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DECEMBER 04, 1998

PTAS

GRAHAM & JAMES LLP
MARC A. SOCKOL
600 HANSEN WAY
PALO ALTO, CALIFORNIA 94304-1043



100804628A

COPY

UNITED STATES PATENT AND TRADEMARK OFFICE
NOTICE OF RECORDATION OF ASSIGNMENT DOCUMENT

THE ENCLOSED DOCUMENT HAS BEEN RECORDED BY THE ASSIGNMENT DIVISION OF THE U.S. PATENT AND TRADEMARK OFFICE. A COMPLETE MICROFILM COPY IS AVAILABLE AT THE ASSIGNMENT SEARCH ROOM ON THE REEL AND FRAME NUMBER REFERENCED BELOW.

PLEASE REVIEW ALL INFORMATION CONTAINED ON THIS NOTICE. THE INFORMATION CONTAINED ON THIS RECORDATION NOTICE REFLECTS THE DATA PRESENT IN THE PATENT AND TRADEMARK ASSIGNMENT SYSTEM. IF YOU SHOULD FIND ANY ERRORS OR HAVE QUESTIONS CONCERNING THIS NOTICE, YOU MAY CONTACT THE EMPLOYEE WHOSE NAME APPEARS ON THIS NOTICE AT 703-308-9723. PLEASE SEND REQUEST FOR CORRECTION TO: U.S. PATENT AND TRADEMARK OFFICE, ASSIGNMENT DIVISION, BOX ASSIGNMENTS, CG-4, 1213 JEFFERSON DAVIS HWY, SUITE 320, WASHINGTON, D.C. 20231.

RECORDATION DATE: 08/17/1998

REEL/FRAME: 9402/0752
NUMBER OF PAGES: 3

BRIEF: ASSIGNMENT OF ASSIGNOR'S INTEREST (SEE DOCUMENT FOR DETAILS).

ASSIGNOR:

TOUBOUL, SHLOMO

DOC DATE: 07/07/1998

ASSIGNEE:

FINJAN SOFTWARE, LTD.
GIBORAI ISRAEL STREET
NETANYA, ISRAEL 42504

SERIAL NUMBER: 08964388
PATENT NUMBER:

FILING DATE: 11/06/1997
ISSUE DATE:

LAWAN FLETCHER, EXAMINER
ASSIGNMENT DIVISION
OFFICE OF PUBLIC RECORDS

DATES ENTERED: No Action

DEC 15 1998

BY mf CALENDARED

ATTORNEY
GRAHAM & JAMES (PA) 10 DEPT.

FJN 013155

SOPHOS
EXHIBIT 1004 - PAGE 0634

08-27-1998

Docket No. 40492.00002 (558)



LET

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100804628

To the Honorable Commissioner of Patents and Trademarks: Please record the attached original documents or copy thereof.

1. Name of conveying party(ies):
Shlomo Touboul

Additional names(s) of conveying party(ies) ☐ Yes ☒ No

3. Nature of conveyance:

- ☒ Assignment ☐ Merger
☐ Security Agreement ☐ Change of Name
☐ Other _____

Execution Date: 7/07/98

2. Name and address of receiving party(ies):

Name: Finjan Software, Ltd.

Address: Giborai Israel Street

City: Netanya 07 State/Prov.: _____

Country: Israel ZIP: 42504

Additional name(s) & address(es) ☐ Yes ☒ No

4. Application number(s) or registration numbers(s):

If this document is being filed together with a new application, the execution date of the application is: _____

Patent Application No. _____ Filing date _____

08/964,388

11/06/97

B. Patent No.(s) _____

Additional numbers ☐ Yes ☒ No

5. Name and address of party to whom correspondence concerning document should be mailed:

Name: Marc A. Sockol

Registration No. 40,823

Address: Graham & James LLP

600 Hansen Way

City: Palo Alto State/Prov.: CA

Country: USA ZIP: 94304-1043

6. Total number of applications and patents involved: 1

7. Total fee (37 CFR 3.41):.....\$ 40.00

☒ Enclosed - Any excess or insufficiency should be credited or debited to deposit account

☐ Authorized to be charged to deposit account

8. Deposit account number:

05-0150

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9. Statement and signature.

To the best of my knowledge and belief, the foregoing information is true and correct and any attached copy is a true copy of the original document.

Marc A. Sockol, Reg. No. 40,823.

Name of Person Signing

Signature

Total number of pages including cover sheet, attachments, and

2

Date

August 17, 1998

FJN 013156

SOPHOS
EXHIBIT 1004 - PAGE 0635

ASSIGNMENT

Attorney Docket No. 40492.00002

(1-8) *Insert Name(s) of Inventor(s)*

(1) <u>Shlomo Touboul</u>	(5) _____
(2) _____	(6) _____
(3) _____	(7) _____
(4) _____	(8) _____

For good and valuable consideration receipt of which is hereby acknowledged, the undersigned agree(s) to assign, and hereby do(es) assign, transfer and set over to:

(9) <i>Insert name of Assignee</i>	(9) <u>Finjan Software, Ltd.</u>
(10) <i>Insert state of incorporation of Assignee</i>	(10) <u>Israel</u>
(11) <i>Insert address of Assignee</i>	(11) <u>Giborai Israel Street, Netania Israel 42504</u> (hereinafter designated as the Assignee) the entire worldwide right, title and interest in the invention known as
(12) <i>Insert Identification of Invention, such as Title, Case Number or Foreign Application Number</i>	(12) <u>SYSTEM AND METHOD FOR PROTECTING A COMPUTER AND A NETWORK FROM HOSTILE DOWNLOADABLES</u> (Case No. 40492.00002) (Serial No. 08/964,388) for which the undersigned has (have) executed an application for patent in United States of America
(13) <i>Insert Date of Signing of Application</i>	(13) on <u>May 13, 1998</u>

1) The undersigned agree(s) to execute all papers necessary in connection with the application and any continuing or divisional applications thereof and also to execute separate assignments in connection with such applications as the Assignee may deem necessary or expedient.

2) The undersigned agree(s) to execute all papers necessary in connection with any interference which may be declared concerning this application or continuation or division thereof and to cooperate with the Assignee in every way possible in obtaining evidence and going forward with such interference.

3) The undersigned agree(s) to execute all papers and documents and perform any act which may be necessary in connection with claims or provisions of the International Convention for Protection of Industrial Property or similar agreements.

4) The undersigned agree(s) to perform all affirmative acts which may be necessary to obtain a grant of a valid United States patent to the Assignee.

131/139340.01.00
062998/1543/40492.00002

5) The undersigned hereby authorize(s) and request(s) the Commissioner of Patents and the duly constituted authorities of foreign countries to issue any and all Letters Patents resulting from said application or any division or divisions or continuing or reissue applications thereof to the said Assignee, its successors and assigns, as Assignee of the entire right, title and interest, and hereby covenants that he has (they have) full right to convey the entire interest herein assigned, and that he has (they have) not executed and will not execute, any agreement in conflict herewith.

6) *The undersigned hereby grant(s)*

David L. Fehrman, Reg. No. 28,600; David L. Henty, Reg. No. 31,323; William J. Robinson, Reg. No. 29,430; Stuart L. Merkadeau, Reg. No. 33,262; David B. Abel Reg. No. 32,394; Hisako Muramatsu, Reg. No. 34,955; Brian M. Berliner, Reg. No. 34,549; David J. Meyer, Reg. No. 33,425;; Vincent J. Belusko, Reg. No. 30,820; Minda Schechter, Reg. No. 38,296; William G. Anderson, Reg. No. 27,851; Victor De Gyafas, Reg. No. 40,583; Dennis R. Gallagher, Reg. No. 42,563; Jonathan L. Pettit, Reg. No. 40,770; Wayne Smith, Reg. No.42,160; Lawrence W. Granatelli, Reg. No. 32,228; Laura A. Majerus, Reg. No. 33,417; Joseph K. Hollinger Reg. No. 40,649; Jonathan T. Kaplan Reg. No. 38,935; Marc A. Sockol Reg. No. 40,823 ;Ian Cartier Reg. No. 38,406; Linda Beach Reg. No. 36,446.

the power to insert on this assignment any further identification which may be necessary or desirable in order to comply with the rules of the United States Patent and Trademark Office for recordation of this document.

Date	<u>7/2/98</u>	Name of Inventor(s)	<u>Shlomo Tabouf</u>
Date	_____	Name of Inventor(s)	_____
Date	_____	Name of Inventor(s)	_____
Date	_____	Name of Inventor(s)	_____
Date	_____	Name of Inventor(s)	_____

131/139340.01.00
062998/1543/40492.00002

TOTAL P.03

TOTAL P.04

FJN 013158
SOPHOS
EXHIBIT 1004 - PAGE 0637

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In Re Application of:

Shlomo Touboul

Serial No. Unassigned

Filed: Unassigned

For: SYSTEM AND METHOD FOR
PROTECTING A COMPUTER AND A
NETWORK FROM HOSTILE
DOWNLOADABLES

Examiner: Unassigned

Art Unit: Unassigned

Box Patent Application
Assistant Commissioner for Patents
Washington, D.C. 20231

GENERAL AUTHORIZATION/REQUEST TO PETITION
FOR EXTENSIONS OF TIME

Dear Sir:

With reference to the subject application, and pursuant to 37 C.F.R. § 1.136, Applicant(s) hereby authorize(s) and request(s) the Commissioner to treat any correspondence requiring a petition for extension of time as containing such a request therefor for the appropriate length of time. This general authorization is effective during the pendency of this application, including any division or continuing application therefrom.

131/201261.01
033000/1007/40492.00011

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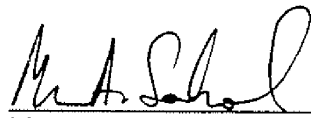
PATENT
Docket No.: 40492.00011

Where no check is received by the Commissioner, you are hereby authorized to charge payment of the requisite petition fees, or charge any additional fee required under 37 C.F.R. § 1.17, or credit any overpayment of same, to Deposit Account No. 05-0150.

Date: March 30, 2000

Respectfully submitted,

Graham & James LLP
600 Hansen Way
Palo Alto, CA 94304-1043
Telephone: (650) 856-6500
Facsimile: (650) 856-3619

By: 
Marc A. Sockol
Attorney for Applicant(s)
Registration No: 40,823

131/201261.01
033000/1007/40492.00011



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Date: 4/1/03

SQUIRE, SANDERS & DEMPSEY L.L.P
 600 HANSEN WAY
 PALO ALTO CA 94304-1043

DATES ENTERED _____

Exam & 1st OA 7/1/04

APR - 8 2003

CALENDARED

To: Applicant of Serial Number 09539667

BY SHY
 ATTORNEY
 SQUIRE, SANDERS & DEMPSEY

We currently project that it will be more than 15 months before this application will receive a first office action. This is because the application is classified in a technology that has experienced a large filing rate growth over the last few years. The Office is addressing the growth by adjusting examination resources accordingly. You may wish to consult the MPEP (708.02) to see if filing a petition to make special is appropriate.

Customer Service Office in Technology Center: 09534

Phone Number: 703-306-5631

FAX Number: 703-746-7240

Applicant/Attorney Contact Information:

Telephone: (650)856-6500

Fax: (650)843-8777



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Date: 4/1/03

SQUIRE, SANDERS & DEMPSEY L.L.P
600 HANSEN WAY
PALO ALTO CA 94304-1043

DATES ENTERED _____
_____ *Expt & B+DA 7/1/04* _____

APR - 8 2003

To: Applicant of Serial Number 09539667

CALENDARED
BY _____ *SAJ* _____
ATTORNEY _____
SQUIRE, SANDERS & DEMPSEY

We currently project that it will be more than 15 months before this application will receive a first office action. This is because the application is classified in a technology that has experienced a large filing rate growth over the last few years. The Office is addressing the growth by adjusting examination resources accordingly. You may wish to consult the MPEP (708.02) to see if filing a petition to make special is appropriate.

Customer Service Office in Technology Center: 09534

Phone Number: 703-306-5631

FAX Number: 703-746-7240

Applicant/Attorney Contact Information:

Telephone: (650)856-6500

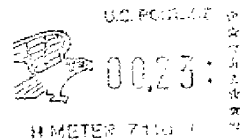
Fax: (650)843-8777

Date Mailed: March 17, 2003 | By: MAS/say | PTO DATE STAMP:
Serial No.: 09/539,667 | Docket No.: 43426.00011
Applicant: Shlomo Touboul
Title: SYSTEM AND METHOD FOR PROTECTING A COMPUTER AND A NETWORK FROM HOSTILE
DOWNLOADABLES

The following has been received in the U.S. Patent Office on the date stamped hereon:

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| <input type="checkbox"/> Patent Application ___ Pages ___ Claims | <input type="checkbox"/> Amendment/Response |
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| <input type="checkbox"/> Oath/Declaration/Power of Attorney (signed) | <input checked="" type="checkbox"/> Transmittal Form |
| <input type="checkbox"/> Assignment & Recordation Cover Sheet | <input type="checkbox"/> Fee Transmittal for FY 2003 (in duplicate) |
| <input type="checkbox"/> Verified Statement Claiming Small Entity Status | <input type="checkbox"/> Appeal Brief (in triplicate) |
| <input type="checkbox"/> Continued Prosecution Application (§1.53(d)) | <input type="checkbox"/> Issue Fee Transmittal with PTO-85b |
| <input type="checkbox"/> Provisional Application ___ Pages | <input type="checkbox"/> Copy of PTO-1533, Notice to File Missing Parts |
| <input type="checkbox"/> Design Application ___ Pages ___ Drawings | <input type="checkbox"/> Info. Disclosure Statement & PTO-1449/Rafs ___ |
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WASHINGTON, D.C. 20231



Squire, Sanders & Dempsey L.L.P.
600 Hansen Way, Suite 100
Palo Alto, CA 94304-1043



FJN 013163

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EXHIBIT 1004 - PAGE 0642

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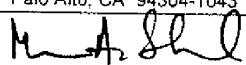
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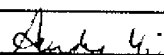
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TRANSMITTAL FORM <i>(to be used for all correspondence after initial filing)</i>	Application Number	09/539,667	
	Filing Date	March 30, 2000	
	First Named Inventor	Shlomo Touboul	
	Group Art Unit	2131	
	Examiner Name	Unknown	
Total Number of Pages in This Submission	2	Attorney Docket Number	43426.00011

ENCLOSURES <i>(check all that apply)</i>		
<input type="checkbox"/> Fee Transmittal Form (in duplicate)	<input type="checkbox"/> Assignment and Recordation Cover Sheet <i>(for an Application)</i>	<input type="checkbox"/> Request to Correct Filing Receipt
<input type="checkbox"/> Amendment / Response	<input type="checkbox"/> Drawing(s) _____ Sheets	<input type="checkbox"/> Appeal Communication to Board of Appeals and Interferences
<input type="checkbox"/> With RCE	<input type="checkbox"/> Licensing-related Papers	<input type="checkbox"/> Appeal Communication to Group <i>(Appeal Notice, Brief, Reply Brief)</i>
<input type="checkbox"/> After Final	<input type="checkbox"/> Petition	<input checked="" type="checkbox"/> Return Postcard
<input type="checkbox"/> Affidavits/declaration(s)	<input type="checkbox"/> Request for Continued Examination	<input checked="" type="checkbox"/> Request for Status of Application
<input type="checkbox"/> Extension of Time Request <i>(in duplicate)</i>	<input type="checkbox"/> Power of Attorney	<input type="checkbox"/> Other Enclosure(s) <i>(please identify below):</i>
<input type="checkbox"/> _____ Reference(s)	<input type="checkbox"/> Terminal Disclaimer	
<input type="checkbox"/> IDS and Form 1449	<input type="checkbox"/> Request for Refund	
<input type="checkbox"/> Certified Copy of Priority Document(s)	<input type="checkbox"/> CD, Number of CD(s) _____	
<input type="checkbox"/> Response to Missing Parts/Incomplete Application	Remarks	
<input type="checkbox"/> Declaration/Oath		

SIGNATURE OF APPLICANT, ATTORNEY, OR AGENT	
Firm or Individual name	Marc A. Sockol, Reg. No. 40,823 Squire, Sanders & Dempsey, L.L.P. 600 Hansen Way Palo Alto, CA 94304-1043
Signature	
Date	March 17, 2003

CERTIFICATE OF MAILING			
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Typed or printed name	Sandy Yi		
Signature		Date	March 17, 2003

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FJN 013164

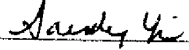
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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

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Date: 3-17-2003

By: 
Sandy Yi

In Re Application Of: Shlomo Touboul	Examiner: Unknown
Serial No.: 09/539,667	Art Unit: 2131
Filed: March 30, 2000	
For: SYSTEM AND METHOD FOR PROTECTING A COMPUTER AND A NETWORK FROM HOSTILE DOWNLOADABLES	

Commissioner for Patents
Washington, D.C. 20231

REQUEST FOR STATUS OF APPLICATION

Sir:

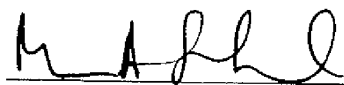
Applicant requests the status of the above-identified patent application. Applicant has not received a communication from the U.S. Patent and Trademark Office since receiving a corrected filing receipt mailed September 13, 2002.

Should the Examiner have any questions regarding this matter, please contact the undersigned at the telephone number shown below.

Date: 3-17-03

SQUIRE, SANDERS & DEMPSEY L.L.P.
600 Hansen Way
Palo Alto, CA 94304-1043
Telephone (650) 856-6500
Facsimile (650) 843-8777

Respectfully submitted,


Marc A. Sockol, Esq.
Attorney for Applicant
Registration No.: 40,823

Date Mailed: February 13, 2003 By: MAS/sav PTO DATE STAMP:
Serial No.: 09/539,667 Docket No.: 43426.00011
Applicant(s): Shlomo Touboul
Title: SYSTEM AND METHOD FOR PROTECTING A COMPUTER AND A NETWORK FROM HOSTILE
DOWNLOADABLES

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| <input type="checkbox"/> Drawings Formal/Informal _____ Sheets | <input type="checkbox"/> Petition for Extension of Time |
| <input type="checkbox"/> General Authorization / Request to Petition for Extensions of Time | |
| <input type="checkbox"/> Oath/Declaration/Power of Attorney | <input checked="" type="checkbox"/> Transmittal Form |
| <input type="checkbox"/> Assignment & Recordation Cover Sheet | <input type="checkbox"/> Fee Transmittal for FY 2003 (in duplicate) |
| <input type="checkbox"/> Verified Statement Claiming Small Entity Status | <input type="checkbox"/> Notice of Change of Attorney Docket Number |
| <input type="checkbox"/> Continued Prosecution Application
(\$1,53(d) CPA - in duplicate) | <input type="checkbox"/> Issue Fee Transmittal
with PTO-85b Drawings |
| <input type="checkbox"/> Design Application ___ Pages ___ Drawings | <input type="checkbox"/> Info. Disclosure Statement & PTO-1449/Refs |
| <input type="checkbox"/> Status Letter | <input type="checkbox"/> Request for Corrected Filing Receipt |
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WASHINGTON, D.C. 20231



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Squire, Sanders & Dempsey L.L.P.

600 Hansen Way, Suite 100
Palo Alto, CA 94304-1043



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EXHIBIT 1004 - PAGE 0645

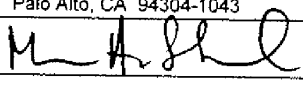
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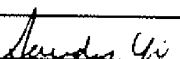
PTO/SB/21 (08-00)
Approved for use through 10/31/2002. OMB 0651-0031

U.S. Patent and Trademark Office: U.S. DEPARTMENT OF COMMERCE
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TRANSMITTAL FORM <i>(to be used for all correspondence after initial filing)</i>	Application Number	09/539,667	
	Filing Date	March 30, 2000	
	First Named Inventor	Shlomo Touboul	
	Group Art Unit	2131	
	Examiner Name	Unknown	
Total Number of Pages in This Submission	3	Attorney Docket Number	43426.00011

ENCLOSURES (check all that apply)		
<input type="checkbox"/> Fee Transmittal Form (in duplicate)	<input type="checkbox"/> Assignment and Recordation Cover Sheet (for an Application)	<input type="checkbox"/> Request to Correct Filing Receipt
<input type="checkbox"/> Amendment / Response	<input type="checkbox"/> Drawing(s) _____ Sheets	<input type="checkbox"/> Appeal Communication to Board of Appeals and Interferences
<input type="checkbox"/> With RCE	<input type="checkbox"/> Licensing-related Papers	<input type="checkbox"/> Appeal Communication to Group (Appeal Notice, Brief, Reply Brief)
<input type="checkbox"/> After Final	<input type="checkbox"/> Petition	<input checked="" type="checkbox"/> Return Postcard
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<input type="checkbox"/> Extension of Time Request (in duplicate)	<input checked="" type="checkbox"/> Associate Power of Attorney	<input type="checkbox"/> Other Enclosure(s) (please identify below):
<input type="checkbox"/> _____ Reference(s)	<input type="checkbox"/> Terminal Disclaimer	
<input type="checkbox"/> IDS and Form 1449	<input type="checkbox"/> Request for Refund	
<input type="checkbox"/> Certified Copy of Priority Document(s)	<input type="checkbox"/> CD, Number of CD(s) _____	
<input type="checkbox"/> Response to Missing Parts/Incomplete Application	Remarks	
<input type="checkbox"/> Declaration/Oath		

SIGNATURE OF APPLICANT, ATTORNEY, OR AGENT	
Firm or Individual name	Marc A. Sockol, Reg. No. 40,823 Squire, Sanders & Dempsey, L.L.P. 600 Hansen Way Palo Alto, CA 94304-1043
Signature	
Date	February 13, 2003

CERTIFICATE OF MAILING			
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Typed or printed name	Sandy Yi		
Signature		Date	February 13, 2003

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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

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Date: 2-13-2003

By: *Sandy Yi*
Sandy Yi

In re Application of: Shlomo Touboul	Examiner: Unknown
Serial No.: 09/539,667	Art Unit: 2131
Filed: March 30, 2000	
Title: SYSTEM AND METHOD FOR PROTECTING A COMPUTER AND A NETWORK FOR HOSTILE DOWNLOADABLES	

Commissioner of Patents
Washington, DC 20231

ASSOCIATE POWER OF ATTORNEY

Sir:

Please recognize the following attorney as an associate attorney in the above-referenced application:

Marc A. Berger, Reg. No. 44,029.


Please continue to address all correspondence and communications to:

Marc A. Sockol
Customer No. 30256
Squire, Sanders & Dempsey L.L.P.
600 Hansen Way
Palo Alto, CA 94304-1043
650-856-6500

Dated: 2-13-03

Respectfully submitted

Squire, Sanders & Dempsey L.L.P.
600 Hansen Way
Palo Alto, CA 94304-1043
Tel (650) 856-6500
Fax (650) 843-8777

By: 

Marc A. Sockol
Attorney for Applicant
Registration No. 40,823

Palo Alto Doc #: 49230v1



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WASHINGTON, D.C. 20231
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APPLICATION NUMBER	FILING DATE	GRP ART UNIT	FIL FEE REC'D	ATTY. DOCKET NO.	DRAWINGS	TOT CLAIMS	IND CLAIMS
09/539,667	03/30/2000	2131	402	40492.00011	10	22	4

30256
SQUIRE, SANDERS & DEMPSEY L.L.P.
600 HANSEN WAY
PALO ALTO, CA 94304-1043

CONFIRMATION NO. 8436
CORRECTED FILING RECEIPT
OC000000008790619

Date Mailed: 09/13/2002

Receipt is acknowledged of this nonprovisional Patent Application. It will be considered in its order and you will be notified as to the results of the examination. Be sure to provide the U.S. APPLICATION NUMBER, FILING DATE, NAME OF APPLICANT, and TITLE OF INVENTION when inquiring about this application. Fees transmitted by check or draft are subject to collection. Please verify the accuracy of the data presented on this receipt. **If an error is noted on this Filing Receipt, please write to the Office of Initial Patent Examination's Filing Receipt Corrections, facsimile number 703-746-9195. Please provide a copy of this Filing Receipt with the changes noted thereon. If you received a "Notice to File Missing Parts" for this application, please submit any corrections to this Filing Receipt with your reply to the Notice. When the USPTO processes the reply to the Notice, the USPTO will generate another Filing Receipt incorporating the requested corrections (if appropriate).**

Applicant(s)

Shlomo Touboul, Kefar-haim, ISRAEL;

Domestic Priority data as claimed by applicant

THIS APPLICATION IS A CON OF 08/964,388 11/06/1997 PAT 6,092,194
WHICH CLAIMS BENEFIT OF 60/030,639 11/08/1996

Foreign Applications

If Required, Foreign Filing License Granted 06/14/2000

Projected Publication Date: Not Applicable, filed prior to November 29, 2000

Non-Publication Request: No

Early Publication Request: No

**** SMALL ENTITY ******Title**

System and method for protecting a computer and a network from hostile downloadables

Preliminary Class

DATES ENTERED _____

SEP 27 2002
CALENDARED
BY _____
ATTORNEY _____
SQUIRE, SANDERS & DEMPSEY

FJN 013170

SOPHOS
EXHIBIT 1004 - PAGE 0649

713

**LICENSE FOR FOREIGN FILING UNDER
Title 35, United States Code, Section 184
Title 37, Code of Federal Regulations, 5.11 & 5.15**

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SEP 27 2002

BY _____ CALENDARED
ATTORNEY _____
SQUIRE, SANDERS & DEMPSEY

FJN 013172

SOPHOS
EXHIBIT 1004 - PAGE 0651

713

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NOT GRANTED

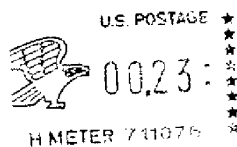
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Date Mailed: August 29, 2002 By: AW/say PTO DATE STAMP:
Serial No.: 09/539,667 Docket No.: 43426.00011
Applicant(s): Shlomo Touboul
Title: SYSTEM AND METHOD FOR PROTECTING A COMPUTER AND A NETWORK FROM HOSTILE
DOWNLOADABLES

The following has been received in the U.S. Patent Office on the date stamped hereon:

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| <input type="checkbox"/> Patent Application ___ Pages ___ Claims | <input type="checkbox"/> Amendment/Response |
| <input type="checkbox"/> Drawings Formal/Informal _____ Sheets | <input type="checkbox"/> Petition for Extension of Time |
| <input type="checkbox"/> General Authorization / Request to Petition for Extensions of Time | |
| <input type="checkbox"/> Oath/Declaration/Power of Attorney | <input checked="" type="checkbox"/> Transmittal Form |
| <input type="checkbox"/> Assignment & Recordation Cover Sheet | <input checked="" type="checkbox"/> Fee Transmittal for FY 2002 (in duplicate) |
| <input type="checkbox"/> Verified Statement Claiming Small Entity Status | <input type="checkbox"/> Notice of Change of Attorney Docket Number |
| <input type="checkbox"/> Continued Prosecution Application
(\$1.53(d) CPA - in duplicate) | <input type="checkbox"/> Issue Fee Transmittal
with PTO-85b Drawings |
| <input type="checkbox"/> Design Application ___ Pages ___ Drawings | <input type="checkbox"/> Info. Disclosure Statement & PTO-1449/Refs |
| <input type="checkbox"/> Status Letter | <input checked="" type="checkbox"/> Request for Corrected Filing Receipt |
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Squire, Sanders & Dempsey L.L.P.
600 Hansen Way, Suite 100
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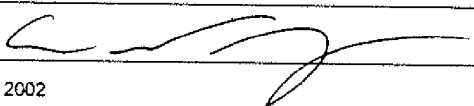
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TRANSMITTAL FORM <i>(to be used for all correspondence after initial filing)</i>	Application Number	09/539,667	
	Filing Date	March 30, 2000	
	First Named Inventor	Shlomo Touboul	
	Group Art Unit	2785	
	Examiner Name	Unknown	
Total Number of Pages in This Submission	7	Attorney Docket Number	43426.00011

ENCLOSURES (check all that apply)		
<input checked="" type="checkbox"/> Fee Transmittal Form (in duplicate)	<input type="checkbox"/> Assignment and Recordation Cover Sheet (for an Application)	<input checked="" type="checkbox"/> Request to Correct Filing Receipt
<input type="checkbox"/> Amendment / Response	<input type="checkbox"/> Drawing(s) _____ Sheets	<input type="checkbox"/> Appeal Communication to Board of Appeals and Interferences
<input type="checkbox"/> With RCE	<input type="checkbox"/> Licensing-related Papers	<input type="checkbox"/> Appeal Communication to Group (Appeal Notice, Brief, Reply Brief)
<input type="checkbox"/> After Final	<input type="checkbox"/> Petition	<input checked="" type="checkbox"/> Return Postcard
<input type="checkbox"/> Affidavits/declaration(s)	<input type="checkbox"/> Request for Continued Examination	<input type="checkbox"/> Status Letter
<input type="checkbox"/> Extension of Time Request (in duplicate)	<input type="checkbox"/> Power of Attorney	<input checked="" type="checkbox"/> Other Enclosure(s) (please identify below):
<input type="checkbox"/> _____ Reference(s)	<input type="checkbox"/> Terminal Disclaimer	Copy of Filing Receipt Mailed 06/14/2000 With Changes Indicated in Red
<input type="checkbox"/> IDS and Form 1449	<input type="checkbox"/> Request for Refund	
<input type="checkbox"/> Certified Copy of Priority Document(s)	<input type="checkbox"/> CD, Number of CD(s) _____	
<input type="checkbox"/> Response to Missing Parts/Incomplete Application	Remarks	
<input type="checkbox"/> Declaration/Oath		

SIGNATURE OF APPLICANT, ATTORNEY, OR AGENT	
Firm or Individual name	Aaron Wininger, Reg. No. 45,229 Squire, Sanders & Dempsey, L.L.P. 600 Hansen Way Palo Alto, CA 94304-1043
Signature	
Date	August 29, 2002

CERTIFICATE OF MAILING	
I hereby certify that this correspondence is being deposited with the United States Postal Service as first class mail in an envelope addressed to: Assistant Commissioner for Patents, Washington, D.C. 20231 on this date: August 29, 2002	
Typed or printed name	Aaron Wininger
Signature	 Date August 29, 2002

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EXHIBIT 1004 - PAGE 0654

FEE TRANSMITTAL for FY 2002

Patent fees are subject to annual revision.

Complete if Known

Application Number 09/539,667
Filing Date March 30, 2000
First Named Inventor Shlomo Touboul
Examiner Name Unknown
Group / Art Unit 2785
Attorney Docket No. 43426.00011

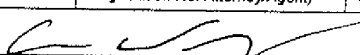
TOTAL AMOUNT OF PAYMENT (\$) 0

METHOD OF PAYMENT (check all that apply)		FEE CALCULATION (continued)																																																																																																																																																																																																	
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<input checked="" type="checkbox"/> Deposit Account: Deposit Account Number 05-0150 Deposit Account Name Squire, Sanders & Dempsey, LLP		<table border="1"><thead><tr><th>Fee Code</th><th>Large Entity Fee (\$)</th><th>Small Entity Fee Code</th><th>Small Entity Fee (\$)</th><th>Fee Description</th><th>Fee Paid</th></tr></thead><tbody><tr><td>105</td><td>130</td><td>205</td><td>65</td><td>Surcharge - late filing fee or oath</td><td></td></tr><tr><td>127</td><td>50</td><td>227</td><td>25</td><td>Surcharge - late provisional filing fee or cover sheet</td><td></td></tr><tr><td>139</td><td>130</td><td>139</td><td>130</td><td>Non-English specification</td><td></td></tr><tr><td>147</td><td>2,520</td><td>147</td><td>2,520</td><td>For filing a request for reexamination</td><td></td></tr><tr><td>112</td><td>920*</td><td>112</td><td>920*</td><td>Requesting publication of SIR prior to Examiner action</td><td></td></tr><tr><td>113</td><td>1,840*</td><td>113</td><td>1,840*</td><td>Requesting publication of SIR after Examiner action</td><td></td></tr><tr><td>115</td><td>110</td><td>215</td><td>55</td><td>Extension for reply within first month</td><td></td></tr><tr><td>116</td><td>400</td><td>216</td><td>200</td><td>Extension for reply within second month</td><td></td></tr><tr><td>117</td><td>920</td><td>217</td><td>460</td><td>Extension for reply within third month</td><td></td></tr><tr><td>118</td><td>1,440</td><td>218</td><td>720</td><td>Extension for reply within fourth month</td><td></td></tr><tr><td>128</td><td>1,960</td><td>228</td><td>980</td><td>Extension for reply within fifth month</td><td></td></tr><tr><td>119</td><td>320</td><td>219</td><td>160</td><td>Notice of Appeal</td><td></td></tr><tr><td>120</td><td>320</td><td>220</td><td>160</td><td>Filing a brief in support of an appeal</td><td></td></tr><tr><td>121</td><td>280</td><td>221</td><td>140</td><td>Request for oral hearing</td><td></td></tr><tr><td>138</td><td>1,510</td><td>138</td><td>1,510</td><td>Petition to institute a public use proceeding</td><td></td></tr><tr><td>140</td><td>110</td><td>240</td><td>55</td><td>Petition to revive - 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FEE CALCULATION					
1. BASIC FILING FEE					
Large Entity Fee Code	Small Entity Fee Code	Fee (\$)	Fee (\$)	Fee Description	Fee Paid
101	201	740	370	Utility filing fee	
106	206	330	165	Design filing fee	
107	207	510	255	Plant filing fee	
108	208	740	370	Reissue filing fee	
114	214	160	80	Provisional filing fee	
SUBTOTAL (1)					(\$) 0

2. EXTRA CLAIM FEES					
Total Claims	20**	Extra Claims	0	Fee from below	0
Independent Claims	3**	Extra Claims	0	Fee from below	0
Multiple Dependent		Extra Claims		Fee from below	0
Large Entity Fee Code					
103	18	203	9	Claims in excess of 20	
102	84	202	42	Independent claims in excess of 3	
104	280	204	140	Multiple dependent claim, if not paid	
109	84	209	42	** Reissue independent claims over original patent	
110	18	210	9	** Reissue claims in excess of 20 and over original patent	
SUBTOTAL (2)					(\$) 0

**or number previously paid, if greater; For Reissues, see above

SUBMITTED BY		Complete (if applicable)			
Name (Print/Type)	Aaron Wininger	Registration No. Attorney/Agent	45,229	Telephone	650.855.6500
Signature		Date	August 29, 2002		

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.
Burden Hour Statement: This form is estimated to take 0.2 hours to complete. Time will vary depending upon the needs of the individual case. Any comments on the amount of time you are required to complete this form should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, Washington, DC 20231. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Assistant Commissioner for Patents, Washington, DC 20231.

FEE TRANSMITTAL for FY 2002

Patent fees are subject to annual revision.

TOTAL AMOUNT OF PAYMENT (\$) 0

Complete if Known

Application Number	09/539,667
Filing Date	March 30, 2000
First Named Inventor	Shlomo Touboul
Examiner Name	Unknown
Group / Art Unit	2785
Attorney Docket No.	43426.00011

METHOD OF PAYMENT (check all that apply)

☐ Check ☐ Credit card ☐ Money Order ☐ Other ☐ None

☒ Deposit Account:

Deposit Account Number 05-0150

Deposit Account Name Squire, Sanders & Dempsey, L.L.P.

The Commissioner 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 Fee Code	Large Fee (\$)	Small Fee Code	Small Fee (\$)	Fee Description
101	740	201	370	Utility filing fee
106	330	206	165	Design filing fee
107	510	207	255	Plant filing fee
108	740	208	370	Reissue filing fee
114	160	214	80	Provisional filing fee

SUBTOTAL (1) (\$) 0

2. EXTRA CLAIM FEES

Total Claims 20 ** = 0 X Fee from below = 0

Independent Claims 3 ** = 0 X Fee from below = 0

Multiple Dependent X Fee from below = 0

Large Fee Code	Large Fee (\$)	Small Fee Code	Small Fee (\$)	Fee Description
103	18	203	9	Claims in excess of 20
102	84	202	42	Independent claims in excess of 3
104	280	204	140	Multiple dependent claim, if not paid
109	84	209	42	** Reissue independent claims over original patent
110	18	210	9	** Reissue claims in excess of 20 and over original patent

SUBTOTAL (2) (\$) 0

**or number previously paid, if greater; For Reissues, see above

3. ADDITIONAL FEES

Large Fee Code	Large Fee (\$)	Small Fee Code	Small Fee (\$)	Fee Description	Fee Paid
105	130	205	65	Surcharge - late filing fee or oath	
127	50	227	25	Surcharge - late provisional filing fee or cover sheet	
139	130	139	130	Non-English specification	
147	2,520	147	2,520	For filing a request for reexamination	
112	920*	112	920*	Requesting publication of SIR prior to Examiner action	
113	1,840*	113	1,840*	Requesting publication of SIR after Examiner action	
115	110	215	55	Extension for reply within first month	
116	400	216	200	Extension for reply within second month	
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118	1,440	218	720	Extension for reply within fourth month	
128	1,960	228	980	Extension for reply within fifth month	
119	320	219	160	Notice of Appeal	
120	320	220	160	Filing a brief in support of an appeal	
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140	110	240	55	Petition to revive - unavoidable	
141	1,280	241	640	Petition to revive - unintentional	
142	1,280	242	640	Utility issue fee (or reissue)	
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144	620	244	310	Plant issue fee	
122	130	122	130	Petitions to the Commissioner	
123	50	123	50	Processing fee under 37 CFR 1.17 (q)	
126	180	126	180	Submission of Information Disclosure Stmt	
581	40	581	40	Recording each patent assignment per property (times number of properties)	
146	740	246	370	Filing a submission after final rejection (37 CFR § 1.129(a))	
149	740	249	370	For each additional invention to be examined (37 CFR § 1.129(b))	
179	740	279	370	Request for Continued Examination (RCE)	
169	900	169	900	Request for expedited examination of a design application	

Other fee (specify) _____

*Reduced by Basic Filing Fee Paid

SUBTOTAL (3) (\$) 0

SUBMITTED BY

Name (Print/Type) Aaron Wininger

Registration No. Attorney/Agent

45,229

Telephone

650.858.6500

Signature

Date

August 29, 2002

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FJN 013177


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EXHIBIT 1004 - PAGE 0656

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

CERTIFICATE OF MAILING

I hereby certify that this paper (along with any paper referred to as being attached or enclosed) is being deposited with the United States Postal Service on the date shown below with sufficient postage as first class mail in an envelope addressed to Commissioner for Patents, Office of Initial Patent Examination, Customer Service Center, Washington, D.C. 20231, on

Date: 8/29/02

By: 
Aaron Wintinger

In Re Application of	
Shlomo Touboul	
Serial No. 09/539,667	Examiner: Unknown
Filing Date: March 30, 2000	Group Art Unit: 2785
For: SYSTEM AND METHOD FOR PROTECTING A COMPUTER AND A NETWORK FROM HOSTILE DOWNLOADABLES	

Office of Initial Patent Examination
Customer Service Center
Commissioner for Patents
Washington, D.C. 20231

REQUEST TO CORRECT FILING RECEIPT

- Attached is a copy of the Official Filing Receipt as received from the U.S. Patent And Trademark Office with regard to the above-identified patent application for which issuance of a corrected Filing Receipt is respectfully requested. The errors are shown in red on the Filing Receipt as well as described below.
- There is an error in that the following data is:
 - ☐ incorrectly entered
 - and/or*
 - ☒ omitted
 - ☐ Applicant's name
 - ☐ Applicant's address
 - ☐ Title
 - ☐ Filing Date
 - ☐ Serial Number
 - ☐ Foreign Application Reference
 - ☐ Attorney Docket No.
 - ☒ Other – Continuing Data As Claimed by Applicant

In re Touboul
U.S. Patent Application No.: 09/539,667

Page 1 of 2
41735

in that the filing receipt should read as follows:

Continuing Data as Claimed by Applicant

THIS APPLICATION IS A CON OF 08/964,388 11/06/1997
WHICH CLAIMS BENEFIT OF 60/030,639 11/08/1996

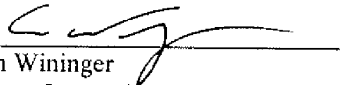
3. Please issue a corrected Filing Receipt rectifying the above errors.

If for any reason an insufficient fee has been paid, please charge the insufficiency to
Deposit Account No. 05-0150.

Date: August 29, 2002

Respectfully submitted,

Squire, Sanders & Dempsey L.L.P.
600 Hansen Way
Palo Alto, CA 94304-1043
Telephone: 650-856-6500
Facsimile: 650-843-8777

By: 
Aaron Wininger
Attorney for Applicant
Reg. No. 45,229

FILING RECEIPT



OC00000005176721

UNITED STATES DEPARTMENT OF COMMERCE
Patent and Trademark OfficeAddress: ASSISTANT SECRETARY AND
COMMISSIONER OF PATENT AND TRADEMARKS
Washington, D.C. 20231

APPLICATION NUMBER	FILING DATE	GRP ART UNIT	FIL FEE REC'D	ATTY. DOCKET NO	DRAWINGS	TOT CLAIMS	IND CLAIMS
09/539,667	03/30/2000	2785	402	40492.00011	10	22	4

Graham & James LLP
600 Hansen Way
Palo Alto, CA 94304-1043

Date Mailed: 06/14/2000

Receipt is acknowledged of this nonprovisional Patent Application. It will be considered in its order and you will be notified as to the results of the examination. Be sure to provide the U.S. APPLICATION NUMBER, FILING DATE, NAME OF APPLICANT, and TITLE OF INVENTION when inquiring about this application. Fees transmitted by check or draft are subject to collection. Please verify the accuracy of the data presented on this receipt. If an error is noted on this Filing Receipt, please write to the Office of Initial Patent Examination's Customer Service Center. Please provide a copy of this Filing Receipt with the changes noted thereon. If you received a "Notice to File Missing Parts" for this application, please submit any corrections to this Filing Receipt with your reply to the Notice. When the PTO processes the reply to the Notice, the PTO will generate another Filing Receipt incorporating the requested corrections (if appropriate).

Applicant(s)

Shlomo Touboul, Kefar-haim, ISRAEL;

Continuing Data as Claimed by Applicant

THIS APPLN CLAIMS BENEFIT OF 60/030,639 11/07/1996

THIS Application is a Con of 08/964,388 11/06/1997

Foreign Applications

WHICH CLAIMS Benefit of 60/030,639 11/08/1996

DATES ENTERED: No Action

JUN 20 2000

If Required, Foreign Filing License Granted 06/14/2000

 BY PD CALENDARED
 ATTORNEY
 GRAHAM & JAMES (PA) (P DEPT)

** SMALL ENTITY **

Title

System and method for protecting a computer and a network from hostile downloadables

Preliminary Class

713

Data entry by : BURNS, DORIS

Team : OIPE

Date: 06/14/2000

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80 81 82 83 84 85 86 87 88 89 90 91 92 93 94 95 96 97 98 99 100

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This license is to be retained by the licensee and may be used at any time on or after the effective date thereof unless it is revoked. This license is automatically transferred to any related applications(s) filed under 36 CFR 1.53(d). This license is not retroactive.

