenue (OR) is a measure of profit contribution from non-interest related sources, and direct expense (DE) is the profit value reduction due to marginal resource consumption by the object.

37. (Withdrawn) The process of claim 30, wherein the step of calculating at least one marginal value of profit includes the step of provisioning (P) for the selected set of prepared information, provisioning being the expected profit value adjustment for future outcomes related to the object.

38. (Withdrawn) The process of claim 37, wherein the step of calculating at least one marginal value of profit includes the steps of calculating net interest (NI), other revenue (OR) and direct expense (DE), wherein net interest (NI) is the summation of interest income, value of funds provided and earnings on equity funds used less the sum of interest expense and costs of funds used, other revenue (OR) is a measure of profit contribution from non-interest related sources, and direct expense (DE) is the profit value reduction due to marginal resource consumption by the object.

39. (Withdrawn) The process of claim 38, wherein the step of calculating a fully absorbed profit adjustment value includes the step of calculating the value for indirect expense (IE) which is an apportioned profit value adjustment for all non-object related resource consumption.

40. (Withdrawn) The process of claim 39, wherein the combining step includes the steps of adding net interest (NI) and other revenues (OR), and subtracting therefrom direct expense (DE), provisioning (P) and indirect expense (IE).

41. (Withdrawn) The process of claim 40, including the step of adjusting the measure for object level profitability for taxes and/or object economic value.

42. (Withdrawn) The process of claim 30, wherein the at least one marginal value of profit is calculated in parallel.

43. (Withdrawn) The process of claim 30, wherein the fully absorbed profit adjustment value is calculated utilizing the calculated at least one marginal value of profit.

44. (New) A process determining object level profitability in a relational database management system, comprising the steps of:

providing a structured query language relational database;

preparing information to be accessed electronically through the relational database management system by extracting, conditioning and loading object attribute values, financial statement attribute values and event attribute values into the relational database;

establishing, in the relational database, rules for processing the prepared information;

in the relational database, simultaneously and independently calculating in parallel at least one marginal value of profit for each object being measured using the established rules as applied to a selected set of prepared information, including the steps of calculating net interest (NI), other revenue (OR) and direct expense (DE), wherein net interest (NI) is the summation of interest income, value of funds provided and earnings on equity funds used less the sum of interest expense and costs of funds

used, other revenue (OR) is a measure of profit contribution from non-interest related sources, and direct expense (DE) is the profit value reduction due to marginal resource consumption by the object;

in the relational database, calculating a fully absorbed profit adjustment value for each object being measured, including the step of calculating the value for indirect expense (IE) which is an apportioned profit value adjustment for all non-object related resource consumption; and

combining the at least one marginal value of profit and the fully absorbed profit adjustment value to create a measure for object level profitability.

45. (New) The process of claim 44, wherein the preparing step further includes the step of calculating opportunity values of funds used or supplied by each object being measured.

46. (New) The process of claim 44, wherein the establishing step includes the steps of providing the information necessary to select objects, and performing the correct profit calculus.

47. (New) The process of claim 44, wherein the step of calculating at least one marginal value of profit includes the step of provisioning (P) for the selected set of prepared information, provisioning being the expected profit value adjustment for future outcomes related to the object.

48. (New) The process of claim 47, wherein the combining step includes the steps of adding net interest (NI) and other revenues (OR), and subtracting therefrom direct expense (DE), provisioning (P) and indirect expense (IE).

49. (New) The process of claim 48, including the step of adjusting the measure for object level profitability for taxes and/or object economic value.

50. (New) A relational computation process measuring an individual or incremental decisions impact on profit, or fundamental object profitability, elemental to multiple business dimensions consistent with independently calculated total profit, the process comprising the steps of:

providing an electronic relational database;

preparing information to be accessed electronically through the relational database management system by extracting, conditioning and loading object attribute values, financial statement attribute values and event attribute values into the relational database;

establishing, in the relational database, rules for processing the prepared information;

in the relational database, simultaneously and independently calculating in parallel marginal profit measures using the established rules, including:

a) marginal profit measures associated with balance sheet resources;

b) marginal measures of non-balanced oriented revenues;

c) marginal cost measures; or

d) marginal measures of expected costs or revenues;

in the relational database, using the calculated marginal profit measures to calculate a fully absorbed profit adjustment value for each fundamental object being measured, including the step of calculating the value for an apportioned profit value adjustment for all non-object related resource consumption; and

combining the at least one marginal value of profit and the fully absorbed profit adjustment value to create a measure for fundamental object profitability.

51. (New) The process of claim 50, wherein the relational database comprises a structured query language (SQL).