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PLEASE NOTE the following information about the Filing Receipt:

- The articles such as "a," "an" and "the" are not included as the first words in the title of an application. They are considered to be unnecessary to the understanding of the title.
- The words "new," "improved," "improvements in" or "relating to" are not included as first words in the title of an application because a patent application, by nature, is a new idea or improvement.
- The title may be truncated if it consists of more than 600 characters (letters and spaces combined).
- The docket number allows a maximum of 25 characters.
- If your application was submitted under 37 CFR 1.10, your filing date should be the "date in" found on the Express Mail label. If there is a discrepancy, you should submit a request for a corrected Filing Receipt along with a copy of the Express Mail label showing the "date in."

Any corrections that may need to be done to your Filing Receipt should be directed to:

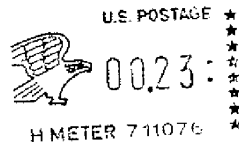
Assistant Commissioner for Patents
Office of Initial Patent Examination
Customer Service Center
Washington, DC 20231

Date Mailed: August 29, 2002 By: AW/say PTO DATE STAMP:
Serial No.: 09/539,667 Docket No.: 43426.00011
Applicant(s): Shlomo Touboul
Title: SYSTEM AND METHOD FOR PROTECTING A COMPUTER AND A NETWORK FROM HOSTILE
DOWNLOADABLES

The following has been received in the U.S. Patent Office on the date stamped hereon:

- | | |
|--|--|
| <input type="checkbox"/> Patent Application ___ Pages ___ Claims | <input type="checkbox"/> Amendment/Response |
| <input type="checkbox"/> Drawings Formal/Informal ___ Sheets | <input type="checkbox"/> Petition for Extension of Time |
| <input type="checkbox"/> General Authorization / Request to Petition for Extensions of Time | |
| <input type="checkbox"/> Oath/Declaration/Power of Attorney | <input checked="" type="checkbox"/> Transmittal Form |
| <input type="checkbox"/> Assignment & Recordation Cover Sheet | <input checked="" type="checkbox"/> Fee Transmittal for FY 2002 (in duplicate) |
| <input type="checkbox"/> Verified Statement Claiming Small Entity Status | <input type="checkbox"/> Notice of Change of Attorney Docket Number |
| <input type="checkbox"/> Continued Prosecution Application
(\$1.53(d) CPA - in duplicate) | <input type="checkbox"/> Issue Fee Transmittal
with PTO-85b Drawings |
| <input type="checkbox"/> Design Application ___ Pages ___ Drawings | <input type="checkbox"/> Info. Disclosure Statement & PTO-1449/Refs |
| <input type="checkbox"/> Status Letter | <input checked="" type="checkbox"/> Request for Corrected Filing Receipt |
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U.S. DEPARTMENT OF COMMERCE
PATENT/TRADEMARK OFFICE
WASHINGTON, D.C. 20231



Squire, Sanders & Dempsey L.L.P.
600 Hansen Way, Suite 100
Palo Alto, CA 94304-1043



Please type a plus sign (+) inside this box → ☐

PTO/SB/21 (08-00)


Approved for use through 10/31/2002. OMB 0651-0031

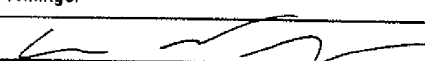
U.S. Patent and Trademark Office: U.S. DEPARTMENT OF COMMERCE

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TRANSMITTAL FORM (to be used for all correspondence after initial filing)	Application Number	09/539,667	
	Filing Date	March 30, 2000	
	First Named Inventor	Shlomo Touboul	
	Group Art Unit	2785	
	Examiner Name	Unknown	
Total Number of Pages in This Submission	7	Attorney Docket Number	43426.00011

ENCLOSURES (check all that apply)		
<input checked="" type="checkbox"/> Fee Transmittal Form (in duplicate)	<input type="checkbox"/> Assignment and Recordation Cover Sheet (for an Application)	<input checked="" type="checkbox"/> Request to Correct Filing Receipt
<input type="checkbox"/> Amendment / Response	<input type="checkbox"/> Drawing(s) _____ Sheets	<input type="checkbox"/> Appeal Communication to Board of Appeals and Interferences
<input type="checkbox"/> With RCE	<input type="checkbox"/> Licensing-related Papers	<input type="checkbox"/> Appeal Communication to Group (Appeal Notice, Brief, Reply Brief)
<input type="checkbox"/> After Final	<input type="checkbox"/> Petition	<input checked="" type="checkbox"/> Return Postcard
<input type="checkbox"/> Affidavits/declaration(s)	<input type="checkbox"/> Request for Continued Examination	<input type="checkbox"/> Status Letter
<input type="checkbox"/> Extension of Time Request (in duplicate)	<input type="checkbox"/> Power of Attorney	<input checked="" type="checkbox"/> Other Enclosure(s) (please identify below):
<input type="checkbox"/> _____ Reference(s)	<input type="checkbox"/> Terminal Disclaimer	Copy of Filing Receipt Mailed 06/14/2000 With Changes Indicated in Red
<input type="checkbox"/> IDS and Form 1449	<input type="checkbox"/> Request for Refund	
<input type="checkbox"/> Certified Copy of Priority Document(s)	<input type="checkbox"/> CD, Number of CD(s) _____	
<input type="checkbox"/> Response to Missing Parts/Incomplete Application	Remarks	
<input type="checkbox"/> Declaration/Oath		

SIGNATURE OF APPLICANT, ATTORNEY, OR AGENT	
Firm or Individual name	Aaron Wininger, Reg. No. 45,229 Squire, Sanders & Dempsey, L.L.P. 600 Hansen Way Palo Alto, CA 94304-1043
Signature	
Date	August 29, 2002

CERTIFICATE OF MAILING			
I hereby certify that this correspondence is being deposited with the United States Postal Service as first class mail in an envelope addressed to: Assistant Commissioner for Patents, Washington, D.C. 20231 on this date: <input type="text" value="August 29, 2002"/>			
Typed or printed name	Aaron Wininger		
Signature		Date	August 29, 2002

Burden Hour Statement: This form is estimated to take 0.2 hours to complete. Time will vary depending upon the needs of the individual case. Any comments on the amount of time you are required to complete this form should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, Washington, DC 20231. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Assistant Commissioner for Patents, Washington, DC 20231.

FJN 013183

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EXHIBIT 1004 - PAGE 0662

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U.S. Patent and Trademark Office: U.S. DEPARTMENT OF COMMERCE
PTO/USPTO (10-011)
Use through 10/31/2002. OMB 0651-0032

FEE TRANSMITTAL for FY 2002

Patent fees are subject to annual revision.

Complete if Known

TOTAL AMOUNT OF PAYMENT (\$) 0

Application Number 09/539,667

Filing Date March 30, 2000

First Named Inventor Shlomo Touboul

Examiner Name Unknown

Group / Art Unit 2785

Attorney Docket No. 43426.00011

METHOD OF PAYMENT (check all that apply)

☐ Check ☐ Credit card ☐ Money Order ☐ Other ☐ None

☒ Deposit Account:

Deposit
Account
Number

05-0150

Deposit
Account
Name

Squire, Sanders & Dempsey, L.L.P.

The Commissioner 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

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Large Fee Code	Entity Fee (\$)	Small Fee Code	Entity Fee (\$)	Fee Description	Fee Paid
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107	510	207	255	Plant filing fee	
108	740	208	370	Reissue filing fee	
114	160	214	80	Provisional filing fee	

SUBTOTAL (1)

(\$ 0)

2. EXTRA CLAIM FEES

Total Claims	Extra Claims	Fee from below	Fee Paid	
-20 **	= 0	X	= 0	
Independent Claims	-3 **	= 0	X	= 0
Multiple Dependent		X	= 0	

Large Fee Code	Entity Fee (\$)	Small Fee Code	Entity Fee (\$)	Fee Description	Fee Paid
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109	84	209	42	** Reissue independent claims over original patent	
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FEE CALCULATION (continued)

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127	50	227	25	Surcharge - late provisional filing fee or cover sheet	
139	130	139	130	Non-English specification	
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118	1,440	218	720	Extension for reply within fourth month	
128	1,960	228	980	Extension for reply within fifth month	
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120	320	220	160	Filing a brief in support of an appeal	
121	280	221	140	Request for oral hearing	
136	1,510	136	1,510	Petition to institute a public use proceeding	
140	110	240	55	Petition to revive - unavoidable	
141	1,280	241	640	Petition to revive - unintentional	
142	1,280	242	640	Utility issue fee (or reissue)	
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123	50	123	50	Processing fee under 37 CFR 1.17 (q)	
126	180	126	180	Submission of Information Disclosure Sheet	
581	40	581	40	Recording each patent assignment per property (times number of properties)	
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149	740	249	370	For each additional invention to be examined (37 CFR § 1.129(b))	
179	740	279	370	Request for Continued Examination (RCE)	
169	900	169	900	Request for expedited examination of a design application	

Other fee (specify) _____

*Reduced by Basic Filing Fee Paid

SUBTOTAL (3)

(\$ 0)

SUBMITTED BY

Name (Print/Type)

Aaron Winninger

Registration No. Attorney/Agent

45,229

Telephone

550.856.6500

Signature

Date

August 29, 2002

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FJN 013184

SOPHOS
EXHIBIT 1004 - PAGE 0663

MULTIPLE DEPENDENT CLAIM FEE CALCULATION SHEET (FOR USE WITH FORM PTO-875)							SERIAL NO.	FILING DATE
							APPLICANT(S) 60492.11	
CLAIMS								
	AS FILED		AFTER 1st AMENDMENT		AFTER 2nd AMENDMENT			
	IND.	DEP.	IND.	DEP.	IND.	DEP.	IND.	DEP.
1	✓						51	
2		✓					52	
3		✓					53	
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5		✓					55	
6		✓					56	
7		✓					57	
8		✓					58	
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11	✓						61	
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13		✓					63	
14		✓					64	
15		✓					65	
16		✓					66	
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18		✓					68	
19		✓					69	
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21	✓						71	
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49							99	
50							100	
TOTAL IND.	4						TOTAL IND.	
TOTAL DEP.	18						TOTAL DEP.	
TOTAL CLAIMS	22						TOTAL CLAIMS	

PTO 1360 (3-78)

*MAY BE USED FOR ADDITIONAL CLAIMS OR AMENDMENTS

U.S. DEPARTMENT OF COMMERCE
Patent and Trademark Office

**APPLICATION FOR
UNITED STATES PATENT
IN THE NAME OF
Shlomo Touboul
OF
FINJAN SOFTWARE, LTD.
SYSTEM AND METHOD FOR PROTECTING A COMPUTER AND A
NETWORK FROM HOSTILE DOWNLOADABLES**

DOCKET NO. 40492.00011

Please direct communications to:

**Intellectual Property Department
Graham & James LLP
600 Hansen Way
Palo Alto, CA 94304-1043
(650) 856-6500**

Express Mail Number EL515155991US

The Internet is currently a collection of over 100,000 individual computer networks owned by governments, universities, nonprofit groups and companies, and is expanding at an accelerating rate. Because the Internet is public, the Internet has become a major source of many system damaging and system fatal application programs,
5 commonly referred to as "viruses."

Accordingly, programmers continue to design computer and computer network security systems for blocking these viruses from attacking both individual and network computers. On the most part, these security systems have been relatively successful. However, these security systems are not configured to recognize computer viruses which
10 have been attached to or configured as Downloadable application programs, commonly referred to as "Downloadables." A Downloadable is an executable application program, which is downloaded from a source computer and run on the destination computer. Downloadable is typically requested by an ongoing process such as by an Internet browser or web engine. Examples of Downloadables include Java™ applets designed for
15 use in the Java™ distributing environment developed by Sun Microsystems, Inc., JavaScript scripts also developed by Sun Microsystems, Inc., ActiveX™ controls designed for use in the ActiveX™ distributing environment developed by the Microsoft Corporation, and Visual Basic also developed by the Microsoft Corporation. Therefore, a system and method are needed to protect a network from hostile Downloadables.

SUMMARY OF THE INVENTION

The present invention provides a system for protecting a network from suspicious Downloadables. The system comprises a security policy, an interface for receiving a Downloadable, and a comparator, coupled to the interface, for applying the security

5 policy to the Downloadable to determine if the security policy has been violated. The Downloadable may include a Java™ applet, an ActiveX™ control, a JavaScript™ script, or a Visual Basic script. The security policy may include a default security policy to be applied regardless of the client to whom the Downloadable is addressed, a specific

10 security policy to be applied based on the client or the group to which the client belongs, or a specific policy to be applied based on the client/group and on the particular Downloadable received. The system uses an ID generator to compute a Downloadable ID identifying the Downloadable, preferably, by fetching all components of the Downloadable and performing a hashing function on the Downloadable including the

15 fetched components.

Further, the security policy may indicate several tests to perform, including (1) a comparison with known hostile and non-hostile Downloadables; (2) a comparison with Downloadables to be blocked or allowed per administrative override; (3) a comparison of

20 the Downloadable security profile data against access control lists; (4) a comparison of a certificate embodied in the Downloadable against trusted certificates; and (5) a comparison of the URL from which the Downloadable originated against trusted and untrusted URLs. Based on these tests, a logical engine can determine whether to allow or block the Downloadable.

The present invention further provides a method for protecting a computer from suspicious Downloadables. The method comprises the steps of receiving a Downloadable, comparing the Downloadable against a security policy to determine if the security policy has been violated, and discarding the Downloadable if the security policy
5 has been violated.

It will be appreciated that the system and method of the present invention may provide computer protection from known hostile Downloadables. The system and method of the present invention may identify Downloadables that perform operations deemed suspicious. The system and method of the present invention may examine the
10 Downloadable code to determine whether the code contains any suspicious operations, and thus may allow or block the Downloadable accordingly.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a block diagram illustrating a network system, in accordance with the present invention;

FIG. 2 is a block diagram illustrating details of the internal network security
5 system of FIG. 1;

FIG. 3 is a block diagram illustrating details of the security program and the security database of FIG. 2;

FIG. 4 is a block diagram illustrating details of the security policies of FIG. 3;

FIG. 5 is a block diagram illustrating details of the security management console
10 of FIG. 1;

FIG. 6A is a flowchart illustrating a method of examining for suspicious Downloadables, in accordance with the present invention;

FIG. 6B is a flowchart illustrating details of the step for finding the appropriate security policy of FIG. 6A;

FIG. 6C is a flowchart illustrating a method for determining whether an incoming
15 Downloadable is to be deemed suspicious;

FIG. 7 is a flowchart illustrating details of the FIG. 6 step of decomposing a Downloadable; and

FIG. 8 is a flowchart illustrating a method 800 for generating a Downloadable ID
20 for identifying a Downloadable.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

FIG. 1 is a block diagram illustrating a network system 100, in accordance with the present invention. The network system 100 includes an external computer network 105, such as the Wide Area Network (WAN) commonly referred to as the Internet, coupled via a communications channel 125 to an internal network security system 110. The network system 100 further includes an internal computer network 115, such as a corporate Local Area Network (LAN), coupled via a communications channel 130 to the internal network computer system 110 and coupled via a communications channel 135 to a security management console 120.

The internal network security system 110 examines Downloadables received from external computer network 105, and prevents Downloadables deemed suspicious from reaching the internal computer network 115. It will be further appreciated that a Downloadable is deemed suspicious if it performs or may perform any undesirable operation, or if it threatens or may threaten the integrity of an internal computer network 115 component. It is to be understood that the term "suspicious" includes hostile, potentially hostile, undesirable, potentially undesirable, etc. Security management console 120 enables viewing, modification and configuration of the internal network security system 110.

FIG. 2 is a block diagram illustrating details of the internal network security system 110, which includes a Central Processing Unit (CPU) 205, such as an Intel Pentium® microprocessor or a Motorola Power PC® microprocessor, coupled to a signal bus 220. The internal network security system 110 further includes an external communications interface 210 coupled between the communications channel 125 and

the signal bus 220 for receiving Downloadables from external computer network 105, and an internal communications interface 225 coupled between the signal bus 220 and the communications channel 130 for forwarding Downloadables not deemed suspicious to the internal computer network 115. The external communications interface 210 and
5 the internal communications interface 225 may be functional components of an integral communications interface (not shown) for both receiving Downloadables from the external computer network 105 and forwarding Downloadables to the internal computer network 115.

Internal network security system 110 further includes Input/Output (I/O)
10 interfaces 215 (such as a keyboard, mouse and Cathode Ray Tube (CRT) display), a data storage device 230 such as a magnetic disk, and a Random-Access Memory (RAM) 235, each coupled to the signal bus 220. The data storage device 230 stores a security database 240, which includes security information for determining whether a received Downloadable is to be deemed suspicious. The data storage device 230 further stores a
15 users list 260 identifying the users within the internal computer network 115 who may receive Downloadables, and an event log 245 which includes determination results for each Downloadable examined and runtime indications of the internal network security system 110. An operating system 250 controls processing by CPU 205, and is typically stored in data storage device 230 and loaded into RAM 235 (as illustrated) for execution.
20 A security program 255 controls examination of incoming Downloadables, and also may be stored in data storage device 230 and loaded into RAM 235 (as illustrated) for execution by CPU 205.

FIG. 3 is a block diagram illustrating details of the security program 255 and the security database 240. The security program 255 includes an ID generator 315, a policy finder 317 coupled to the ID generator 315, and a first comparator 320 coupled to the policy finder 317. The first comparator 320 is coupled to a logical engine 333 via four
5 separate paths, namely, via Path 1, via Path 2, via Path 3 and via Path 4. Path 1 includes a direct connection from the first comparator 320 to the logical engine 333. Path 2 includes a code scanner coupled to the first comparator 320, and an Access Control List (ACL) comparator 330 coupling the code scanner 325 to the logical engine 333. Path 3 includes a certificate scanner 340 coupled to the first comparator 320, and a certificate
10 comparator 345 coupling the certificate scanner 340 to the logical engine 333. Path 4 includes a Uniform Resource Locator (URL) comparator 350 coupling the first comparator 320 to the logical engine 333. A record-keeping engine 335 is coupled between the logical engine 333 and the event log 245.

The security program 255 operates in conjunction with the security database 240,
15 which includes security policies 305, known Downloadables 307, known Certificates 309 and Downloadable Security Profile (DSP) data 310 corresponding to the known Downloadables 307. Security policies 305 includes policies specific to particular users 260 and default (or generic) policies for determining whether to allow or block an incoming Downloadable. These security policies 305 may identify specific
20 Downloadables to block, specific Downloadables to allow, or necessary criteria for allowing an unknown Downloadable. Referring to FIG. 4, security policies 305 include policy selectors 405, access control lists 410, trusted certificate lists 415, URL rule bases 420, and lists 425 of Downloadables to allow or to block per administrative override.

Known Downloadables 307 include lists of Downloadables which Original Equipment Manufacturers (OEMs) know to be hostile, of Downloadables which OEMs know to be non-hostile, and of Downloadables previously received by this security program 255. DSP data 310 includes the list of all potentially hostile or suspicious
5 computer operations that may be attempted by each known Downloadable 307, and may also include the respective arguments of these operations. An identified argument of an operation is referred to as "resolved." An unidentified argument is referred to as "unresolved." DSP data 310 is described below with reference to the code scanner 325.

The ID generator 315 receives a Downloadable (including the URL from which
10 it came and the userID of the intended recipient) from the external computer network 105 via the external communications interface 210, and generates a Downloadable ID for identifying each Downloadable. The Downloadable ID preferably includes a digital hash of the complete Downloadable code. The ID generator 315 preferably prefetches all components embodied in or identified by the code for Downloadable ID generation.
15 For example, the ID generator 315 may prefetch all classes embodied in or identified by the Java™ applet bytecode to generate the Downloadable ID. Similarly, the ID generator 315 may retrieve all components listed in the .INF file for an ActiveX™ control to compute a Downloadable ID. Accordingly, the Downloadable ID for the Downloadable will be the same each time the ID generator 315 receives the same
20 Downloadable. The ID generator 315 adds the generated Downloadable ID to the list of known Downloadables 307 (if it is not already listed). The ID generator 315 then forwards the Downloadable and Downloadable ID to the policy finder 317.

The policy finder 317 uses the userID of the intended user and the Downloadable ID to select the specific security policy 305 that shall be applied on the received Downloadable. If there is a specific policy 305 that was defined for the user (or for one of its super groups) and the Downloadable, then the policy is selected. Otherwise the
5 generic policy 305 that was defined for the user (or for one of its super groups) is selected. The policy finder 317 then sends the policy to the first comparator 320.

The first comparator 320 receives the Downloadable, the Downloadable ID and the security policy 305 from the policy finder 317. The first comparator 320 examines the security policy 305 to determine which steps are needed for allowing the
10 Downloadable. For example, the security policy 305 may indicate that, in order to allow this Downloadable, it must pass all four paths, Path 1, Path 2, Path 3 and Path 4. Alternatively, the security policy 305 may indicate that to allow the Downloadable, the it must pass only one of the paths. The first comparator 320 responds by forwarding the proper information to the paths identified by the security policy 305.

15 Path 1

In path 1, the first comparator 320 checks the policy selector 405 of the security policy 305 that was received from the policy finder 317. If the policy selector 405 is either "Allowed" or "Blocked," then the first comparator 320 forwards this result directly to the logical engine 333. Otherwise, the first comparator 320 invokes the
20 comparisons in path2 and/or path 3 and/or path 4 based on the contents of policy selector 405. It will be appreciated that the first comparator 320 itself compares the Downloadable ID against the lists of Downloadables to allow or block per administrative

override 425. That is, the system security administrator can define specific Downloadables as “Allowed” or “Blocked.”

Alternatively, the logical engine 333 may receive the results of each of the paths and based on the policy selector 405 may institute the final determination whether to
5 allow or block the Downloadable. The first comparator 320 informs the logical engine 333 of the results of its comparison.

Path 2

In path 2, the first comparator 320 delivers the Downloadable, the Downloadable
10 ID and the security policy 305 to the code scanner 325. If the DSP data 310 of the received Downloadable is known, the code scanner 325 retrieves and forwards the information to the ACL comparator 330. Otherwise, the code scanner 325 resolves the DSP data 310. That is, the code scanner 325 uses conventional parsing techniques to decompose the code (including all prefetched components) of the Downloadable into the
15 DSP data 310. DSP data 310 includes the list of all potentially hostile or suspicious computer operations that may be attempted by a specific Downloadable 307, and may also include the respective arguments of these operations. For example, DSP data 310 may include a READ from a specific file, a SEND to an unresolved host, etc. The code scanner 325 may generate the DSP data 310 as a list of all operations in the
20 Downloadable code which could ever be deemed potentially hostile and a list of all files to be accessed by the Downloadable code. It will be appreciated that the code scanner 325 may search the code for any pattern, which is undesirable or suggests that the code was written by a hacker.

An Example List of Operations Deemed Potentially Hostile

File operations: READ a file, WRITE a file;

Network operations: LISTEN on a socket, CONNECT to a socket, SEND data,

5 RECEIVE data, VIEW INTRANET;

Registry operations: READ a registry item, WRITE a registry item;

Operating system operations: EXIT WINDOWS, EXIT BROWSER, START
PROCESS/THREAD, KILL PROCESS/THREAD, CHANGE PROCESS/THREAD
PRIORITY, DYNAMICALLY LOAD A CLASS/LIBRARY, etc.; and

10 Resource usage thresholds: memory, CPU, graphics, etc.

In the preferred embodiment, the code scanner 325 performs a full-content inspection.

However, for improved speed but reduced security, the code scanner 325 may examine
only a portion of the Downloadable such as the Downloadable header. The code scanner
325 then stores the DSP data into DSP data 310 (corresponding to its Downloadable ID),

15 and sends the Downloadable, the DSP data to the ACL comparator 330 for comparison
with the security policy 305.

The ACL comparator 330 receives the Downloadable, the corresponding DSP
data and the security policy 305 from the code scanner 325, and compares the DSP data
against the security policy 305. That is, the ACL comparator 330 compares the DSP data
20 of the received Downloadable against the access control lists 410 in the received security
policy 305. The access control list 410 contains criteria indicating whether to pass or
fail the Downloadable. For example, an access control list may indicate that the
Downloadable fails if the DSP data includes a WRITE command to a system file. The
ACL comparator 330 sends its results to the logical engine 333.

Path 3

In path 3, the certificate scanner 340 determines whether the received Downloadable was signed by a certificate authority, such as VeriSign, Inc., and scans for a certificate embodied in the Downloadable. The certificate scanner 340 forwards the found certificate to the certificate comparator 345. The certificate comparator 345 retrieves known certificates 309 that were deemed trustworthy by the security administrator and compares the found certificate with the known certificates 309 to determine whether the Downloadable was signed by a trusted certificate. The certificate comparator 345 sends the results to the logical engine 333.

Path 4:

In path 4, the URL comparator 350 examines the URL identifying the source of the Downloadable against URLs stored in the URL rule base 420 to determine whether the Downloadable comes from a trusted source. Based on the security policy 305, the URL comparator 350 may deem the Downloadable suspicious if the Downloadable comes from an untrustworthy source or if the Downloadable did not come from a trusted source. For example, if the Downloadable comes from a known hacker, then the Downloadable may be deemed suspicious and presumed hostile. The URL comparator 350 sends its results to the logical engine 333.

The logical engine 333 examines the results of each of the paths and the policy selector 405 in the security policy 305 to determine whether to allow or block the Downloadable. The policy selector 405 includes a logical expression of the results received from each of the paths. For example, the logical engine 333 may block a

Downloadable if it fails any one of the paths, i.e., if the Downloadable is known hostile (Path 1), if the Downloadable may request suspicious operations (Path 2), if the Downloadable was not signed by a trusted certificate authority (Path 3), or if the Downloadable did come from an untrustworthy source (Path 4). The logical engine 333
5 may apply other logical expressions according to the policy selector 405 embodied in the security policy 305. If the policy selector 405 indicates that the Downloadable may pass, then the logical engine 333 passes the Downloadable to its intended recipient. Otherwise, if the policy selector 405 indicates that the Downloadable should be blocked, then the logical engine 333 forwards a non-hostile Downloadable to the intended
10 recipient to inform the user that internal network security system 110 discarded the original Downloadable. Further, the logical engine 333 forwards a status report to the record-keeping engine 335, which stores the reports in event log 245 in the data storage device 230 for subsequent review, for example, by the MIS director.

15 FIG. 5 is a block diagram illustrating details of the security management console 120, which includes a security policy editor 505 coupled to the communications channel 135, an event log analysis engine 510 coupled between communications channel 135 and a user notification engine 515, and a Downloadable database review engine 520 coupled to the communications channel 135. The security management console 120
20 further includes computer components similar to the computer components illustrated in FIG. 2.

The security policy editor 505 uses an I/O interface similar to I/O interface 215 for enabling authorized user modification of the security policies 305. That is, the security policy editor 505 enables the authorized user to modify specific security policies

305 corresponding to the users 260, the default or generic security policy 305, the Downloadables to block per administrative override, the Downloadables to allow per administrative override, the trusted certificate lists 415, the policy selectors 405, the access control lists 410, the URLs in the URL rule bases 420, etc. For example, if the
5 authorized user learns of a new hostile Downloadable, then the user can add the Downloadable to the Downloadables to block per system override.

The event log analysis engine 510 examines the status reports contained in the event log 245 stored in the data storage device 230. The event log analysis engine 510 determines whether notification of the user (e.g., the security system manager or MIS
10 director) is warranted. For example, the event log analysis engine 510 may warrant user notification whenever ten (10) suspicious Downloadables have been discarded by internal network security system 110 within a thirty (30) minute period, thereby flagging a potential imminent security threat. Accordingly, the event log analysis engine 510 instructs the user notification engine 515 to inform the user. The user notification
15 engine 515 may send an e-mail via internal communications interface 220 or via external communications interface 210 to the user, or may display a message on the user's display device (not shown).

FIG. 6A is a flowchart illustrating a method 600 for protecting an internal
20 computer network 115 from suspicious Downloadables. Method 600 begins with the ID generator 315 in step 602 receiving a Downloadable. The ID generator 315 in step 604 generates a Downloadable ID identifying the received Downloadable, preferably, by generating a digital hash of the Downloadable code (including prefetched components). The policy finder 317 in step 606 finds the appropriate security policy 305

corresponding to the userID specifying intended recipient (or the group to which the intended recipient belongs) and the Downloadable. The selected security policy 305 may be the default security policy 305. Step 606 is described in greater detail below with reference to FIG. 6B.

5 The first comparator 320 in step 608 examines the lists of Downloadables to allow or to block per administrative override 425 against the Downloadable ID of the incoming Downloadable to determine whether to allow the Downloadable automatically. If so, then in step 612 the first comparator 320 sends the results to the logical engine 333. If not, then the method 600 proceeds to step 610. In step 610, the first comparator
10 620 examines the lists of Downloadables to block per administrative override 425 against the Downloadable ID of the incoming Downloadable for determining whether to block the Downloadable automatically. If so, then the first comparator 420 in step 612 sends the results to the logical engine 333. Otherwise, method 600 proceeds to step 614.

 In step 614, the first comparator 320 determines whether the security policy 305
15 indicates that the Downloadable should be tested according to Path 4. If not, then method 600 jumps to step 618. If so, then the URL comparator 350 in step 616 compares the URL embodied in the incoming Downloadable against the URLs of the URL rules bases 420, and then method 600 proceeds to step 618.

 In step 618, the first comparator 320 determines whether the security policy 305
20 indicates that the Downloadable should be tested according to Path 2. If not, then method 600 jumps to step 620. Otherwise, the code scanner 235 in step 626 examines the DSP data 310 based on the Downloadable ID of the incoming Downloadable to determine whether the Downloadable has been previously decomposed. If so, then

method 600 jumps to step 630. Otherwise, the code scanner 325 in step 628 decomposes the Downloadable into DSP data. Downloadable decomposition is described in greater detail with reference to FIG. 7. In step 630, the ACL comparator 330 compares the DSP data of the incoming Downloadable against the access control lists 410 (which include
5 the criteria necessary for the Downloadable to fail or pass the test).

In step 620, the first comparator 320 determines whether the security policy 305 indicates that the Downloadable should be tested according to Path 3. If not, then method 600 returns to step 612 to send the results of each of the test performed to the logical engine 333. Otherwise, the certificate scanner 622 in step 622 scans the
10 Downloadable for an embodied certificate. The certificate comparator 345 in step 624 retrieves trusted certificates from the trusted certificate lists (TCL) 415 and compares the embodied certificate with the trusted certificates to determine whether the Downloadable has been signed by a trusted source. Method 600 then proceeds to step 612 by the certificate scanner 345 sending the results of each of the paths taken to the logical engine
15 333. The operations of the logical engine 333 are described in greater detail below with reference to FIG. 6C. Method 600 then ends.

One skilled in the art will recognize that the tests may be performed in a different order, and that each of the tests need not be performed. Further, one skilled in the art will recognize that, although path 1 is described in FIG. 6A as an automatic allowance or
20 blocking, the results of Path 1 may be another predicate to be applied by the logical engine 333. Further, although the tests are shown serially in FIG. 6A, the tests may be performed in parallel as illustrated in FIG. 3.

FIG. 6B is a flowchart illustrating details of step 606 of FIG. 6A (referred to herein as method 606). Method 606 begins with the policy finder 317 in step 650 determining whether security policies 305 include a specific security policy corresponding to the userID and the Downloadable. If so, then the policy finder 317 in
5 step 654 fetches the corresponding specific policy 305. If not, then the policy finder 317 in step 652 fetches the default or generic security policy 305 corresponding to the userID. Method 606 then ends.

FIG. 6C is a flowchart illustrating details of a method 655 for determining
10 whether to allow or to block the incoming Downloadable. Method 655 begins with the logical engine 333 in step 660 receiving the results from the first comparator 320, from the ACL comparator 330, from the certificate comparator 345 and from the URL comparator 350. The logical engine 333 in step 662 compares the results with the policy selector 405 embodied in the security policy 305, and in step 664 determines whether the
15 policy selector 405 confirms the pass. For example, the policy selector 405 may indicate that the logical engine 333 pass the Downloadable if it passes one of the tests of Path 1, Path 2, Path 3 and Path 4. If the policy selector 405 indicates that the Downloadable should pass, then the logical engine 333 in step 666 passes the Downloadable to the intended recipient. In step 668, the logical engine 333 sends the results to the record-
20 keeping engine 335, which in turn stores the results in the event log 245 for future review. Method 655 then ends. Otherwise, if the policy selector 405 in step 664 indicates that the Downloadable should not pass, then the logical engine 333 in step 670 stops the Downloadable and in step 672 sends a non-hostile substitute Downloadable to

inform the user that the incoming Downloadable has been blocked. Method 655 then jumps to step 668.

FIG. 7 is a flowchart illustrating details of step 628 of FIG. 6A (referred to herein as method 628) for decomposing a Downloadable into DSP data 310. Method 628 begins in step 705 with the code scanner 325 disassembling the machine code of the Downloadable. The code scanner 325 in step 710 resolves a respective command in the machine code, and in step 715 determines whether the resolved command is suspicious (e.g., whether the command is one of the operations identified in the list described above with reference to FIG. 3). If not, then the code scanner 325 in step 725 determines whether it has completed decomposition of the Downloadable, i.e., whether all operations in the Downloadable code have been resolved. If so, then method 628 ends. Otherwise, method 628 returns to step 710.

Otherwise, if the code scanner 325 in step 715 determines that the resolved command is suspect, then the code scanner 325 in step 720 decodes and registers the suspicious command and its command parameters as DSP data 310. The code scanner 325 in step 720 registers the commands and command parameters into a format based on command class (e.g., file operations, network operations, registry operations, operating system operations, resource usage thresholds). Method 628 then jumps to step 725.

FIG. 8 is a flowchart illustrating a method 800 for generating a Downloadable ID for identifying a Downloadable. Method 800 begins with the ID generator 315 in step 810 receiving a Downloadable from the external computer network 105. The ID generator 315 in step 820 may fetch some or all components referenced in the

Downloadable code, and in step 830 includes the fetched components in the
Downloadable code. The ID generator 315 in step 840 performs a hashing function on
at least a portion of the Downloadable code to generate a Downloadable ID. The ID
generator 315 in step 850 stores the generated Downloadable ID in the security database
5 240 as a reference to the DSP data 310. Accordingly, the Downloadable ID will be the
same for the identical Downloadable each time it is encountered.

The foregoing description of the preferred embodiments of the invention is by
way of example only, and other variations of the above-described embodiments and
10 methods are provided by the present invention. For example, although the invention has
been described in a system for protecting an internal computer network, the invention
can be embodied in a system for protecting an individual computer. Components of this
invention may be implemented using a programmed general purpose digital computer,
using application specific integrated circuits, or using a network of interconnected
15 conventional components and circuits. The embodiments described herein have been
presented for purposes of illustration and are not intended to be exhaustive or limiting.
Many variations and modifications are possible in light of the foregoing teaching. The
system is limited only by the following claims.

WHAT IS CLAIMED IS:

- 1 1. A computer-based method for generating a Downloadable ID to identify a
2 Downloadable, comprising the steps of:
3 obtaining a Downloadable;
4 fetching, if the Downloadable includes one or more references to a component, at
5 least one component identified by the one or more references; and
6 performing a function on the Downloadable and all components fetched to
7 generate a Downloadable ID.
8
9 2. The method of claim 1, wherein the Downloadable includes an applet.
10
11 3. The method of claim 1, wherein the Downloadable includes an ActiveX™
12 control.
13
14 4. The method of claim 1, wherein the Downloadable includes a plugin.
15
16 5. The method of claim 1, wherein the Downloadable includes HTML code.
17
18 6. The method of claim 1, wherein the Downloadable includes an application
19 program.
20
21 7. The method of claim 1, wherein the function includes a hashing function.

22

23 8. The method of claim 1, wherein the step of fetching includes the step of fetching
24 the first component referenced by the Downloadable.

25

26 9. The method of claim 1, wherein the Downloadable does not include any
27 references.

28

29 10. The method of claim 1, wherein the step of fetching includes fetching all
30 components referenced by the Downloadable.

31

32 11. A system for generating a Downloadable ID to identify a Downloadable,
33 comprising:
34 a communications engine for obtaining a Downloadable; and
35 an ID generator coupled to the communications engine for fetching, if the
36 Downloadable includes one or more references to a component, at least one component
37 identified by the one or more references, and for performing a function on the
38 Downloadable and all components fetched to generate a Downloadable ID.

39

40 12. The system of claim 11, wherein the Downloadable includes an applet.

41

42 13. The system of claim 11, wherein the Downloadable includes an ActiveX™
43 control.

44 14. The system of claim 11, wherein the Downloadable includes a plugin.

45

46 15. The system of claim 11, wherein the Downloadable includes HTML code.

47

48 16. The system of claim 11, wherein the Downloadable includes an application
49 program.

50

51 17. The system of claim 11, wherein the function includes a hashing function.

52

53 18. The system of claim 11, wherein the ID generator fetches the first component
54 referenced by the Downloadable.

55

56 19. The system of claim 11, wherein the Downloadable does not include any
57 references.

58

59 20. The system of claim 11, wherein the ID generator fetches all components
60 referenced by the Downloadable.

61

62 21. A system for generating a Downloadable ID to identify a Downloadable,
63 comprising:

64 means for obtaining a Downloadable;

65 means for fetching, if the Downloadable includes one or more references to a

66 component, at least one component identified by the one or more references; and

67 means for performing a function on the Downloadable and all components
68 fetched to generate a Downloadable ID.
69
70 22. A computer-readable storage medium storing program code for causing a
71 computer to perform the steps of:
72 obtaining a Downloadable;
73 fetching, if the Downloadable includes one or more references to a component, at
74 least one component identified by the one or more references; and
75 performing a function on the Downloadable and all components fetched to
76 generate a Downloadable ID.
77

ABSTRACT OF THE DISCLOSURE

A system protects a computer from suspicious Downloadables. The system comprises a security policy, an interface for receiving a Downloadable, and a comparator, 5 coupled to the interface, for applying the security policy to the Downloadable to determine if the security policy has been violated. The Downloadable may include a Java™ applet, an ActiveX™ control, a JavaScript™ script, or a Visual Basic script. The security policy may include a default security policy to be applied regardless of the client to whom the Downloadable is addressed, or a specific security policy to be applied based 10 on the client or the group to which the client belongs. The system uses an ID generator to compute a Downloadable ID identifying the Downloadable, preferably, by fetching all components of the Downloadable and performing a hashing function on the Downloadable including the fetched components.

Further, the security policy may indicate several tests to perform, including (1) a 15 comparison with known hostile and non-hostile Downloadables; (2) a comparison with Downloadables to be blocked or allowed per administrative override; (3) a comparison of the Downloadable security profile data against access control lists; (4) a comparison of a certificate embodied in the Downloadable against trusted certificates; and (5) a comparison of the URL from which the Downloadable originated against trusted and 20 untrusted URLs. Based on these tests, a logical engine can determine whether to allow or block the Downloadable.

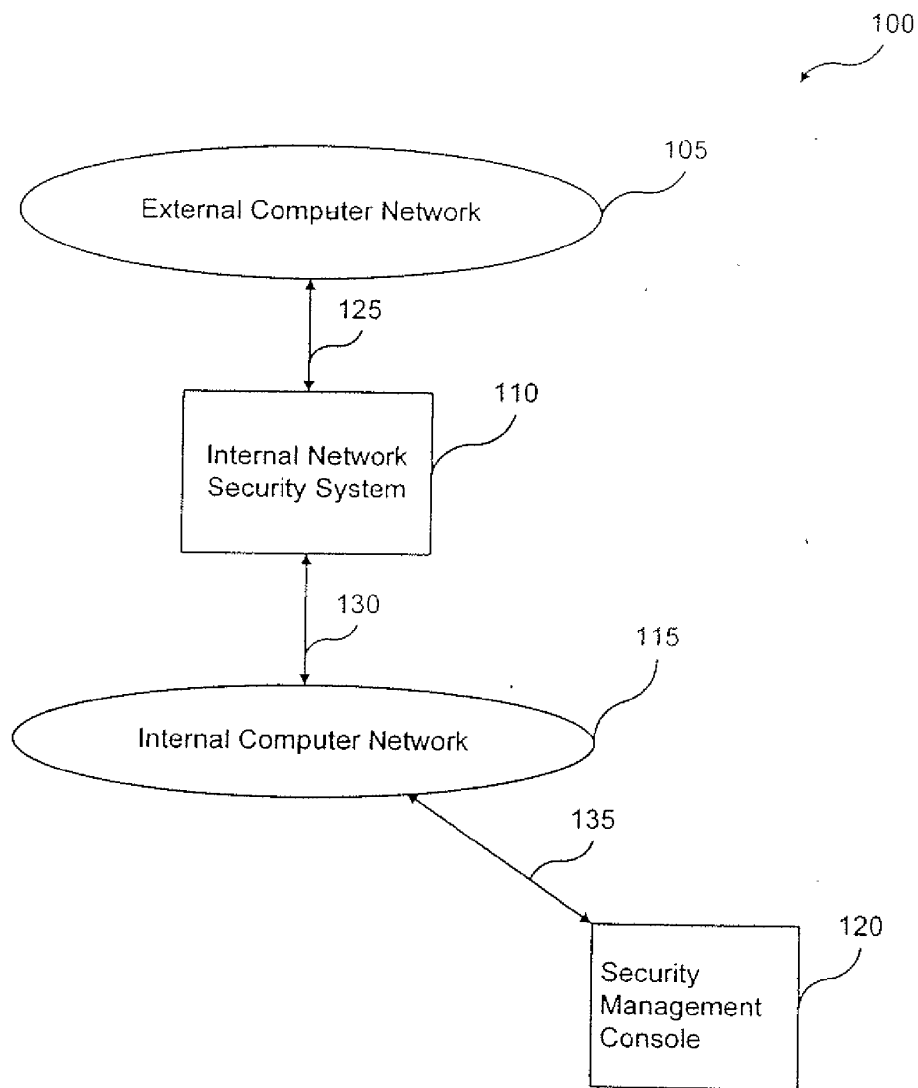


FIG. 1

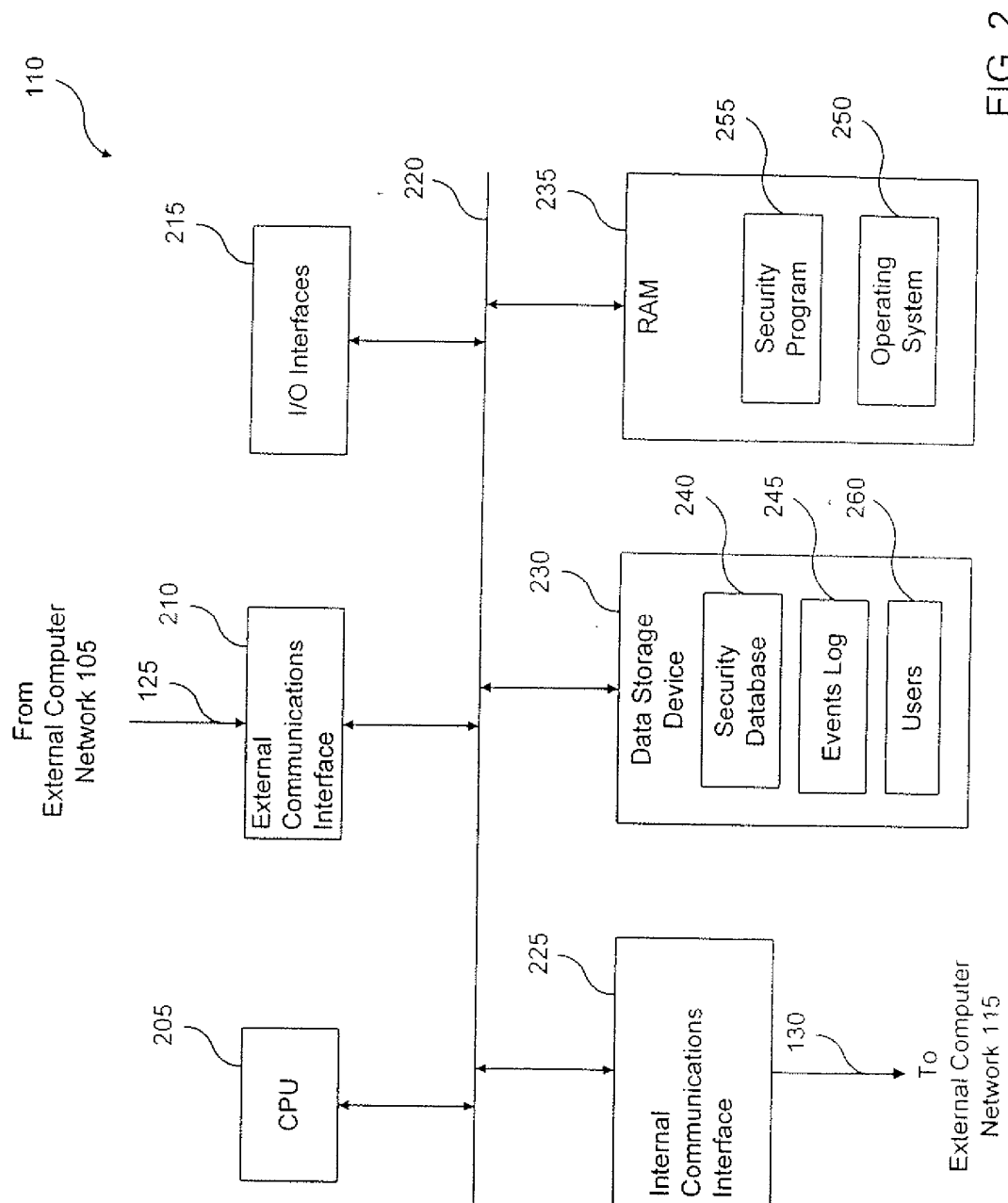


FIG. 2

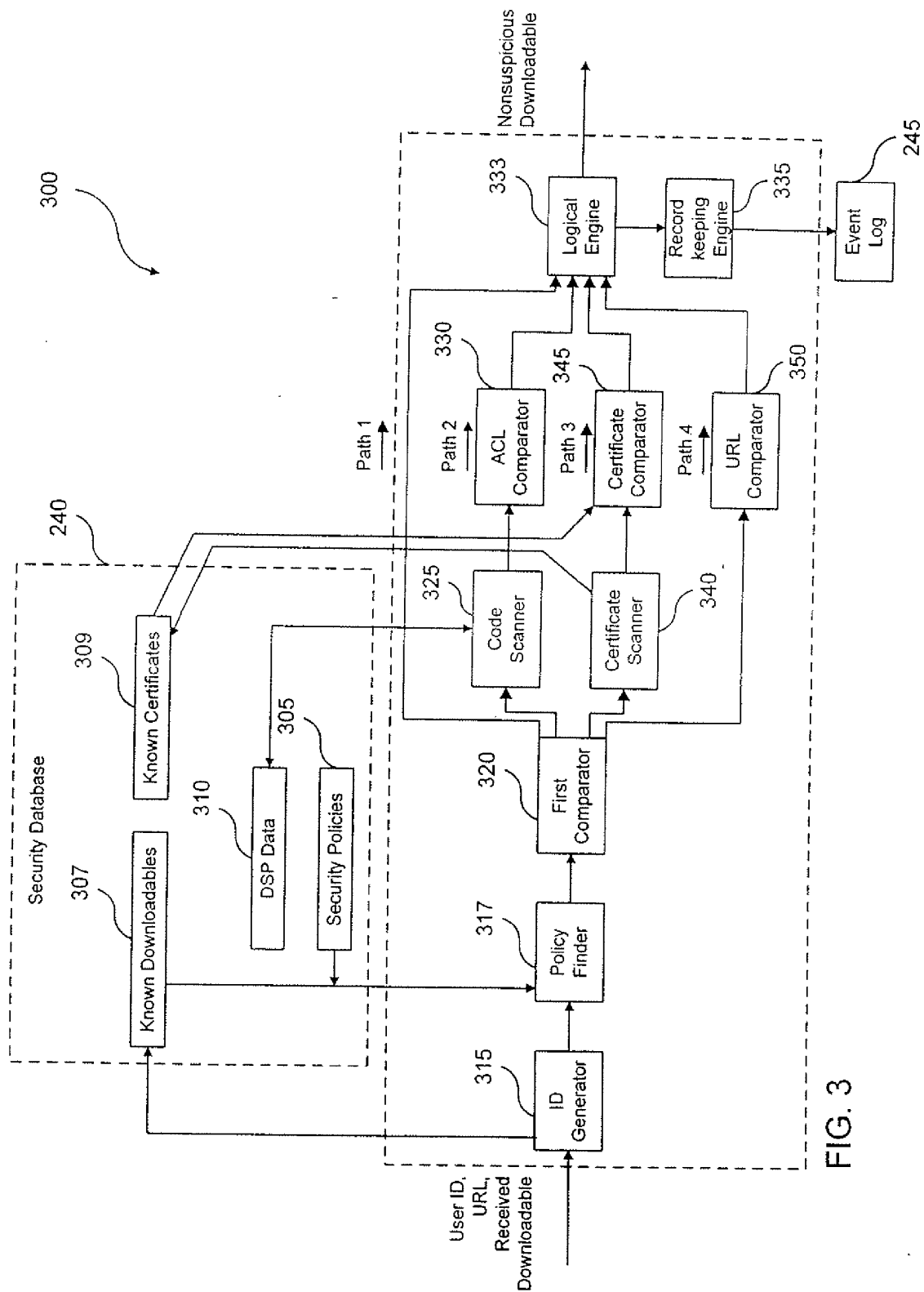


FIG. 3

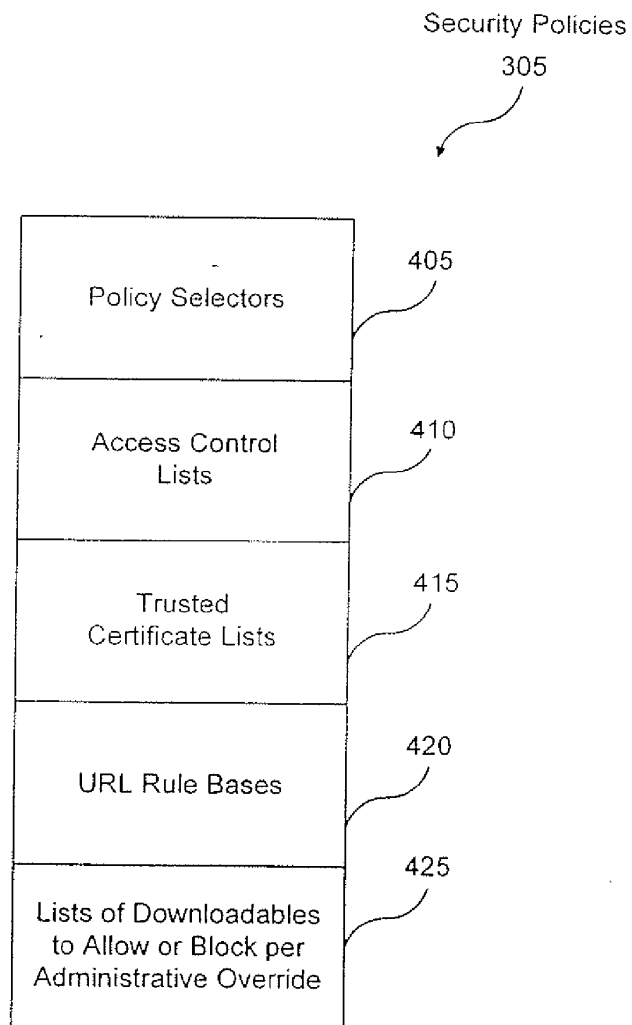


FIG. 4

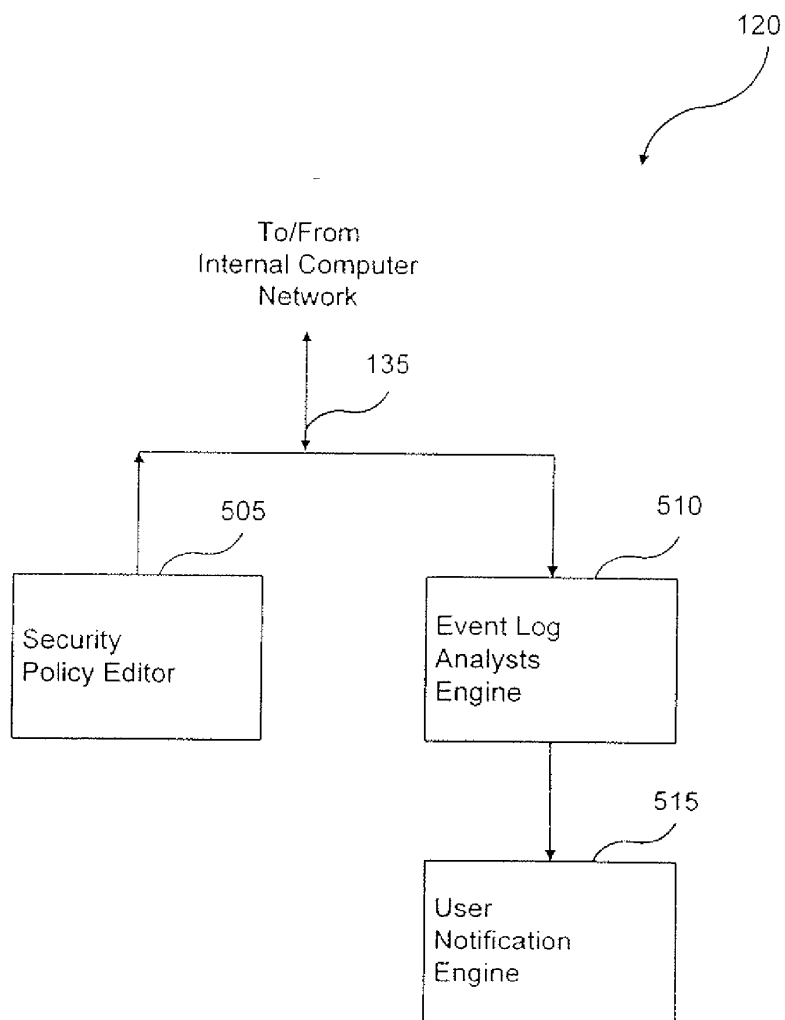


FIG. 5

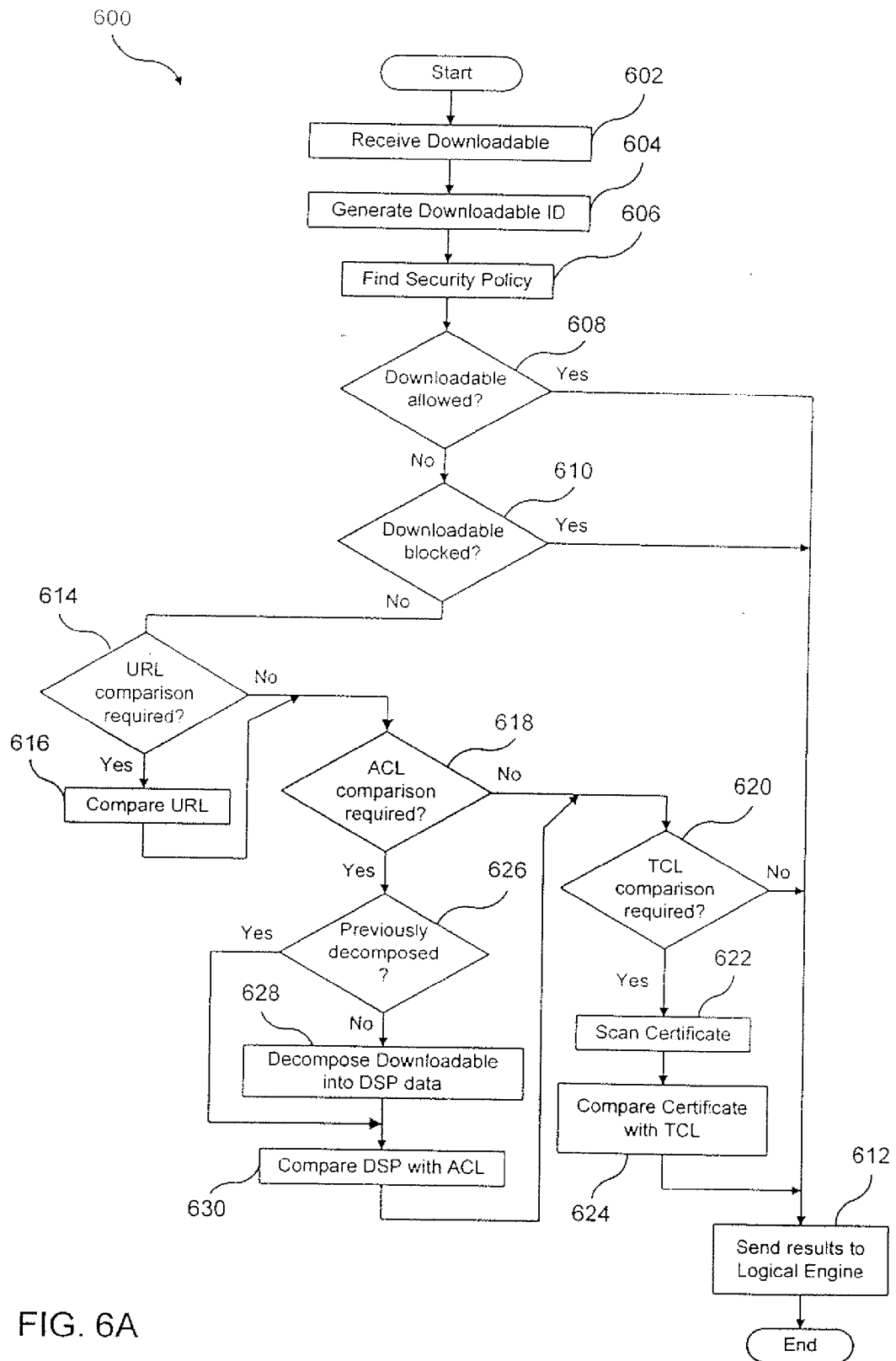


FIG. 6A

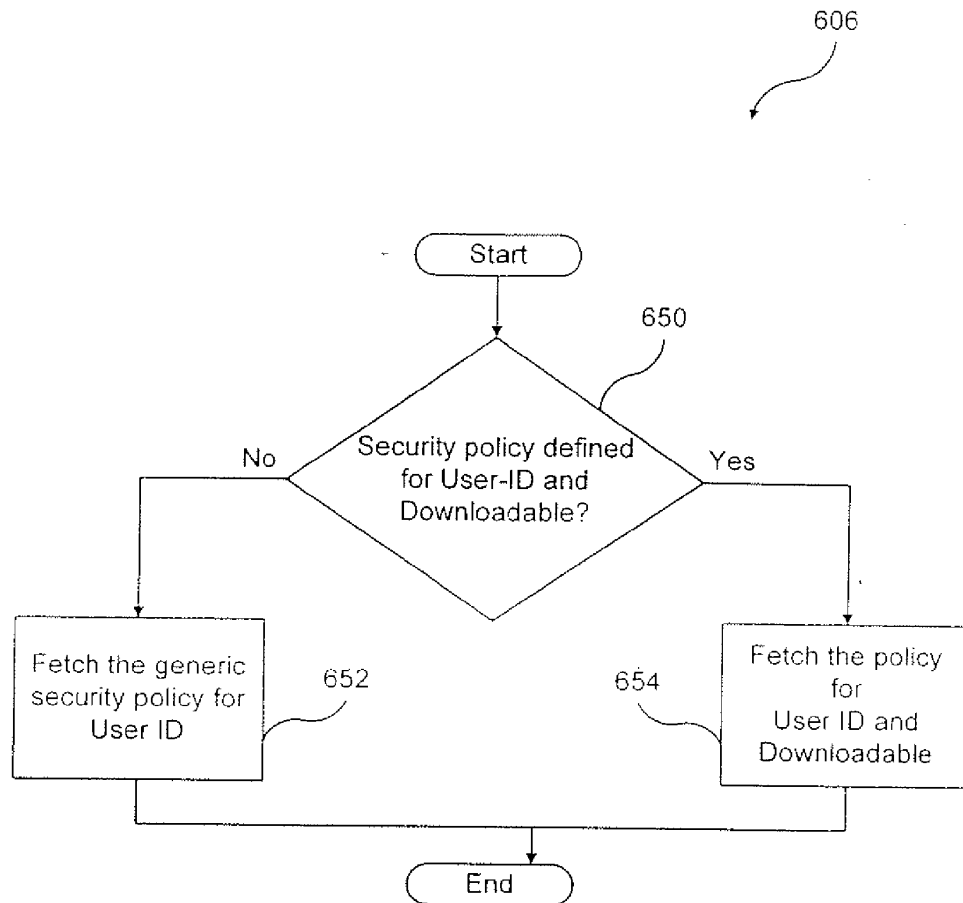


FIG. 6B

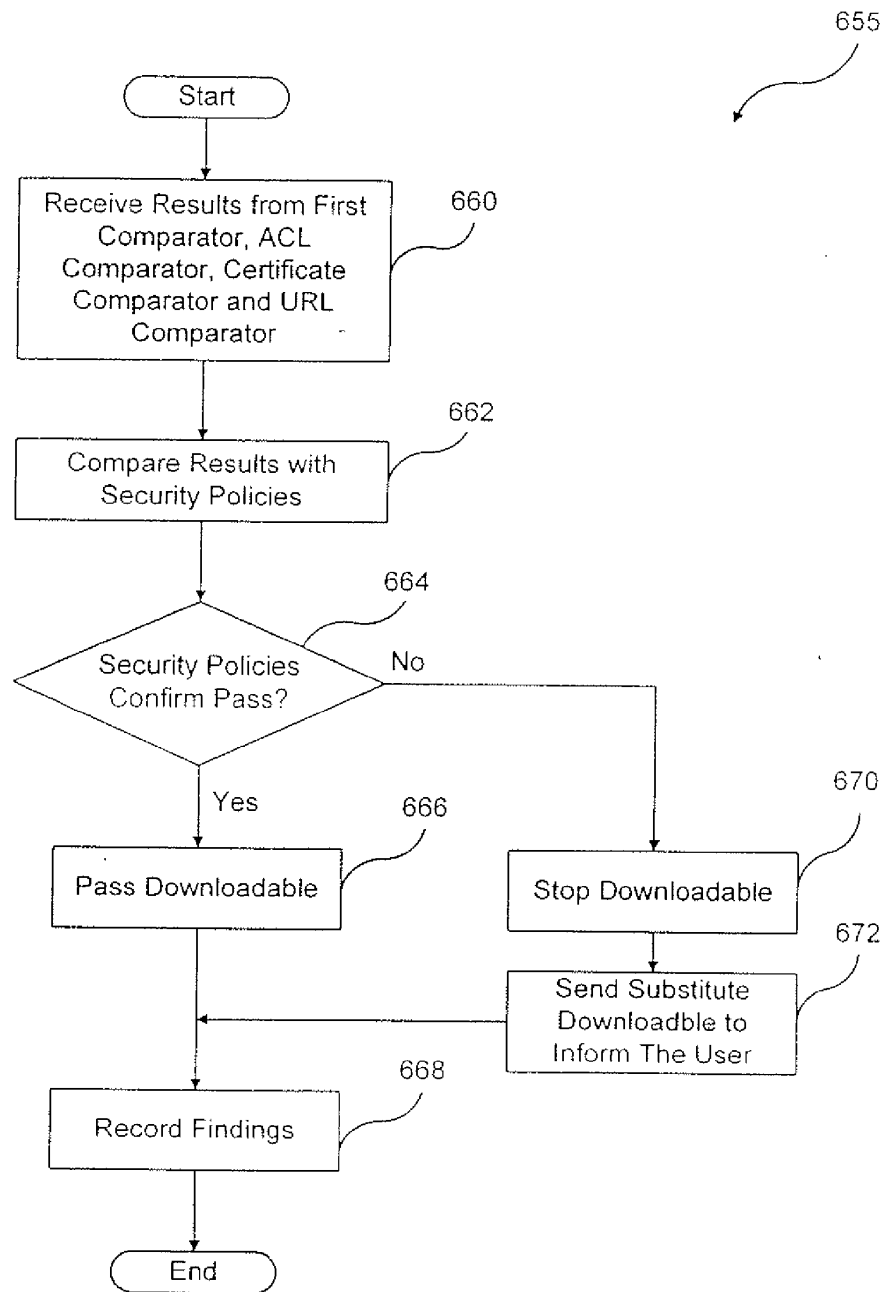


FIG. 6C

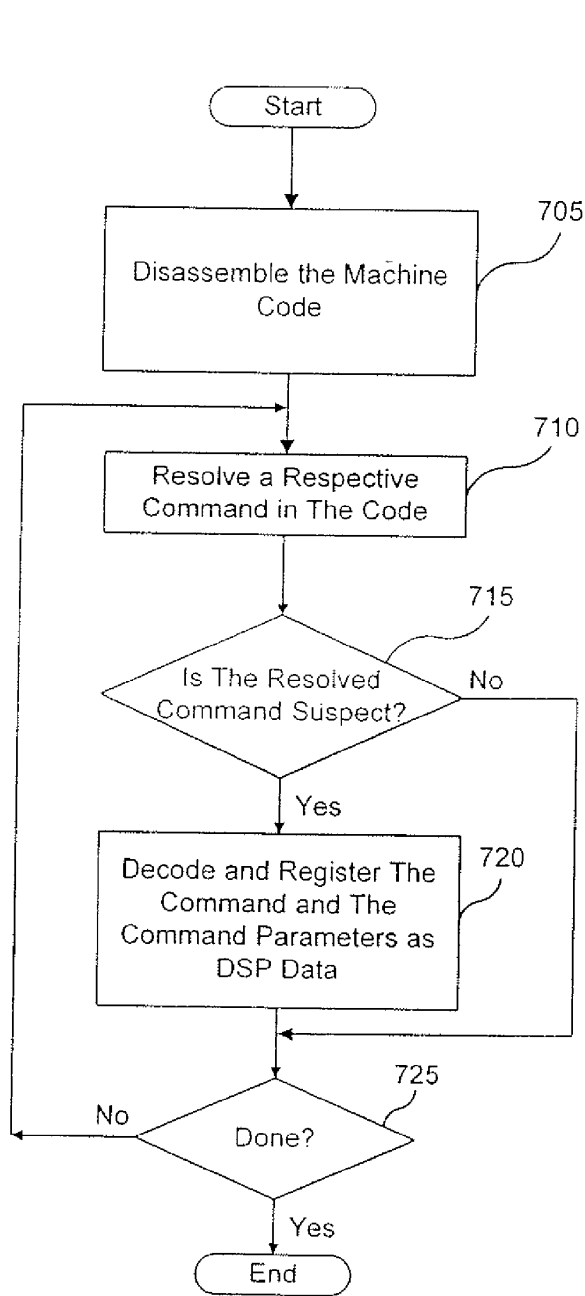


FIG. 7

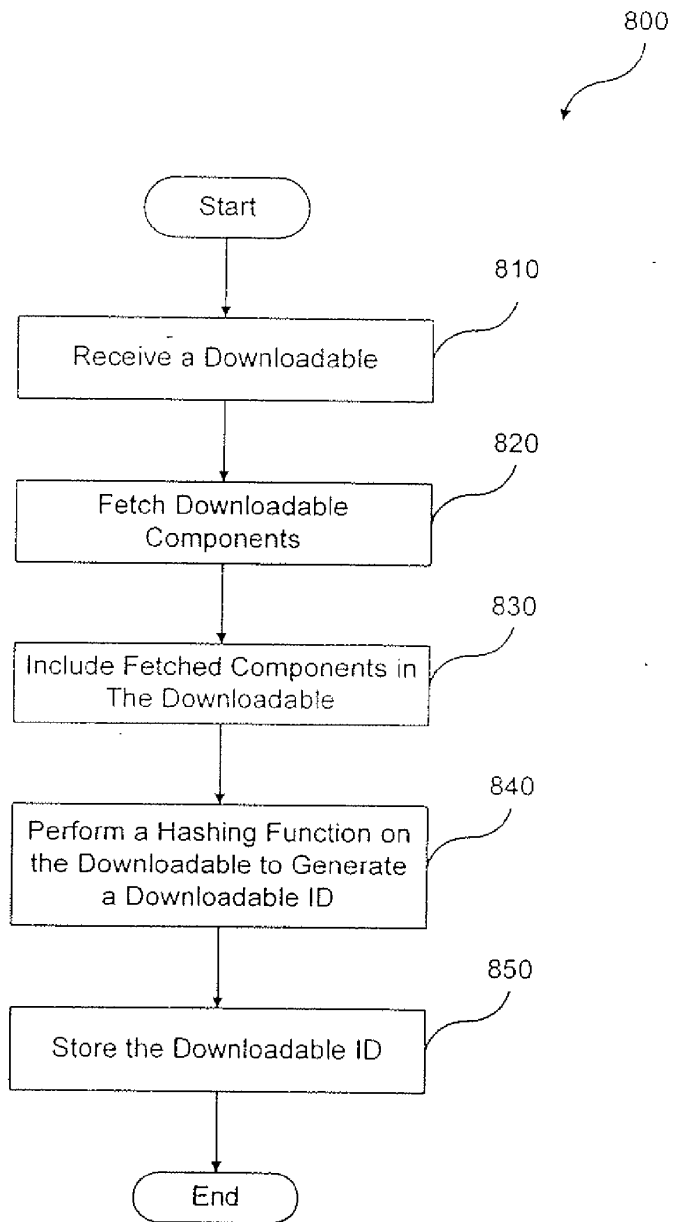


FIG. 8

Electronic Acknowledgement Receipt	
EFS ID:	15718275
Application Number:	13290708
International Application Number:	
Confirmation Number:	4120
Title of Invention:	Malicious Mobile Code Runtime Monitoring System and Methods
First Named Inventor/Applicant Name:	Yigal Mordechai Edery
Customer Number:	74877
Filer:	Dawn-Marie Bey./Amanda Bayliss
Filer Authorized By:	Dawn-Marie Bey.
Attorney Docket Number:	FIN0001-CON1-CIP1-CON4
Receipt Date:	07-MAY-2013
Filing Date:	07-NOV-2011
Time Stamp:	21:49:21
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	no
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File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
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Total Files Size (in bytes):				165278595	
<p>This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.</p> <p><u>New Applications Under 35 U.S.C. 111</u> If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.</p> <p><u>National Stage of an International Application under 35 U.S.C. 371</u> If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.</p> <p><u>New International Application Filed with the USPTO as a Receiving Office</u> If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.</p>					

Electronic Acknowledgement Receipt	
EFS ID:	15718284
Application Number:	13290708
International Application Number:	
Confirmation Number:	4120
Title of Invention:	Malicious Mobile Code Runtime Monitoring System and Methods
First Named Inventor/Applicant Name:	Yigal Mordechai Edery
Customer Number:	74877
Filer:	Dawn-Marie Bey./Mary Ellen Quigley
Filer Authorized By:	Dawn-Marie Bey.
Attorney Docket Number:	FIN0001-CON1-CIP1-CON4
Receipt Date:	07-MAY-2013
Filing Date:	07-NOV-2011
Time Stamp:	21:52:56
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	no
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Information:					
Total Files Size (in bytes):			29872598		
<p>This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.</p> <p><u>New Applications Under 35 U.S.C. 111</u> If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.</p> <p><u>National Stage of an International Application under 35 U.S.C. 371</u> If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.</p> <p><u>New International Application Filed with the USPTO as a Receiving Office</u> If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.</p>					

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.

PATENT APPLICATION FEE DETERMINATION RECORD Substitute for Form PTO-875					Application or Docket Number 13/290,708		Filing Date 11/07/2011		<input type="checkbox"/> To be Mailed	
APPLICATION AS FILED – PART I										
(Column 1)			(Column 2)			SMALL ENTITY <input type="checkbox"/> OR		OTHER THAN SMALL ENTITY		
FOR	NUMBER FILED	NUMBER EXTRA	RATE (\$)	FEE (\$)	OR	RATE (\$)	FEE (\$)			
<input type="checkbox"/> BASIC FEE (37 CFR 1.16(a), (b), or (c))	N/A	N/A	N/A			N/A				
<input type="checkbox"/> SEARCH FEE (37 CFR 1.16(k), (i), or (m))	N/A	N/A	N/A			N/A				
<input type="checkbox"/> EXAMINATION FEE (37 CFR 1.16(o), (p), or (q))	N/A	N/A	N/A			N/A				
TOTAL CLAIMS (37 CFR 1.16(i))	minus 20 =	*	X \$ =		OR	X \$ =				
INDEPENDENT CLAIMS (37 CFR 1.16(h))	minus 3 =	*	X \$ =			X \$ =				
<input type="checkbox"/> APPLICATION SIZE FEE (37 CFR 1.16(s)) If the specification and drawings exceed 100 sheets of paper, the application size fee due is \$250 (\$125 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s).										
<input type="checkbox"/> MULTIPLE DEPENDENT CLAIM PRESENT (37 CFR 1.16(j))										
* If the difference in column 1 is less than zero, enter "0" in column 2.			TOTAL			TOTAL				
APPLICATION AS AMENDED – PART II										
(Column 1)			(Column 2)			(Column 3)		SMALL ENTITY OR OTHER THAN SMALL ENTITY		
AMENDMENT	05/07/2013	CLAIMS REMAINING AFTER AMENDMENT	HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA	RATE (\$)	ADDITIONAL FEE (\$)	OR	RATE (\$)	ADDITIONAL FEE (\$)	
	Total (37 CFR 1.16(i))	* 18	Minus	** 20	= 0	X \$ =		OR	X \$80= 0	
	Independent (37 CFR 1.16(h))	* 2	Minus	*** 3	= 0	X \$ =		OR	X \$420= 0	
	<input type="checkbox"/> Application Size Fee (37 CFR 1.16(s))									
	<input type="checkbox"/> FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))									
					TOTAL ADD'L FEE		OR	TOTAL ADD'L FEE	0	
AMENDMENT	CLAIMS REMAINING AFTER AMENDMENT	HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA	RATE (\$)	ADDITIONAL FEE (\$)	OR	RATE (\$)	ADDITIONAL FEE (\$)		
	Total (37 CFR 1.16(i))	*	Minus	**	=	X \$ =		OR	X \$ =	
	Independent (37 CFR 1.16(h))	*	Minus	***	=	X \$ =		OR	X \$ =	
	<input type="checkbox"/> Application Size Fee (37 CFR 1.16(s))									
	<input type="checkbox"/> FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))									
					TOTAL ADD'L FEE		OR	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.										

Legal Instrument Examiner:
/EVELYN NIMMONS/

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.**

If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.



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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
13/290,708	11/07/2011	Yigal Mordechai Edery	FIN0001-CON1-CIP1-CON4	4120
74877	7590	01/07/2013	EXAMINER	
King and Spalding LLP 1700 Pennsylvania Ave, NW Suite 200 Washington, DC 20006			REVAK, CHRISTOPHER A	
			ART UNIT	PAPER NUMBER
			2431	
			NOTIFICATION DATE	DELIVERY MODE
			01/07/2013	ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

dbey@KSLaw.com
jpaolella-bald@kslaw.com

Office Action Summary	Application No. 13/290,708		Applicant(s) EDERY ET AL.	
	Examiner CHRISTOPHER REVAK		Art Unit 2431	

-- 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 ____.

2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.

3) ☐ An election was made by the applicant in response to a restriction requirement set forth during the interview on ____; the restriction requirement and election have been incorporated into this action.

4) ☐ 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

5) ☒ Claim(s) 1-18 is/are pending in the application.

5a) Of the above claim(s) ____ is/are withdrawn from consideration.

6) ☐ Claim(s) ____ is/are allowed.

7) ☒ Claim(s) 1-18 is/are rejected.

8) ☐ Claim(s) ____ is/are objected to.

9) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

* If any claims have been determined allowable, you may be eligible to benefit from the **Patent Prosecution Highway** program at a participating intellectual property office for the corresponding application. For more information, please see http://www.uspto.gov/patents/init_events/pph/index.jsp or send an inquiry to PPHfeedback@uspto.gov.

Application Papers

10) ☐ The specification is objected to by the Examiner.

11) ☒ The drawing(s) filed on 07 November 2011 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).

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)

2) ☐ Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date ____.

3) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. ____.

4) ☐ Other: ____.

DETAILED ACTION

Response to Arguments

1. Applicant's arguments filed have been fully considered but they are not persuasive since the Petition filed on October 31, 2012 for Correction of Unintentional Delayed Claim of Priority has been dismissed in the decision mailed on November 27, 2012.
2. The Examiner notes that claims 1-12 have been rejected as indicated on the PTO form 326 and in the rejection under 35 USC 102(e) as mailed on July 23, 2012, however claims 1-18 have been addressed in the actual rejection. The Examiner apologizes for the inadvertent error.

Terminal Disclaimer

3. The terminal disclaimer filed on October 23, 2012 disclaiming the terminal portion of any patent granted on this application which would extend beyond the expiration date of U.S. Patents 8,079,086; 7,613,926; 7,418,731; 6,480,962; 6,167,520; 7,647,633; 6,804,780; 6,154,844; and 6,092,194 has been reviewed and is accepted. The terminal disclaimer has been recorded.

Claim Rejections - 35 USC § 102

4. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

5. Claims 1-18 are rejected under 35 U.S.C. 102(e) as being anticipated by Ji, U.S. Patent 5,983,348.

As per claim 1, it is taught of a computer-based method, comprising the steps of receiving an incoming Downloadable; deriving security profile data for the Downloadable, including a list of suspicious computer operations that may be attempted by the Downloadable; and storing the Downloadable security profile data in a database (col. 3, lines 32-56 and col. 6, lines 38-51).

As per claims 2 and 11, it is disclosed of further comprising storing a date & time when the Downloadable security profile data was derived, in the database (col. 3, lines 32-44).

As per claims 3 and 12, it is taught wherein the Downloadable includes an applet (col. 3, lines 17-31).

As per claims 4 and 13, it is disclosed wherein the Downloadable includes an active control (col. 3, lines 17-31).

As per claims 5 and 14, it is taught wherein the Downloadable includes program script (col. 3, lines 17-31).

As per claims 6 and 15, it is disclosed wherein suspicious computer operations include calls made to an operating system, a file system, a network system, and to memory (col. 3, lines 17-31).

As per claims 7 and 16, it is taught wherein the Downloadable security profile data includes a URL from where the Downloadable originated (col. 4, lines 55-65).

As per claims 8 and 17, it is disclosed wherein the Downloadable security profile data includes a digital certificate (col. 8, lines 6-15).

As per claims 9 and 18, it is taught wherein said deriving Downloadable security profile data comprises disassembling the incoming Downloadable (col. 7, lines 13-33).

As per claim 10, it is disclosed of a system for managing Downloadables, comprising a receiver for receiving an incoming Downloadable; a Downloadable scanner coupled with said receiver, for deriving security profile data for the Downloadable, including a list of suspicious computer operations that may be attempted by the Downloadable; and a database manager coupled with said Downloadable scanner, for storing the Downloadable security profile data in a database (col. 3, lines 32-56 and col. 6, lines 38-51).

Conclusion

6. **THIS ACTION IS MADE FINAL.** 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 mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to CHRISTOPHER REVAK whose telephone number is (571)272-3794. The examiner can normally be reached on Monday-Thursday, 9:00am-5:00pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nathan Flynn can be reached on 517-272-1915. 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). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Application/Control Number: 13/290,708
Art Unit: 2431

Page 6

/Christopher A. Revak/
Primary Examiner, Art Unit 2431

<i>Index of Claims</i> 	Application/Control No. 13290708	Applicant(s)/Patent Under Reexamination EDERY ET AL.
	Examiner CHRISTOPHER REVAK	Art Unit 2431

✓	Rejected	-	Cancelled	N	Non-Elected	A	Appeal
=	Allowed	÷	Restricted	I	Interference	O	Objected

☐ Claims renumbered in the same order as presented by applicant
 ☐ CPA
 ☐ T.D.
 ☐ R.1.47

CLAIM		DATE									
Final	Original	07/14/2012	01/02/2013								
	1	✓	✓								
	2	✓	✓								
	3	✓	✓								
	4	✓	✓								
	5	✓	✓								
	6	✓	✓								
	7	✓	✓								
	8	✓	✓								
	9	✓	✓								
	10	✓	✓								
	11	✓	✓								
	12	✓	✓								
	13	✓	✓								
	14	✓	✓								
	15	✓	✓								
	16	✓	✓								
	17	✓	✓								
	18	✓	✓								



UNITED STATES PATENT AND TRADEMARK OFFICE

Commissioner for Patents
United States Patent and Trademark Office
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Alexandria, VA 22313-1450
www.uspto.gov

King and Spalding LLP
1700 Pennsylvania Ave, NW
Suite 200
Washington DC 20006

MAILED
NOV 27 2012
OFFICE OF PETITIONS

In re Application of :
Edery et al. :
Application No. 13/290,708 : DECISION DISMISSING PETITIONS
Filed: November 7, 2011 : UNDER 37 CFR 1.78(a)(3) AND (a)(6)
Attorney Docket No. FIN0001-CON1-CIP1- :
CON4 :

This is a decision on the petition under 37 CFR §§ 1.78(a)(3) and 1.78(a)(6), filed October 23, 2012 and supplemented on October 31, 2012, to accept an unintentionally delayed claim under 35 U.S.C. §§ 120 and 119(e) for the benefit of priority to the prior-filed nonprovisional and provisional applications set forth in the concurrently filed amendment.

The petition is **DISMISSED**

A petition for acceptance of a claim for late priority under 37 CFR §§ 1.78(a)(3) and 1.78(a)(6) is only applicable to those applications filed on or after November 29, 2000 and after the expiration of the period specified in 37 CFR §§ 1.78(a)(2)(ii) and 1.78(a)(5)(ii). In addition, the petition under 37 CFR §§ 1.78(a)(3) and 1.78(a)(6) must be accompanied by:

- (1) the reference required by 35 U.S.C. §§ 120 and 119(e) and 37 CFR §§ 1.78(a)(2)(i) and 1.78(a)(5)(i) of the prior-filed application, unless previously submitted;
- (2) the surcharge set forth in § 1.17(t); and
- (3) a statement that the entire delay between the date the claim was due under 37 CFR §§ 1.78(a)(2)(ii) and 1.78(a)(5)(ii) and the date the claim was filed was unintentional. The Director may require additional where there is a question whether the delay was unintentional.

The petition does not comply with item (1).

The amendment is not acceptable as drafted because Application No. 09/551,302, filed April 18, 2000, does not properly claim benefit of Application No. 60/030,639, filed November 8, 1996. It

cannot because the non-provisional application was filed more than 12 months after the filing date of the provisional application. It appears Application No. 08/790,097, filed January 29, 1997, claims benefit of Application No. 60/030,639, filed November 8, 1996. Please submit another amendment that corrects the priority chain.

37 CFR § 1.78(a)(6) requires a statement that the entire delay between the date the claim was due under 37 CFR § 1.78(a)(5)(ii) and the date the claim was filed was unintentional. Since the statement appearing in the petition varies from the required language, the statement is being construed as the statement required by 37 CFR § 1.78(a)(6). If this is not a correct reading of the statement appearing in the petition, petitioner should promptly notify the Office.

Before the petition under 37 CFR §§ 1.78(a)(3) and 1.78(a)(6) can be granted, a renewed petition and either an Application Data Sheet or a substitute amendment (complying with the provisions of 37 CFR 1.121 and 37 CFR 1.76(b)(5)) to correct the above matters are required.

Further correspondence with respect to this matter should be addressed as follows:


By mail: Mail Stop PETITIONS
 Commissioner for Patents
 Post Office Box 1450
 Alexandria, VA 22313-1450

By hand: Customer Service Window
 Mail Stop Petitions
 Randolph Building
 401 Dulany Street
 Alexandria, VA 22314

By fax: (571) 273-8300
 ATTN: Office of Petitions

By internet: EFS-Web
 www.uspto.gov/ebs/efs_help.html
 (for help using EFS-Web call the
 Patent Electronic Business Center
 at (866) 217-9197)

Any questions concerning this matter may be directed to the undersigned at (571) 272-3230.


Shirene Willis Brantley
Senior Petitions Attorney
Office of Petitions

FIN0001-CON1-CIP1-CON4

PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of

Yigal Mordechai EDERY, et al.

Group Art Unit: 2431

Serial No.: 13/290,708

Examiner: Christopher A. Revak

Filed: November 7, 2011

For: MALICIOUS MOBILE CODE RUNTIME MONITORING SYSTEM AND METHODS

**CORRECTED PETITION TO ACCEPT UNINTENTIONALLY DELAYED CLAIM OF
PRIORITY UNDER 35 U.S.C. §119(e) AND §120 FOR THE BENEFIT OF A PRIOR-
FILED APPLICATION FILED UNDER 37 CFR § 1.78(a)(3)**

Mail Stop Petition

Commissioner for Patents

P. O. Box 1450

Alexandria, VA 22313-1450

Sir:

Applicant respectfully submits this corrected petition to the petition filed October 23, 2012 for the acceptance of an unintentionally delayed claim of priority under 35 U.S.C. § 119(e) and §120 for the benefit of prior-filed applications in the above-referenced patent application. In conjunction with this Petition, Applicant submits an Amendment to the Specification, and payment of the required fees.

Applicant understands that a petition for acceptance of a claim for late priority under 37 CFR §1.78(a)(3) is only applicable to those applications filed on or after November 29, 2000 and after the expiration of the period specified in 37 CFR §1.78(a)(2)(ii). Applicant understands that the petition under 37 CFR §1.78(a)(3) must be accompanied by (1) the reference required by 35 U.S.C. §119(e), §120 and 37 CFR §1.78(a)(2)(i) of the prior-filed application, unless previously submitted; (2) the surcharge set forth in 37 CFR §1.17(t); and (3) a statement that the entire delay between the date the claim was due under 37 CFR §1.78(a)(2)(ii) and the date the claim was filed was unintentional.

The correction of the priority claim of the present application, filed November 7, 2011, to include a reference to prior-filed U.S. Patent Application Nos. 09/539,667, filed March 30, 2000, now U.S. Patent No. 6,804,780 and 60/030,639, filed November 8, 1996, is made after the expiration of the period specified in 37 CFR §1.78(a)(2)(ii).

In accordance with 35 U.S.C. §119(e), §120, and 37 CFR §1.78(a)(2)(i), an amendment to the specification of the present application which adds a reference to prior-filed U.S. Patent Application Nos. 09/539,667 and 60/030,639 is submitted in conjunction with this Petition. This amendment has been submitted separately as an Amendment to the Specification and includes no new matter. In accordance with 37 CFR §1.78(a)(2)(i), the amendment identifies the prior filed application by application number and indicates the relationship of the applications.