52. (New) The process of claim 50, wherein the preparing step further includes the step of calculating opportunity values of funds used or supplied by each object being measured.

53. (New) The process of claim 50, wherein the establishing step includes the steps of providing the information necessary to select objects, and performing the correct profit calculus.

54. (New) The process of claim 50, wherein the step of calculating at least one marginal value of profit includes the step of provisioning (P) for the selected set of prepared information, provisioning being the expected profit value adjustment for future outcomes related to the object.

55. (New) The process of claim 50, including the step of adjusting the measure for object level profitability for taxes and/or object economic value.

56. (New) A relational computation process measuring an individual or incremental decisions impact on profit, or fundamental object profitability, elemental to multiple business dimensions consistent with independently calculated total profit, the process comprising the steps of:

providing an electronic structured query language relational database;

preparing information to be accessed electronically through the relational database management system by extracting, conditioning and loading object attribute values, financial statement attribute values and event attribute values into the relational database;

calculating opportunity values of funds used or supplied by each object being measured;

establishing, in the relational database, rules for processing the prepared information, including providing the information necessary to select objects, and performing the correct profit calculus;

in the relational database, simultaneously and independently calculating in parallel marginal profit measures using the established rules, including:

- a) marginal profit measures associated with balance sheet resources;
- b) marginal measures of non-balanced oriented revenues;
- c) marginal cost measures; and
- d) marginal measures of expected costs or revenues;

in the relational database, using the calculated marginal profit measures to calculate a fully absorbed profit adjustment value for each fundamental object being measured, including the step of calculating the value for an apportioned profit value adjustment for all non-object related resource consumption;

combining the at least one marginal value of profit and the fully absorbed profit adjustment value to create a measure for fundamental object profitability; and

adjusting the measure for object level profitability for taxes and/or object economic value.

57. (New) A relational computation process measuring an individual or incremental decisions impact on profit, or fundamental object profitability, elemental to multiple business dimensions consistent with independently calculated total profit, the process comprising the steps of:

providing an electronic structured query language relational database;

preparing information to be accessed electronically through the relational database management system by extracting, conditioning and loading object attribute values, financial statement attribute values and event attribute values into the relational database;

establishing, in the relational database, rules for processing the prepared information, including providing the information necessary to select objects, and performing the correct profit calculus;

in the relational database, simultaneously and independently calculating in parallel marginal profit measures using the established rules, including:

- a) marginal profit measures associated with balance sheet resources;
- b) marginal measures of non-balanced oriented revenues;
- c) marginal cost measures;
- d) marginal measures of expected costs or revenues; calculating the marginal profit measures; and
- e) fully absorbed indirect expense.

58. (New) The process of claim 57, wherein the preparing step further includes the step of calculating opportunity values of funds used or supplied by each object being measured.

59. (New) The process of claim 57, including the step of adjusting the measure for object level profitability for taxes and/or object economic value.

REMARKS/ARGUMENTS

In the January 26, 2004 Office Action, the drawings/specification was objected to once again. The restriction of claims 16-43 was maintained. The Declaration filed on December 8, 2003 was indicated as being sufficient to overcome Curley reference. However, claims 1-31 were rejected under 35 USC §103(a) as being unpatentable over Price et al. "College Accounting, 7th Edition" in combination with an "Official Notice". On May 5, 2004, Applicant, his attorney and the Examiner conducted an interview regarding the rejections. An agreement with respect to the claims and the relevance of the reference was not reached during this interview.

In response to the above-identified Office Action, Applicant has amended the Specification to conform with the previously submitted formal drawings. Applicant has also amended claims 1 and 11, cancelled claims 3-5, 10 and 14-15, and added new claims 44-59. Reexamination and reconsideration of the application, as amended, is respectfully requested.

TIME EXTENSION REQUEST

Submitted previously was a One-month Time Extension Request and required fee.

DRAWING OBJECTIONS

The drawings were objected to under 37 CFR §1.83(a) in the August 4, 2003 Office Action based upon the assertion that they failed to describe FIGS. 2-5 as described in the Specification, and that FIG. 7 did not describe steps 3-6 as detailed from page 17 of the application. Furthermore, FIG. 1 failed to be labeled as prior art. In the August 4, 2003

Office Action, it was requested that any structural detail that was essential for a proper understanding of the disclosed invention should be shown in the drawing.

In the December 8, 2003 Response, Applicant provided a revised set of drawings which labeled steps and components of the drawings with reference numbers and labeled FIG. 1 (prior art). Portions of the Specification were amended to incorporate the reference numbers, provide added description of the figures, and correct deficiencies such as grammar or spelling deficiencies.