Applicant submits that the entire delay between the date the claim was due under 37 CFR §1.78(a)(2)(ii) and the date the claim was filed was unintentional.

No additional fees are believed to be necessary since this document corrects the Petition originally filed on October 23, 2012, and the payment of the \$1,410 fee as required under 37 CFR §1.17(t) was electronically filed via EFS-Web with that submission. The Commissioner is authorized to charge any underpayment of fees, or to credit any overpayment, to Deposit Account No. 50-4402.

Applicant respectfully submits that this request and the amendment to the specification are diligently made. Granting of this petition is requested.

Respectfully submitted,

Date: October 30, 2012

By: /Dawn-Marie Bey - 44,442/
Dawn-Marie Bey
Reg. No. 44,442

King & Spalding LLP
1700 Pennsylvania Avenue, N.W.
Suite 200
Washington, DC 20006
(202) 626-8978 (Office)
(202) 626-3737 (Fax)

Electronic Acknowledgement Receipt	
EFS ID:	14113207
Application Number:	13290708
International Application Number:	
Confirmation Number:	4120
Title of Invention:	Malicious Mobile Code Runtime Monitoring System and Methods
First Named Inventor/Applicant Name:	Yigal Mordechai Edery
Customer Number:	74877
Filer:	Dawn-Marie Bey./Jeanne Paolella-Bald
Filer Authorized By:	Dawn-Marie Bey.
Attorney Docket Number:	FIN0001-CON1-CIP1-CON4
Receipt Date:	31-OCT-2012
Filing Date:	07-NOV-2011
Time Stamp:	13:44:41
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	no
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File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Petition for review by the Office of Petitions.	fin0001con1cip1con4_correctedpet.pdf	99486 1ebd05a39658adfb969e1da604bab078387681f9	no	2

Warnings:

Information:

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

New Applications Under 35 U.S.C. 111


If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371

If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office

If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

Application Number 	Application/Control No. 13/290,708	Applicant(s)/Patent under Reexamination EDERY ET AL.	
Document Code - DISQ		Internal Document – DO NOT MAIL	

TERMINAL DISCLAIMER	<input checked="" type="checkbox"/> APPROVED	<input type="checkbox"/> DISAPPROVED
Date Filed : October 23, 2012	This patent is subject to a Terminal Disclaimer	

Approved/Disapproved by:

Henry D. Jefferson

9 td's are approved

FIN0001-CON1-CIP1-CON4

PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of

Yigal Mordechai EDERY, et al.

Group Art Unit: 2431

Serial No.: 13/290,708

Examiner: Christopher A. Revak

Filed: November 7, 2011

For: MALICIOUS MOBILE CODE RUNTIME MONITORING SYSTEM AND METHODS

**PETITION TO ACCEPT UNINTENTIONALLY DELAYED CLAIM OF PRIORITY
UNDER 35 U.S.C. §119(e) AND §120 FOR THE BENEFIT OF A PRIOR-FILED
APPLICATION FILED UNDER 37 CFR § 1.78(a)(3)**

Mail Stop Petition

Commissioner for Patents

P. O. Box 1450

Alexandria, VA 22313-1450

Sir:

Applicant respectfully petitions for the acceptance of an unintentionally delayed claim of priority under 35 U.S.C. § 119(e) and §120 for the benefit of prior-filed applications in the above-referenced patent application. In conjunction with this Petition, Applicant submits an Amendment to the Specification, and payment of the required fees.

Applicant understands that a petition for acceptance of a claim for late priority under 37 CFR §1.78(a)(3) is only applicable to those applications filed on or after November 29, 2000 and after the expiration of the period specified in 37 CFR §1.78(a)(2)(ii). Applicant understands that the petition under 37 CFR §1.78(a)(3) must be accompanied by (1) the reference required by 35 U.S.C. §119(e), §120 and 37 CFR §1.78(a)(2)(i) of the prior-filed application, unless previously submitted; (2) the surcharge set forth in 37 CFR §1.17(t); and (3) a statement that the entire delay between the date the claim was due under 37 CFR §1.78(a)(2)(ii) and the date the claim was filed was unintentional.

The correction of the priority claim of the present application, filed November 7, 2011, to include a reference to prior-filed U.S. Patent Application Nos. 09/539,667, filed March 30, 2000, now U.S. Patent No. 6,804,780, 08/964,388, filed November 6, 1997, now U.S. Patent No. 6,092,194, and 60/030,639, filed November 8, 1996, is made after the expiration of the period specified in 37 CFR §1.78(a)(2)(ii).

In accordance with 35 U.S.C. §119(e), §120, and 37 CFR §1.78(a)(2)(i), an amendment to the specification of the present application which adds a reference to prior-filed U.S. Patent Application Nos. 09/539,667, 08/964,388, and 60/030,639 is submitted in conjunction with this Petition. This amendment has been submitted separately as an Amendment to the Specification and includes no new matter. In accordance with 37 CFR §1.78(a)(2)(i), the amendment identifies the prior filed application by application number and indicates the relationship of the applications.

Applicant submits that the entire delay between the date the claim was due under 37 CFR §1.78(a)(2)(ii) and the date the claim was filed was unintentional.

Payment of the \$1,410 fee as required under 37 CFR §1.17(t) is provided electronically via EFS-Web. The Commissioner is authorized to charge any underpayment of fees, or to credit any overpayment, to Deposit Account No. 50-4402.

Applicant respectfully submits that this request and the amendment to the specification are diligently made. Granting of this petition is requested.

Respectfully submitted,

Date: October 23, 2012

By: /Dawn-Marie Bey - 44,442/
Dawn-Marie Bey
Reg. No. 44,442

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1700 Pennsylvania Avenue, N.W.
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Washington, DC 20006
(202) 626-8978 (Office)
(202) 626-3737 (Fax)

FIN0001-CON1-CIP1-CON4

PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of

Yigal Mordechai EDERY, et al.

Group Art Unit: 2431

Serial No.: 13/290,708

Examiner: Christopher A. Revak

Filed: November 7, 2011

For: MALICIOUS MOBILE CODE RUNTIME MONITORING SYSTEM AND
METHOFDS

AMENDMENT TO THE SPECIFICATION

Commissioner for Patents
P. O. Box 1450
Alexandria, VA 22313-1450

Sir:

In conjunction with a Petition to Accept Unintentionally Delayed Claim of Priority Under 35 U.S.C. §119(e) and § 120 for the Benefit of a Prior-Filed Application Filed Under 37 C.F.R. § 1.78(a)(3), entry of the amendments and consideration of the remarks submitted herein is respectfully requested.

Amendments to the Specification begin on page 2 of this paper

Remarks begin on page 4 of this paper

Amendments to the Specification

Please replace Paragraph [0001] with the following amended paragraph:

[0001] This application is a continuation of assignee's pending U.S. patent application serial no. 12/471,942, filed May 26, 2009 by inventors Yigal Mordechai Edery, et al., now U.S. Patent No. 8,079,086, entitled "Malicious Mobile Code Runtime Monitoring System and Methods," which is a continuation of assignee's U.S. patent application serial no. 11/370,114, filed March 7, 2006 by inventors Yigal Mordechai Edery, et al., now U.S. Patent No. 7,613,926, entitled "Method and System for Protecting a Computer and a Network from Hostile Downloadables," which is a continuation of assignee's U.S. patent application serial no. 09/861,229, filed on May 17, 2001 by inventors Yigal Mordechai Edery, et al., now U.S. Patent No. 7,058,822, entitled "Malicious Mobile Code Runtime Monitoring System And Methods," all of which are hereby incorporated by reference. U.S. patent application serial no. 09/861,229, now U.S. Patent No. 7,058,822, claims benefit of provisional U.S. patent application serial no. 60/205,591, entitled "Computer Network Malicious Code Run-Time Monitoring," filed on May 17, 2000 by inventors Nimrod Itzhak Vered, et al., which is hereby incorporated by reference. U.S. patent application serial no. 09/861,229, now U.S. Patent No. 7,058,822, is also a Continuation-In-Part of assignee's U.S. patent application serial no. 09/539,667, entitled "System and Method for Protecting a Computer and a Network From Hostile Downloadables," filed on March 30, 2000 by inventor Shlomo Touboul, now U.S. Patent No. 6,804,780, and hereby incorporated by reference, which is a continuation of assignee's U.S. patent application serial no. 08/964,388, filed on November 6, 1997 by inventor Shlomo Touboul, now U.S. Patent No. 6,092,194, also entitled "System and Method for Protecting a Computer and a Network from Hostile Downloadables" and hereby incorporated by reference, which application claims the benefit of provisional U.S. application serial no. 60/030,639, filed November 8, 1996 by inventors Shlomo Touboul, entitled "System and Method For Protecting a Computer From Hostile Downloadables." U.S. Serial No. 09/861,229, now U.S. Patent No. 7,058,822, is also a Continuation-In-Part of assignee's U.S. patent application serial no. 09/551,302, entitled "System and Method for Protecting a Client During Runtime From Hostile Downloadables," filed on April 18, 2000 by inventor Shlomo Touboul, now U.S. Patent No. 6,480,962, which is hereby incorporated by reference, which

claims the benefit of U.S. provisional application no. 60/030,639, filed on November 8, 1996 by inventor Shlomo Touboul, entitled "System and Method For Protecting a Computer From Hostile Downloadables," and is a continuation of U.S. application serial no. 08/790,097, filed January 29, 1997 by inventor Shlomo Touboul, now U.S. Patent No. 6,167,520, entitled "System and Method For Protecting a Client From Hostile Downloadables."

Remarks

Applicant respectfully requests entry of the amendment to the specification of U.S. Patent Application No. 13/290,708 in conjunction with the Petition to Accept Unintentionally Delayed Claim of Priority Under 35 U.S.C. § 119(e) and § 120 for the Benefit of a Prior-Filed Application Filed Under 37 C.F.R. § 1.78(a)(3) filed herewith. The amendment introduces no new matter and corrects the priority claim of the application. Applicant notes that U.S. Patent Application Nos. 09/539,667, 08/964,388, and 60/030,639 and the present invention share the inventor Shlomo Touboul.

Applicant respectfully notes that this submission is part of the procedural requirements involved in petitioning to correct an unintentionally delayed priority claim and is not to be construed as Applicant's response to the Non-Final Office Action mailed July 23, 2012.

No fees are believed due with this submission. However, in the event fees are due, the Commissioner is authorized to charge any underpayment of fees, or to credit any overpayment, to Deposit Account No. 50-4402.

Respectfully submitted,

Date: October 23, 2012

By: /Dawn-Marie Bey - 44,442/
Dawn-Marie Bey
Reg. No. 44,442

King & Spalding LLP
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15157/105034
Doc. No. 19720357

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In Re Patent Application of:)	
)	Examiner: Christopher A. Revak
Yigal Mordechai Edery)	
Nimrod Itzhak Vered)	Art Unit: 2431
David R. Kroll)	
Shlomo Touboul)	
)	
Application No: 13/290,708)	
)	
Filed: November 7, 2011)	
)	
For: METHOD AND SYSTEM FOR)	
PROTECTING A COMPUTER)	
AND A NETWORK FROM)	
HOSTILE DOWNLOADABLES)	
)	
<hr/>		
Mail Stop AMENDMENT		
Commissioner for Patents		
P. O. Box 1450		
Alexandria, VA 22313-1450		

AMENDMENT AND RESPONSE TO OFFICE ACTION

UNDER 37 C.F.R. §1.111

In response to the Office Action dated July 23, 2012 and pursuant to 37 C.F.R. §1.111 (the "Office Action"), applicants respectfully request that the above-identified application be amended as follows.

IN THE CLAIMS:

Please substitute the following claims for the pending claims with the same number:

- 1.** (original) A computer-based method, comprising the steps of:
 receiving an incoming Downloadable;
 deriving security profile data for the Downloadable, including a
list of suspicious computer operations that may be attempted by the
Downloadable; and
 storing the Downloadable security profile data in a database.
- 2.** (original) The computer-based method of claim **1** further
comprising storing a date & time when the Downloadable security profile
data was derived, in the database.
- 3.** (original) The computer-based method of claim **1** wherein the
Downloadable includes an applet.
- 4.** (original) The computer-based method of claim **1** wherein the
Downloadable includes an active control.
- 5.** (original) The computer-based method of claim **1** wherein the
Downloadable includes program script.
- 6.** (original) The computer-based method of claim **1** wherein
suspicious computer operations include calls made to an operating
system, a file system, a network system, and to memory.

- 7.** (original) The computer-based method of claim **1** wherein the Downloadable security profile data includes a URL from where the Downloadable originated.
- 8.** (original) The computer-based method of claim **1** wherein the Downloadable security profile data includes a digital certificate.
- 9.** (original) The computer-based method of claim **1** wherein said deriving Downloadable security profile data comprises disassembling the incoming Downloadable.
- 10.** (original) A system for managing Downloadables, comprising:
 a receiver for receiving an incoming Downloadable;
 a Downloadable scanner coupled with said receiver, for deriving security profile data for the Downloadable, including a list of suspicious computer operations that may be attempted by the Downloadable; and
 a database manager coupled with said Downloadable scanner, for storing the Downloadable security profile data in a database.
- 11.** (original) The system of claim **86** wherein said database manager also stores a date & time when the Downloadable security profile data was derived by said Downloadable scanner, in the database.
- 12.** (original) The system of claim **86** wherein the Downloadable includes an applet.
- 13.** (original) The system of claim **86** wherein the Downloadable includes an active control.

14. (original) The system of claim **86** wherein the Downloadable includes program script.

15. (original) The system of claim **86** wherein suspicious computer operations include calls made to an operating system, a file system, a network system, and to memory.

16. (original) The system of claim **86** wherein the Downloadable security profile data includes a URL from where the Downloadable originated.

17. (original) The system of claim **86** wherein the Downloadable security profile data includes a digital certificate.

18. (original) The system of claim **86** wherein said Downloadable scanner comprises a disassembler for disassembling the incoming Downloadable.

REMARKS

Applicants' representative has carefully studied the outstanding Office Action. The present amendment is intended to place the application in condition for allowance and is believed to overcome all of the objections and rejections made by the Office Action. Favorable reconsideration and allowance of the application are respectfully requested.

Specification

At paragraph 2, the Office Action has objected to the specification because of a formality. The specification has been requested to be amended in accordance with co-filed Petition to Accept Unintentionally Delayed Claim of Priority and Amendment:

[0001] This application is a continuation of assignee's pending U.S. patent application serial no. 12/471,942, filed May 26, 2009 by inventors Yigal Mordechai Edery, et al., now U.S. Patent No. 8,079,086, entitled "Malicious Mobile Code Runtime Monitoring System and Methods," which is a continuation of assignee's U.S. patent application serial no. 11/370,114, filed March 7, 2006 by inventors Yigal Mordechai Edery, et al., now U.S. Patent No. 7,613,926, entitled "Method and System for Protecting a Computer and a Network from Hostile Downloadables," which is a continuation of assignee's U.S. patent application serial no. 09/861,229, filed on May 17, 2001 by inventors Yigal Mordechai Edery, et al., now U.S. Patent No. 7,058,822, entitled "Malicious Mobile Code Runtime Monitoring System And Methods," all of which are hereby incorporated by reference. U.S. patent application serial no. 09/861,229, now U.S. Patent No. 7,058,822, claims benefit of provisional U.S. patent application serial no. 60/205,591, entitled "Computer Network Malicious Code Run-Time Monitoring," filed on May 17, 2000 by inventors Nimrod Itzhak Vered, et al., which is hereby incorporated by reference. U.S. patent application serial no. 09/861,229, now U.S. Patent No. 7,058,822, is also a Continuation-In-Part of assignee's U.S. patent application serial no. 09/539,667, entitled "System and Method for Protecting a Computer and a Network From Hostile Downloadables," filed on March 30, 2000 by inventor Shlomo Touboul, now U.S. Patent No. 6,804,780, and hereby incorporated by reference, which is a continuation of assignee's U.S. patent application serial no. 08/964,388, filed on November 6, 1997 by inventor Shlomo Touboul, now U.S. Patent No. 6,092,194, also entitled "System and Method for Protecting a Computer and a Network from Hostile Downloadables" and hereby incorporated by reference, which application claims the benefit of provisional U.S. application serial no. 60/030,639, filed November 8, 1996 by inventors Shlomo Touboul, entitled "System and Method For Protecting a Computer From Hostile Downloadables." U.S. Serial No. 09/861,229, now U.S. Patent No. 7,058,822, is also a Continuation-In-Part of assignee's U.S. patent application serial no. 09/551,302, entitled "System and Method for Protecting a Client During Runtime From Hostile Downloadables," filed on April 18, 2000 by inventor Shlomo Touboul, now U.S. Patent No. 6,480,962, which is hereby incorporated by reference, which

claims the benefit of U.S. provisional application no. 60/030,639, filed on November 8, 1996 by inventor Shlomo Touboul, entitled "System and Method For Protecting a Computer From Hostile Downloadables," and is a continuation of U.S. application serial no. 08/790,097, filed January 29, 1997 by inventor Shlomo Touboul, now U.S. Patent No. 6,167,520, entitled "System and Method For Protecting a Client From Hostile Downloadables."

Double Patenting

At paragraphs 3 – 12, the Office Action has rejected the claims on the ground of non-statutory obviousness-type double patenting in view of nine patents.

Applicants do not admit that the claims of the subject application are obvious over all of the nine patents. However, in order to expedite prosecution, applicants are submitting nine respective terminal disclaimers.

Claim Rejections – 35 USC §102

At paragraphs 13 and 14, the Office Action has rejected claims **1 – 18** under 35 U.S.C. 102(e) as being anticipated by Ji, U.S. Patent No. 5,983,348 ("Ji").

On October 23, 2012, applicants filed a Petition for Delayed Claim of Priority to, *inter alia*, U.S. Provisional Application No. 60/030,639.

Ji is not prior art because Ji has a priority date of September 10, 1997, whereas the claimed invention is supported in the priority document U.S. Provisional Application No. 60/030,639 of November 8, 1996, which pre-dates Ji. Moreover, Ji itself references the claimed invention at col. 1, line 64 – col. 2, line 42.

In Paragraph 2 of the June 2011 Office Action for the parent application, U.S. Serial No. 12/471,942, the Examiner requested a specific showing of support for the claimed invention in the priority document, U.S. Provisional Serial No. 60/030,639 filed on November 8,

1996, in order to overcome the prior art of Ji. Applicants provided arguments establishing support in the Preliminary Amendment filed for the subject application on November 7, 2011. Applicants' arguments are reproduced here for ease of reference.

Support for the Claimed Invention in Touboul, U.S. Provisional Patent Application No. 60/030,639 ("Touboul")

Claim **1** is supported in Touboul at least by page 8, lines 14 – 19: *"Security database 240 stores ... Downloadable Security Profiles (DSPs) ... in a third data storage device 230 portion"*; by page 15, lines 2 and 3: *"... code scanner 325, which in step 650 decomposes the received Downloadable into DSP data ..."*

Claim **3** is supported in Touboul at least by page 2, line 4: *"Examples of Downloadables include applets designed for use in the Java™ distributing environment produced by Sun Microsystems ..."*

Claim **4** is supported in Touboul at least by page 2, lines 4 – 7: *"Examples of Downloadables include applets designed for use ... in the Active X distributing environment produced by Microsoft Corporation."*

Claim **6** is supported in Touboul at least by page 9, lines 9 – 13: *"DSP data 310 ... may include READs, WRITEs, file management operations, system management operations, memory management operations and CPU allocation operations;"* and by page 16, lines 3 – 8: *"Code scanner 325 in step 720 decodes and registers the command and the command parameters as DSP data. Code scanner 325 in step 720 registers command and command parameters into a format based on command class, e.g., file system class, network system class, memory system class and CPU system class."*

Claim **9** is supported in Touboul at least by page 15, line 15 – page 16, line 4: *"FIG. 7 is a flowchart illustrating details of method 650 for decomposing a Downloadable. Method 650 begins in step 705 with code scanner 325 disassembling the machine code of the Downloadable. Code scanner 325 in step 710 resolves a respective command in the machine code. Code scanner 325 in step 715 determines whether the resolved command is a suspect command ... code scanner 325 in step 720 decodes and registers the command and the command parameters as DSP data ..."*

Claim **10** is supported in Touboul at least by page 8, lines 14 – 19: *"Security database 240 stores ... Downloadable Security Profiles (DSPs) ... in a third data storage device 230 portion";* by page 10, lines 16 – 19: *"Code scanner 325 receives unknown Downloadables from first comparator 320 and uses conventional parsing techniques to decompose the byte code of the unknown Downloadable into DSP data;"* and by page 11, lines 13 – 16: *"... if second comparator 330 received the non-hostile Downloadable from code scanner 325, then ... its corresponding DSP data is stored in DSP data 310."*

Claim **12** is supported in Touboul at least by page 2, line 4: *"Examples of Downloadables include applets designed for use in the JavaTM distributing environment produced by Sun Microsystems ..."*

Claim **13** is supported in Touboul at least by page 2, lines 4 – 7: *"Examples of Downloadables include applets designed for use ... in the Active X distributing environment produced by Microsoft Corporation."*

Claim **15** is supported in Touboul at least by page 9, lines 9 – 13: *"DSP data 310 ... may include READs, WRITEs, file management operations, system management operations, memory*

management operations and CPU allocation operations;" and by page 16, lines 3 – 8: "Code scanner 325 in step 720 decodes and registers the command and the command parameters as DSP data. Code scanner 325 in step 720 registers command and command parameters into a format based on command class, e.g., file system class, network system class, memory system class and CPU system class."

Claim **18** is supported in Touboul at least by page 15, line 15, lines 2 and 3: "... code scanner 325 ... decomposes the received Downloadable into DSP data ..."

For the foregoing reasons, applicants respectfully submit that the applicable objections and rejections have been overcome and that the claims are in condition for allowance.

Respectfully submitted,

Date: October 23, 2012

By: /Dawn-Marie Bey - 44,442/

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**TERMINAL DISCLAIMER TO OBTAIN A DOUBLE PATENTING
REJECTION OVER A "PRIOR" PATENT**

Docket Number (Optional)
FIN0001-CON1-CIP1-CON4

In re Application of: YIGAL MORDECHAI EDERY

Application No.: 13/290,708

Filed: 11/07/2011

For: MALICIOUS MOBILE CODE RUNTIME MONITORING SYSTEM AND METHODS

The owner*, FINJAN, INC., of 100 percent interest in the instant application hereby disclaims, except as provided below, the terminal part of the statutory term of any patent granted on the instant application which would extend beyond the expiration date of the full statutory term of **prior patent** No. 8,079,086 as the term of said **prior patent** is presently shortened by any terminal disclaimer. The owner hereby agrees that any patent so granted on the instant application shall be enforceable only for and during such period that it and the **prior patent** are commonly owned. This agreement runs with any patent granted on the instant application and is binding upon the grantee, its successors or assigns.

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2. ☒ The undersigned is an attorney or agent of record. Reg. No. 44,442

/DAWN-MARIE BEY/
Signature

10/23/2012
Date

DAWN-MARIE BEY
Typed or printed name

202.626.8978
Telephone Number

- ☒ Terminal disclaimer fee under 37 CFR 1.20(d) included.

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Docket Number (Optional)
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Docket Number (Optional)
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Application No.: 13/290,708

Filed: 11/07/2011

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Filed: 11/07/2011

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Electronic Patent Application Fee Transmittal				
Application Number:		13290708		
Filing Date:		07-Nov-2011		
Title of Invention:		Malicious Mobile Code Runtime Monitoring System and Methods		
First Named Inventor/Applicant Name:		Yigal Mordechai Edery		
Filer:		Dawn-Marie Bey./Julie Clements		
Attorney Docket Number:		FIN0001-CON1-CIP1-CON4		
Filed as Large Entity				
Utility under 35 USC 111(a) Filing Fees				
Description	Fee Code	Quantity	Amount	Sub-Total in USD(\$)
Basic Filing:				
Pages:				
Claims:				
Miscellaneous-Filing:				
Petition:				
Priority accept. unintentional delayed claim	1454	1	1410	1410
Patent-Appeals-and-Interference:				
Post-Allowance-and-Post-Issuance:				
Extension-of-Time:				

Description	Fee Code	Quantity	Amount	Sub-Total in USD(\$)
Miscellaneous:				
Statutory or terminal disclaimer	1814	9	160	1440
Total in USD (\$)				2850

Electronic Acknowledgement Receipt	
EFS ID:	14053299
Application Number:	13290708
International Application Number:	
Confirmation Number:	4120
Title of Invention:	Malicious Mobile Code Runtime Monitoring System and Methods
First Named Inventor/Applicant Name:	Yigal Mordechai Edery
Customer Number:	74877
Filer:	Dawn-Marie Bey./Julie Clements
Filer Authorized By:	Dawn-Marie Bey.
Attorney Docket Number:	FIN0001-CON1-CIP1-CON4
Receipt Date:	23-OCT-2012
Filing Date:	07-NOV-2011
Time Stamp:	14:29:55
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	Credit Card
Payment was successfully received in RAM	\$2850
RAM confirmation Number	817
Deposit Account	
Authorized User	

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
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1		13290708_Response-to-NFOA_Petition_Amendment_Terminal-Disclaimers_2012-10-23.pdf	1117910 <div>7aa54a968f70e87cf25814f78e5d022523061133</div>	yes	25
	Multipart Description/PDF files in .zip description				
	Document Description		Start	End	
	Transmittal Letter		1	1	
	Petition for review by the Office of Petitions.		2	3	
	Specification		4	7	
	Amendment/Req. Reconsideration-After Non-Final Reject		8	8	
	Claims		9	11	
	Applicant Arguments/Remarks Made in an Amendment		12	16	
	Terminal Disclaimer Filed		17	17	
	Terminal Disclaimer Filed		18	18	
	Terminal Disclaimer Filed		19	19	
	Terminal Disclaimer Filed		20	20	
	Terminal Disclaimer Filed		21	21	
	Terminal Disclaimer Filed		22	22	
	Terminal Disclaimer Filed		23	23	
	Terminal Disclaimer Filed		24	24	
	Terminal Disclaimer Filed		25	25	
	Warnings:				
Information:					
2	Fee Worksheet (SB06)	fee-info.pdf	32087 <div>2f209593bed2616fc1d3e3d9d1b51f0a1c285858</div>	no	2
Warnings:					
Information:					
Total Files Size (in bytes):			1149997		

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New Applications Under 35 U.S.C. 111

If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371

If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office

If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

Doc Code: TRAN.LET

Document Description: Transmittal Letter

PTO/SB/21 (07-09)

Approved for use through 07/31/2012. OMB 0651-0031

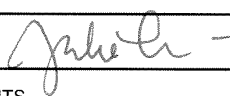
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TRANSMITTAL FORM <small>(to be used for all correspondence after initial filing)</small>	Application Number	13/290,708	
	Filing Date	11/07/2011	
	First Named Inventor	YIGAL MORDECHAI EDERY et al.	
	Art Unit	2431	
	Examiner Name	CHRISTOPHER A. REVAK	
Total Number of Pages in This Submission	25	Attorney Docket Number	FIN0001-CON1-CIP1-CON4

ENCLOSURES (Check all that apply)		
<input type="checkbox"/> Fee Transmittal Form <input type="checkbox"/> Fee Attached <input checked="" type="checkbox"/> Amendment/Reply <input type="checkbox"/> After Final <input type="checkbox"/> Affidavits/declaration(s) <input type="checkbox"/> Extension of Time Request <input type="checkbox"/> Express Abandonment Request <input type="checkbox"/> Information Disclosure Statement <input type="checkbox"/> Certified Copy of Priority Document(s) <input type="checkbox"/> Reply to Missing Parts/ Incomplete Application <input type="checkbox"/> Reply to Missing Parts under 37 CFR 1.52 or 1.53	<input type="checkbox"/> Drawing(s) <input type="checkbox"/> Licensing-related Papers <input checked="" type="checkbox"/> (Unintentionally delayed claim of priority) <input type="checkbox"/> Petition to Convert to a Provisional Application <input type="checkbox"/> Power of Attorney, Revocation Change of Correspondence Address <input checked="" type="checkbox"/> Terminal Disclaimer (9 total) <input type="checkbox"/> Request for Refund <input type="checkbox"/> CD, Number of CD(s) _____ <input type="checkbox"/> Landscape Table on CD	<input type="checkbox"/> After Allowance Communication to TC <input type="checkbox"/> Appeal Communication to Board of Appeals and Interferences <input type="checkbox"/> Appeal Communication to TC (Appeal Notice, Brief, Reply Brief) <input type="checkbox"/> Proprietary Information <input type="checkbox"/> Status Letter <input type="checkbox"/> Other Enclosure(s) (please identify below):
Remarks 1. THE ABOVE-MENTIONED DOCUMENTS ARE BEING ELECTRONICALLY FILED VIA EFS-WEB ON OCTOBER 23, 2012. 2. ANY FEE(S) WHICH MAY BE DUE AT THE TIME OF FILING WILL BE PAID BY CREDIT CARD VIA EFS-WEB.		

SIGNATURE OF APPLICANT, ATTORNEY, OR AGENT			
Firm Name	KING & SPALDING LLP		
Signature	/DAWN-MARIE BEY/		
Printed name	DAWN-MARIE BEY		
Date	10/23/2012	Reg. No.	44,442

CERTIFICATE OF TRANSMISSION/MAILING via EFS-Web			
I hereby certify that this correspondence is being ^{electronically} electronically 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	JULIE CLEMENTS	Date	10/23/2012

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**TERMINAL DISCLAIMER TO OBIATE A DOUBLE PATENTING
REJECTION OVER A "PRIOR" PATENT**

Docket Number (Optional)
FIN0001-CON1-CIP1-CON4

In re Application of: YIGAL MORDECHAI EDERY

Application No.: 13/290,708

Filed: 11/07/2011

For: MALICIOUS MOBILE CODE RUNTIME MONITORING SYSTEM AND METHODS

The owner*, FINJAN, INC., of 100 percent interest in the instant application hereby disclaims, except as provided below, the terminal part of the statutory term of any patent granted on the instant application which would extend beyond the expiration date of the full statutory term of **prior patent** No. 6,154,844 as the term of said **prior patent** is presently shortened by any terminal disclaimer. The owner hereby agrees that any patent so granted on the instant application shall be enforceable only for and during such period that it and the **prior patent** are commonly owned. This agreement runs with any patent granted on the instant application and is binding upon the grantee, its successors or assigns.

In making the above disclaimer, the owner does not disclaim the terminal part of the term of any patent granted on the instant application that would extend to the expiration date of the full statutory term of the **prior patent**, "as the term of said **prior patent** is presently shortened by any terminal disclaimer," in the event that said **prior patent** later:

- expires for failure to pay a maintenance fee;
- is held unenforceable;
- is found invalid by a court of competent jurisdiction;
- is statutorily disclaimed in whole or terminally disclaimed under 37 CFR 1.321;
- has all claims canceled by a reexamination certificate;
- is reissued; or
- is in any manner terminated prior to the expiration of its full statutory term as presently shortened by any terminal disclaimer.

Check either box 1 or 2 below, if appropriate.

1. ☐ For submissions on behalf of a business/organization (e.g., corporation, partnership, university, government agency, etc.), the undersigned is empowered to act on behalf of the business/organization.

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.

2. ☒ The undersigned is an attorney or agent of record. Reg. No. 44,442

/DAWN-MARIE BEY/
Signature

10/23/2012
Date

DAWN-MARIE BEY
Typed or printed name

202.626.8978
Telephone Number

- ☒ Terminal disclaimer fee under 37 CFR 1.20(d) included.

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.

*Statement under 37 CFR 3.73(b) is required if terminal disclaimer is signed by the assignee (owner).
Form PTO/SB/96 may be used for making this certification. See MPEP § 324.

This collection of information is required by 37 CFR 1.321. 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 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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**TERMINAL DISCLAIMER TO OBTAIN A DOUBLE PATENTING
REJECTION OVER A "PRIOR" PATENT**

Docket Number (Optional)
FIN0001-CON1-CIP1-CON4

In re Application of: YIGAL MORDECHAI EDERY

Application No.: 13/290,708

Filed: 11/07/2011

For: MALICIOUS MOBILE CODE RUNTIME MONITORING SYSTEM AND METHODS

The owner*, FINJAN, INC., of 100 percent interest in the instant application hereby disclaims, except as provided below, the terminal part of the statutory term of any patent granted on the instant application which would extend beyond the expiration date of the full statutory term of **prior patent** No. 7,647,633 as the term of said **prior patent** is presently shortened by any terminal disclaimer. The owner hereby agrees that any patent so granted on the instant application shall be enforceable only for and during such period that it and the **prior patent** are commonly owned. This agreement runs with any patent granted on the instant application and is binding upon the grantee, its successors or assigns.

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- expires for failure to pay a maintenance fee;
- is held unenforceable;
- is found invalid by a court of competent jurisdiction;
- is statutorily disclaimed in whole or terminally disclaimed under 37 CFR 1.321;
- has all claims canceled by a reexamination certificate;
- is reissued; or
- is in any manner terminated prior to the expiration of its full statutory term as presently shortened by any terminal disclaimer.

Check either box 1 or 2 below, if appropriate.

1. ☐ For submissions on behalf of a business/organization (e.g., corporation, partnership, university, government agency, etc.), the undersigned is empowered to act on behalf of the business/organization.

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.

2. ☒ The undersigned is an attorney or agent of record. Reg. No. 44,442

/DAWN-MARIE BEY/

Signature

10/23/2012

Date

DAWN-MARIE BEY

Typed or printed name

202.626.8978

Telephone Number

- ☒ Terminal disclaimer fee under 37 CFR 1.20(d) included.

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.

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**TERMINAL DISCLAIMER TO OBTAIN A DOUBLE PATENTING
REJECTION OVER A "PRIOR" PATENT**

Docket Number (Optional)
FIN0001-CON1-CIP1-CON4

In re Application of: YIGAL MORDECHAI EDERY

Application No.: 13/290,708

Filed: 11/07/2011

For: MALICIOUS MOBILE CODE RUNTIME MONITORING SYSTEM AND METHODS

The owner*, FINJAN, INC., of 100 percent interest in the instant application hereby disclaims, except as provided below, the terminal part of the statutory term of any patent granted on the instant application which would extend beyond the expiration date of the full statutory term of **prior patent** No. 7,613,926 as the term of said **prior patent** is presently shortened by any terminal disclaimer. The owner hereby agrees that any patent so granted on the instant application shall be enforceable only for and during such period that it and the **prior patent** are commonly owned. This agreement runs with any patent granted on the instant application and is binding upon the grantee, its successors or assigns.

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expires for failure to pay a maintenance fee;
is held unenforceable;
is found invalid by a court of competent jurisdiction;
is statutorily disclaimed in whole or terminally disclaimed under 37 CFR 1.321;
has all claims canceled by a reexamination certificate;
is reissued; or
is in any manner terminated prior to the expiration of its full statutory term as presently shortened by any terminal disclaimer.

Check either box 1 or 2 below, if appropriate.

1. ☐ For submissions on behalf of a business/organization (e.g., corporation, partnership, university, government agency, etc.), the undersigned is empowered to act on behalf of the business/organization.

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.

2. ☒ The undersigned is an attorney or agent of record. Reg. No. 44,442

/DAWN-MARIE BEY/

Signature

10/23/2012

Date

DAWN-MARIE BEY

Typed or printed name

202.626.8978

Telephone Number

- ☒ Terminal disclaimer fee under 37 CFR 1.20(d) included.

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.

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**TERMINAL DISCLAIMER TO OBIATE A DOUBLE PATENTING
REJECTION OVER A "PRIOR" PATENT**

Docket Number (Optional)
FIN0001-CON1-CIP1-CON4

In re Application of: YIGAL MORDECHAI EDERY

Application No.: 13/290,708

Filed: 11/07/2011

For: MALICIOUS MOBILE CODE RUNTIME MONITORING SYSTEM AND METHODS

The owner*, FINJAN, INC., of 100 percent interest in the instant application hereby disclaims, except as provided below, the terminal part of the statutory term of any patent granted on the instant application which would extend beyond the expiration date of the full statutory term of **prior patent** No. 7,418,731 as the term of said **prior patent** is presently shortened by any terminal disclaimer. The owner hereby agrees that any patent so granted on the instant application shall be enforceable only for and during such period that it and the **prior patent** are commonly owned. This agreement runs with any patent granted on the instant application and is binding upon the grantee, its successors or assigns.

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- expires for failure to pay a maintenance fee;
- is held unenforceable;
- is found invalid by a court of competent jurisdiction;
- is statutorily disclaimed in whole or terminally disclaimed under 37 CFR 1.321;
- has all claims canceled by a reexamination certificate;
- is reissued; or
- is in any manner terminated prior to the expiration of its full statutory term as presently shortened by any terminal disclaimer.

Check either box 1 or 2 below, if appropriate.

1. ☐ For submissions on behalf of a business/organization (e.g., corporation, partnership, university, government agency, etc.), the undersigned is empowered to act on behalf of the business/organization.

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.

2. ☒ The undersigned is an attorney or agent of record. Reg. No. 44,442

/DAWN-MARIE BEY/
Signature

10/23/2012
Date

DAWN-MARIE BEY
Typed or printed name

202.626.8978
Telephone Number

- ☒ Terminal disclaimer fee under 37 CFR 1.20(d) included.

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.

*Statement under 37 CFR 3.73(b) is required if terminal disclaimer is signed by the assignee (owner).
Form PTO/SB/96 may be used for making this certification. See MPEP § 324.

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PATENT APPLICATION FEE DETERMINATION RECORD Substitute for Form PTO-875					Application or Docket Number 13/290,708		Filing Date 11/07/2011		<input type="checkbox"/> To be Mailed	
APPLICATION AS FILED – PART I										
(Column 1)			(Column 2)			SMALL ENTITY <input type="checkbox"/> OR		OTHER THAN SMALL ENTITY		
FOR	NUMBER FILED	NUMBER EXTRA	RATE (\$)	FEE (\$)	OR	RATE (\$)	FEE (\$)			
<input type="checkbox"/> BASIC FEE (37 CFR 1.16(a), (b), or (c))	N/A	N/A	N/A			N/A				
<input type="checkbox"/> SEARCH FEE (37 CFR 1.16(k), (i), or (m))	N/A	N/A	N/A			N/A				
<input type="checkbox"/> EXAMINATION FEE (37 CFR 1.16(o), (p), or (q))	N/A	N/A	N/A			N/A				
TOTAL CLAIMS (37 CFR 1.16(j))	minus 20 =	*	X \$ =		OR	X \$ =				
INDEPENDENT CLAIMS (37 CFR 1.16(h))	minus 3 =	*	X \$ =			X \$ =				
<input type="checkbox"/> APPLICATION SIZE FEE (37 CFR 1.16(s))	If the specification and drawings exceed 100 sheets of paper, the application size fee due is \$250 (\$125 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s).									
<input type="checkbox"/> MULTIPLE DEPENDENT CLAIM PRESENT (37 CFR 1.16(j))										
* If the difference in column 1 is less than zero, enter "0" in column 2.			TOTAL			TOTAL				
APPLICATION AS AMENDED – PART II										
(Column 1)			(Column 2)			SMALL ENTITY OR		OTHER THAN SMALL ENTITY		
AMENDMENT	10/23/2012	CLAIMS REMAINING AFTER AMENDMENT	HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA	RATE (\$)	ADDITIONAL FEE (\$)	OR	RATE (\$)	ADDITIONAL FEE (\$)	
Total (37 CFR 1.16(i))	*	18	Minus	** 20	=	0		X \$62=	0	
Independent (37 CFR 1.16(h))	*	2	Minus	*** 3	=	0		X \$250=	0	
<input type="checkbox"/> Application Size Fee (37 CFR 1.16(s))										
<input type="checkbox"/> FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))										
					TOTAL ADD'L FEE		OR	TOTAL ADD'L FEE	0	
(Column 1)			(Column 2)			SMALL ENTITY OR		OTHER THAN SMALL ENTITY		
AMENDMENT	CLAIMS REMAINING AFTER AMENDMENT	HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA	RATE (\$)	ADDITIONAL FEE (\$)	OR	RATE (\$)	ADDITIONAL FEE (\$)		
Total (37 CFR 1.16(i))	*	Minus	**	=	X \$ =		X \$ =			
Independent (37 CFR 1.16(h))	*	Minus	***	=	X \$ =		X \$ =			
<input type="checkbox"/> Application Size Fee (37 CFR 1.16(s))										
<input type="checkbox"/> FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))										
					TOTAL ADD'L FEE		OR	TOTAL ADD'L FEE		
<p>* If the entry in column 1 is less than the entry in column 2, write "0" in column 3.</p> <p>** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, enter "20".</p> <p>*** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 3, enter "3".</p> <p>The "Highest Number Previously Paid For" (Total or Independent) is the highest number found in the appropriate box in column 1.</p>										

Legal Instrument Examiner:
/TRACIE HARGROVE/

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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www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
13/290,708	11/07/2011	Yigal Mordechai Edery	FIN0001-CON1-CIP1-CON4	4120
74877	7590	07/23/2012	EXAMINER	
King and Spalding LLP 1700 Pennsylvania Ave, NW Suite 200 Washington, DC 20006			REVAK, CHRISTOPHER A	
			ART UNIT	PAPER NUMBER
			2431	
			NOTIFICATION DATE	DELIVERY MODE
			07/23/2012	ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

dbey@KSLaw.com
jpaolella-bald@kslaw.com

DETAILED ACTION

Information Disclosure Statement

1. The information disclosure statement (IDS) submitted are in compliance with the provisions of 37 CFR 1.97. Accordingly, the information disclosure statement is being considered by the examiner.

Specification

2. The disclosure is objected to because of the following informalities:

On page 1 of the Applicant's Specification, reference is made to U.S. Patent Application No. 12/471,942 which is now U.S. Patent No. 8,079,086.

Appropriate correction is required.

Double Patenting

3. The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the "right to exclude" granted by a patent and to prevent possible harassment by multiple assignees. A nonstatutory obviousness-type double patenting rejection is appropriate where the conflicting claims are not identical, but at least one examined application claim is not patentably distinct from the reference claim(s) because the examined application claim is either anticipated by, or would have been obvious over, the reference claim(s). See, e.g., *In re Berg*, 140

F.3d 1428, 46 USPQ2d 1226 (Fed. Cir. 1998); *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970); and *In re Thorington*, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) or 1.321(d) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the conflicting application or patent either is shown to be commonly owned with this application, or claims an invention made as a result of activities undertaken within the scope of a joint research agreement.

Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

4. Claims 1-18 are rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 1-42 of U.S. Patent No. 8,079,086. Although the conflicting claims are not identical, they are not patentably distinct from each other because the claims of the instant application are anticipated by the patented claims in that the claims of the patent contain all of the limitations of the instant application. Claims 1-18 of the instant application therefore are not patentably distinct from the earlier patented claims, and as such is unpatentable for obvious-type double patenting.

5. Claims 1-12 are rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 1-30 of U.S. Patent No. 7,613,926.

Although the conflicting claims are not identical, they are not patentably distinct from each other because the claims of the instant application are anticipated by patented claims 1-30 in that the claims of the patent contain all of the limitations of the instant application. Claims 1-12 therefore are not patentably distinct from the earlier patented claims, and as such, is unpatentable for obvious-type double patenting.