However, in the January 26, 2004 Office Action, the drawings were once again objected to as not being acceptable based upon the assertion that the drawings do not correspond to the descriptive portion of the Specification, pointing out various perceived inconsistencies.

In Response, Applicant submits herewith a substitute Specification incorporating changes in the Specification such that the Specification reflects the reference numbers in the drawings. Paragraphs have also been inserted to the Detailed Description of the Preferred Embodiment section having a basis in the original Specification and drawings to overcome the objections. No new matter has been added to the application. Applicant has taken the opportunity to correct a few misspellings as well. With these amendments, Applicant believes that there are no inconsistencies between the drawings and the revised Specification.

CLAIM REJECTIONS

As indicated above, claims 16-31 are subject to a Restriction Requirement. The remaining claims (1-15) were rejected as being obvious in light of the Price publication and the Examiner's "Official Notice" regarding performing financial processing using computer software.

As part of the May 5, 2004 Interview with the Examiner, Applicant submitted a Declaration (which Examiner indicated would be entered into the record so as to be a part of this Response). In the Declaration, Applicant provided his expertise in this field, addressed the fact that the Price publication does not teach what is claimed in the present invention, and states the non-obviousness of the invention due to the benefits achieved by the present invention and the commercial success that it has attained.

During the Interview, the Examiner indicated that there might be an "intended use" concern with independent claim 1 due to the word "for" in the preamble. Applicant has amended claim 1 to delete "for" in the preamble to alleviate any such concern. During the Interview, Applicant explained the benefits derived by conducting the present invention in a relational database management system. The Examiner indicated that he was giving this consideration very little patentable weight as it was recited only in the preamble. Applicant has amended independent claim 1 to positively recite that a relational database is provided and that various steps are conducted within the relational database. Contrary to the statement in the May 7, 2004 Interview Summary, the Examiner maintained his assertion that claim 1 did not define over the Price reference; and Applicant maintained his assertion that the Price reference did not teach Applicant's invention, as claimed in independent claim 1. The Examiner indicated that it was the Group Art Unit's policy that a "relational database" consisted of any group of information which was interrelated. Applicant has amended independent claim 1 to positively recite an electronic relational database as well as to positively recite that many of the steps, including the preparing, establishing and calculating steps be performed within the electronic relational database. Applicant respectfully asserts that this is simply not addressed in either the Price or "Official Notice" rejections.

As indicated above, claim 1 is directed to a process that determines object level profitability in a relational database management system. An

electronic relational database is provided and information to be accessed electronically through the relational database management system is prepared by extracting, conditioning and loading object attribute values, financial statement attribute values and event attribute values into the relational database. Rules are established in the relational database for processing the prepared information. Within the relational database, at least one marginal value of profit for each object being measured is simultaneously and independently calculated in parallel using the established rules. In the relational database, a fully absorbed profit adjustment value for each object being measured is then calculated. Finally, the at least one marginal value of profit and the full absorbed profit adjustment value are combined to create a measure for object level profitability.

New independent claim 44 specifies that the relational database is a structured query language relational database. The at least one marginal value of profit calculation is defined as calculating net interest, other revenue and direct expense. The calculation of the fully absorbed profit adjustment value for each object being measured is recited as including the step of calculating the value for indirect expense. Otherwise, independent claim 44 contains the same recitations as independent claim 1.

While a single reference may serve as the basis of a rejection under 35 USC §103, that single reference must still disclose all the features of the claimed invention. To establish *prima facie* obviousness of a claimed invention, all the claim limitations must be taught or suggested by the prior art. M.P.E.P. §2143.03 (citing In re Royka, 180 USPQ 580 (CCPA 1974)). All words in a claim must be considered in judging the patentability of that claim against the prior art. In re Wilson, 165 USPQ 494, 496 (CCPA 1970).

Although Price may disclose a method of measuring profit based on factors of revenues, direct expenses, indirect expenses, and risk, as stated in the Declaration of Tad Lepman, dated April 27, 2004 (copy attached).

Price actually discloses what is referred to in the present application as being "prior art", as illustrated in FIG. 1 and discussed in the background section of the present application. Price covers the basics of transactional accounting, or bookkeeping. Price does not discuss methods of marginal pricing necessary for object profit measures which are more detailed than departmental or business segments. In contrast to the present invention, Price states that interest income and interest expense are not allocated in responsibility accounting. Price's scope is financial bookkeeping and not economic theory or market based financial concepts, and thus it is silent on the concepts of fund transfer pricing or of risk base adjustment to profit measures.

In particular, there is no discussion whatsoever in Price as to preparing information to be accessed electronically through a relational database, or establishing the rules necessary in a relational database for processing and preparing information. Price's accounting rules do not lead to relational database formulation or mathematical rules making parallel computer financial calculation possible.

As stated in paragraphs 6-8 of Mr. Lepman's Declaration, the steps of extracting, conditioning and loading object attribute values, financial statement attribute values and event attribute values into a relational database is not discussed whatsoever in Price. Moreover, as Mr. Lepman states, Price would consider it completely unnecessary for transactional accounting or marginal valuing attributes. Thus, Price teaches away from these recitations, which are now in independent claim 1 (as well as new independent claims 44, 50, 56 and 57).

Claims 6, 45, 52 and 58 recite that the preparing step includes a step of calculating opportunity values of funds used or supplied by each object being measured. Mr. Lepman, in paragraph 9 of his Declaration, states that Price is totally silent on how to properly value balance sheet dynamics in responsibility accounting and thus completely ignores this step.

With respect to claims 7, 36 and 53, Mr. Lepman, in paragraph 10 of his Declaration, states that Price is completely silent on establishing steps of providing the information necessary to select objects, and performing correct profit calculus.

With respect to claims 1, 8, 11, 12, 44, 50, 56 and 57, Mr. Lepman, in his Declaration, states that Price does not mention the profit calculation recited in these claims which is required to value a financial objects balance sheet dynamic. Mr. Lepman states that due to the fact that Price is directed to the creation of financial statements in a traditional accounting sense, Price simply does not imply the use of expected valuing in risk provisioning or combining at least one marginal value of calculated profit and fully absorbed profit adjustment values to create a measure for object level profitability.

With respect to claims 13, 48, 54 and 59, no economic adjustment is proscribed for taxes and/or object economic value in Price.

In light of the foregoing, Applicant respectfully submits that Price does not teach or suggest all of the claim limitations of the present application.

In the above-identified Office Action, the Examiner took "official notice" that performing financial processing using computer software is common knowledge in the art. Moreover, the Examiner asserted that "to have provided a method of performing a financial process for an account using software for a computer measuring profit based on the factors of net interest revenue, other revenues, direct expenses, indirect expenses and risks, also have to take advantage of flexible business rules to calculate known variations of one of the factors e.g. net interest revenue, would have been obvious to one of ordinary skill in the art". Applicant respectfully disagrees and traverses this basis of rejection. Applicant is not merely claiming financial processing using computer software. Instead, Applicant is claiming a process for determining object level profitability in a relational database management system. Utilizing an electronic relational database in accordance with the present invention

allows at least one marginal value of profit for each object being measured to be simultaneously and independently calculated in parallel. As stated by Mr. Lepman, in paragraph 14 of his Declaration, although account level profitability has been attempted with limited success using computer software, object level profitability using a relational database management system was not in place before his invention and provides many benefits over prior methodologies and systems. Calculating in parallel in accordance with the present invention allows "bottoms up" or behaviorally based calculation in determination of object level profitability in a manner which has been heretofore unattainable. The Examiner simply has not provided supporting documentation to show that such calculations would have been obvious to have been performed in a relational database using parallel computations in the manner recited in Applicant's independent claims at the time the application was filed.

Tad Lepman, in paragraphs 15-26 (referring to Exhibits B-M) points to the problem of companies who were unable to figure out how profitable their customers were. Mr. Lepman also describes the success that the present invention has attained, as well as the awards that it has won. Such success in the industry is evidence of the non-obviousness of the invention and counters the "official notice" that the invention is merely performing financial processing using computer software that is common knowledge in the art.

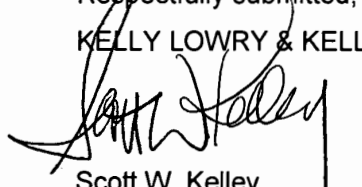
The United States Supreme Court in Graham v. John Deere Co., 383 U.S. 1 (1966) required that to make out a case of obviousness, one must: (a) determine the scope and contents of the prior art; (b) ascertain the differences between the prior art and the claims in issue; (c) determine the level of skill in the pertinent art; and (d) evaluate any evidence of secondary considerations. MPEP §716 et. seq. and §2144 et. seq. require the Examiner to consider such secondary considerations such as commercial success in determining obviousness. Mr. Lepman's Declaration specifically discusses the previous unsolved need of companies who are unable to figure out how profitable their customers

were (see Lepman Declaration, paragraph 15 and Exhibit B). Mr. Lepman, in his Declaration, has also shown the commercial success of his invention due to the embracing of the invention by many major companies and the awards that it has received (see Lepman Declaration, paragraphs 16-26). Such secondary considerations must be given substantial weight in the determination of obviousness or non-obviousness. See e.g. United States v. Adams, 383 U.S. 39 (1966); and In re Piasecki, 745 F.2d 1468 (Fed. Cir. 1984). Applicant respectfully asserts that when given the proper weight and consideration, such secondary considerations overcome the "official notice" and evidence the fact that the present invention was not obvious at the time of invention and filing of the present application.