6. Claims 1-12 are rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 1-22 of U.S. Patent No. 7,418,731.

Although the conflicting claims are not identical, they are not patentably distinct from each other because the claims of the instant application are anticipated by patented claims 1-22 in that the claims of the patent contain all of the limitations of the instant application. Claims 1-12 therefore are not patentably distinct from the earlier patented claims, and as such, is unpatentable for obvious-type double patenting.

7. Claims 1-12 are rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 1-35 of U.S. Patent No. 6,480,962.

Although the conflicting claims are not identical, they are not patentably distinct from each other because the claims of the instant application are anticipated by patent claims 1-35 in that the claims of the patent contain all of the limitations of the instant application. Claims 1-12 therefore are not patentably distinct from the earlier patented claims, and as such, is unpatentable for obvious-type double patenting.

8. Claims 1-12 are rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 1-8 of U.S. Patent No. 6,167,520.

Although the conflicting claims are not identical, they are not patentably distinct from each other because the claims of the instant application are anticipated by patent claims 1-8 in that the claims of the patent contain all of the limitations of the instant application. Claims 1-12 therefore are not patentably distinct from the earlier patented claims, and as such, is unpatentable for obvious-type double patenting.

9. Claims 1-12 are rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 1-41 of U.S. Patent No. 7,647,633.

Although the conflicting claims are not identical, they are not patentably distinct from each other because the claims of the instant application are anticipated by patent claims 1-41 in that the claims of the patent contain all of the limitations of the instant application. Claims 1-12 therefore are not patentably distinct from the earlier patented claims, and as such, is unpatentable for obvious-type double patenting.

10. Claims 1-12 are rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 1-18 of U.S. Patent No. 6,804,780.

Although the conflicting claims are not identical, they are not patentably distinct from each other because the claims of the instant application are anticipated by patent claims 1-18 in that the claims of the patent contain all of the limitations of the instant application. Claims 1-12 therefore are not patentably distinct from the earlier patented claims, and as such, is unpatentable for obvious-type double patenting.

11. Claims 1-12 are rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 1-44 of U.S. Patent No. 6,154,844.

Although the conflicting claims are not identical, they are not patentably distinct from each other because the claims of the instant application are anticipated by patent claims 1-44 in that the claims of the patent contain all of the limitations of the instant application. Claims 1-12 therefore are not patentably distinct from the earlier patented claims, and as such, is unpatentable for obvious-type double patenting.

12. Claims 1-12 are rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 1-68 of U.S. Patent No. 6,092,194.

Although the conflicting claims are not identical, they are not patentably distinct from each other because the claims of the instant application are anticipated by patent claims 1-68 in that the claims of the patent contain all of the limitations of the instant application. Claims 1-12 therefore are not patentably distinct from the earlier patented claims, and as such, is unpatentable for obvious-type double patenting.

Claim Rejections - 35 USC § 102

13. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

14. Claims 1-12 are rejected under 35 U.S.C. 102(e) as being anticipated by Ji, U.S. Patent 5,983,348.

As per claim 1, it is taught of a computer-based method, comprising the steps of receiving an incoming Downloadable; deriving security profile data for the Downloadable, including a list of suspicious computer operations that may be attempted by the Downloadable; and storing the Downloadable security profile data in a database (col. 3, lines 32-56 and col. 6, lines 38-51).

As per claims 2 and 11, it is disclosed of further comprising storing a date & time when the Downloadable security profile data was derived, in the database (col. 3, lines 32-44).

As per claims 3 and 12, it is taught wherein the Downloadable includes an applet (col. 3, lines 17-31).

As per claims 4 and 13, it is disclosed wherein the Downloadable includes an active control (col. 3, lines 17-31).

As per claims 5 and 14, it is taught wherein the Downloadable includes program script (col. 3, lines 17-31).

As per claims 6 and 15, it is disclosed wherein suspicious computer operations include calls made to an operating system, a file system, a network system, and to memory (col. 3, lines 17-31).

As per claims 7 and 16, it is taught wherein the Downloadable security profile data includes a URL from where the Downloadable originated (col. 4, lines 55-65).

As per claims 8 and 17, it is disclosed wherein the Downloadable security profile data includes a digital certificate (col. 8, lines 6-15).

As per claims 9 and 18, it is taught wherein said deriving Downloadable security profile data comprises disassembling the incoming Downloadable (col. 7, lines 13-33).

As per claim 10, it is disclosed of a system for managing Downloadables, comprising a receiver for receiving an incoming Downloadable; a Downloadable scanner coupled with said receiver, for deriving security profile data for the Downloadable, including a list of suspicious computer operations that may be attempted by the Downloadable; and a database manager coupled with said Downloadable scanner, for storing the Downloadable security profile data in a database (col. 3, lines 32-56 and col. 6, lines 38-51).

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to CHRISTOPHER REVAK whose telephone number is (571)272-3794. The examiner can normally be reached on Monday-Thursday, 9:00am-5:00pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nathan Flynn can be reached on 517-272-1915. 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). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Christopher A. Revak/
Primary Examiner, Art Unit 2431

Notice of References Cited	Application/Control No. 13/290,708	Applicant(s)/Patent Under Reexamination EDERY ET AL.	
	Examiner CHRISTOPHER REVAK	Art Unit 2431	Page 1 of 1

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*	A	US-8,079,086	12-2011	Edery et al.	726/24
	B	US-			
	C	US-			
	D	US-			
	E	US-			
	F	US-			
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	I	US-			
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	K	US-			
	L	US-			
	M	US-			

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	N					
	O					
	P					
	Q					
	R					
	S					
	T					

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*		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>Index of Claims</i> 	Application/Control No. 13290708	Applicant(s)/Patent Under Reexamination EDERY ET AL.
	Examiner CHRISTOPHER REVAK	Art Unit 2431

✓	Rejected	-	Cancelled	N	Non-Elected	A	Appeal
=	Allowed	÷	Restricted	I	Interference	O	Objected

<input type="checkbox"/> Claims renumbered in the same order as presented by applicant <input type="checkbox"/> CPA <input type="checkbox"/> T.D. <input type="checkbox"/> R.1.47										
CLAIM		DATE								
Final	Original	07/14/2012								
	1	✓								
	2	✓								
	3	✓								
	4	✓								
	5	✓								
	6	✓								
	7	✓								
	8	✓								
	9	✓								
	10	✓								
	11	✓								
	12	✓								

<i>Search Notes</i> 	Application/Control No. 13290708	Applicant(s)/Patent Under Reexamination EDERY ET AL.
	Examiner CHRISTOPHER REVAK	Art Unit 2431

SEARCHED			
Class	Subclass	Date	Examiner
none	none	7/13/12	CR

SEARCH NOTES		
Search Notes	Date	Examiner
PALM Inventor Name Search	7/14/12	CR
BRS Text Search: USPAT, US PGPUB, USOCR, DERWENT, FPRS, IBM TDB, EPO, JPO (see attached search strategy)	7/14/12	CR
BRS Subclass Text Search: USPAT, US PGPUB (see attached search strategy)	7/14/12	CR

INTERFERENCE SEARCH			
Class	Subclass	Date	Examiner

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Receipt date: 11/07/2011

13290708 - GAU: 2431

Form PTO-1449 (Rev. 2-32)		U.S. Department of Commerce Patent & Trademark Office		Atty. Docket No. FIN0001-CON1-CIP1- CON4		Serial No. To Be Assigned	
INFORMATION DISCLOSURE STATEMENT							
(Use several sheets if necessary)				Applicant Yigal Mordechai EDERY, et al.			
				Filing Date Herewith		Group To Be Assigned	
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Page 2 of 8

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Page 3 of 8

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Information Disclosure Statement**

Page 4 of 8

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Page 5 of 8

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Serial No. To Be Assigned (Docket No. FIN0001-CON1-CIP1-CON4)
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BIB DATA SHEET

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13/290,708	11/07/2011	726	2431	FIN0001-CON1-CIP1-CON4
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APPLICANTS Yigal Mordechai Edery, Pardesia, ISRAEL; Nirmrod Itzhak Vered, Goosh Tel Mond, ISRAEL; David R. Kroll, San Jose, CA; Shlomo Touboul, Kefar-Haim, ISRAEL;				
** CONTINUING DATA ***** This application is a CON of 12/471,942 05/26/2009 PAT 8,079,086 which is a CON of 11/370,114 03/07/2006 PAT 7,613,926 which is a CON of 09/861,229 05/17/2001 PAT 7,058,822 which claims benefit of 60/205,591 05/17/2000 and is a CIP of 09/539,667 03/30/2000 PAT 6,804,780 which is a CON of 08/964,388 11/06/1997 PAT 6,092,194 and said 09/861,229 05/17/2001 is a CIP of 09/551,302 04/18/2000 PAT 6,480,962				
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Foreign Priority claimed	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No		STATE OR COUNTRY	SHEETS DRAWINGS
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INFORMATION DISCLOSURE STATEMENT							
(Use several sheets if necessary)				Applicant Yigal Mordechai EDERY, et al.			
				Filing Date November 7, 2011		Group 2431	
U.S. PATENT DOCUMENTS							
Examiner Initial		Document Number	Date	Name	Class	Sub- Class	Filing Date (if appropriate)
/C.R./		2003/0074190	4/17/03	Allison	704	10	10/12/01
FOREIGN PATENT DOCUMENTS							
/C.R./		WO 04/063948	7/29/04	Vihana, Inc.	G06F	17/30	1/9/04
OTHER DOCUMENTS (Including Author, Title, Date, Pertinent Pages, Etc.)							
/C.R./		Scott, et al., "Abstracting Application-Level Web Security," <i>ACM</i> , pp. 396-407, 2002					
EXAMINER				DATE CONSIDERED			
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EAST Search History

EAST Search History (Prior Art)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
L1	446086	(code or executable or download\$5 or applet or java or javascript or script or activex)with(determin\$5 or ascertain\$3 or monitor\$3 or analy\$4 or inspect\$3 or examin\$5)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2012/07/14 10:52
L2	668163	(code or executable or download\$5 or applet or java or javascript or script or activex)with(append\$3 or attach\$4 or indicat\$3 or profile or character\$5 or identif\$7 or report\$3)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2012/07/14 10:52
L3	124404	1 with 2	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2012/07/14 10:53
L4	2049592	(append\$3 or attach\$4 or indicat\$3 or profile or character\$5 or identif\$7 or report\$3)with(malicious or suspicious or attack\$3 or malware or virus or viral or trojan or worm or detail\$3 or list\$3)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2012/07/14 10:54
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L6	227896	4 with(deriv\$5 or comput\$3 or process\$3 or creat\$3 or generat\$3)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2012/07/14 10:55
L7	4426	5 same 6	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2012/07/14 10:55
L8	28257	6 with(send\$3 or forward\$3 or communicat\$3 or transmi\$5)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2012/07/14 10:57
L9	871	7 same 8	US-PGPUB; USPAT;	OR	ON	2012/07/14 10:57

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			USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB			
L10	26016	3 with(database or repository or storage or memory)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2012/07/14 10:58
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L12	18340	(726/22-25 or 713/168,175,176,179-181).ccls.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2012/07/14 10:59
L13	102	9 and 12	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2012/07/14 10:59

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NOTICE OF PUBLICATION OF APPLICATION

The above-identified application will be electronically published as a patent application publication pursuant to 37 CFR 1.211, et seq. The patent application publication number and publication date are set forth above.

The publication may be accessed through the USPTO's publically available Searchable Databases via the Internet at www.uspto.gov. The direct link to access the publication is currently <http://www.uspto.gov/patft/>.

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U.S. PATENT DOCUMENTS							
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		2003/0074190	4/17/03	Allison	704	10	10/12/01
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		Scott, et al., "Abstracting Application-Level Web Security," <i>ACM</i> , pp. 396-407, 2002					
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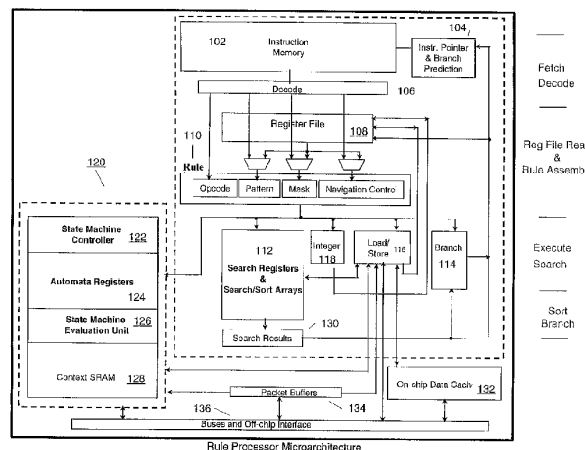
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[Continued on next page]

(54) **Title:** A PROGRAMMABLE PROCESSOR APPARATUS INTEGRATING DEDICATED SEARCH REGISTERS AND DEDICATED STATE MACHINE REGISTERS WITH ASSOCIATED EXECUTION HARDWARE TO SUPPORT RAPID APPLICATION OF RULESETS TO DATA



(57) **Abstract:** A rule processor and method for using the same are disclosed. In one embodiment, the rule processor comprises a general purpose register file, an instruction sequencer to provide instructions, a decoder coupled to the general purpose register file to decode a set of instructions specified by the instruction sequencer, and a state machine unit coupled to the decoder and having state machine registers to store one or more state machines and state machine execution hardware coupled to the state machine registers to evaluate the one or more state machines in response to executing one or more of the set of instructions and based on information from one or both of the decoder and the general purpose register file.

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**A PROGRAMMABLE PROCESSOR APPARATUS INTEGRATING
DEDICATED SEARCH REGISTERS AND DEDICATED STATE MACHINE
REGISTERS WITH ASSOCIATED EXECUTION HARDWARE TO
SUPPORT RAPID APPLICATION OF RULESETS TO DATA**

[0001] This application is a non-provisional application of U.S. Provisional Patent Application Serial No. 60/438,847, filed January 9, 2003, which is incorporated herein by reference.

RELATED APPLICATIONS

[0002] The present application is related to U.S. Patent Application No. 10/650,363 entitled "Programmable Rule Processing Apparatus for Conducting High Speed Contextual Searches and Characterizations of Patterns in Data," filed on August, 27, 2003; U.S. Patent Application No. 10/650,364 entitled "Method and Apparatus for Efficient Implementation and Evaluation of State Machines and Programmable Finite State Automata," filed on August, 27, 2003; and U.S. Patent Application No. _____ entitled "_____", concurrently filed with this application, the entire contents of which are hereby incorporated by reference.

FIELD OF THE INVENTION

[0003] The present invention relates to the field of information processing, specifically the field of content analytics and processing.

BACKGROUND OF THE INVENTION

[0004] Significant trends in computing and communications are leading to the emergence of environments that abound in content analytics and processing. These environments require high performance as well as programmability on a certain class of functions, namely searching, parsing, analysis, interpretation, and transformation of content in messages, documents, or packets. Notable fields that stress such rich content analytics and processing include content-aware networking, content-based security systems, surveillance, distributed computing, wireless communication, human interfaces to computers, information storage and retrieval systems, content search on the semantic web, bio-informatics, and others.

[0005] The field of content-aware networking requires searching and inspection of the content inside packets or messages in order to determine where to route or forward such packages and messages. Such inspection has to be performed on in-flight messages at “wire-speed”, which is the data-rate of the network connection. Given that wire rates in contemporary networks range from 100Mbits/second all the way to 40Gbits/second, there is tremendous pressure on the speed at which the content inspection function needs to be performed.

[0006] Content-based security systems and surveillance and monitoring systems are required to analyze the content of messages or packets and apply a set of rules to determine whether there is a security breach or the possibility of an intrusion. Typically, on modern network intrusion detection systems (NIDS), a large number of patterns, rules, and expressions have to be applied to the input payload at wire speed to ensure that all potential system vulnerabilities are uncovered. Given that the network and computing infrastructure is continuously evolving, fresh vulnerabilities continue to arise. Moreover, increasingly sophisticated attacks are employed by intruders in order to evade detection. Intrusion detection systems need to be able to detect all known attacks on the system, and also be intelligent enough to detect unusual and suspicious behavior that is indicative of new attacks. All these factors lead to a requirement for both programmability as well as extremely high performance on content analysis and processing.

[0007] With the advent of distributed and clustered computing, tasks are now distributed to multiple computers or servers that collaborate and communicate with one another to complete the composite job. This distribution leads to a rapid increase in computer communication, requiring high performance on such message processing. With the emergence of XML (Extensible Markup Language) as the new standard for universal data interchange, applications communicate with one another using XML as the “application layer data transport”. Messages and documents are now embedded in XML markup. All message processing first requires that the XML document be parsed and the relevant content extracted and interpreted, followed by any required transformation and filtering. Since these functions need to be performed at a high message rate, they become computationally very demanding.

[0008] With the growth of untethered communication and wireless networks, there is an increase in the access of information from the wireless device. Given the light form factor of the client device, it is important that data delivered to this device be filtered and the payload be kept small. Environments of the future will filter and transform XML content from the wireline infrastructure into lightweight content (using the Wireless Markup Language or WML) on the wireless infrastructure. With the increasing use of wireless networks, this content transformation function will be so common that an efficient solution for it's handling will be needed.

[0009] Another important emerging need is the ability to communicate and interact with computers using human interfaces such as speech. Speech processing and natural language processing is extremely intensive in content searching, lexical analysis, content parsing, and grammar processing. Once a voice stream has been transduced into text, speech systems need to apply large vocabularies as well as syntactic and semantic rules on the incoming text stream to understand the speech.

[0010] The emergence and growth of the worldwide web has placed tremendous computational load on information retrieval (IR) systems. Information continues to be added to the web at a high rate. This information typically gets fully indexed against an exhaustive vocabulary of words and is added to databases of search engines and IR systems. Since information is continuously being created and added, indexers need to be "always-on". In order to provide efficient real-time contextual search, it is necessary that there be a high performance pattern-matching system for the indexing function.

[0011] Another field that stresses rich content analytics and processing is the field of bio-informatics. Gene analytics and proteomics entail the application of complex search and analysis algorithms on gene sequences and structures. Once again, such computation requires high performance search, analysis, and interpretation capability.

[0012] Thus, emerging computer and communications environments of the future will stress rich analysis and processing of content. Such environments will need efficient and programmable solutions for the following functions - searching, lexical analysis, parsing, characterization, interpretation, filtering and transformation of content in documents, messages, or packets.

[0013] Central to these rich content processing functions are (1) operations to perform contextual and content-based search, lookup, navigation, and rich associative lookup, and (2) the capability to efficiently evaluate state machines against an input data stream.

[0014] In the prior art, search and lookup processing has typically has been performed in one of two ways. First, such processing has been performed using fixed application specific integrated circuits (ASIC) solutions using a combination of content addressable memories (CAMs), comparator hardware and dedicated logic. For example, search rules are stored in a content-addressable memory, and the data is streamed across the structure, shifting it 1 byte or 1 word at a time. Alternatively, specific comparators are arranged at fixed locations to recognize specific values in the incoming data. Incidences of matches are recorded and consumed by the dedicated logic as per the requirements of the target application. Although the fixed ASIC approach can increase performance, it lacks easy programmability, and hence its application is severely restricted. Furthermore, the expense associated with designing and tailoring specific chips for each targeted solution is prohibitive.

[0015] Second, traditional general-purpose microprocessors with general-purpose execution datapaths have been used to handle rich search and lookup functions and associated content processing. Microprocessors are fully programmable devices and are able to address the evolving needs of problems – by simply reprogramming the software the new functionality can be redeployed. However, the traditional microprocessor is limited in the performance level it can offer to rich content analytics and processing.

[0016] The limitation in performance on content analytics is inherent in the design and evolution of the microprocessor architecture. The microprocessor originated as a computing unit, performing arithmetic operations on 1,2,4,8 byte words. Subsequently, as the field of computing evolved, more functionality was progressively added to the microprocessor to address emerging fields. As a result, the general purpose microprocessor is functional across a very wide range of applications, but not very well tuned for any one in particular. Fundamentally, as it applies to the needs of content analytics, the microprocessor architecture has two key limitations – (1) it lacks the capability to simultaneously perform massively parallel and fine-grain

pattern-matching and comparison operations on large datasets, and (2) it lacks the capability to make rapid and multiple state transitions and efficient multi-directional control flow changes based on input data.

[0017] A number of search and pattern matching algorithms have evolved to make best use of the microprocessor. The Boyer-Moore algorithm is widely regarded as one of the best-known techniques employed on a microprocessor to find occurrences of patterns in a given data set. The algorithm processes only one pattern at a time and must be repeatedly invoked if more than one pattern is to be searched in a data set. For each pattern to be searched, it advances sequentially through the data set making selective comparisons based on observations obtained from pre-characterizing the pattern. This algorithm provides superior performance relative to other pattern matching algorithms by reducing the total number of comparisons within a given data set. However, due to the sequential nature of the algorithm, the performance is limited by fundamental constraints of microprocessor architecture, namely the scalar instruction set and the penalty incurred on branching.

[0018] Owing to the aforementioned architectural limitations of the microprocessor, the efficiency and capability of conventional microprocessors are severely challenged by the emerging computing and communications environments described earlier. Several data points can be provided to support these arguments. For example, in a Network Intrusion Detection System (NIDS) such as Snort, it is already desirable to apply signature detection of hundreds of strings on incoming packets. Performing this workload with signatures of 8-byte patterns on a 3GHz Pentium IV processor in a commercial microprocessor-based system that employs an improved version of the Boyer-Moore pattern matching algorithm limits the packet rate to less than 50Mbps. Likewise, parsing of XML documents on such a platform is limited to the 10MB/s range, and speech processing is limited to 1 real-time stream on restricted grammars and vocabularies. These data points indicate that the conventional microprocessor of 2003 or 2004 will be able to deliver rich content analytics and processing at rates around the 100Mbps range. However, by that timeframe, data rates of between 1Gbps to 10Gbps will not be uncommon in enterprise networks and environments. Clearly, there is a severe mismatch of one to two orders of magnitude between the performance that can be delivered by the conventional microprocessor and that which

is demanded by the environment. While it is possible to employ multiple parallel microprocessor systems to execute some of the desired functions at the target rate, this greatly increases the cost of the system. There is clearly a need for a more efficient solution for these target functions.

[0019] A similar parallel exists in the case of state machine evaluation. The history of state machines dates back to early computer science. In their simplest formulation, state machines are formal models that consist of states, transitions amongst states, and an input representation. Starting with Turing's model of algorithmic computation (1936), state machines have been central to the theory of computation. In the 1950s, the regular expression was developed by Kleene as a formal notation to describe and characterize sets of strings. The finite state automaton was developed as a state machine model that was found to be equivalent to the regular expression. Non-deterministic automata were subsequently developed and proven to be equivalent to deterministic automata. Subsequent work by Thompson and others led to a body of construction algorithms for constructing finite state automata to evaluate regular expressions. A large number of references are available for descriptions of Regular Expressions and Finite State Automata. For a reference text on the material, see "Speech and Language Processing" (by Daniel Jurafsky and James H. Martin, Prentice-Hall Inc, 2000).

[0020] Using techniques available in the prior art, state machine and finite state automata processing can be performed in one of three ways. First, such processing has been performed using fixed application specific integrated circuits (ASIC) solutions that directly implement a fixed and chosen state machine that is known apriori. Although the fixed ASIC approach can increase performance, it lacks programmability, and hence its application is severely restricted. Furthermore, the expense associated with designing and tailoring specific chips for each targeted solution is prohibitive.

[0021] Second, Field Programmable Gate Arrays (FPGA) can be used to realize state machines in a programmable manner. Essentially, the FPGA architecture provides generalized programmable logic that can be configured for a broad range of applications, rather than being specially optimized for the implementation of state machines. Using this approach, one can only accommodate a small number of state

machines on a chip, and furthermore the rate at which evaluation can progress is limited. The density and performance characteristics of the implementations make this choice of solution inadequate for the broad range of emerging applications.

[0022] Third, traditional general-purpose microprocessors have been used to implement a variety of state machines. Microprocessors are fully programmable devices and are able to address the evolving needs of problems – by simply reprogramming the software the new functionality can be redeployed. However, the traditional microprocessor is limited in the efficiency with which it can implement and evaluate state machines.

[0023] There is a need for a new solution for a programmable processing apparatus that is more suitable for content analytics and processing, and that is efficient on a set of functions that include state machine evaluation as well as the execution of operations for contextual search, lexical analysis, parsing, interpretation, and transformation of content on messages, packets, or documents.

SUMMARY OF THE INVENTION

[0024] A rule processor and method for using the same are disclosed. In one embodiment, the rule processor comprises a general purpose register file, an instruction sequencer to provide instructions, a decoder coupled to the general purpose register file to decode a set of instructions specified by the instruction sequencer, and a state machine unit coupled to the decoder and having state machine registers to store one or more state machines and state machine execution hardware coupled to the state machine registers to evaluate the one or more state machines in response to executing one or more of the set of instructions and based on information from one or both of the decoder and the general purpose register file.

BRIEF DESCRIPTION OF THE DRAWINGS

[0025] The present invention will be understood more fully from the detailed description given below and from the accompanying drawings of various embodiments of the invention, which, however, should not be taken to limit the invention to the specific embodiments, but are for explanation and understanding only.

[0026] **Figure 1** is a block diagram of a rule processor.

[0027] **Figure 2** is an example of the use of one embodiment of a rule processor.

[0028] **Figure 3** illustrates interfaces of one embodiment of a rule processor.

[0029] **Figure 4** is a block diagram of one embodiment of a line card with a look-aside configuration.

[0030] **Figure 5** is a block diagram of one embodiment of a line card with a flow-through configuration.

[0031] **Figure 6** is a block diagram of one embodiment of a server co-processor configuration.

[0032] **Figure 7** is a block diagram of one embodiment of a rule processor with a search apparatus.

[0033] **Figure 8A** is a block diagram of one embodiment of a search register and the search execution hardware.

[0034] **Figure 8B** is a block diagram of one embodiment of a search array.

[0035] **Figure 9A** is a block diagram of one embodiment of a sorter.

[0036] **Figure 9B** is a block diagram of one embodiment of a range select mechanism in a sorter.

[0037] **Figure 10** is a circuit schematic of one embodiment of a search array.

[0038] **Figure 11** illustrates an exemplary micro-architecture of a rule processor comprising of four processing stages.

[0039] **Figure 12** illustrates an example pseudo-code of a complex pattern matching rule-set and the corresponding micro-code for an exemplary rule-processor.

[0040] **Figure 13** illustrates the clock-by-clock pipelined execution of the micro-code shown in Figure 12.

[0041] **Figure 14** illustrates a basic state machine evaluation building block or finite state automata building block (FSA building block) from a programming perspective in accordance with one embodiment of the invention.

[0042] **Figure 15** illustrates a logic circuit for implementing an FSA building block in accordance with one embodiment of the invention.

[0043] **Figure 16** illustrates an FSA building block in which a number of features have been implemented to provide additional functionality in accordance with one embodiment of the invention.

[0044] **Figure 17** illustrates an on-chip state machine unit, referred to as a RE processor, in accordance with one embodiment of the invention.

DETAILED DESCRIPTION OF THE PRESENT INVENTION

[0045] A programmable rule processor apparatus integrating dedicated search registers and dedicated state machine registers with execution hardware to support rapid application of rulesets and grammars to data is described. Such a processor may be used for content analysis and searches. In one embodiment, the programmable rule processor includes portions or apparatus typically found in a general purpose processor along with search registers coupled with a search/parse execution array and also state machine registers coupled with state machine evaluation units. The portions of a general purpose processor may include the use of an instruction (or rule) memory, instruction pointer and instruction sequencer, as well as a decoder and general purpose register file. Other portions may be used and will be described in more detail below.

[0046] In one embodiment, the search registers store data or content in an array and the general purpose processor front end presents rules to the array for executing searches. The content may be a packet, stream, message or a document. The search registers and search/parse execution array allow for parallel and recursive sequencing of rules against the content payload, as well as parallel pattern matching capability and the capability of making multiple rapid content-based state transitions. Operations such as, for example, pattern matching, lexical analysis, parsing and interpretation functions, may be performed.

[0047] In contrast, in one embodiment, the state machine registers and state machine evaluation engines operate in an inverse fashion by storing rules programmed into the state machine registers and by streaming data through them. Note that for the discussion herein the terms state machine registers, automata registers and expression registers may be used interchangeably.

[0048] The coupling of the search registers and the search/parse array with the state machine registers and evaluation logic using a generalized sequencer and an instruction set format provide for a powerful programmable rule processor that accelerates rule-processing functions through dedicated and tailored hardware, and that allows a rich mix of operations to be performed in a single integrated processor apparatus.. By integrating dedicated search registers and associated search/parse execution hardware with the general purpose processor apparatus, the associative

search and lookup functionality can be accelerated efficiently, and yet a rich mix of general purpose operations can be simultaneously performed. Likewise, by integrating state machine registers and associated state machine execution hardware with the general purpose processor apparatus, the state machine evaluation functionality can be accelerated, and simultaneously, a rich mix of general purpose functions can be performed on the data. The integration of all three pieces of apparatus – search registers and search execution hardware, state machine registers and state machine evaluation hardware, and general purpose processor hardware, yields a powerful programmable rule processor solution. Data can be fed into the rule processor and a mix of search functions, state machine evaluation functions as well as general purpose programming functions can be simultaneously performed. The state machine hardware and the search hardware can be viewed as another dedicated resource in the rule processor. A variety of operations can be performed on the data, which can be both analyzed and transformed progressively. In one embodiment, the various functional operations that can be performed in this rule processor can be performed in any sequence or order, and also in parallel, leading to accelerated content analysis and transformation capability.

[0049] Some portions of the detailed descriptions that follow are presented in terms of algorithms and symbolic representations of operations on data bits within a computer memory. These algorithmic descriptions and representations are the means used by those skilled in the data processing arts to most effectively convey the substance of their work to others skilled in the art. An algorithm is here, and generally, conceived to be a self-consistent sequence of steps leading to a desired result. The steps are those requiring physical manipulations of physical quantities. Usually, though not necessarily, these quantities take the form of electrical or magnetic signals capable of being stored, transferred, combined, compared, and otherwise manipulated. It has proven convenient at times, principally for reasons of common usage, to refer to these signals as bits, values, elements, symbols, characters, terms, numbers, or the like.

[0050] It should be borne in mind, however, that all of these and similar terms are to be associated with the appropriate physical quantities and are merely convenient labels applied to these quantities. Unless specifically stated otherwise as apparent from the following discussion, it is appreciated that throughout the description,

discussions utilizing terms such as "processing" or "computing" or "calculating" or "determining" or "displaying" or the like, refer to the action and processes of a computer system, or similar electronic computing device, that manipulates and transforms data represented as physical (electronic) quantities within the computer system's registers and memories into other data similarly represented as physical quantities within the computer system memories or registers or other such information storage, transmission or display devices.

[0051] The present invention also relates to apparatus for performing the operations herein. This apparatus may be specially constructed for the required purposes, or it may comprise a general purpose computer selectively activated or reconfigured by a computer program stored in the computer. Such a computer program may be stored in a computer readable storage medium, such as, but is not limited to, any type of disk including floppy disks, optical disks, CD-ROMs, and magnetic-optical disks, read-only memories (ROMs), random access memories (RAMs), EPROMs, EEPROMs, magnetic or optical cards, or any type of media suitable for storing electronic instructions, and each coupled to a computer system bus.

[0052] The algorithms and displays presented herein are not inherently related to any particular computer or other apparatus. Various general purpose systems may be used with programs in accordance with the teachings herein, or it may prove convenient to construct more specialized apparatus to perform the required method steps. The required structure for a variety of these systems will appear from the description below. In addition, the present invention is not described with reference to any particular programming language. It will be appreciated that a variety of programming languages may be used to implement the teachings of the invention as described herein.

[0053] A machine-readable medium includes any mechanism for storing or transmitting information in a form readable by a machine (e.g., a computer). For example, a machine-readable medium includes read only memory ("ROM"); random access memory ("RAM"); magnetic disk storage media; optical storage media; flash memory devices; electrical, optical, acoustical or other form of propagated signals (e.g., carrier waves, infrared signals, digital signals, etc.); etc.

Overview

[0054] A programmable rule processor is disclosed that comprises a general purpose processor portion having general purpose registers, a general purpose execution data path attached thereto, and an instruction sequencer. The general purpose processor portion is tightly coupled with search registers with search execution units and state machine registers with state machine execution units. Together the search registers with search execution units and together the state machine recognition units the state machine execution units may each be considered processor execution units much like a floating point unit and an integer unit are execution units in a general purpose processor. Based on the type of instruction (e.g., opcode), a decoder in the general purpose processor portion is able to direct instructions to either of these execution blocks.

[0055] The general purpose processor portion feeds data and rules to the search registers and the state machine registers and is able to receive results from either one and supply them to the other or to both. That is, the general purpose processor portion is integrated with the search registers and the state machine registers such that the general purpose processor portion can access all the data in the search registers and the state machine registers, as well as move data between the search registers, and the state machine register, and the general purpose registers.

[0056] The general purpose processor portion also includes a (rule) instruction memory to store instructions, an instruction sequencer, including an instruction pointer, to sequence through a set of instructions stored in the instruction memory, a decoder to decode each instruction. The decoder is able to examine the instructions fed to it and to obtain search parameters and operands or retrieve indexes to locations in a general purpose register file that store such parameters and operands. Thus, the decoder decodes the instructions and then assembles the operands and parameters and prepares the rules that will be presented to the various rule processing execution units.

[0057] Figure 1 is a block diagram of one embodiment of a programmable rule processor. The programmable rule processor integrates traditional microprocessor capability with grammar processing, expression processing and string matching capabilities. Simple string matching is provided by search registers and a search/parse array that search for a set of bytes. The expression processing is

provided by state machine hardware that detects and processes combinations of multiple strings and operators. The grammar processing is achieved by the combined use of these two pieces of specialized hardware along with the general purpose processor to perform contextual and progressive parsing by applying a tree of rules and expressions, resulting in a contextual search with complex control flow.

[0058] Thus, the programmable processor of the present invention integrates parallel pattern matching, contextual search, navigation and progressive rule analysis, state machine hardware and elements of a conventional processor (e.g., integer, load/store, associative lookup, branching).

[0059] Referring to Figure 1, the instructions are stored in an instruction memory 102. Instructions are selected by flow control using an instruction fetch pointer and branch prediction unit 104. The instruction pointer points to locations in instruction memory 102 from which instructions are to be fetched. This occurs during the fetch stage of the hardware pipeline. Instruction fetch pointer and branch prediction unit 104 operate in a manner well known in the art to sequence instructions to decoder 106.

[0060] Decoder 106 reads and decodes instructions during a decoding stage. As far as decoded instructions for rule processing by the search registers and search hardware is concerned, the results from decoder 106 include an identification of the opcode, pattern, mask and navigation control (e.g., windows of where to begin and end searching) for each rule, such as instruction 110, or an indication of where in the general purpose register file 108 such information is stored. The instruction format is expanded to specify rules for searching and analysis of data. Note that other instruction formats may be used. After reading from register file 108, the values can be used to incorporate or write specific values into various fields of a rule that is being assembled.

[0061] As far as decoded instructions for rule processing by the state machine apparatus is concerned, the results from the decoder include an identification of the opcode, the input data values or a pointer to where the data values reside (either in general purpose register 108, or in packet buffers 134, or in an external address), as well as a code or indication as to which of state machine registers 124 and state machine units need to be invoked.

[0062] Next, the parameters of each instruction are supplied by decoder 106 to state machine unit 120, search registers & search/sort arrays 112, integer (or other arithmetic logic unit (ALU)) unit 118, load/store unit 116, and branch unit 114. In another embodiment, this is done with an instruction sequencer unit, which acts both as an instruction sequencer and a decoder.

[0063] Load /store unit 16 loads values into or stores values from the search registers as well as state machine registers 124 as well as streams data into the state machine unit 120.

[0064] The instructions may specify rules for searching and analysis of data. In such a case, the rule is presented to the search registers of search registers & search/sort arrays 112. The search execution hardware finds the specified pattern in the search registers, if it exists. Sort array sorts and delivers the desired match location and match results and completes execution of the search(es). Results of the searching are sent to search results storage 130.

[0065] More specifically, search registers & search/sort arrays 112 comprises search register and a sorter. These will be described in more detail below. The search register stores searchable data, which may be content from a document, message, packet, or any other well-known source of data that can undergo searching. The size of the search register may be arbitrary, and in one embodiment is organized within a larger array, called a search array having multiple rows of a predetermined number of bytes each. Data from search register is stored in a replicated manner inside the search array. Irrespective of the manner in which the searchable data is organized throughout the search array, the search array receives a pattern and mask from rule 110. The pattern is compared against entries in the search array. The mask provides an indication of those bytes in the pattern that are not part of the pattern being searched. In one embodiment, the search array has an output line for each of the rows in the search array indicating whether the pattern being searched matched that content data stored in that particular row. The output lines of the search array are coupled to inputs of the sorter.

[0066] The sorter receives offsets that indicate a starting and ending point, respectively, of a range in the search register that is to be searched. Based on the match indication lines from the search array and the start and end range as specified

by the offsets, the sorter processes the results of the search array. Such processing may include performing one or more operations. These operations may be index resolution functions that output a specific match index pursuant to the type of operation. In one embodiment, the operations include Find_First_Forward, Find_First_Reverse and Find_Population_Count. The operations are specified by the opcode in search instruction 110. The sorter may store intermediate or final results of previous operations that may be used in subsequent operations in conjunction with the match indication lines from the search array. In this manner, the sorter may be used to progressively navigate through the searchable data set by issuing a series of operations that utilize the results of previous operations. Thus, after processing, the sorter generates outputs indicating whether there is a match, and an index associated with the match. The index may indicate the location (address) in the search register where the first match occurs or where the last match occurs with respect to the top of the search register. Alternatively, the index may indicate the number of matches that occurred within the range specified by offsets.

[0067] Following the computation of the outputs, namely, the match indication and the index, they may be utilized to control the execution of one or more search instructions that follow by storing the outputs in general-purpose registers and utilizing indirect specification in subsequent instructions, branching to a specified address in the instruction memory (e.g., instruction memory 102) dependent on the match indication or other similar techniques. For example, the search results in search results storage 130 can be made available for branching via branch unit 114, which causes branching based on those results, or to instruction pointer & branch prediction unit 104 for changing values of the instruction pointer and determining a new set of rules that are to be executed by the rule processor. Note that the branch unit 114 may branch based on a value specified in a rule or opcode field, which branch unit 114 receives after decoding. Branch unit 114 operates in a manner well-known in the art and is described in greater detail below.

[0068] Additionally, the sorter may also be coupled to a register file for storage of results of previous operations for use in subsequent operations that may be executed after an arbitrary number of other operations have been executed. The results of the

sorter may also be coupled to the rule processor instruction sequencer 104 to generate or assist in the generation of rule program offsets (e.g., branch addresses).

[0069] Alternatively, the instructions may specify rules for expression processing or state machine evaluation. Such an instruction may indicate that the state machine unit is to be invoked, what state machines are to be tested and what data is to be streamed or input to those state machines. In such a case, state machine unit 120 performs the expression processing in response to the instructions. State machine controller 122 controls state machine registers 124 based on state machine configuration information. State machine configuration information may be received by state machine unit 120 via load/store unit 116, packet buffers 134 or the buses 136, and state machine controller 122 loads this information in state machine registers 124. The state machine configuration information is used to program state machine behavior into state machine registers 124. Once programmed, data may be streamed across the state machines and the state machines may be evaluated. State machine evaluation unit 126 comprises hardware that evaluates one or more state machines programmed into the state machine registers 124 in view of the data being presented to state machine unit 120. In one embodiment, state machine evaluation unit 126 evaluates a large number of state machines in parallel. One embodiment of state machine unit 120 is described in more detail below.

[0070] Multiple state machines may be evaluated in parallel. Each state machine's behavior is specified in a set of state machine registers. For each state machine register set, a state machine evaluation unit executes the state machine specified in the register set against input data. Multiple state machines are specified via multiple sets of state machine registers. Multiple state machines can be evaluated in parallel, by providing an execution unit for each state machine register set. Each state machine could be fed independent data so that multiple state machines could be evaluated in parallel on multiple distinct data streams.

[0071] Context static random access memory (SRAM) 128 is used to store context information for multiple sets of data being evaluated (e.g., data from multiple different streams). If a packet is from a different stream or connection, then the front-end of the programmable rule processor issues an indication to state machine controller 122 that indicates a new stream (or connection) and not part of the same

stream as the previous bytes being processed. This indication can be issued on either a dedicated instruction or issued on a field of the instruction that invokes the state machine operation. In response, state machine controller 122 causes the accumulated state machine evaluation information that exists in state machine registers 124 and state machine evaluation unit 126 to be stored away as context in context SRAM 128. More specifically, once a new rule provides this indication (e.g., via opcode), state machine controller 122 first stores all temporary status of the execution thus far in context SRAM 128 and loads in the context for the stream corresponding to the new rule. If it is a new stream, there is no context accumulated as yet and it starts with the register context initialized. Note that in this case after the end of the first packet of a fresh stream, fresh context is created. Note that in one embodiment, load/store unit 116 has access to context SRAM 128.

[0072] Note that the state machine unit 120 and search registers and search/sort array 116 act as distinct execution units that may operate in parallel. They may be processing the same or different data, or process the same data at different times.

[0073] In one embodiment, load/store unit 116 stores values into search registers 112 or remove values from search registers 112. Load/store unit 116 could load values into general purpose registers file 108 in a manner well-known in the art. Load/store unit 116 communicates with an on-chip data memory or data cache 132 and external memory (through bus and off-chip interface 136).

[0074] Load/ store unit 116 also reads from and writes from a message buffer or packet buffer (temporary storage) 134. Packets flow into the message buffer or data buffer or packet buffer 134. Load/ store unit 116 may move those into search registers 112 to enable an entire packet or message or document to be stored in search registers 112 via packet buffer 134. This allows the programmable rule processor to receive packet, message, document or stream data and load it into search registers 112 and, using the rule processor, do a series of finds or navigated windowed searches to locate specific portions of the data, characterize the packet, or delineate various zones in the packet or regions of interest in the packet wherein more pattern matching or state machine evaluation has to be performed. Rulesets stored in instruction memory specify the high level control flow of the program that includes the overall control flow graph specifying the graph or tree of rules that needs to be applied or performed.

A variety of rich sequences or rulesets or grammars could thus be applied to the data. For example, initially, based on a context search to be performed, search registers 112 are loaded to find a zone of interest. Once the zone of interest in the data has been found, load/store unit 116 transfers that region to state machine unit 120 for application of a certain number of rules or regular expressions to that zone or portion of data. After transfer, a new rule is presented to state machine controller 122 that indicates which state machines to evaluate against this zone of data.

[0075] Load/store unit 116 can access state machine unit 120. For example, load/store unit 116 can send values to program state machine registers 124 with state machine behavior. Load/store unit 116 may provide data from a number of sources for evaluation. Load/store unit 116 may provide data from packet buffers 134 and can be streamed or fed to state machine unit 120. Load/store unit 116 can provide data or from buses via off-chip interface 136. Load/store unit 116 may send program or data values. State machine unit 120 then evaluates such data by having state machine controller 122 take the data and feed it to state machine registers 124 and state machine evaluation unit 126 for evaluation.

[0076] Note that although not shown, in one embodiment, state machine unit 120 and the search registers and search/sort arrays 112 may be coupled together using dedicated buses or shared buses to transfer data and/or results between each other.