Thus, Applicant respectfully asserts, that the "official notice" combined with Price still fail to teach or suggest the present invention, as recited in the currently pending claims. Accordingly, Applicant believes that the application is in condition for allowance, notice of which is hereby respectfully requested.

Additionally, the above-listed claims are provided in response to Office Action dated July 20, 2005, wherein the full text of the withdrawn claims were required to be submitted along with the other claims.

Respectfully submitted,
KELLY LOWRY & KELLEY, LLP



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UNITED STATES PATENT AND TRADEMARK OFFICE

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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/545,628	04/07/2000	Richard Tad Lepman	Berk-37617	2145
7590	08/22/2005		EXAMINER	
Scott W Kelley Kelly Bauersfeld Lowry & Kelly LLP 6320 Canoga Avenue Suite 1650 Woodland Hills, CA 91367			RUDY, ANDREW J	
			ART UNIT	PAPER NUMBER
			3627	

DATE MAILED: 08/22/2005

Please find below and/or attached an Office communication concerning this application or proceeding.



UNITED STATES PATENT AND TRADEMARK OFFICE

09/545/028
Commissioner for Patents
United States Patent and Trademark Office
P.O. Box 1450
Alexandria, VA 22313-1450
www.uspto.gov

NOTICE REQUIRING EXCESS CLAIMS FEES

The excess claim(s) filed on 7/29/05 is not accompanied by the appropriate payment of excess claims fees set forth in 37 CFR 1.16(h)-(j) or 1.492(d)-(f). Excess claims fees are required for each claim in independent form in excess of three (§ 1.16(h)), each claim (whether dependent or independent) in excess of twenty (note that § 1.75(c) indicates how multiple dependent claims are considered for fee calculation purposes) (§ 1.16(i)), and each application that contains a multiple dependent claim (§ 1.16(j)).

Since the application is not under a final rejection, applicant is given a time period of **ONE (1) MONTH or THIRTY (30) DAYS** from the mailing date of this notice, whichever is longer, to submit either: (1) the fee payment of \$ _____, or (2) an amendment in compliance with 37 CFR 1.121 that cancels the excess claim(s), in order to avoid **ABANDONMENT**. Extensions of this time period may be granted under 37 CFR 1.136, unless the excess claim(s) was presented in a preliminary amendment.

- ☐ 1. The funds in Deposit Account No. _____ are insufficient to cover the entire fee due. The balance is due within the time period set forth in this notice. See note below regarding the appropriate service charge.
- ☐ 2. The Credit Card payment to cover the entire fee due to Account _____ (Card type + last 4 digits ONLY) was refused. The balance is due within the time period set forth in this notice. See note below regarding the appropriate service charge.
- ☒ 3. The amendment that includes the excess claim(s) has not been entered, since applicant has failed to remit (or authorize charge to a Deposit Account or Credit Card) the fee as indicated on the attached Patent Application Fee Determination Record (PTO/SB/06). Remittance or authorization is due within the time period set forth in this notice.
- ☒ 4. The fee submitted in this application is insufficient. A balance of \$ 650.00 is due for presentation of excess claims (37 CFR 1.16(h)-(j) or 1.492(d)-(f)).
- ☐ 5. Other.

Explanation (Provide specific details of the required correction in order to assist the applicant. Indicate whether a service charge has been added to the fee due):

THE AMOUNT OF THE FEE(S) DUE IS SUBJECT TO CHANGE, GENERALLY ON OCTOBER 1 OF EACH YEAR (37 CFR 1.16, 1.21 & 1.492). THE AMOUNT OF THE FEE(S) DUE IS DETERMINED AS OF THE DATE A COMPLETE REPLY WITH THE APPROPRIATE FEE(S) IS RECEIVED BY THE OFFICE (37 CFR 1.8 & 1.10). BECAUSE THE AMOUNT DUE IS SUBJECT TO CHANGE, IT IS RECOMMENDED THAT APPLICANT CHECK THE CURRENT FEE SCHEDULE WHICH IS AVAILABLE ON THE USPTO'S WEBSITE AT: <http://www.uspto.gov/web/offices/ac/qs/ope/fees.htm>

Service Charges: There is a \$50 service charge for processing each payment refused (including a check returned "unpaid") or charged back by a financial institution (37 CFR 1.21(m)). There is a \$25.00 service charge for each month when the balance of a deposit account is below \$1000 at the end of the month (37 CFR 1.21(b)(2)).

Sharon M. [Signature]
Technical Support Staff (TSS)

Note to TSS: Please do NOT use this notice if the application is under a final rejection.

PATENT APPLICATION FEE DETERMINATION RECORD

Effective December 8, 2004

09/545,628

CLAIMS AS FILED - PART I

(Column 1)

(Column 2)

TOTAL CLAIMS		
FOR	NUMBER FILED	NUMBER EXTRA
TOTAL CHARGEABLE CLAIMS	minus 20=	*
INDEPENDENT CLAIMS	minus 3 =	*
MULTIPLE DEPENDENT CLAIM PRESENT. ☐		

* If the difference in column 1 is less than zero, enter "0" in column 2

SMALL ENTITY
TYPE ☐

OR

OTHER THAN
SMALL ENTITY

RATE	FEE		RATE	FEE
BASIC FEE	150.00	OR	BASIC FEE	300.00
X\$ 25=		OR	X\$50=	
X100=		OR	X200=	
+180=		OR	+360=	
TOTAL		OR	TOTAL	

CLAIMS AS AMENDED - PART II

(Column 1)

(Column 2)

(Column 3)

AMENDMENT A		CLAIMS REMAINING AFTER AMENDMENT		HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA
	Total	* 53	Minus	** 43	= 10
	Independent	* 7	Minus	*** 3	= 4
	FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM ☐				

SMALL ENTITY

OR

OTHER THAN
SMALL ENTITY

RATE	ADDI- TIONAL FEE		RATE	ADDI- TIONAL FEE
X\$ 25=	250.00	OR	X\$50=	
X100=	400.00	OR	X200=	
+180=		OR	+360=	
TOTAL ADDIT. FEE		OR	TOTAL ADDIT. FEE	

(Column 1)

(Column 2)

(Column 3)

AMENDMENT B		CLAIMS REMAINING AFTER AMENDMENT		HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA
	Total	*	Minus	**	=
	Independent	*	Minus	***	=
	FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM ☐				

RATE	ADDI- TIONAL FEE		RATE	ADDI- TIONAL FEE
X\$ 25=		OR	X\$50=	
X100=		OR	X200=	
+180=		OR	+360=	
TOTAL ADDIT. FEE		OR	TOTAL ADDIT. FEE	

(Column 1)

(Column 2)

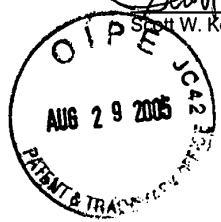
(Column 3)

AMENDMENT C		CLAIMS REMAINING AFTER AMENDMENT		HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA
	Total	*	Minus	**	=
	Independent	*	Minus	***	=
	FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM ☐				

RATE	ADDI- TIONAL FEE		RATE	ADDI- TIONAL FEE
X\$ 25=		OR	X\$50=	
X100=		OR	X200=	
+180=		OR	+360=	

I hereby certify that this correspondence is being deposited with the United States Postal Service as first class mail in an envelope addressed to: Commissioner for Patents, P.O. Box 1450, Alexandria, Virginia 22313-1450, on August 26, 2005.

en \$ 3627



Scott W. Kelley, Reg. No. 30,762 August 26, 2005 Date

PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of	)	Art Unit: 3627
Richard Tad Lepman	)	Examiner: Andrew J. Rudy
Serial No. 09/545,628	)	
Filed: April 7, 2000	)	
Entitled: PROCESS FOR DETERMINING OBJECT LEVEL PROFITABILITY	)	Docket No. BERK-37617

RESPONSE

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Dear Sir:

In Response to an Office Action dated August 22, 2005, in connection with the above-identified application, Applicant submits the balance of \$650.00 due for presentation of excess claims.

08/31/2005 SHASSEN1 00000017 09545628
01 FC:2202 650.00 OP

Respectfully submitted,

KELLY LOWRY & KELLEY, LLP

Scott W. Kelley
Reg. No. 30,762

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Woodland Hills, California 91367
(818) 347-7900

PATENT APPLICATION FEE DETERMINATION RECORD
Effective December 8, 2004

09/545,628

CLAIMS AS FILED - PART I

	(Column 1)	(Column 2)
TOTAL CLAIMS		
FOR	NUMBER FILED	NUMBER EXTRA
TOTAL CHARGEABLE CLAIMS	minus 20=	*
INDEPENDENT CLAIMS	minus 3 =	*
MULTIPLE DEPENDENT CLAIM PRESENT. ☐		