[0077] Integer unit 118 performs general purpose integer functions. In one embodiment, integer unit 118 computes indexes or addresses, or transforms data that may be then fed back to the search registers or state machine registers.

[0078] Thus, one embodiment of the programmable rule processor includes three sets of registers. These include general purpose registers and two other sets of registers, namely search registers and state machine registers. An execution unit is coupled to each of the search registers and the state machine registers. For the state machine registers, the execution unit is the state machine evaluation unit, while for the search registers, the execution unit is the search and sort array. Thus, the rule processor takes a conventional microprocessor front-end and adds search registers and a search and sort execution hardware and state machine registers and state machine evaluation unit to evaluate state machines.

[0079] Figure 2 is an example illustrating the capability of one embodiment of the rule processor executing a rich rule tree comprising a sequence of operations that include a protocol decode function followed by the use of regular expression processing to find patterns of interest in specific portions of the input data. Referring to Figure 2, the rule tree is shown with two phases or levels.. The first phase involves a protocol decode operation in which packets going through a network are examined and decoded to understand what protocol is in effect. This requires pattern matching on potentially all the bytes in each packet. In this case, the search registers and search/parse array are used to perform a series of find operations. In this example, various routines of FindForward and FindNotForward operations, which are discussed in more detail below are used to determine if the protocol being used is HTTP and to determine if a GET command or a POST command is being used. More specifically, FindNotForward and FindForward operations locate where the commands begin and end as well as locating arguments for any universal resource indicator (URI). Note that each of a series of such location operations may be executed in a single iteration of a cycle.

[0080] After determining that the packet is some type of HTTP packet, determining if a get command or a post command exists, and after locating the arguments, the last sequence shown in the program, the FINDRE sequence or function, is used to determine if a set of patterns exists. To that end, the start and end locations that were found by the search register and search/parse execution hardware identify where the relevant bytes are in the search registers that may be extracted by the load/store unit and sent to the state machine unit for processing thereby. The instruction sequencer provides a command to point to a group of state machines for evaluation and the state machine controller decodes the group and invokes them against the data. In the end, results are available that indicate whether any of the URIs were found in that zone (i.e., whether there was a match). The result information can be passed back to the remainder of the rule processor, which may, for example, use the branch unit to branch to some other location based on those results (maybe due to some pattern identified in the payload of the packet).

[0081] Thus, one embodiment of the programmable rule processor performs stateful inspection, pattern matching, analysis, and state machine evaluation on high speed data streams.

[0082] Embodiments of the rule processor described herein include one or more advantageous features. For example, one embodiment of the rule processor may utilize a non-procedural high-level language to describe data and data patterns. The use of high level descriptions reduces coding effort. Embodiments of the present invention also provide support for complex protocols and data layouts, such as, for example, variable size, string terminated, conditional, overlaid, or arbitrarily ordered data, as well as arbitrary data layouts.

Exemplary Card Configurations

[0083] Figure 3 illustrates interfaces of one embodiment of a rule processor.

Referring to Figure 3, rule processor 300 includes a host interface 301, a streaming interface 302, a memory interface 303, and a look-aside interface 304. Host interface 301 may comprise, for example, a PCI-X interface. Streaming interface 302 may comprise, for example, a SPI 4.2 interface or a HT & Cascade interface. Memory interface 303 may comprise, for example, a DDRII interface. Look-aside interface 304 may comprise, for example, a LA-1 interface. Note that in other embodiments, the rule processor may have additional interfaces or a subset of the interfaces shown in Figure 3.

[0084] A rule processor, such as rule processor 300, may be included in a number of card configurations. Figures 4-6 illustrate a number of exemplary card configurations. Figure 4 is a block diagram of a line card look-aside configuration. Figure 5 is a block diagram of a line card flow-thru configuration. The in-line codes operate on a stand-alone basis. Therefore, in such a configuration, the rule processor does not send results back to a host processor. The rule processor receives packets on one interface, unravels the packets and determines the protocol to detect packets. The rule processor creates results and may modify the data to be sent. Subsequently, the rule processor sends the data to its next destination. Note that rule processor performs, storing, routing, delivery and other network functions.

[0085] Figure 6 is a block diagram of a server co-processor card configuration. In this configuration, the host processor receives a message, because the host processor handles all of the network functions. The host processor sends a message (packet or buffer) and some instructions indicating what type of rule processing is to be applied to the rule processor. In response, the rule processor applies a rule processing sequence or program and then sends the results to the host processor. The host is then able to take any action, if necessary.

[0086] Referring to Figure 4, the line card configuration comprises a rule processor 401 having a memory 402 coupled to its memory interface and a network processor 403 coupled to a streaming interface of rule processor 401. Rule processor 401 has a host interface for coupling to a host or other control plane.

[0087] Network processor 403 is coupled to a memory 404 and includes an interface 407 for coupling to a host or other control plane. Network processor 403 has an input 405A and an output 405B. Input 405A is coupled to receive network traffic, which network processor 403 forwards to rule processor 401 for processing (e.g., attack detection using patterns, rules, expressions and grammar). The network traffic is forwarded from network processor 403 via output 406.

[0088] Referring to Figure 5, the line card flow-thru configuration comprises a rule processor 501 having a memory 502 coupled to its memory interface, an output 505B of a network processor 503A coupled to its streaming interface, and an input 506A of a network processor 503B coupled to its look-aside interface. Rule processor 501 has a host interface for coupling to a host or other control plane.

[0089] Network processor 503A is coupled to a memory 504A and includes an interface 507A for coupling to a host or other control plane. Network processor 503A has an input 505A and an output 505B. Input 505A is coupled to receive network traffic, which network processor 503A forwards to rule processor 501, via output 505B, for processing (e.g., attack detection using patterns, rules, expressions and grammar). After processing, rule processor 501 forwards the network traffic to network processor 503B via input 506A. Network processor 503B is coupled to a memory 504B and includes an interface 507B for coupling to a host or other control plane. Network processor 506B outputs network traffic via output 506B.

[0090] Referring to Figure 6, the co-processor card resembles a standard PCI-X card that includes a host processor 606 coupled to a chipset 604 via a host interface.

Chipset 604 includes a memory interface coupled to host memory 605. Chipset 604 also includes two PCI-X interfaces, one coupled to a network interface card (NIC) 603 and the other coupled to a host interface of rule processor 601. Rule processor 601 also includes a memory interface coupled to memory 602.

[0091] In the arrangement in Figure 6, content is received via NIC 603 and is sent via chipset 604 to host memory 605. Processor 606 receives an indication (e.g., interrupt) indicating that content has been received and is stored in host memory 605. In response, host processor 606 signals rule processor 601 to handle the content processing. Once completed, rule processor 601 signals host processor 606, which signals NIC 603 indicating to NIC 603 that the data in host memory 605 is ready for transfer. Finally, NIC 603 access the network traffic from host memory 605 via chipset 604 and sends the network traffic out to the network

An Exemplary Embodiment of Search Register and Search/Sort Array Hardware

[0092] One embodiment of the search register and search/sort array hardware is given below. Note that alternative embodiments of search register and search/sort array hardware may be used.

[0093] Figure 7 is a block diagram of a portion of one embodiment of a rule processor comprising search registers 701 and search execution hardware 702. Such a portion may be part of the rule processor of Figure 1. Search instruction 703 is presented to search registers 701 and search execution hardware 702. As described above, the processor further comprises of an instruction store referred to as rule/instruction memory 704 and an apparatus to control the flow of instructions that includes, in one embodiment, instruction sequencer 705 and instruction pointer 706.

[0094] A typical search entails presentation of an instruction or rule to the search registers. The rule specifies a pattern along with one or more additional search parameters. In one embodiment, the search function returns a number of results. These include an indication of whether or not a match was found between the pattern and the content in the search registers, and also a match location indicating where in the payload search registers the match occurred.

[0095] Additional search control parameters are provided by the rule processor to search execution hardware 702. Search instructions might provide a mask vector along with a set of bytes comprising the target search pattern. The mask vector might be comprised of bits that correspond to the target pattern byte or bytes. In one embodiment, specific bytes in the target pattern to be ignored during the search operation are selected by setting the corresponding bits in the mask vector to a predetermined logic level of 0 or 1. Thus, the target pattern used in the search may be reduced in size. Additionally, the rule processing instructions may specify starting and ending locations that constitute a search window or a range of bytes in search registers 701 within which the search is constrained.

[0096] Additional parameters to search instructions may include a branch address to be utilized by the rule processor in the event of an unsuccessful search.

[0097] An example of a search instruction is a windowed-find-first-forward instruction. In one embodiment, in a windowed-find-first-forward search, given an 8-byte pattern specified in or by a rule, an 8-bit mask, a starting location offset address pointing to a starting byte in the content data (e.g., document data) in search registers 701, and an ending location offset address pointing to an ending byte in the content data (e.g., document data) in search registers 701, the search returns the starting address in search registers 701 of the first string after the specified starting location address that matches the masked pattern, providing this address starts before the ending location offset address. In another example, a windowed-find-first-reverse search may be performed. In one embodiment, in a windowed-find-first-reverse search, given an 8-byte pattern in the rule, an 8-bit mask, a starting location offset address pointing to a starting byte in the content in search registers 701, and an ending location address pointing to an ending byte in the content in search registers 701, the search returns the starting address of the last string before the specified ending location address that matches the masked pattern, providing this address starts after the starting location offset address.

[0098] The rule processor also provides a control store or rule memory 704 that contains rules or rule sets to be applied to the payload data. In one embodiment, the memory 704 holds rule sets or sequences of instructions or code that describe patterns, rules, expressions or grammars that need to be applied and detected in search

registers 701. The rule vocabulary may specify a range of operations, including, but not limited to, global or local (windowed) searches with either exact matches or partial matches, with individual and multiple match information delivered to some registers, primitives to generate offsets and addresses in the output payload of the rule processor, as well as logical and computational operators to be applied to the search results. Such rules may be composed of multiple fields that specify the various parameters described above. Each parameter may be directly specified within the rule or, alternatively, indirectly specified through the use of a pointer to a register or memory location containing the value to be used. In embodiments where both direct and indirect specifications are permissible, each such field may contain an additional sub-field that indicates whether direct or indirect specification is being utilized.

[0099] In one embodiment, the rule processor performs sequences of prioritized and directed searches of anchored or unanchored patterns and windowed and ranged searches for an arbitrary long pattern starting at any arbitrary location in a document, stream, message, or packet. The patterns as well as the range control and program control flow (e.g., branch addresses) can be specified statically in rules contained in the program store or dynamically selected indirectly from a register file using a pointer or index set forth in a rule. This enables powerful dynamic and contextual pattern matching.

[00100] The rule processor presents one or more rules of a search to a search register structure. In one embodiment, the search register is a 2KB register file with each entry being one byte wide. Data to be searched is loaded in the search register file. Each rule may specify a pattern that is presented to the search register file to determine if the pattern is present in the data stored therein. A mask may also be provided to further configure the pattern and/or to reduce the size of the pattern being used in the search.

[00101] Referring to Figure 7, search registers 701 and search execution hardware 702 is collectively presented with a search instruction 703. Search instruction 703 is further illustrated in Figure 8A. Referring to Figure 8A, search instruction 801 comprises an opcode 801a that describes the type of search operation, a search pattern 801b, a mask 801c that specifies the bytes in the pattern that are relevant to the current search instruction and two offsets 801d and 801e that specify

the starting and ending bounds, respectively, of the locations in the search register that are relevant to the current search instruction. Search execution unit 802 outputs a result 803 that, in one embodiment, comprises an indication of the success of the search operation and additionally includes one or more parameters such as, but not limited to, an index that indicates the location within the search register that met the search instruction of the search operation.

[00102] Search execution hardware 802 comprises search register 802a and a sorter 802b as shown in Figure 8A. Search register 802a stores searchable data, which may be content from a document, message, packet, or any other well-known source of data that can undergo searching. The size of search register 802a may be arbitrary, M bytes, and in one embodiment is organized within a larger array, called a search array 802c, of M rows of N bytes each. Data from search register 802a is stored in a replicated manner inside the search array

[00103] In one embodiment, data to be searched is stored in search register 802a by use of a data generator 813, based on addresses generated from address generator 811, which are decoded by address decoder 812. The process of storing also entails recording the size of the searchable data in search register 802a. For data sets that are smaller in size than the capacity of search register 802a, search register 802a provides a mechanism to restrict the search operation to the appropriate data. In one embodiment, data generator 813 may store a pattern that is established a priori to be data that will be ignored for search operations in the remaining locations of search array 802c or in an alternate embodiment search register 802a disables the appropriate locations of search array 802c from participating in search operations.

[00104] Irrespective of the manner in which the searchable data is organized throughout search array 802c, search array 802c receives a pattern 801b and mask 801c. Pattern 801b is compared against entries in search array 802c. In one embodiment, search array 802c has M rows of N bytes, where N is the same number of bytes as are in pattern 801b. Mask 801c provides an indication of those bytes in pattern 801b that are not part of the pattern being searched. In other words, if pattern 801b is a pattern that is less than N bytes, mask 801c specifies which bytes of pattern 801b search array 802c is to ignore. In one embodiment, search array 802c has an output line for each of the M rows in search array 802c indicating whether the pattern

being searched matched that content data stored in that particular row. In one embodiment, if the output is a 1, the pattern matched content data in the particular row. The M output lines of search array 802c are coupled to inputs of sorter 802b.

[00105] Sorter 802b is also coupled to receive offsets 801d and 801e that indicate a starting and ending point, respectively, of a range in search register 802a that is to be searched. In one embodiment, these offsets are $\log_2 M$ -bit numbers. Based on the match indication lines from search array 802c and the start and end range as specified by offsets 801d and 801e, sorter 802b processes the results of search array 802c.

Such processing may include performing one or more operations. These operations may be index resolution functions that output a specific match index pursuant to the type of operation. In one embodiment, the operations include Find_First_Forward, Find_First_Reverse and Find_Population_Count. The operations are specified by opcode 801a in search instruction 801. Sorter 802b may store intermediate or final results of previous operations that may be used in subsequent operations in conjunction with the match indication lines from search array 802c. In this manner, sorter 802b may be used to progressively navigate through the searchable data set by issuing a series of operations that utilize the results of previous operations.

Additionally, sorter 802b may also be coupled to a register file for storage of results of previous operations for use in subsequent operations that may be executed after an arbitrary number of other operations have been executed. The results of sorter 802b may also be coupled to the rule processor instruction sequencer, such as instruction sequencer 705 of Figure 7, to generate or assist in the generation of rule program offsets (e.g., branch addresses).

[00106] After processing, sorter 802b generates outputs indicating whether there is a match, and an index associated with the match. The index may indicate the location (address) in search register 802a where the first match occurs or where the last match occurs with respect to the top of search register 802a. Alternatively, the index may indicate the number of matches that occurred within the range specified by offsets.

[00107] Note that the range specified by the offsets may be changed dynamically. For example, a first search instruction may be applied to search array 802c initially while a range that is specified by offset 801d and offset 801e comprises all rows of search array 802c. However, after the first search instruction and a match is

identified, the start and end ranges may be changed in a subsequent search instruction such that the searching begins from a location that includes the match lines found within the range specified by the previous search instruction. This capability is achieved by using the indirection functionality that allows fields of a rule or an instruction to reference values in a general purpose register file.

[00108] In Figure 8A, in one embodiment, search array 802c is comprised of 2K rows of 8 bytes each. Thus, search register 802a holds 2K bytes of data. Search array 802c holds replicated data. Each 8-byte string that begins with a distinct byte in search register 802a is stored as a distinct row of bytes in search array 802c. These strings are comprised of the distinct byte from search register 802a and additionally 7 consecutive bytes that follow that byte in search register 802a. Thus, each row of search array 802c holds the 7 most significant bytes of the previous row and additionally one immediately succeeding higher order byte, which is appended to the right of these 7 bytes.

[00109] Data is loaded into search array 802c by data generator 813, which, in one embodiment, supplies the appropriate 8 bytes of data for each row from the source data.

[00110] In one embodiment, an 8-byte search pattern is presented in each search instruction. The search pattern is aligned with search array 802c such that each of the 8 columns in the array is presented with a unique byte. This is shown in Figure 8B. Referring to Figure 8B, state bytes 1 through 8 are stored in the search array for each of rows 1 through 2K. For each byte that is stored as an element of the search array of 2K rows and 8 columns shown in Figure 8B, there exists a signal line 310. For example, byte 1 of row 1 generates signal line 310₁₁, byte 2 of row 1 generates signal line 310₁₂, byte 1 of row 2 generates signal line 310₂₁, and so forth. The signal for each byte is asserted during a search operation when the stored byte matches the byte of the search pattern that is presented to the same column that the element belongs to. In this embodiment, where each row contains 8 bytes, 8 signal lines, for example 310₁₁ through 310₁₈, are used to indicate each of the byte level matches in the row. The byte level matches for each row are ANDed together with the masks from masks 102c in row & mask resolver blocks 311. The result of the AND function is an indication of whether a match occurred in each row. In this embodiment, where the

search array includes 2K rows, 2K match lines are output to the sorter. The circuit structure of two of the byte elements 312 in this array is shown in Figure 10. The circuit operates in a manner that provides a fully parallel search operation by performing a simultaneous search within all its rows in one clock period. When a search operation is conducted, all byte level match lines 401 in a column simultaneously indicate matches with their respective stored bytes. A search operation is invoked on all columns simultaneously allowing the masked reduction block in each row to indicate a row level match. Thus, in this embodiment of the search array, in a single clock, a parallel search of all 2K strings in the search register that are comprised of 8 contiguous bytes is performed and the results are indicated on the 2K match lines.

[00111] Figure 9A is a block diagram of one embodiment of a sorter. Referring to Figure 9A, match lines 910 from the search array are coupled to and input to a range mask and select unit 901. In one embodiment, match lines 910 comprise match 1 to match 2048. Range mask and select unit 901 receives a pair of offsets specifying a range of rows of the M match lines from search array to perform further processing. In one embodiment, the offsets are 11 bit numbers that are converted into 2K mask bits that may be ANDed together with the match lines to provide an output. Such an example is shown in Figure 9B in which the offset for the start range is converted to one or more zeros with the remainder of the bits being a one bit, while the offset for the end of the range is converted to all zeros starting from the bottom up to a certain point after which all bits are ones. By ANDing these registers with the match lines, the matches that occur within the specified start and ending range are output without change, while other match lines outside the range are masked (e.g., changed to a predetermined logic level).

[00112] The output of range mask and the select unit 901 is coupled to the inputs of index resolution functions unit 902. In one embodiment, index resolution functions unit 902 includes one or more functions that are performed on the outputs of range mask and select unit 901. For example, as shown, the sorter includes an ascending priority encoder 902A to find the first occurrence (with respect to the top of the search array) of a match between the specified pattern of N bytes and the content data in the search array as indicated by the non-masked match lines. A descending priority

encoder 902B may also be included to find the last occurrence (with respect to the top of the search array) of a match between the N byte pattern and the content data in the search array as indicated by the non-masked match lines. A population counter 902C indicates the number of matches that occur between the N byte pattern and the data in the search array as indicated by the non-masked match lines. Other index selectors may also be used.

[00113] The outputs of index resolution functions unit 902 are input to an index combine and select unit 903, which is also coupled to receive opcode 102a. The opcode 102a is specified in the search instruction and selects one of the index resolution function outputs as the output of the sorter. Index combine and select unit 903 generates a match indicator 921 indicating that there was match along with an index 922 indicating that the location within the search array of the data that is either the first occurrence of a match if the output ascending priority encoder 902A is selected, the last occurrence of a match in case the output of descending priority indicator 902B is selected, indicates the number of matches in the non-masked match lines if the pop counter 902C is selected, etc. Following the computation of the outputs, namely, match indicator 921 and index 922, they may be utilized to control the execution of one or more search instructions that follow by storing the outputs in general-purpose registers and utilizing indirect specification in subsequent instructions, branching to a specified address in the instruction memory (e.g., instruction memory 704) dependent on the match indicator 921 or other similar techniques.

[00114] Figure 11 illustrates the micro architecture of a rule processor that includes search apparatus. Referring to Figure 11, the search instructions are stored in an instruction memory 1101. Instructions are selected by flow control using an instruction fetch pointer register 1102. Instructions are decoded by a decoder 1103. The individual subsets of each instruction are either taken from the instruction or fetched from general purpose register file 1104. Then the various subsets of each instruction are supplied to the separate units, namely, search array 1105, sorter 1106 comprising of a sort unit 1106a followed by a characterization unit 1106b, a conventional arithmetic logic unit (ALU) 1107, as set forth above. In one embodiment, the processing of each instruction follows a 4-stage pipeline consisting

of (i) instruction fetch stage 1108, (ii) an instruction assembly stage 1109, (iii) a search/execute stage 1110, and (iv) a sort and delivery of results and/or branch stage 1111.

[00115] In one embodiment, the rule engine instruction format comprises a number of bits are divided into subsets that contain various fields to issue directives to various hardware engines on the rule processor. In one embodiment, the search subset contains a search/sort opcode field, a pattern field (in one embodiment, this contains a value or a pointer to a location that provides a value along with an additional bit(s) that specifies whether the value in the instruction is a pointer or not), a byte level mask field, a start location address field (in one embodiment, this field, comprises a value or a pointer to a register that provides the value, and including an additional bit(s) to indicate whether the start location address contains the value or such a pointer), an end location address field (in one embodiment, this field, comprises a value, or a pointer to a register that provides the value, with an additional bit(s) to specify whether the end location address information is a pointer or not), a result register field that specifies where the results of the search operations are to be returned and a branch address field (in one embodiment, this field comprises a value or a pointer to a register that provides the value, with an additional bit(s) to specify whether the branch address information is a pointer or not)

[00116] Figure 12 illustrates an example pseudo-code 1201 of a rule-set that may be processed by one embodiment of the rule processor described above. The rule has multiple patterns with some specific constraints on the locations of where such patterns may exist in a message or document or packet. The constraints are expressed in the pseudo-code through the use of key words such as BEFORE and AND. For purposes of simplicity, the patterns in 1201 are used in this example without any additional delimiters between strings, which may be the case in practice. Also, in Figure 12 is a listing 1202 of the corresponding micro-code for the exemplary rule processor. The format of the instructions is as described earlier. Using the first instruction 1203 for illustration, it consists of the FIND_FIRST_FORWARD opcode where all 8 bytes of the Pattern "cp /bin/" are relevant for the search (through the use of 0xFF as Mask) with the start and end offsets expressed as constant values (through the use of Indirection Flags) to denote the start and end of the searchable payload held

in the search registers. For purposes of brevity, the derivation of the constant numbers has been skipped here. The result of this opcode is shown to be loaded into general purpose register A and lastly the branch address is specified as the constant value of 11 which is the instruction that would follow the micro-code snippet shown in Figure 12. This instruction will cause the search execution hardware to search for the occurrence of "cp /bin/" within byte locations 0x03D and 0x800 of the search registers 802a. All rows in the search array 802c that match will assert their respective match lines 910 by the end of the search execution stage 1110 of the micro-architectural pipeline. In the sort and branch stage 1111, the sorter 802b converts 0x03D and 0x800 into bit vectors as illustrated in Figure 9B. The bit vectors are used to perform the range mask and select function 901 to negate any matches that start outside of the location window from 0x03D to 0x800. Of the remaining matches that are now within the location window, the opcode of this instruction chooses the ascending priority encoder 902a from the index resolution functions 902 to convert the lowest numbered match into an 11-bit binary encoded location. If such a match was found, match 921 would be asserted and index 922 would hold the 11-bit location. If match 921 were to be not asserted because a match was not found, the instruction sequencer 705 would load the branch address 0xB into the instruction pointer 706. Index 922 would be loaded into general-purpose register A by the control circuitry of the register file 1104. The load into general-purpose register A and the load of the instruction pointer, if applicable, will be completed by the end of the sort and branch execution stage 1111. Second instruction 1204, FIND_FORWARD_ANCHORED, further illustrates the rich vocabulary of the exemplary rule engine. It is a variant of FIND_FIRST_FORWARD in that the match begins at the start_offset for the search to be successful.

[00117] Figure 13 illustrates the execution of the micro-code shown in Figure 12 within the micro-architecture of the exemplary rule processor shown in Figure 11. Table 701 shows the execution across multiple clock cycles. For purposes of simplicity, it is assumed that all the search instructions are successful in finding the specified patterns in the search registers. In one embodiment, the execution proceeds in a pipelined fashion through the 4 stages described in Figure 11. Through the use of indirect specification, the execution of a search instruction can use the offsets

calculated in the immediately preceding instruction. Therefore, instructions 1 through 8 are executed in consecutive cycles. Instruction 8 is a branch dependent on the result of the comparison of the contents of general purpose register A and general purpose register B which are computed in clock cycle 8 and clock cycle 9 respectively. The branch is taken in clock cycle 11 and the instruction execution completed in clock cycle 14. Thus, the complex pattern matching expression described using pseudo-code 1201 is executed in only 14 clock cycles using the rich instruction vocabulary of the exemplary rule processor. This example illustrates the capability and efficiency of the exemplary rule processor on execution of functions that include dynamic and contextual search and analysis of documents, messages or packets.

An Exemplary Embodiment of State Machine Unit Hardware

[00118] One embodiment of state machine unit hardware is described below. Note that other embodiments of state machine unit hardware may be used.

[00119] A state machine evaluation architecture is described that allows for efficient implementation and evaluation of state machines and finite state automata. In one embodiment, the apparatus employs a technique of building graphs using circuits in a way that enables, in a programmable manner, the physical realization of any arbitrary control flow graph in hardware. The apparatus provides a high performance and compact solution for implementation of multiple state machines as well as large and complex state machines. The apparatus can be used for efficient parsing and evaluation of data via the hierarchical application of thousands of regular expressions on the incoming data stream. Such an apparatus may be the central evaluation engine for a regular expression processor. Note that one embodiment of finite state machine units are described in U.S. Patent Application No. 10/650,364 entitled "Method and Apparatus for Efficient Implementation and Evaluation of State Machines and Programmable Finite State Automata," filed on August, 27, 2003; and U.S. Patent Application No. _____, entitled "_____" concurrently filed with this application, which are incorporated herein by reference.

[00120] Figure 14 illustrates a basic state machine evaluation building block or finite state automata building block (FSA building block) from a programming perspective in accordance with one embodiment of the invention. FSA building block 1400,

shown in Figure 14 includes a number of registers that allow the FSA building block to be fully programmable. Register 1401 contains node elements that specify the current state of the FSA. Register 1402 contains state transition evaluation symbols on which match a state will be transitioned. Register 1403 contains a state transition connectivity control matrix that specifies which states of the FSA are connected (i.e., the enabled state connections).

[00121] Initially, the nodes are in a certain state. With each evaluation cycle, an input (e.g., an input byte) 1405 is input to the state transition dynamic trigger computation 1410, which compares the input to the state transition evaluation symbols contained in register 1402. The comparison information is input to the state transition interconnections and next state evaluation logic 1415. Then, based on the nodal connections contained in register 1403, the next state is computed and latched and then becomes the current state. That is, the next states are calculated using triggers, connectivity controls, and current state bits. The architecture of the FSA building block allows a character of input data to be analyzed every clock cycle without the need for external memory.

[00122] Figure 15 illustrates a logic circuit for implementing an FSA building block in accordance with one embodiment of the invention. The logic circuit 1500, shown in Figure 15, may be used to implement a state machine architecture for realization of a non-deterministic finite state automata with R nodes, R symbols, and R^2 arcs. In Figure 15, R has been set to a variable M , and the hardware organization is designed and laid out to be scalable for any M . By fixing the value of M and providing the appropriate level of hardware, an FSA building block with specifically M instantiated nodes can be realized.

[00123] The node elements N_1-N_M are fully connected with interconnections 1501. Each node element has an arc or interconnection to itself, as well as to each of the other node elements. Hence, for $M=32$, there are 32×32 or 1024 interconnections 1501. Likewise, for $M=16$, there are 16×16 or 256 interconnections 1501.

[00124] For $M=32$, the state transition connectivity controls 1502 comprise 1024 bits organized as a matrix of 32 bits \times 32 bits. Likewise, for $M=16$, the state transition connectivity controls 1502 comprise 256 bits organized as a matrix of 16 bits \times 16 bits. A bit in row Y and column Z represents the control to enable or disable an

interconnection between node element N_Y and node element N_Z . The mechanism by which the interconnections 1501 between node elements N_1 - N_M can be enabled or disabled by the state transition connectivity controls 1502 is embodied as a switch on the interconnection (e.g., wire) 1501, with the switch being gated by the relevant control bit for that interconnection. This could be implemented using AND gate logic as well.

[00125] In this embodiment, there are as many state transition evaluation symbols 1503 as there are states in the machine. For $M=32$, there are 32 symbols. For $M=16$, there are 16 symbols. Each symbol could comprise a single 8-bit character value and compare operator, so that input data is specified for comparison to the 8-bit character value to compute the state transition dynamic trigger 1504. In this embodiment, the logic for the state transition dynamic trigger 1504 computation is as follows. A fresh byte of input data is fed simultaneously to all M comparators. A set of M match lines act as state transition dynamic triggers 1504. Once again, M may be either 16 or 32.

[00126] The mechanism by which the state transition dynamic triggers 1504 govern the update and transfer of values between node elements N_1 - N_M (over interconnections 1501 that have been enabled) is implemented in this embodiment as simple AND gate logic. That is, AND gates in cooperation with OR gates act to enable and/or disable interconnections 1501.

[00127] The data transfer unit 1505 dynamically configures and programs the state transition connectivity controls 1502 and the state transition evaluation symbols 1503. This enables dynamic realization of a range of control flow graph structures or configurations. In this embodiment, for $M=32$, the bit matrix for the state transition connectivity controls 1502 can be implemented as 32 registers of 32 bits each. Likewise, for $M=16$, the bit matrix for the state transition connectivity controls 1502 can be implemented as 16 registers of 16 bits each. In this embodiment, for $M=32$, the storage for the state transition evaluation symbols 1503 can be implemented as 32 registers of 8 bits each. Likewise, for $M=16$, the storage for the state transition evaluation symbols 1503 can be implemented as 16 registers of 8 bits each.

[00128] The data transfer unit 1505 also provides access to read and write the node elements N_1 - N_M . For $M=32$, the node elements could be viewed as a logical register of 32 bits. Likewise, for $M=16$, the node elements could be viewed as a logical

register of 16 bits. The data transfer unit 1505 executes load and store operations to read and write values from and into all these registers. This ability to read and write the node elements N_1 - N_M can be used to enable the data transfer unit 1505 to communicate with an external interconnect fabric to connect the state machine building block to other such building blocks, in order to construct larger state machines or graphs. The data transfer unit 1505 outputs values from selected node elements on dedicated signal wires, which can be sent to, for example, other state machines (e.g., another FSA building block) or an external interconnect fabric. Likewise, it receives values from the external interconnect fabric on dedicated signal wires. These values can be transferred into selected node elements.

[00129] A single reset signal 1507 is fed to various elements of the apparatus to clear values to zero.

[00130] Before the start of the state machine evaluation, the state transition connectivity controls 1502 and the state transition evaluation symbols 1503 should have been programmed with desired configuration values. Hence, the signal values in the storage assigned for these controls will be stable before the state machine evaluation begins.

[00131] In one embodiment, there is a mechanism to control the start of the state machine evaluation. In one embodiment, for $M=32$, the start state select controls 1509 consist of a register of 32 bits. In one embodiment, for $M=16$, the start state select controls 1509 consist of a register of 16 bits. Each bit in this register corresponds to a node element. Any number of bits in this register could be set to 1 (active). Upon initialization of the state machine, node elements that correspond to active bits in the start state select controls 1509 register will start as active states.

[00132] In one embodiment, the progress of the state machine evaluation is conditioned by a clock 1508 that determines an evaluation cycle. In one embodiment, every evaluation cycle, a fresh byte of input data is presented to the apparatus, and this byte is evaluated in parallel against all state transition evaluation symbols (in this embodiment, this is a comparison of the input byte versus the 8-bit character value), leading to an update of set of M match lines representing the state transition dynamic triggers 1504. These M triggers 1504, along with the M^2 bits corresponding to the state transition connectivity controls 1502, combine with the current state values in

the node elements N_1 - N_M to compute the next state value for each node element. The logic equation for the computation of the next state of each node element is as follows:

If the state transition dynamic triggers are T_1 to T_M

If node elements are N_1 to N_M

If state transition connectivity controls are a bit matrix $C_{I,J}$ with $I=1,M$, and $J=1,M$

Then, given previous state PS_K for node element N_K , the next state NS_K is as follows:

$$NS_K = \text{OR} ($$

$$[PS_1 \text{ AND } T_1 \text{ AND } C_{1,K}],$$

$$[PS_2 \text{ AND } T_2 \text{ AND } C_{2,K}],$$

$$\dots\dots\dots$$

$$\dots\dots\dots$$

$$[PS_I \text{ AND } T_I \text{ AND } C_{I,K}],$$

$$\dots\dots\dots$$

$$\dots\dots\dots$$

$$[PS_M \text{ AND } T_M \text{ AND } C_{M,K}]$$

$$)$$

Effectively, for each node element, the next state computation is a large OR function of M terms. Each term is computed by ANDing together 3 values – the previous state value of a node element, the corresponding dynamic trigger, and the corresponding connectivity control bit that indicates whether that particular interconnection 1501 is enabled.

[00133] Once the next state computation is complete, the node elements are updated with the next state values, and the state machine completes a single evaluation cycle. As can be seen by the logic equations for the next state computation, the evaluation cycle time for the apparatus is three levels of logic evaluation. The first level comprises of AND gates to compute the triggers, the second level comprises of AND gates to factor in the connectivity controls, and finally an M -input OR gate. This

evaluation cycle time is considerably shorter than the cycle time that governs the operating frequency of commercial microprocessors.

[00134] Note that the sequence of steps described above represents the computation needed in a single logical evaluation cycle. Physically speaking, additional pipelining is possible, to further boost the frequency of operations. For example, the computation of the state transition dynamic triggers (given a fresh byte of input data) can be decoupled from the next state evaluation.

[00135] In one embodiment, there is a mechanism to control the halting of the state machine evaluation. For $M=32$, the accept state select controls 1510 consist of a register of 32 bits. For $M=16$, the accept state select controls 1510 consist of a register of 16 bits. Each bit in this register corresponds to a node element. Any number of bits in this register could be set to 1 (active). Once the state machine enters into any of these states (corresponding node element goes active), the state machine halts its evaluation.

[00136] The foregoing provided a description of the evaluation cycle for a single FSA building block. When such an FSA building block is coupled to other state machines (e.g., another FSA building block) via the external interconnect fabric, an additional synchronization handshake would be incurred to enable the respective evaluation cycles to be coordinated.

[00137] The basic FSA building block, as described above, may be implemented in various ways. The remainder of the detailed description will discuss specific embodiments that address a number of concerns.

[00138] As discussed above, embodiments of the invention provide a fixed-size FSA building block (i.e., an FSA building block having a fixed number of states) to facilitate efficient implementation. In alternative embodiments, FSA building blocks of various sizes may be implemented. However, a regular, repeatable structure of a fixed size FSA building block allows for efficient implementation of a large number (e.g., 1000) of FSA building blocks on a chip.

[00139] The fixed size FSA building block, while easier to implement, raises the issue of how to address REs having a number of states greater than the fixed size of the FSA building block. For one embodiment of the invention, a fixed size for the FSA building block is determined based upon the particular problem space, and two

or more FSA building blocks are connected (stitched) to accommodate REs having a greater number of states.

[00140] For one embodiment, the stitching of FSA building blocks to solve REs having an excessive number of states is accomplished as follows. The RE is converted into a syntax tree. The syntax tree is then split into a number of sub-trees, each having a number of characters that is no greater than the fixed size of the FSA building block. This division of the syntax tree may be effected using a number of well-known algorithms. Each sub-tree is then converted to an NFA having a number of states that can be accommodated by the fixed size FSA building blocks. The NFA for each sub-tree is then implemented on a separate FSA building block and each of the separate FSA building blocks are then stitched together to effect evaluation of the RE.

[00141] Depending upon the size of the REs in the problem space, a number of the FSA building blocks may be grouped together. For example, for a fixed size FSA building block of 16 states, grouping 16 FSA building blocks together would accommodate an RE having 256 states. For one embodiment of the invention, the approximately 1000 FSA building blocks on a chip are divided into groups of 16 FSA building blocks each. By interconnecting each FSA building block with all FSA building blocks within its group, clock penalties for cross-group transitions are avoided.

[00142] For one embodiment, each group of FSA building blocks is not interconnected with every group, rather the groups are cascaded with some groups "triggering" one or more particular other groups. For one embodiment, where such architecture is unable to accommodate an excessively large RE, a controller is employed to read the state of the FSA building block(s) and explicitly write the transitions states.

[00143] As described above, an RE may be too large to be solved by a single FSA building block. By the same token, occasionally REs are smaller than the fixed size of the FSA building block. For one embodiment, two or more REs are solved using a single FSA building block as described below.

[00144] For one embodiment, the number of REs that can be solved is not limited by the number of REs instantiated within the FSA building blocks. For one embodiment,

REs can be loaded to the FSA building blocks from a rule memory (e.g., conventional memory), that can store many more RE's than are implemented in hardware.

Coupling the FSA building blocks to a rule memory allows REs to be stored in memory and used to dynamically program the FSA building blocks.

[00145] Occasionally, the input data to an FSA building block is fragmented, that is, a first portion of the input data is followed immediately by unrelated data, which is followed subsequently by the remaining portion of the input data. To address this situation, one embodiment of the invention provides the capability of storing a partial context to a context memory and accessing the partial context at the appropriate time.

[00146] For one embodiment of the invention, the FSA building blocks include counters, pointers, and status registers to provide additional information (e.g., beyond whether or not a pattern has been discerned). For example, a counter may be used to indicate the number of times a particular RE matched or to implement more complex REs; a pointer may be used to indicate the start and end locations of an RE match; and status bits may be used to indicate various occurrences during an RE search.

SYSTEM

[00147] Figure 16 illustrates an FSA building block in which a number of features have been implemented to provide additional functionality in accordance with one embodiment of the invention. FSA building block 1600 shown in Figure 16 is a 16-state FSA building block. FSA building block 1600 includes an enable signal 1615 that is driven by an externally programmed start offset/end offset register. That is, when receiving an input data stream, it is not necessary to commence evaluation at the beginning of the stream.

[00148] The starting and ending points of the evaluation can be determined and programmed to drive the enable signal 1615 of FSA building block 1600. A clock signal 1608 controls the evaluation process and a reset signal 1607 resets the FSA building block (i.e., sets all node elements 1616 to zero). A start state register 1609 is programmed via software to indicate which of the 16 states are initially active. When the initial clock signal 1608 is received, if the enable signal 1615 is high, the values contained in start state register 1609 are latched into node elements 1616. When an input byte 1606 is received, it is compared to the evaluation symbols of the symbol

evaluation unit (SEU) 1603. The determination, as to whether or not the input byte is a match, is forwarded to the state transition interconnection and next state evaluation logic (STINSEL) 1617. Then upon a match, and based upon the nodal connections as programmed into the state transition connectivity control (STCC) register 1602, the dynamic next state (DNS) 1625 is enabled and used by the next state determination logic (NSDL) 1618 to determine the next state. The NSDL 1618 then latches the next state to the node elements 1616 at the end of the clock cycle. The latched value then becomes the current state of the FSA building block, the next input data byte is received, and the evaluation continues.

SYMBOL EVALUATION UNIT

[00149] In accordance with one embodiment of the invention, the SEU 1603 contains a number of registers and accompanying logic to allow for efficient evaluation of complex REs.

[00150] An RE may be defined to employ a range rather than a single character symbol. For example, the RE may reference a character in the range of a – z or 0 – 9. As shown in Figure 16, the SEU 1603 includes two range registers, namely rangelower register 1620 and rangeupper register 1621, to specify the lower range value and an upper range value, respectively, for multiple (e.g., up to four) ranges. The input byte 1606 and the upper and lower range values are provided to a range detection logic 1619 to determine if the input was within the specified range. This information, together with input byte 1606 and the programmed match symbol from symbol register 1622, is provided to the symbol match detection logic (SMDL) 1622 that evaluates the input byte 1606 against the symbol itself. This allows the software to program a state transition on a range, a character, or a combination thereof. This is accomplished by expanding the character definition (e.g., to include range information) and providing additional space for the character definition. For one embodiment, 16 symbol registers of 24 bits each are implemented, with 12 of the 24 bits used to define the extended character and 12 used for a bit-mask (discussed below). Of the 12 bits used for the extended character, 8 are used for the character itself, and four are used to specify whether the extended character has a range.

[00151] SEU 1603 includes a symbol mask register 1623 to indicate a particular bit or bits that is not to be compared. For some applications it may be more efficient to mask a bit of the input data (i.e., to program the evaluation logic such that a particular bit is not considered). For example, ASCII provides an 8-bit character to represent characters a-z (lower case) and A-Z (upper case), with the fifth bit specifying the case. If an RE employed a range of a-z and A-Z, it could be more efficiently implemented by ignoring the case (i.e., masking the fifth bit). That is, by masking the case bit (fifth bit) it would not be necessary to effect a comparison for lower case and a separate comparison for upper case, a single state can complete the comparison.

[00152] SEU 1603 includes a logical operation register 1624 that may be used to indicate state transition upon the occurrence of a matching symbol in conjunction with a logical operator. For example, an RE may be programmed such that transition occurs upon the negative polarity of the evaluation instead of the positive polarity of the evaluation (e.g., transition occurs on "NOT" match instead of match). For one such embodiment, the logical operation register provides 16 bits (i.e., one bit per state) to specify the logical operator "NOT".

ACCEPT STATE DETECTION UNIT

[00153] When the DNS 1625 is enabled, the next state is checked to determine if an accept state has been reached. Accept state detection unit 1610 includes accept state registers 1626 and accept state detection logic (ASDL) 1627. The accept state registers 1626 are programmed with accept states. The ASDL 1627 used the DNS 1625 to determine if the programmed accept state has reached, if so, a hit is recorded in hit register 1628a corresponding to the accept state register 1626. the hit register, then, records the number of hits, this information can be made available externally via register read/write bus 1628b. In accordance with one embodiment of the invention, the ASDU 1610 includes two accept state registers 1626 to facilitate the packing of two REs into a single FSA building block. As described above, two or more REs having a total number of states not greater than the fixed number of states of the FSA building block may be packed into a single FSA building block. Each RE may have unique accept states, and therefore an accept state register should be implemented on the FSA building block for each packed RE. Because each RE may reach accept

states separately, a corresponding hit register should be implemented for each accept state register. For the embodiment shown in Figure 16, two accept state registers 1626 are implemented along with corresponding hit registers 1628a and 1628b. To maintain flexibility, each register is a full 16-bit register, which allows packing REs of various sizes. For example, a 12-state RE may be packed with a 4-state RE, or in the extreme a 15-state RE could be packed with a 1-state RE. If the particular FSA building block is not being packed, the additional accept state register and corresponding hit register are not used.

MATCH LOCATION POINTER

[00154] For some applications, it is useful to determine the location at which a match begins and ends. To effect such determination, a start location register 1629 and an end location register 1630, as well as a byte count 1631, are implemented in the FSA building block in accordance with one embodiment. When the evaluation starts, a byte count 1631 is provided, when a transition of the next state occurs (e.g., a match is initiated), the value of the byte count at that point is latched to the start location register 1629. When, subsequently, the DNS 1625 is enabled, a determination is made as to whether an accept state is reached (e.g., a match is determined), the value of the byte count 1631 at that point is latched to the end location register 1630, thus providing start and end locations for the match.

STATE TRANSITION COUNTER UNIT

[00155] The FSA building block 1600 includes a state transition counter unit (STCU) 1632 that contains a number of registers and accompanying logic to allow for efficient evaluation of complex REs. For example, the counter allows an RE to be programmed that employs state transitions not just upon receipt of a specified symbol, but upon receipt of the specified symbol a specified number of times. So, for example, an RE may be programmed as a b {2, 4} c, which indicates a match when "a" is received followed by the occurrence of "b" from two to four times, followed by "c" (i.e., abbc, abbbc, and abbbbc). A counter trigger state (CTS) register 1633 can be programmed with a trigger state (e.g., state 1, the state corresponding to "b") for the counter 1634. For this example, the CTS register 1633 is programmed to state 1,

the counter lower value (CLV) register 1635 is programmed to 2 (i.e., the minimum number of occurrences for a match), and the counter upper value (CUV) register 1636 is programmed to 4 (i.e., the maximum number of occurrences for a match). The programmed values of the CTS 1633, the CLV 1635, and the CUV 1636, together with the value of the counter 1634, are input to the counter logic 1637. When the conditions of the RE are satisfied, the counter logic output 1638 will be activated. The transition from one state to the next is controlled by the counter logic output 1638, so no transition will occur until the counter logic output is high.

[00156] For one embodiment the CTS register 1633 can be programmed with multiple trigger states to effect more complex REs. For example, an RE programmed as a (b|c) {2, 4} would require programming the states corresponding to “b” and “c” (i.e., states 1 and 2) as trigger states.

[00157] For one embodiment, the trigger state of CTS 1633 can be programmed to an accept state of the RE to count the number of times the RE has hit.

[00158] To effect stitching, the FSA building block 1600 includes a stitch out control unit (SOCU) 1639 with two caller outgoing state (COS) registers 1640 and two corresponding caller’s target FSA (CTF) registers 1641. Each COS register is programmed with the states at which to stitch to another FSA building block. The corresponding CTF registers 1641 indicate which FSA building blocks to stitch to (i.e., the callee FSA building blocks). The stitch trigger computation logic (STCL) 1642 receives the stitch state information and the target FSA building block information from the COS registers 1640 and the corresponding CTF registers 1641, respectively, and uses the information to activate FSA startout 1643. FSA startout 1643 is connected to, and activates, the FSA startin 1644 of the callee FSA building blocks. At the callee FSA building blocks, the receiving states selector (RSS) 1645 is programmed to determine which of the callee receiving state (CRS) registers 1646 to access for the callee receiving states. The NSDL 1618 then uses the value in the selected CRS register 1646, the start state 1609, and the DNS 1625 to determine the next state for the callee FSA building block, which is then latched to the node elements 1616. For one embodiment the values in the selected CRS register(s) 1646, the start state 1609, and the DNS 1625 are OR’d to determine the next state.

[00159] Similarly, when the callee FSA building block reaches an accept state contained in an accept state register 1626, it determines which FSA building block to return to by reference to the accept's target FSA (ATF) register 1647. The ASDL 1627 uses the value in the accept state register 1626 and the value in the ATF register 1647 to determine when to activate stitch return out (SRO) 1648. SRO 1648 is connected to, and activates, the stitch return in (SRI) 1649 of the target FSA building blocks, and the evaluation continues at the target FSA building blocks.

[00160] FSA building blocks may be interconnected to provide FSA building block stitching in accordance with one embodiment of the invention. Each FSA building block may be connected to itself via an internal connection.

[00161] Figure 17 illustrates an on-chip state machine unit, referred to as a RE processor, in accordance with one embodiment of the invention. RE processor 1700, shown in Figure 17, includes a number of FSA building blocks 1705, that may be interconnected in groups as described above. For one embodiment, the number of FSA building blocks 1705 may be approximately 1000 – 2000. RE processor 1700 also includes an automata controller 1710 that provides input data to the FSA building blocks 1705. Automata controller 1710 couples the FSA building blocks 1705 to a rule memory 1715 and a context memory 1720, as well as to an on-chip bus and interface 1725, for communication with off-chip memory 1730 and with other system devices through an off-chip interface 1735.

CONTEXT MEMORY

[00162] As discussed above, if the input data is fragmented, then the state (context) of the FSA building block should be saved in order to resume appropriate evaluation when the input data resumes. The context of the FSA building block includes the node element values, the counter values, and potentially, the location registers. Upon resuming the input data, the saved context memory is loaded to the FSA building block so that the evaluation may continue. In accordance with one embodiment, upon interruption of the input data, the automata controller 1710, which is capable of reading from, and writing to, the FSA building block, reads the context from the appropriate registers of the FSA building block, and stores the context, on-chip, in context memory 1720. Upon resumption of the input data, the automata controller

1710 loads the context from context memory 1720 to the FSA building block. The amount of context data is small relative to the programmed registers of the FSA building block. Therefore, by implementing an on-chip context memory, it is possible to efficiently handle multiple concurrent fragmented RE evaluations.

RULES MEMORY

[00163] Initially, the FSA building blocks are programmed with rules that define the relevant REs. Without more, the FSA building blocks could evaluate only those particular REs. However, applications frequently contain more REs than can be practically implemented as FSA building blocks. Embodiments of the invention provide FSA building blocks that are fully programmable and reprogrammable. For one embodiment, additional rules are stored in rule memory 1715. The automata controller 1710 moves rules from the rule memory 1715 into the appropriate FSA building block and vice versa. That is, based upon an externally provided instruction, the automata controller 1710 reprograms particular FSA building blocks with rules stored in rule memory 1715. Storing the additional rules on-chip allows for the rapid reprogramming of the FSA building blocks. The amount of rules that can be practically stored on-chip is at least several times the amount of rules implemented in the on-chip FSA building blocks.

[00164] The interconnection of FSA building blocks in groups allows for the context and rule information to be written to, or read from, the FSA building blocks in parallel. Such interconnection also allows for increasing throughput by concurrently evaluating multiple data input streams. For example, if an application requires only a portion of the available FSA building blocks, then the relevant rules may be loaded repeatedly into the available FSA building blocks and the REs evaluated through multiple data input streams.

[00165] Whereas many alterations and modifications of the present invention will no doubt become apparent to a person of ordinary skill in the art after having read the foregoing description, it is to be understood that any particular embodiment shown and described by way of illustration is in no way intended to be considered limiting. Therefore, references to details of various embodiments are not intended to limit the

scope of the claims, which in themselves recite only those features regarded as essential to the invention.

CLAIMS

We claim:

1. A programmable rule processor comprising:
 - a general purpose register file;
 - an instruction sequencer to provide instructions;
 - a decoder coupled to the general purpose register file to decode a set of instructions specified by the instruction sequencer; and
 - a state machine unit coupled to the decoder and having state machine registers to store one or more state machines and state machine execution hardware coupled to the state machine registers to evaluate the one or more state machines in response to executing one or more of the set of instructions and based on information from one or both of the decoder and the general purpose register file.
2. The programmable rule processor defined in Claim 1 wherein the state machines being evaluated are finite state automata to detect regular expressions on input data.
3. A programmable rule processor comprising:
 - a general purpose register file;
 - an instruction sequencer to provide instructions;
 - a decoder coupled to the general purpose register file to decode a set of instructions specified by the instruction sequencer;
 - search registers and search execution hardware coupled to the plurality of search registers and coupled to receive search parameters from one or both of the decoder and the general purpose register file to perform one or more contextual searches on content in the search registers in response to executing one or more of the set of instructions; and
 - a state machine unit coupled to the decoder and having state machine registers to store one or more state machines and state machine execution hardware coupled to the state machine registers to evaluate the one or more state machines in response to

executing one or more of the set of instructions and based on information from one or both of the decoder and the general purpose register file.

4. The processor defined in Claim 3 wherein either results from performing one or more contextual searches by the search execution hardware are subsequently used by the state machine unit in evaluating at least one state machine or results from evaluation of the one or more state machines are subsequently used the search execution hardware in performing at least one contextual search.

5. The processor defined in Claim 3 wherein the search execution hardware performs at least one of the one or more contextual searches via parallel pattern matching in response to executing one or more search instructions specifying the one or more pattern searches and presenting one or more patterns to the content in the search registers.

6. The rule processor defined in Claim 5 wherein the search execution hardware comprises:

a search array coupled to the plurality of search registers, wherein content in the plurality of search registers is replicated and stored in the search array; and

a sorter coupled to the search array to perform the one or more operations in response to information specified by one or more search instructions.

7. The processor defined in Claim 3 wherein the state machine execution hardware comprises a state machine evaluation unit.

8. The rule processor defined in Claim 3 further comprising a memory to store the one or more search instructions to be applied to data in the search registers or to be applied to be evaluated by the state machine execution hardware.

9. The rule processor defined in Claim 3 further comprising an instruction sequencer for applying one or more search instructions to the search execution engine and the state machine execution hardware.
10. The rule processor defined in Claim 3 wherein at least one search instruction includes a field that specifies a parameter to use to control the search or a pointer into a memory that stores the parameter to control the search.
11. The rule processor defined in Claim 10 wherein the pointer points to a general purpose register.
12. The programmable rule processor defined in Claim 3 wherein state machines being evaluated are finite state automata to detect regular expressions on input data.
13. The rule processor defined in Claim 3 wherein at least one of the one or more search instructions specifies a pattern that is to be searched against the content in the plurality of search registers and zero or more search parameters.
14. The rule processor defined in Claim 13 wherein one parameter specifies a portion of the pattern to be masked to enable a subset of the pattern to be searched against the content in the search registers.
15. The rule processor defined in Claim 14 wherein the portion of the pattern to be masked is specified by a mask vector to mask off specific bytes in the pattern.
16. The rule processor defined in Claim 14 wherein the zero or more parameters specify starting and ending locations that constitute a range of the content within the search registers within which the search execution engine is to constrain a search.

17. The rule processor defined in Claim 3 wherein the one or more search instructions specify at least one pattern, range control, and program control flow.

18. A programmable rule processor comprising:
a general purpose register file;
a plurality of search registers;
a plurality of state machine registers;
a plurality of execution units;
an instruction sequencer to provide instructions;
a decoder coupled to the general purpose register file, the plurality of search registers, the plurality of state machine registers, and the plurality of execution units, to decode a set of instructions specified by the instruction sequencer and provide the decoded instructions to one or more execution units and one or more of the plurality of search registers and plurality of state machine registers for execution thereby based on an opcode in each instruction in the set of instructions.

19. The processor defined in Claim 18 wherein one of the plurality of execution units comprises a state machine evaluation unit.

20. The programmable rule processor defined in Claim 18 wherein at least one of the execution units evaluates state machines represented by data in the state machine registers.

21. The programmable rule processor defined in Claim 20 wherein the state machines being evaluated are finite state automata to detect regular expressions on input data.

22. The processor defined in Claim 18 wherein one of the plurality of execution units comprises a sort array.

23. The processor defined in Claim 18 wherein two of the execution unit comprise a state machine evaluation unit and search execution hardware, and further wherein either results from processing data by the search execution hardware are subsequently used by the state machine evaluation unit in evaluating at least one state machine or results from evaluation of the one or more state machines are subsequently used the search execution hardware in performing at least one search.

24. The processor defined in Claim 18 further comprising a branch unit to branch to another set of one or more instructions based on results of data processing involving one or more of the state machine registers and the search registers.

25. A process for performing contextual searches using a rule processor, the process comprising:

fetching a first rule from a memory on the rule processor;

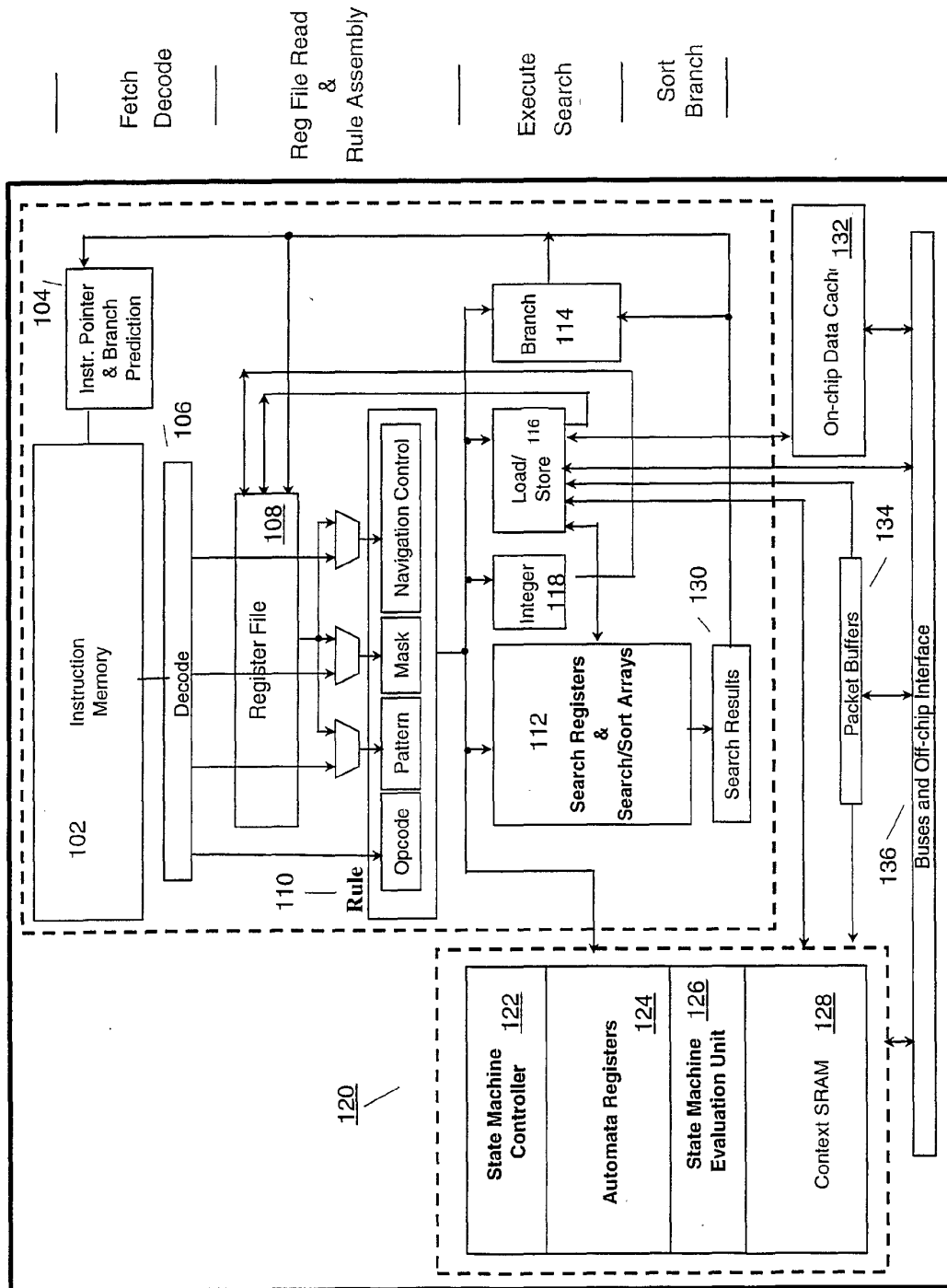
decoding the first rule to identify whether search parameters are located in the first rule or a general purpose register file in the rule processor;

executing one or more search operations on values in a plurality of search registers in the rule processor using the search parameters obtained from either or both of the first rule and the general purpose register file, the plurality of search registers storing content therein;

generating search results of executing the one or more search operations;

fetching a second rule from the memory;

evaluating one or more state machines with respect to data identified by the search results using state machine execution hardware in the rule processor according to parameters obtained from either or both of the first rule and the general purpose register file.



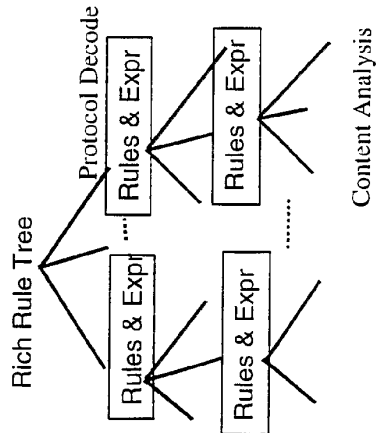
204

Code Fragment for UriClass: Uses Search Register Apparatus

```
// Parse the Request Line
methodStartLoc = (0, docSize, space)
methodEndLoc = (0, docSize, space)
uriArgsStartLoc = methodEndLoc, docSize, space)
uriArgsEndLoc = uriArgsStartLoc, docSize, space)
.....
methodIsGet =
    (methodStartLoc, methodEndLoc, "GET")
methodIsPost =
    (methodStartLoc, methodEndLoc, "POST")

If (methodIsGet>docSize) & (methodIsPost>docSize) return;
....
    (uriArgsStartLoc, uriEndLoc, UriGroup);
.....
```

202



UriGroup REs: Uses Search Register Apparatus

```
"X"
"Y"
"Z"
.....
```

206

Figure 2

3/19

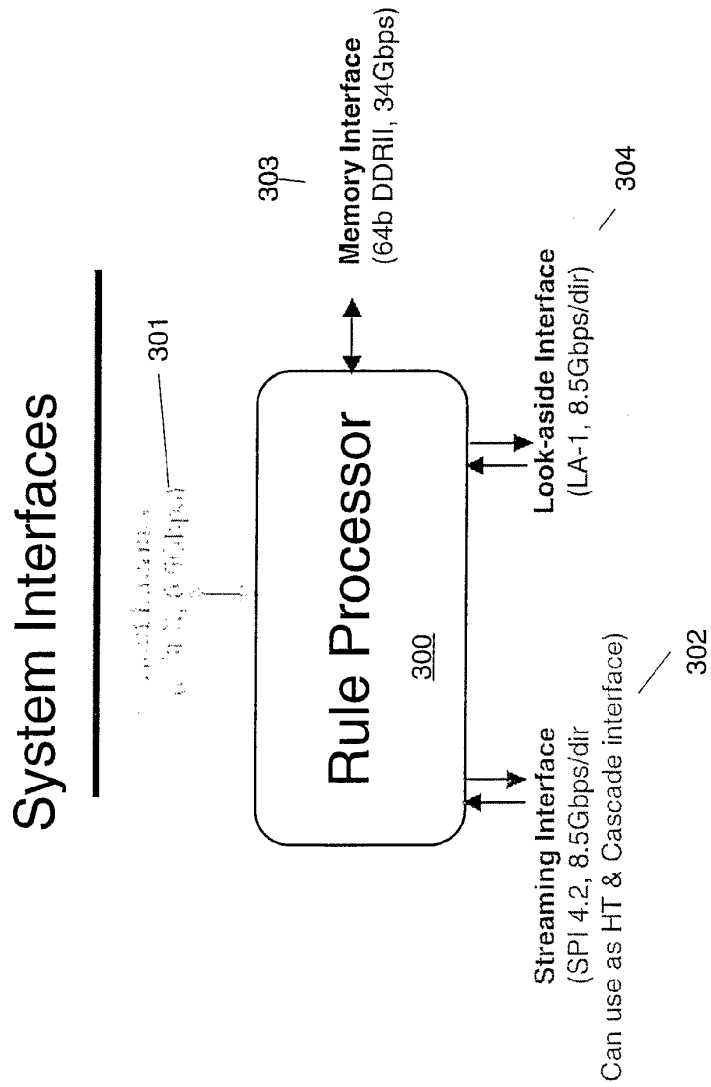


Figure 3

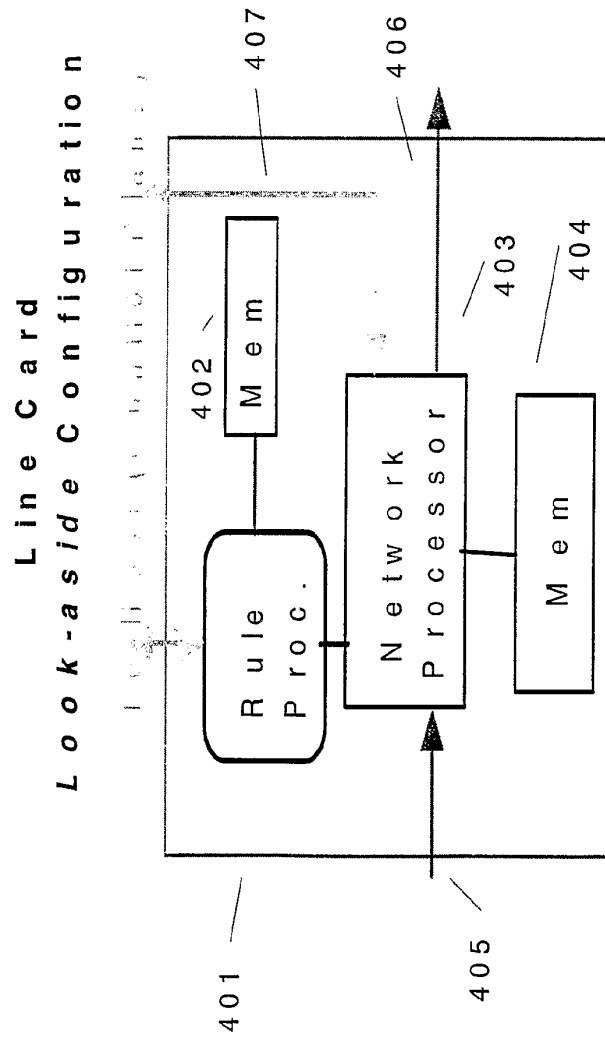


Figure 4

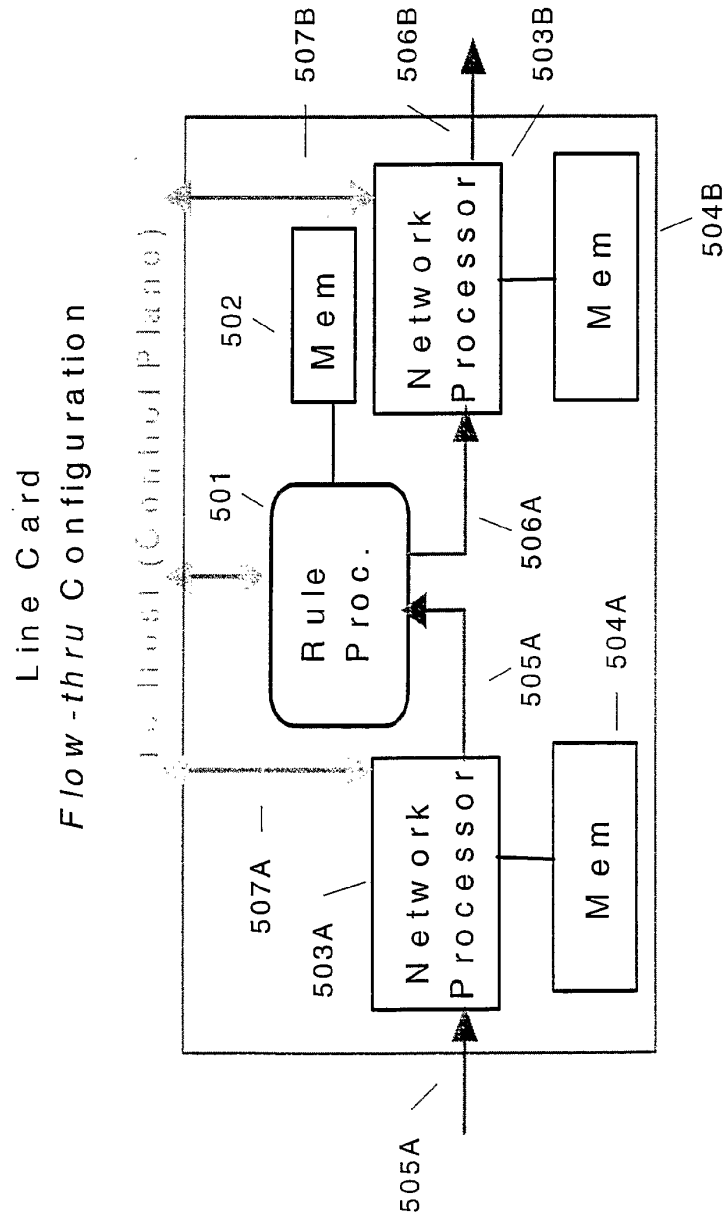


Figure 5

S e r v e r C o - P r o c e s s o r
C o n f i g u r a t i o n

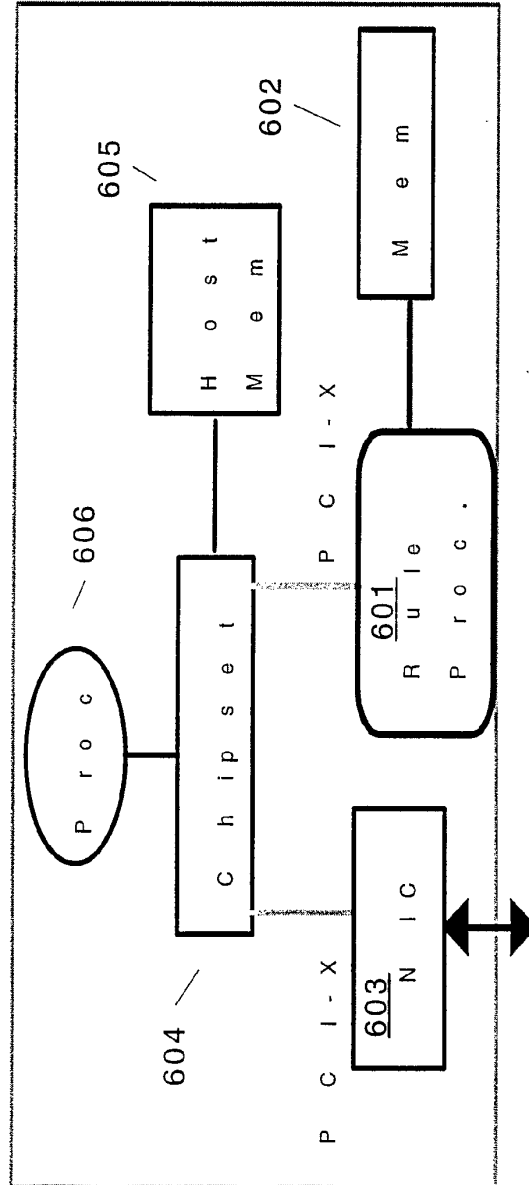


Figure 6

7/19

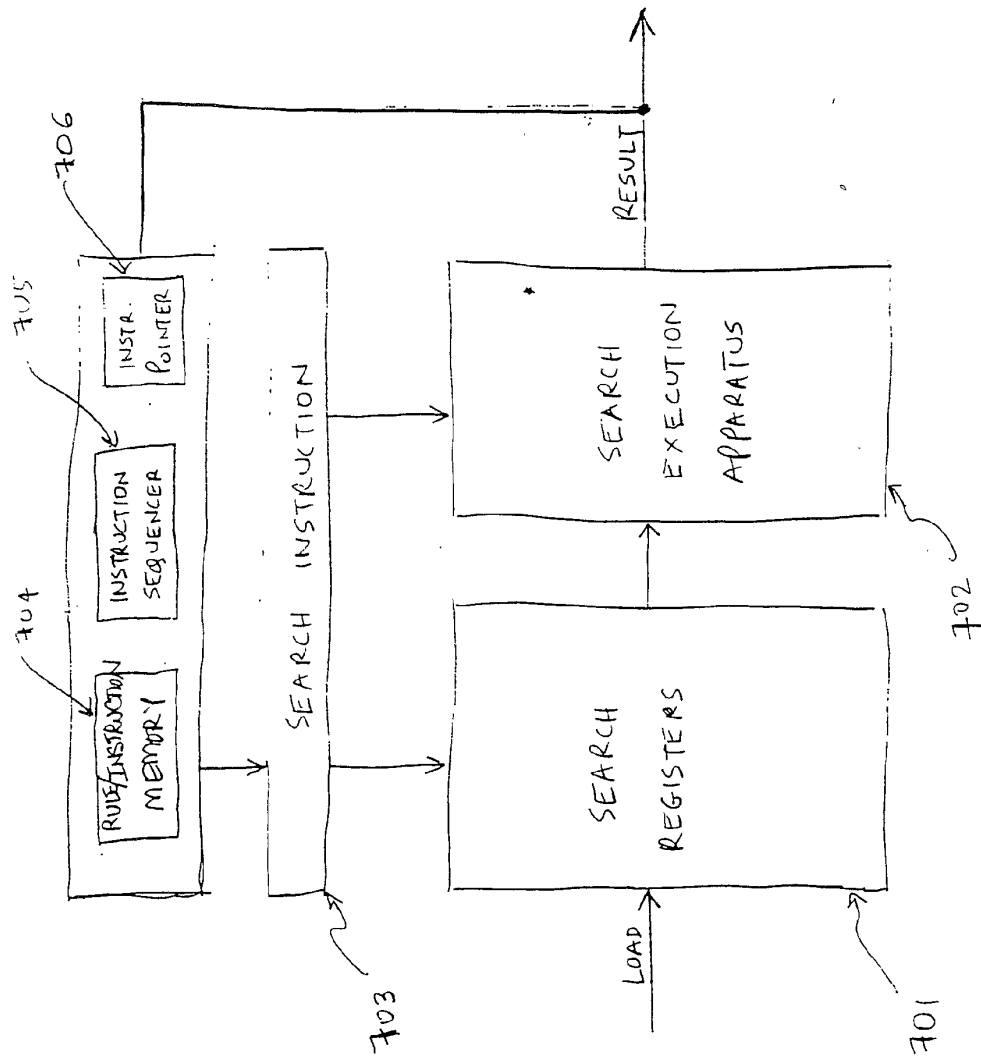


FIGURE 7

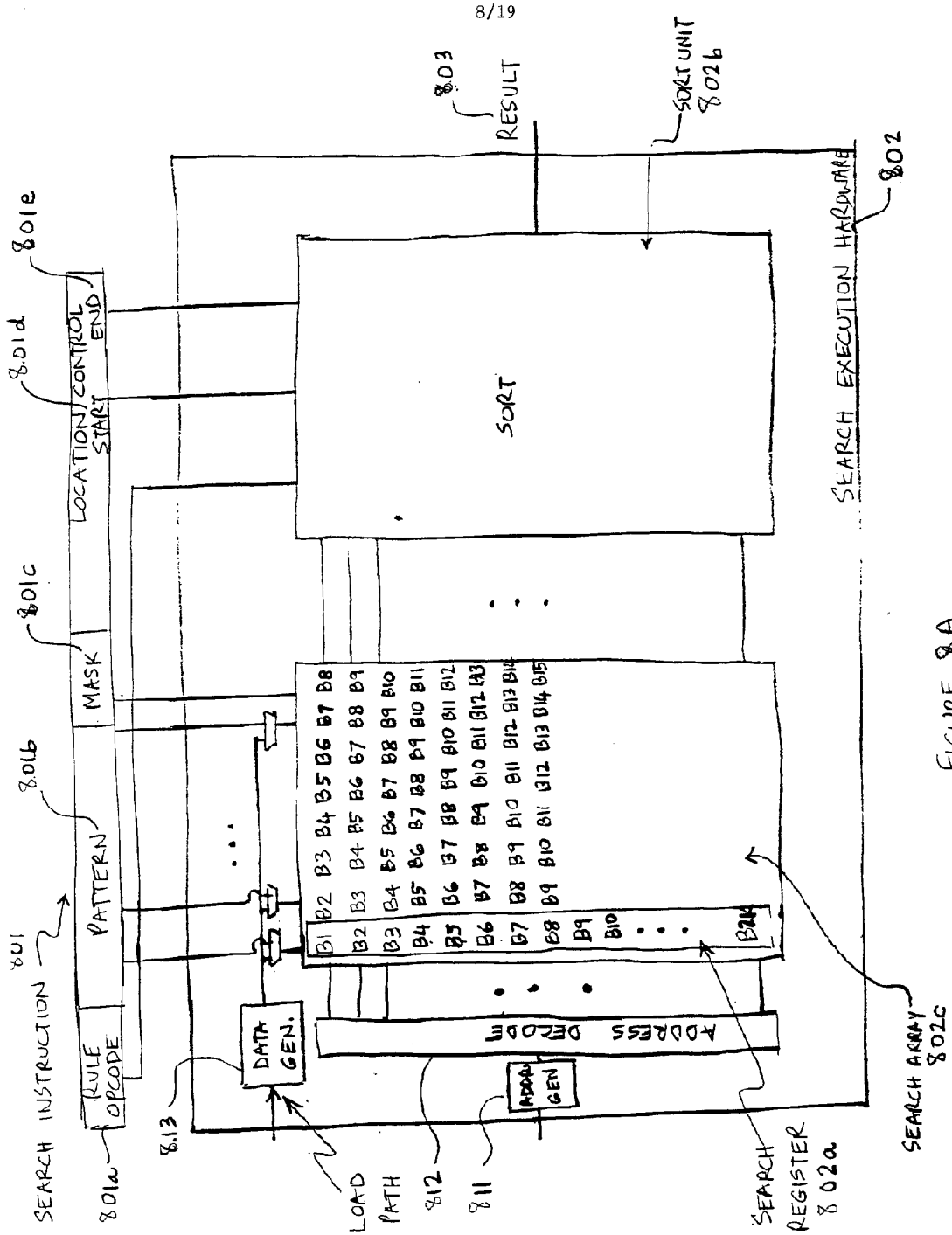


FIGURE 8A

9/19

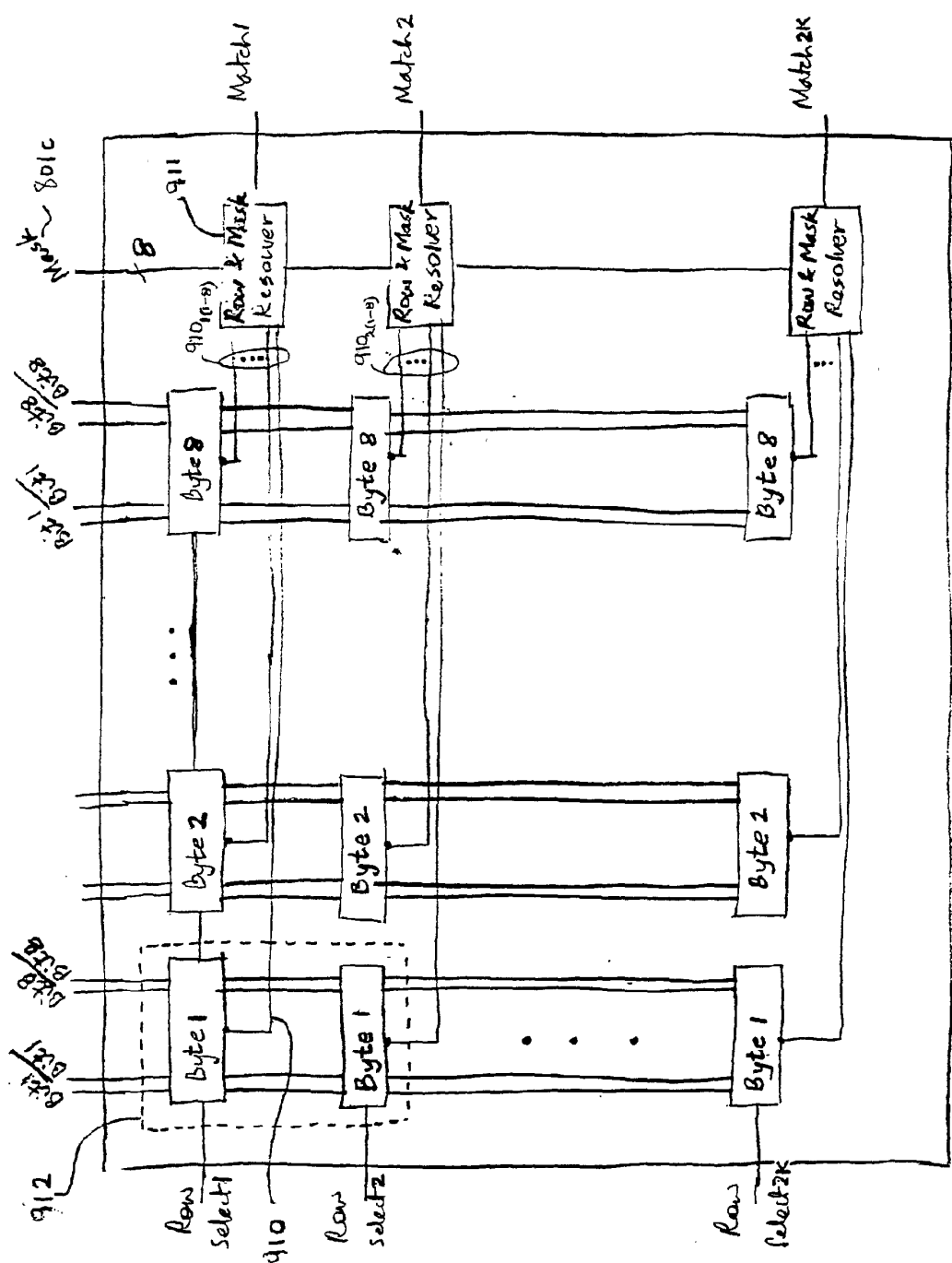
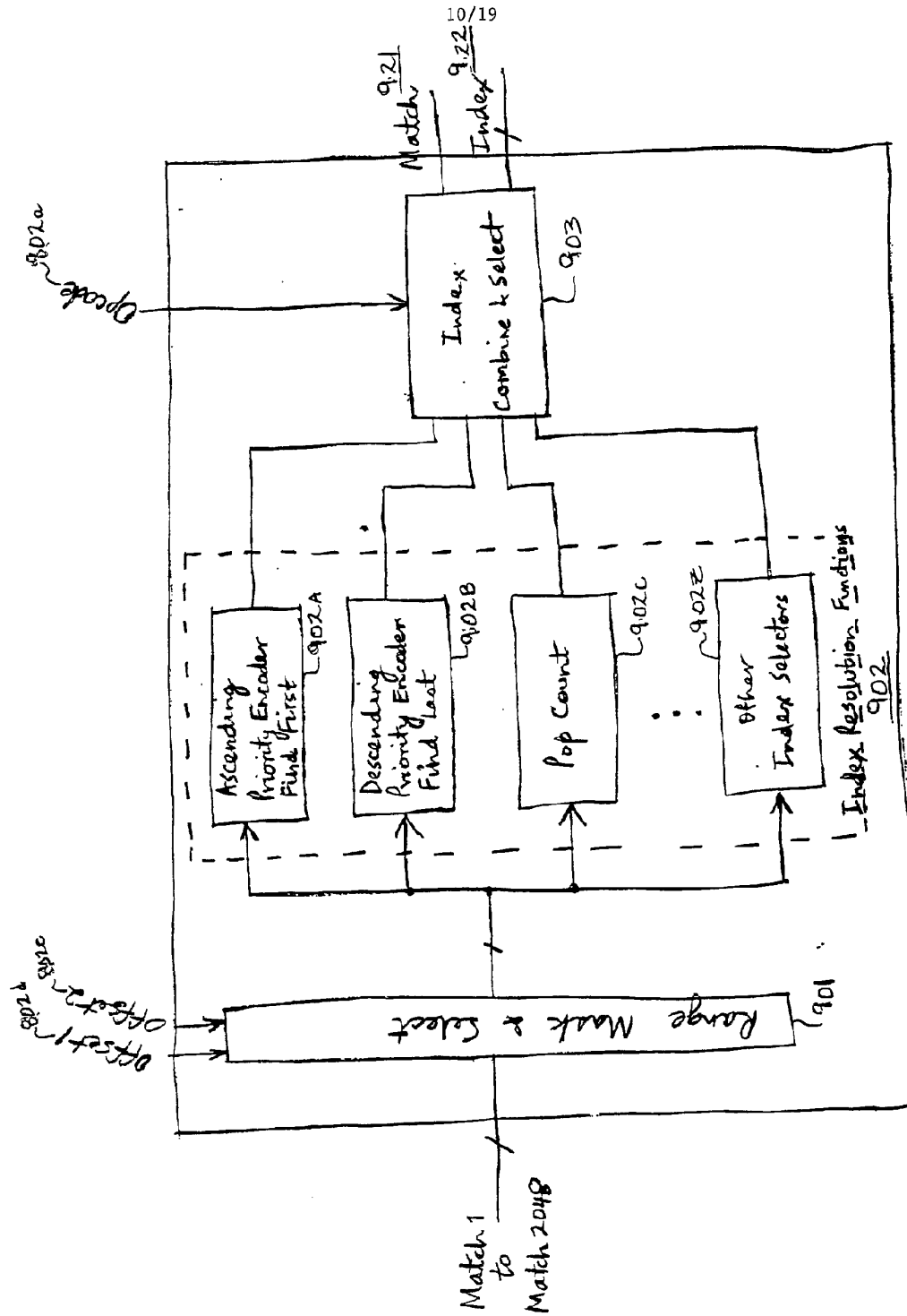