* If the difference in column 1 is less than zero, enter "0" in column 2

CLAIMS AS AMENDED - PART II

	(Column 1)	(Column 2)	(Column 3)
	CLAIMS REMAINING AFTER AMENDMENT	HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA
Total	* 53	Minus 43	= 10
Independent	* 7	Minus 3	= 4
FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM ☐			

fee Pd

SMALL ENTITY
TYPE ☐

OR
OTHER THAN SMALL ENTITY

RATE	FEE	OR	RATE	FEE
BASIC FEE	150.00	OR	BASIC FEE	300.00
X\$ 25=		OR	X\$50=	
X100=		OR	X200=	
+180=		OR	+360=	
TOTAL		OR	TOTAL	

SMALL ENTITY
OR

OTHER THAN SMALL ENTITY

RATE	ADDITIONAL FEE	OR	RATE	ADDITIONAL FEE
X\$ 25=	250.00	OR	X\$50=	
X100=	400.00	OR	X200=	
+180=		OR	+360=	
TOTAL ADDIT. FEE	650	OR	TOTAL ADDIT. FEE	

	(Column 1)	(Column 2)	(Column 3)
	CLAIMS REMAINING AFTER AMENDMENT	HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA
Total	*	Minus **	=
Independent	*	Minus ***	=
FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM ☐			

RATE	ADDITIONAL FEE	OR	RATE	ADDITIONAL FEE
X\$ 25=		OR	X\$50=	
X100=		OR	X200=	
+180=		OR	+360=	
TOTAL ADDIT. FEE		OR	TOTAL ADDIT. FEE	

	(Column 1)	(Column 2)	(Column 3)
	CLAIMS REMAINING AFTER AMENDMENT	HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA
Total	*	Minus **	=
Independent	*	Minus ***	=
FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM ☐			

RATE	ADDITIONAL FEE	OR	RATE	ADDITIONAL FEE
X\$ 25=		OR	X\$50=	
X100=		OR	X200=	
+180=		OR	+360=	



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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/545,628	04/07/2000	Richard Tad Lepman	Berk-37617	2145
7590 11/16/2005 Scott W Kelley Kelly Bauersfeld Lowry & Kelly LLP 6320 Canoga Avenue Suite 1650 Woodland Hills, CA 91367			EXAMINER RUDY, ANDREW J	
			ART UNIT 3627	PAPER NUMBER

DATE MAILED: 11/16/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/545,628	LEPMAN, RICHARD TAD	
	Examiner	Art Unit	
	Andrew Joseph Rudy	3627	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 29 July 2005.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1,2,6-9,11-13 and 16-59 is/are pending in the application.
- 4a) Of the above claim(s) 16-59 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1, 2, 6-9 and 11-13 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)	4) ☐ Interview Summary (PTO-413)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)	Paper No(s)/Mail Date. _____
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)	5) ☐ Notice of Informal Patent Application (PTO-152)
Paper No(s)/Mail Date _____	6) ☐ Other: _____

DETAILED ACTION

1. Claims 1, 2, 6-9, 11-13 and 16-59 are pending. Claims 16-43 are still withdrawn from consideration as drawn to a non-elected invention.

2. Newly submitted claims 44-59 directed to an invention that is independent or distinct from the invention originally claimed for the following reasons: These claims comprise separate inventions/species.

Since applicant has received an action on the merits for the originally presented invention, this invention has been constructively elected by original presentation for prosecution on the merits. Accordingly, claims 44-59 are withdrawn from consideration as being directed to a non-elected invention. See 37 CFR 1.142(b) and MPEP § 821.03.

3. The amendment filed July 29, 2005 is objected to under 35 U.S.C. 132(a) because it introduces new matter into the disclosure. 35 U.S.C. 132(a) states that no amendment shall introduce new matter into the disclosure of the invention. The added material which is not supported by the original disclosure is as follows: The proposed material presented from pages 11-13, 20-30, etc. are not supported from the original specification. Applicant's blanket statement that no new matter has been added is not supported by any particular evidence from the original specification for the voluminous proposed additional material to the original specification.

Applicant is required to cancel the new matter in the reply to this Office Action.

Claim Rejections - 35 USC § 112

4. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

5. Claims 1, 2, 6-9 and 11-13 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention. The Examiner does not see where the additional material added to the claims is present from the original application.

Claim Rejections - 35 USC § 103

6. Claims 1, 2, 6-9 and 11-13, as understood, are rejected under 35 U.S.C. 103(a) as being unpatentable over Price.

Applicant is directed towards paragraph 5 of the January 24, 2005 non-final Office Action regarding Price. Applicant's REMARKS have been reviewed, but are not convincing. It is noted that Applicant has not adequately addressed the new subject matter previously objected to. As understood, to use a computer to analyze and compute common knowledge data disclosed would have been obvious to one of ordinary skill in the art. The motivation for having done such would have been to implement common knowledge with computer technology for a more efficient calculation of profits.

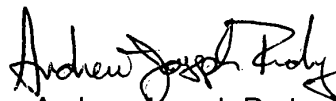
7. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

8. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Andrew Joseph Rudy whose telephone number is 571-272-6789. The examiner can normally be reached on Monday thru Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Alexander G. Kalinowski can be reached on 571-272-6771. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).


Andrew Joseph Rudy
Primary Examiner
Art Unit 3627

Index of Claims 	Application/Control No.		Applicant(s)/Patent under Reexamination	
	09/545,628		LEPMAN, RICHARD TAD	
	Examiner		Art Unit	
	Andrew Joseph Rudy		3627	

✓	Rejected
=	Allowed

—	(Through numeral) Cancelled
÷	Restricted

N	Non-Elected
I	Interference

A	Appeal
O	Objected

Claim		Date			
Final	Original				
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1	✓				
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8	✓				
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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/545,628	04/07/2000	Richard Tad Lepman	Berk-37617	2145

7590 09/22/2006

Scott W Kelley
Kelly Bauersfeld Lowry & Kelly LLP
6320 Canoga Avenue
Suite 1650
Woodland Hills, CA 91367

EXAMINER

RUDY, ANDREW J

ART UNIT PAPER NUMBER

3627

DATE MAILED: 09/22/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Notice of Abandonment	Application No.	Applicant(s)	
	09/545,628	LEPMAN, RICHARD TAD	
	Examiner	Art Unit	
	Andrew Joseph Rudy	3627	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--

This application is abandoned in view of:

1. ☒ Applicant's failure to timely file a proper reply to the Office letter mailed on 16 November 2005.
 - (a) ☐ A reply was received on _____ (with a Certificate of Mailing or Transmission dated _____), which is after the expiration of the period for reply (including a total extension of time of _____ month(s)) which expired on _____.
 - (b) ☐ A proposed reply was received on _____, but it does not constitute a proper reply under 37 CFR 1.113 (a) to the final rejection.
(A proper reply under 37 CFR 1.113 to a final rejection consists only of: (1) a timely filed amendment which places the application in condition for allowance; (2) a timely filed Notice of Appeal (with appeal fee); or (3) a timely filed Request for Continued Examination (RCE) in compliance with 37 CFR 1.114).
 - (c) ☐ A reply was received on _____ but it does not constitute a proper reply, or a bona fide attempt at a proper reply, to the non-final rejection. See 37 CFR 1.85(a) and 1.111. (See explanation in box 7 below).
 - (d) ☒ No reply has been received.
2. ☐ Applicant's failure to timely pay the required issue fee and publication fee, if applicable, within the statutory period of three months from the mailing date of the Notice of Allowance (PTOL-85).
 - (a) ☐ The issue fee and publication fee, if applicable, was received on _____ (with a Certificate of Mailing or Transmission dated _____), which is after the expiration of the statutory period for payment of the issue fee (and publication fee) set in the Notice of Allowance (PTOL-85).
 - (b) ☐ The submitted fee of \$_____ is insufficient. A balance of \$_____ is due.
The issue fee required by 37 CFR 1.18 is \$_____. The publication fee, if required by 37 CFR 1.18(d), is \$_____.
 - (c) ☐ The issue fee and publication fee, if applicable, has not been received.
3. ☐ Applicant's failure to timely file corrected drawings as required by, and within the three-month period set in, the Notice of Allowability (PTO-37).
 - (a) ☐ Proposed corrected drawings were received on _____ (with a Certificate of Mailing or Transmission dated _____), which is after the expiration of the period for reply.
 - (b) ☐ No corrected drawings have been received.
4. ☐ The letter of express abandonment which is signed by the attorney or agent of record, the assignee of the entire interest, or all of the applicants.
5. ☐ The letter of express abandonment which is signed by an attorney or agent (acting in a representative capacity under 37 CFR 1.34(a)) upon the filing of a continuing application.
6. ☐ The decision by the Board of Patent Appeals and Interference rendered on _____ and because the period for seeking court review of the decision has expired and there are no allowed claims.
7. ☐ The reason(s) below:


 Andrew Joseph Rudy
 Primary Examiner
 Art Unit: 3627

Petitions to revive under 37 CFR 1.137(a) or (b), or requests to withdraw the holding of abandonment under 37 CFR 1.181, should be promptly filed to minimize any negative effects on patent term.