FIGURE 8B

FIGURE A



11/19

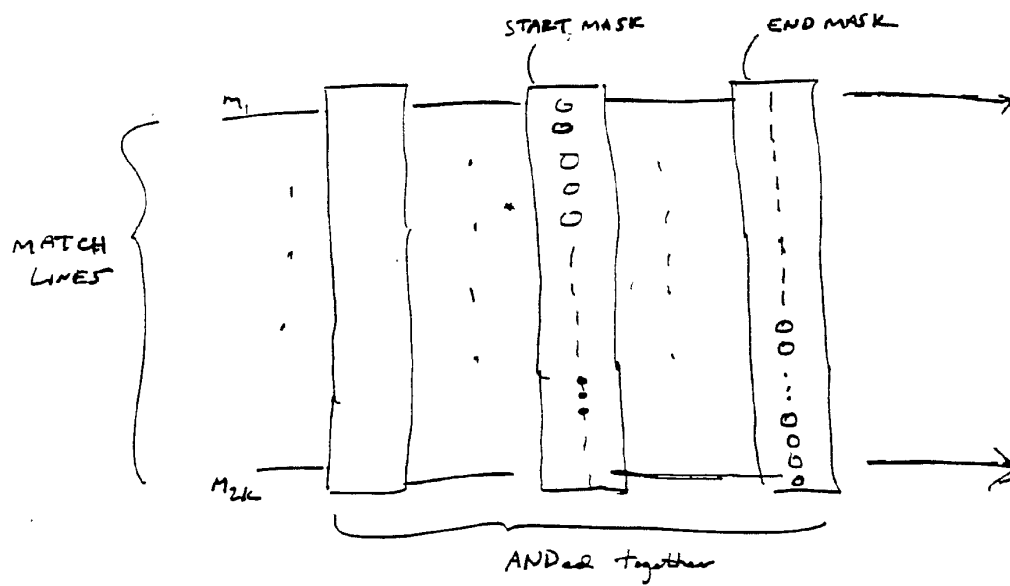


Figure 9B

12/19

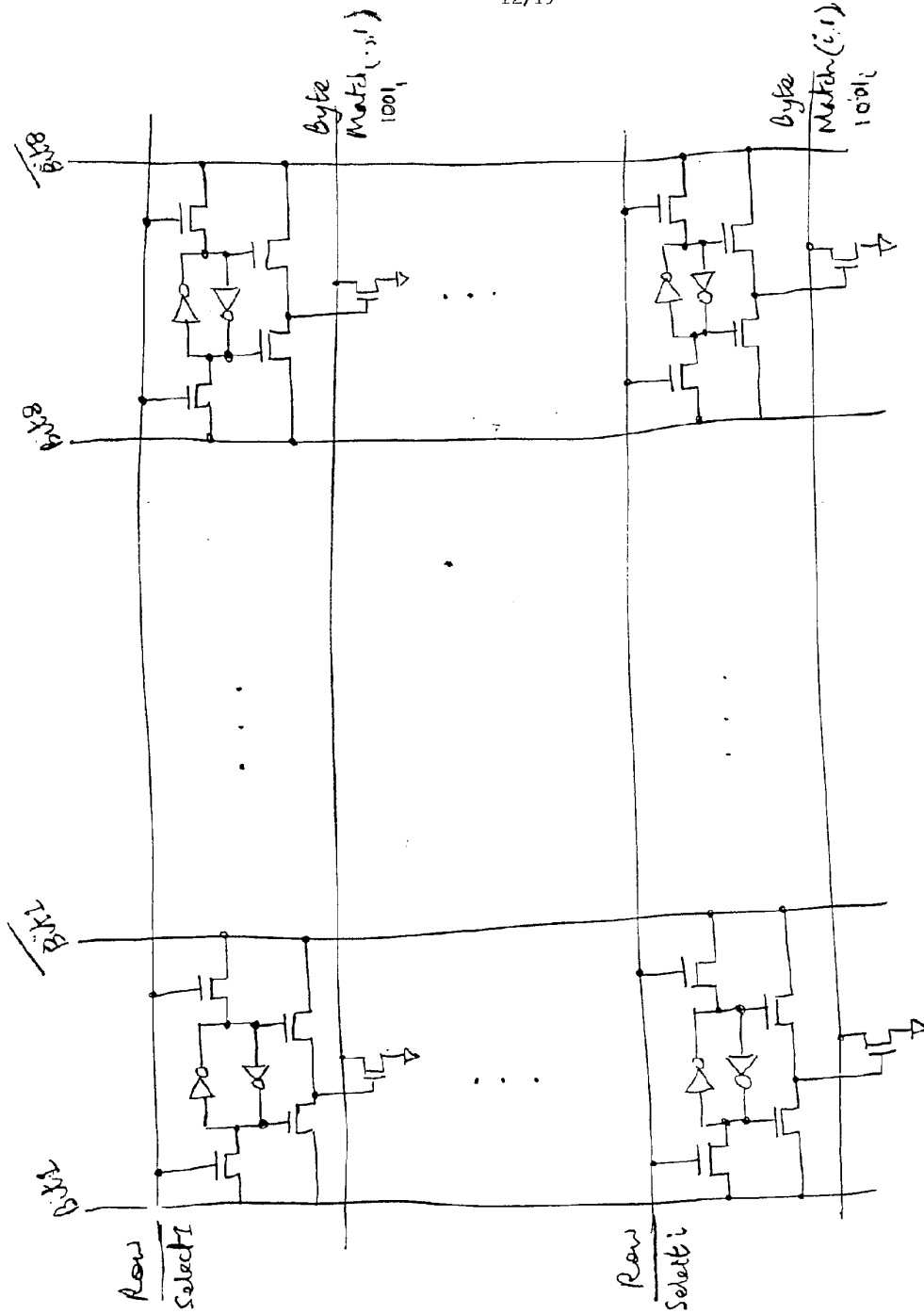


FIGURE 10

13/19

Microarchitecture Diagram

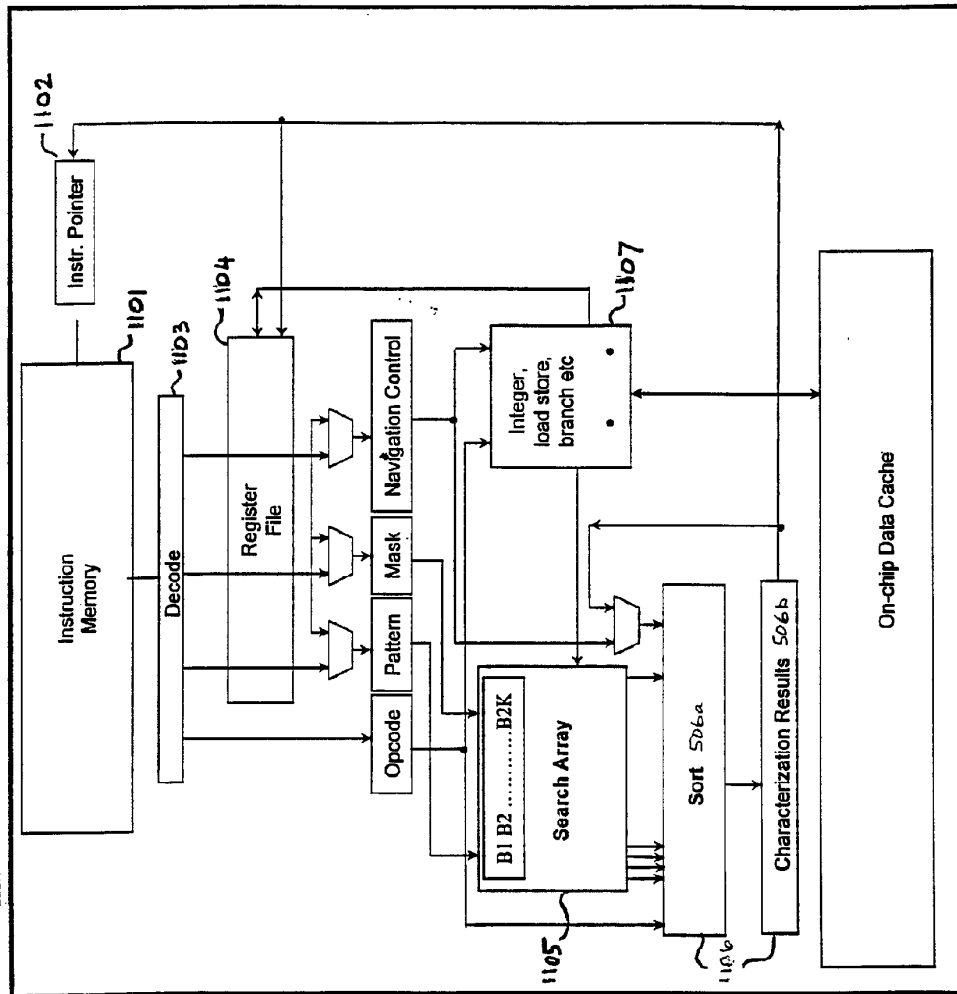


Figure 11

Fetch ~ 1108

Reg File Read ~ 1109 & Rule Assembly

Execute/Search ~ 1110

Sort & Branch ~ 1111

8/27/03

Example pseudo-code and Rule Engine micro-code

Pseudo-code

FIND ("cp /bin/sh /usr/spool/mail/root" BEFORE "chmod 4755 |\$") AND "touch" BEFORE "mail"

Micro-code for an exemplary Rule Engine

	Opcode	Pattern	Mask	Start Offset	Start Offset Indirect	End Offset	End Offset Indirect	Result Register	Branch Address
1	FIND_FIRST_FORWARD	"cp /bin/"	0xFF	0x03D	0	0x800	0	A	0xB
2	FIND_FORWARD_ANCHORED	"sh /usr/"	0xFF	<A + 8>	1	0x800	0	A	0xB
3	FIND_FORWARD_ANCHORED	"spool/ma"	0xFF	<A + 8>	1	0x800	0	A	0xB
4	FIND_FORWARD_ANCHORED	"ll/root"	0xFE	<A + 8>	1	0x800	0	A	0xB
5	FIND_FIRST_FORWARD	"chmod 47"	0xFF	<A + 7>	1	0x800	0	A	0xB
6	FIND_FORWARD_ANCHORED	"55 \$"	0xF8	<A + 8>	1	0x800	0	A	0xB
7	FIND_FIRST_FORWARD	"touch"	0xF8	0x03D	0	0x800	0	B	0xB
8	CMP(B+5, A+5)_BRANCH(10)	-	-	-	-	-	-	-	0xA
9	FIND_FIRST_FORWARD	"mail"	0xF0	<A + 5>	1	0x800	0	C	0xB
10	FIND_FIRST_FORWARD	"mail"	0xF0	<B + 5>	1	0x800	0	C	0xB

FIGURE 1a

15/19

Execution of example micro-code: pipeline diagram

1301

Clock 14	-	-	-	10
Clock 13	-	-	10	-
Clock 12	-	10	-	-
Clock 11	10	-	-	-
Clock 10	-	-	-	8
Clock 9	-	-	8	7
Clock 8	-	8	7	6
Clock 7	8	7	6	5
Clock 7	7	6	5	4
Clock 6	6	5	4	3
Clock 5	5	4	3	2
Clock 4	4	3	2	1
Clock 3	3	2	1	-
Clock 2	2	1	-	-
Clock 1	1	-	-	-
Fetch				
Assemble				
Search/ Execute				
Sort & Branch				

FIGURE 13

16/19

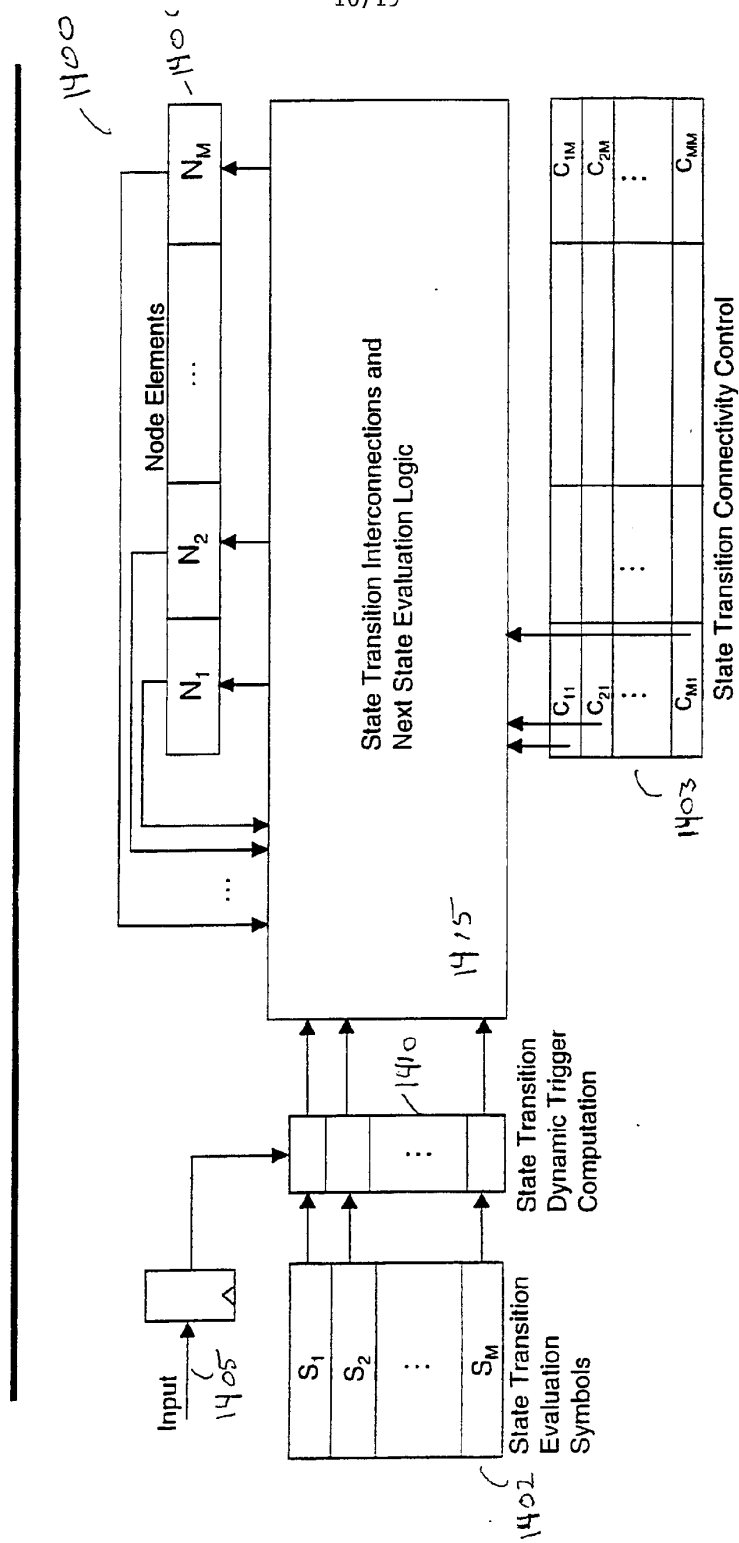
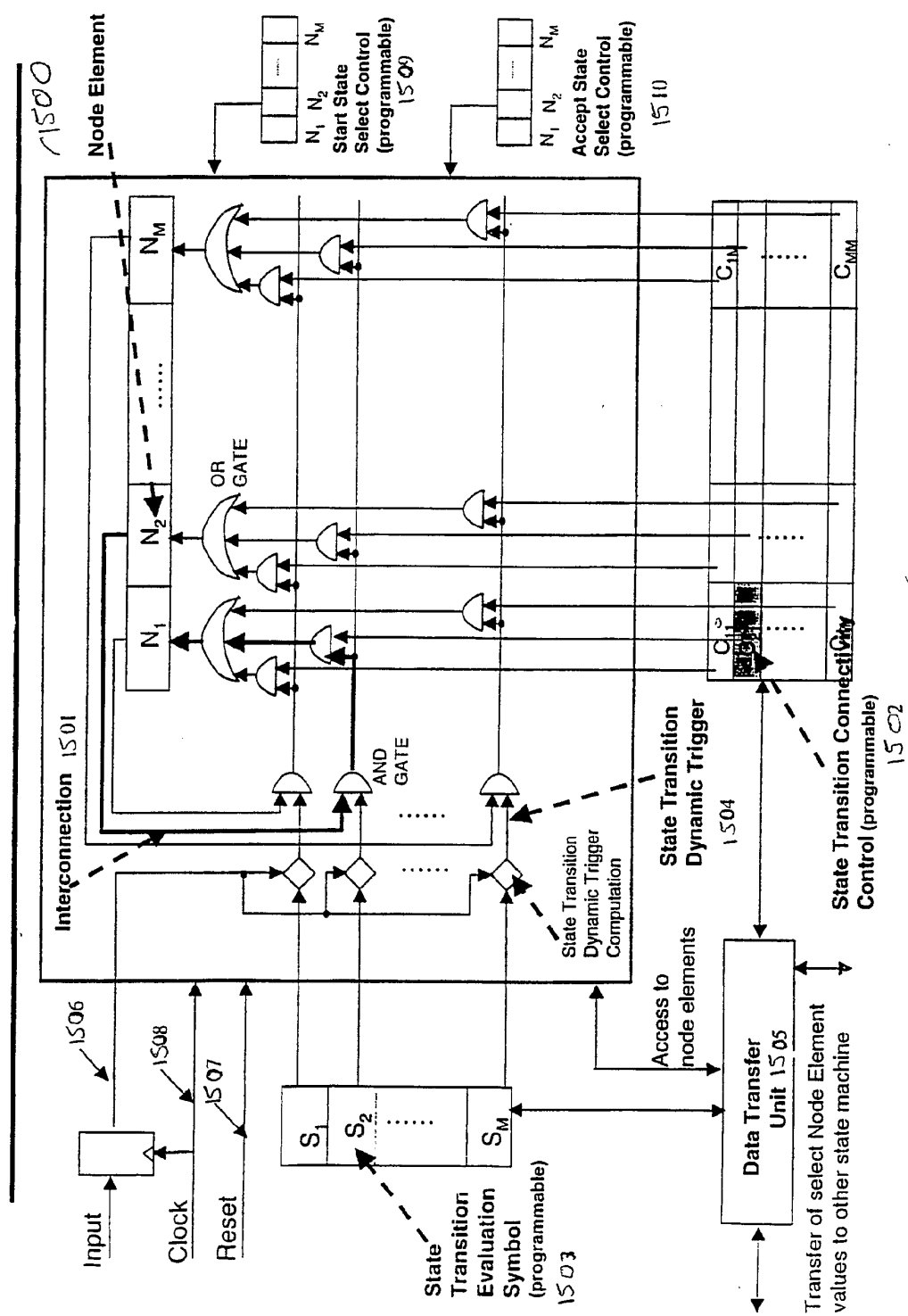


Fig. 14



18/19

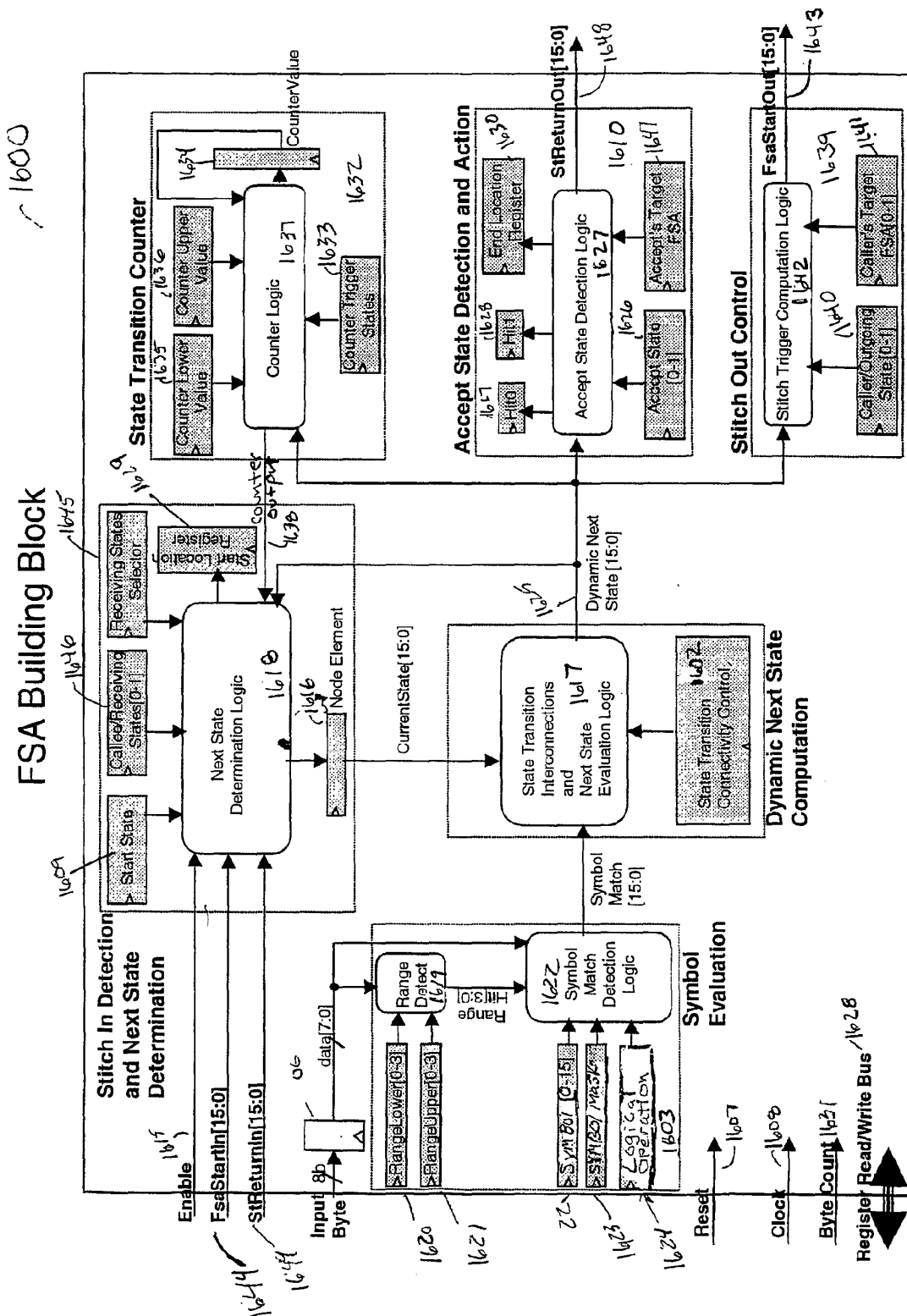


Fig. 16

19/19

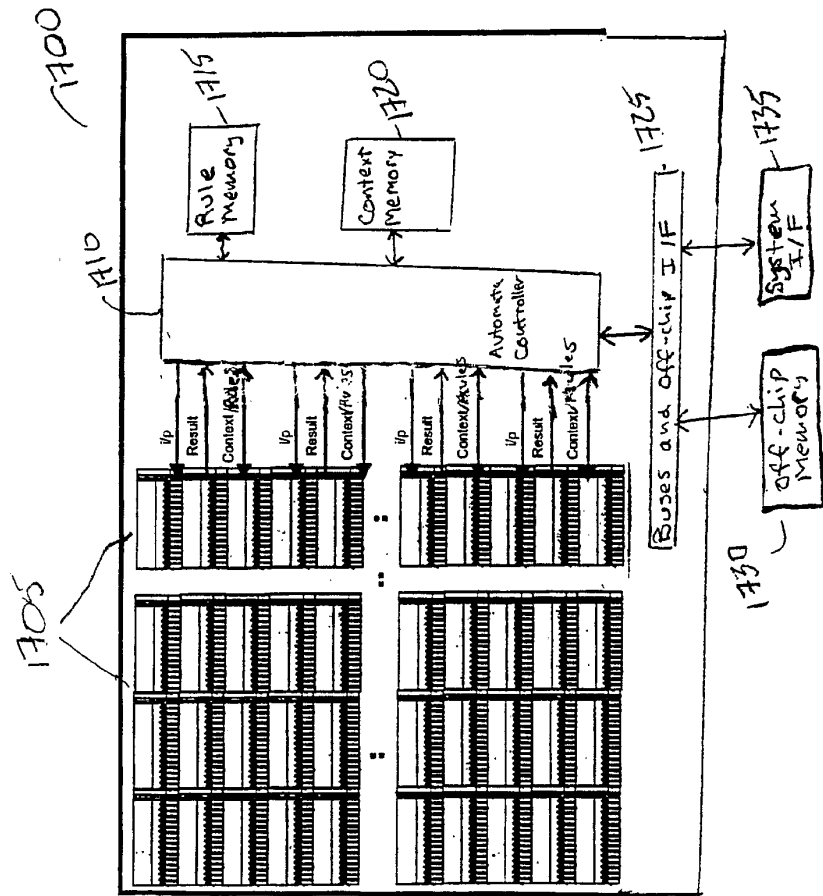


Fig. 17

INTERNATIONAL SEARCH REPORT

International Application No
PCT/US2004/000409

A. CLASSIFICATION OF SUBJECT MATTER
IPC 7 G06F17/30

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 7 G06F G05B

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EPO-Internal, INSPEC, IBM-TDB

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 6 212 625 B1 (RUSSELL RICHARD G) 3 April 2001 (2001-04-03)	1,2
A	abstract column 2, line 55 - column 3, line 11 column 5, line 6 - column 5, line 25 column 6, line 57 - column 7, line 21 figures 1-6	3-25
A	----- US 6 327 508 B1 (MERGARD JIM) 4 December 2001 (2001-12-04) abstract column 2, line 29 - column 2, line 50 column 4, line 46 - column 5, line 46	3-25
A	----- EP 0 488 297 A (HITACHI LTD ; HITACHI MAXELL (JP)) 3 June 1992 (1992-06-03) the whole document ----- -/--	3-25

☒ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in annex.

* Special categories of cited documents :

A document defining the general state of the art which is not considered to be of particular relevance

E earlier document but published on or after the international filing date

L document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

O document referring to an oral disclosure, use, exhibition or other means

P document published prior to the international filing date but later than the priority date claimed

T later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

X document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

Y document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

G document member of the same patent family

Date of the actual completion of the international search

1 June 2004

Date of mailing of the international search report

09/06/2004

Name and mailing address of the ISA

European Patent Office, P.B. 5818 Patentlaan 2
NL - 2280 HV Rijswijk
Tel. (+31-70) 340-2040, Tx. 31 651 epo nl,
Fax: (+31-70) 340-3016

Authorized officer

Abbing, R

INTERNATIONAL SEARCH REPORT

International Application No
PCT/US2004/000409

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 5 101 376 A (NOGUCHI KOUKI ET AL) 31 March 1992 (1992-03-31) abstract column 1, line 31 - column 3, line 12 figures 1,10,12	3-5,18, 23,25
A	US 5 452 451 A (AKIZAWA MITSURU ET AL) 19 September 1995 (1995-09-19) the whole document	3-5,18, 23,25

Form PCT/ISA/210 (continuation of second sheet) (January 2004)

INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No.

PCT/US2004/000409

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 6212625	B1	03-04-2001	NONE
US 6327508	B1	04-12-2001	NONE
EP 0488297	A	03-06-1992	JP 2960533 B2 06-10-1999 JP 4205174 A 27-07-1992 DE 69131954 D1 09-03-2000 DE 69131954 T2 05-10-2000 EP 0488297 A2 03-06-1992 US 5497488 A 05-03-1996
US 5101376	A	31-03-1992	JP 3130994 A 04-06-1991 KR 159941 B1 01-02-1999 US 5036486 A 30-07-1991
US 5452451	A	19-09-1995	JP 2825009 B2 18-11-1998 JP 3017780 A 25-01-1991 JP 2880199 B2 05-04-1999 JP 3131969 A 05-06-1991 US 5497488 A 05-03-1996

Electronic Acknowledgement Receipt	
EFS ID:	12088621
Application Number:	13290708
International Application Number:	
Confirmation Number:	4120
Title of Invention:	Malicious Mobile Code Runtime Monitoring System and Methods
First Named Inventor/Applicant Name:	Yigal Mordechai Edery
Customer Number:	74877
Filer:	Dawn-Marie Bey./Jeanne Paoella-Bald
Filer Authorized By:	Dawn-Marie Bey.
Attorney Docket Number:	FIN0001-CON1-CIP1-CON4
Receipt Date:	16-FEB-2012
Filing Date:	07-NOV-2011
Time Stamp:	00:54:51
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	no
------------------------	----

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Transmittal Letter	fin0001con1cip1con4_suppidst rans.pdf	102076 a857f16449513cf1faf4a2f9bbc19e95c5d55701	no	2

Warnings:

Information:

2	Information Disclosure Statement (IDS) Form (SB08)	fin0001con1cip1con4_1449frm.pdf	101076 <small>fc918ee90cdb6737d1eb73b6db2c000cd3423e00</small>	no	1
Warnings:					
Information:					
This is not an USPTO supplied IDS fillable form					
3	Foreign Reference	fin0001_ref.pdf	3494083 <small>72f6d6e57d84613f7a3e8f04df2d150691f69890</small>	no	75
Warnings:					
Information:					
4	Non Patent Literature	fin0001_ref2.pdf	1043428 <small>f24e3400af85593b920d6c5ec0f0f428dfb1145d</small>	no	14
Warnings:					
Information:					
Total Files Size (in bytes):			4740663		
<p>This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.</p> <p><u>New Applications Under 35 U.S.C. 111</u> If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.</p> <p><u>National Stage of an International Application under 35 U.S.C. 371</u> If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.</p> <p><u>New International Application Filed with the USPTO as a Receiving Office</u> If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.</p>					

Docket No. FIN0001-CON1-CIP1-CON4

PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Patent Application of

Yigal Mordechai EDERY, et al.

Serial No.: **13/290,708**

Group Art Unit: **2431**

Filed: **November 7, 2011**

Examiner: **To Be Assigned**

For: **MALICIOUS MOBILE CODE RUNTIME MONITORING SYSTEM AND METHODS**

**INFORMATION DISCLOSURE STATEMENT
UNDER 37 C.F.R. §§ 1.97 AND 1.98**

U.S. Patent and Trademark Office
Customer Window, Mail Stop Amendment
Randolph Building
401 Dulany Street
Alexandria , VA 22314

Sir:

In accordance with the requirements of 37 C.F.R. §§ 1.56, 1.97-1.98 and MPEP § 609, the references noted on the attached Form PTO-1449 are hereby brought to the attention of the Examiner.

No fees are believed to be necessary since the references cited in this statement are being submitted before the First Office Action. However, the Commissioner is hereby authorized to charge any additional fees which may be required, or to credit any overpayment, to Deposit Account No. 50-4402.

The above information is presented so that the United States Patent and Trademark Office may, in the first instance, determine any materiality thereof to the claimed invention. See

U.S. Serial No.: 13/290,708
Information Disclosure Statement

- 2 - Docket No. FIN0001-CON1-CIP1-CON4

37 C.F.R. §§ 1.104(a) conferring the PTO duty to consider and use any such information. It is respectfully requested that the information be expressly considered during the prosecution of this application, and that the references be made of record therein and appear among the "References Cited" on any patent to issue therefrom.

Respectfully submitted,

Dated: February 14, 2012

By: /Dawn-Marie Bey - 44,442/
Dawn-Marie Bey
Registration No. 44,442

KING & SPALDING LLP
1700 Pennsylvania Avenue, N.W.
Suite 200
Washington, DC 20006
(202) 737-0500

15157/105034
Doc. No. 18232654

PATENT APPLICATION FEE DETERMINATION RECORD Substitute for Form PTO-875						Application or Docket Number 13/290,708				
APPLICATION AS FILED - PART I										
(Column 1)		(Column 2)		SMALL ENTITY		OTHER THAN SMALL ENTITY				
FOR	NUMBER FILED	NUMBER EXTRA	RATE(\$)	FEE(\$)		RATE(\$)	FEE(\$)			
BASIC FEE <small>(37 CFR 1.16(a), (b), or (c))</small>	N/A	N/A	N/A			N/A	380			
SEARCH FEE <small>(37 CFR 1.16(k), (j), or (m))</small>	N/A	N/A	N/A			N/A	620			
EXAMINATION FEE <small>(37 CFR 1.16(o), (p), or (q))</small>	N/A	N/A	N/A			N/A	250			
TOTAL CLAIMS <small>(37 CFR 1.16(i))</small>	18	minus 20 = *			OR	x 60 =	0.00			
INDEPENDENT CLAIMS <small>(37 CFR 1.16(h))</small>	2	minus 3 = *			OR	x 250 =	0.00			
APPLICATION SIZE FEE <small>(37 CFR 1.16(s))</small>	If the specification and drawings exceed 100 sheets of paper, the application size fee due is \$310 (\$155 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s).						0.00			
MULTIPLE DEPENDENT CLAIM PRESENT <small>(37 CFR 1.16(j))</small>							0.00			
* If the difference in column 1 is less than zero, enter "0" in column 2.				TOTAL		TOTAL	1250			
APPLICATION AS AMENDED - PART II										
(Column 1)		(Column 2)		(Column 3)		SMALL ENTITY		OTHER THAN SMALL ENTITY		
AMENDMENT A		CLAIMS REMAINING AFTER AMENDMENT		HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA	RATE(\$)	ADDITIONAL FEE(\$)		RATE(\$)	ADDITIONAL FEE(\$)
	Total <small>(37 CFR 1.16(i))</small>	*	Minus	**	=	x	=	OR	x	=
	Independent <small>(37 CFR 1.16(h))</small>	*	Minus	***	=	x	=	OR	x	=
	Application Size Fee <small>(37 CFR 1.16(s))</small>							OR		
	FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM <small>(37 CFR 1.16(j))</small>							OR		
TOTAL ADD'L FEE								OR	TOTAL ADD'L FEE	
AMENDMENT B		CLAIMS REMAINING AFTER AMENDMENT		HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA	RATE(\$)	ADDITIONAL FEE(\$)		RATE(\$)	ADDITIONAL FEE(\$)
	Total <small>(37 CFR 1.16(i))</small>	*	Minus	**	=	x	=	OR	x	=
	Independent <small>(37 CFR 1.16(h))</small>	*	Minus	***	=	x	=	OR	x	=
	Application Size Fee <small>(37 CFR 1.16(s))</small>							OR		
	FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM <small>(37 CFR 1.16(j))</small>							OR		
TOTAL ADD'L FEE								OR	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 found in the appropriate box in column 1.										



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NUMBER	FILING or 371(c) DATE	GRP ART UNIT	FIL FEE REC'D	ATTY. DOCKET NO.	TOT CLAIMS	IND CLAIMS
13/290,708	11/07/2011	2431	1250	FIN0001-CON1-CIP1-CON4	18	2

CONFIRMATION NO. 4120

UPDATED FILING RECEIPT



OC000000052278893

74877

King and Spalding LLP
1700 Pennsylvania Ave, NW
Suite 200
Washington, DC 20006

Date Mailed: 02/02/2012

Receipt is acknowledged of this non-provisional patent application. The application will be taken up for examination in due course. Applicant will be notified as to the results of the examination. Any correspondence concerning the application must include the following identification information: the U.S. APPLICATION NUMBER, FILING DATE, NAME OF APPLICANT, and TITLE OF INVENTION. Fees transmitted by check or draft are subject to collection. Please verify the accuracy of the data presented on this receipt. **If an error is noted on this Filing Receipt, please submit a written request for a Filing Receipt Correction. Please provide a copy of this Filing Receipt with the changes noted thereon. If you received a "Notice to File Missing Parts" for this application, please submit any corrections to this Filing Receipt with your reply to the Notice. When the USPTO processes the reply to the Notice, the USPTO will generate another Filing Receipt incorporating the requested corrections**

Applicant(s)

Yigal Mordechai Edery, Pardesia, ISRAEL;
Nirmrod Itzhak Vered, Goosh Tel Mond, ISRAEL;
David R. Kroll, San Jose, CA;
Shlomo Touboul, Kefar-Haim, ISRAEL;

Power of Attorney: The patent practitioners associated with Customer Number 74877

Domestic Priority data as claimed by applicant

This application is a CON of 12/471,942 05/26/2009 PAT 8079086
which is a CON of 11/370,114 03/07/2006 PAT 7613926
which is a CON of 09/861,229 05/17/2001 PAT 7058822
which claims benefit of 60/205,591 05/17/2000
and is a CIP of 09/539,667 03/30/2000 PAT 6804780
which is a CON of 08/964,388 11/06/1997 PAT 6092194
and said 09/861,229 05/17/2001
is a CIP of 09/551,302 04/18/2000 PAT 6480962

Foreign Applications (You may be eligible to benefit from the **Patent Prosecution Highway** program at the USPTO. Please see <http://www.uspto.gov> for more information.)

If Required, Foreign Filing License Granted: 11/17/2011

The country code and number of your priority application, to be used for filing abroad under the Paris Convention, is **US 13/290,708**

Projected Publication Date: 05/10/2012

Non-Publication Request: No

Early Publication Request: No
Title

Malicious Mobile Code Runtime Monitoring System and Methods

Preliminary Class

726

PROTECTING YOUR INVENTION OUTSIDE THE UNITED STATES

Since the rights granted by a U.S. patent extend only throughout the territory of the United States and have no effect in a foreign country, an inventor who wishes patent protection in another country must apply for a patent in a specific country or in regional patent offices. Applicants may wish to consider the filing of an international application under the Patent Cooperation Treaty (PCT). An international (PCT) application generally has the same effect as a regular national patent application in each PCT-member country. The PCT process **simplifies** the filing of patent applications on the same invention in member countries, but **does not result** in a grant of "an international patent" and does not eliminate the need of applicants to file additional documents and fees in countries where patent protection is desired.

Almost every country has its own patent law, and a person desiring a patent in a particular country must make an application for patent in that country in accordance with its particular laws. Since the laws of many countries differ in various respects from the patent law of the United States, applicants are advised to seek guidance from specific foreign countries to ensure that patent rights are not lost prematurely.

Applicants also are advised that in the case of inventions made in the United States, the Director of the USPTO must issue a license before applicants can apply for a patent in a foreign country. The filing of a U.S. patent application serves as a request for a foreign filing license. The application's filing receipt contains further information and guidance as to the status of applicant's license for foreign filing.

Applicants may wish to consult the USPTO booklet, "General Information Concerning Patents" (specifically, the section entitled "Treaties and Foreign Patents") for more information on timeframes and deadlines for filing foreign patent applications. The guide is available either by contacting the USPTO Contact Center at 800-786-9199, or it can be viewed on the USPTO website at <http://www.uspto.gov/web/offices/pac/doc/general/index.html>.

For information on preventing theft of your intellectual property (patents, trademarks and copyrights), you may wish to consult the U.S. Government website, <http://www.stopfakes.gov>. Part of a Department of Commerce initiative, this website includes self-help "toolkits" giving innovators guidance on how to protect intellectual property in specific countries such as China, Korea and Mexico. For questions regarding patent enforcement issues, applicants may call the U.S. Government hotline at 1-866-999-HALT (1-866-999-4158).

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Title 35, United States Code, Section 184

Title 37, Code of Federal Regulations, 5.11 & 5.15

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The applicant has been granted a license under 35 U.S.C. 184, if the phrase "IF REQUIRED, FOREIGN FILING LICENSE GRANTED" followed by a date appears on this form. Such licenses are issued in all applications where

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This license is to be retained by the licensee and may be used at any time on or after the effective date thereof unless it is revoked. This license is automatically transferred to any related applications(s) filed under 37 CFR 1.53(d). This license is not retroactive.

The grant of a license does not in any way lessen the responsibility of a licensee for the security of the subject matter as imposed by any Government contract or the provisions of existing laws relating to espionage and the national security or the export of technical data. Licensees should apprise themselves of current regulations especially with respect to certain countries, of other agencies, particularly the Office of Defense Trade Controls, Department of State (with respect to Arms, Munitions and Implements of War (22 CFR 121-128)); the Bureau of Industry and Security, Department of Commerce (15 CFR parts 730-774); the Office of Foreign Assets Control, Department of Treasury (31 CFR Parts 500+) and the Department of Energy.

NOT GRANTED

No license under 35 U.S.C. 184 has been granted at this time, if the phrase "IF REQUIRED, FOREIGN FILING LICENSE GRANTED" DOES NOT appear on this form. Applicant may still petition for a license under 37 CFR 5.12, if a license is desired before the expiration of 6 months from the filing date of the application. If 6 months has lapsed from the filing date of this application and the licensee has not received any indication of a secrecy order under 35 U.S.C. 181, the licensee may foreign file the application pursuant to 37 CFR 5.15(b).

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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of

Yigal Mordechai EDERY, et al.

Group Art Unit: 2431

Serial No.: 13/290,708

Examiner: To Be Assigned

Filed: November 7, 2011

For: MALICIOUS MOBILE CODE RUNTIME MONITORING SYSTEM AND METHODS

RESPONSE TO NOTICE TO FILE CORRECTED APPLICATION PAPERS

United States Patent and Trademark Office
Customer Service Window, Mail Stop Missing Parts
Randolph Building
401 Dulany Street
Alexandria, VA 22314

Sir:

Responsive to the Notice to File Corrected Application Papers, mailed November 21, 2011, the following items are submitted herewith to complete the formal filing requirements for the above-identified application:

- (1) Replacement Abstract (2 sheets). A replacement abstract is being presented which incorporate changes for compliance with 37 C.F.R. 1.72(b) and 37 C.F.R. 1.121. The changes can be explained as follows: The abstract was revised to meet the requirement for length of abstract not to exceed 150 words. A marked-up copy of the abstract is attached showing changes made to the original submission, together with a clean copy of the revised abstract.

If any additional fees are required in connection with the filing of this response, the Commissioner is hereby authorized to charge the same, or to credit any overpayment, to Deposit Account No. 50-4402.

Respectfully submitted,

Date: January 23, 2012
KING & SPALDING LLP
1700 Pennsylvania Avenue, N.W.
Suite 200
Washington, DC 20006
(202) 626-8978

By: /Dawn-Marie Bey - 44,442/
Dawn-Marie Bey (Reg. No. 44,442)

15157/105034
Doc. No. 18099447

REPLACEMENT SHEET - REVISED VERSION

ABSTRACT

Protection systems and methods provide for protecting one or more personal computers ("PCs") and/or other intermittently or persistently network accessible devices or processes from undesirable or otherwise malicious operations of Java TN applets, ActiveX™ controls, JavaScript™ scripts, Visual Basic scripts, add-ins, downloaded/uploaded programs or other "Downloadables" or "mobile code" in whole or part. A protection engine embodiment provides, ~~within a server, firewall or other suitable "recommunicator,"~~ for monitoring information received ~~by the communicator,~~ determining whether received information does or is likely to include executable code, and if so, causes mobile protection code (MPC) to be transferred to and rendered operable within a destination device of the received information, ~~more suitably by forming a protection agent including the MPC, protection policies and a detected Downloadable.~~ An MPC embodiment further provides, within a Downloadable-destination, for initiating the Downloadable, enabling malicious Downloadable operation attempts to be received by the MPC, and causing (predetermined) corresponding operations to be executed in response to the attempts, ~~more suitably in conjunction with protection policies.~~

REPLACEMENT SHEET - CLEAN VERSION

ABSTRACT

Protection systems and methods provide for protecting one or more personal computers (“PCs”) and/or other intermittently or persistently network accessible devices or processes from undesirable or otherwise malicious operations of Java TN applets, ActiveX™ controls, JavaScript™ scripts, Visual Basic scripts, add-ins, downloaded/uploaded programs or other “Downloadables” or “mobile code” in whole or part. A protection engine embodiment provides for monitoring information received, determining whether received information does or is likely to include executable code, and if so, causes mobile protection code (MPC) to be transferred to and rendered operable within a destination device of the received information. An MPC embodiment further provides, within a Downloadable-destination, for initiating the Downloadable, enabling malicious Downloadable operation attempts to be received by the MPC, and causing (predetermined) corresponding operations to be executed in response to the attempts.

Electronic Acknowledgement Receipt	
EFS ID:	11897001
Application Number:	13290708
International Application Number:	
Confirmation Number:	4120
Title of Invention:	Malicious Mobile Code Runtime Monitoring System and Methods
First Named Inventor/Applicant Name:	Yigal Mordechai Edery
Customer Number:	74877
Filer:	Dawn-Marie Bey./Jeanne Paolella-Bald
Filer Authorized By:	Dawn-Marie Bey.
Attorney Docket Number:	FIN0001-CON1-CIP1-CON4
Receipt Date:	23-JAN-2012
Filing Date:	07-NOV-2011
Time Stamp:	15:25:07
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	no
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File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Applicant Response to Pre-Exam Formalities Notice	fin0001con1cip1con4_resp.pdf	92131 07e8992a99efe6d4f98241e40a9ed26bb1406f9d	no	4

Warnings:

Information:

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

New Applications Under 35 U.S.C. 111

If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371

If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office

If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NUMBER	FILING or 371(c) DATE	GRP ART UNIT	FIL FEE REC'D	ATTY. DOCKET NO.	TOT CLAIMS	IND CLAIMS
13/290,708	11/07/2011	2431	1250	FIN0001-CON1-CIP1-CON4	18	2

CONFIRMATION NO. 4120

74877

King and Spalding LLP
1700 Pennsylvania Ave, NW
Suite 200
Washington, DC 20006

FILING RECEIPT



OC000000051023231

Date Mailed: 11/21/2011

Receipt is acknowledged of this non-provisional patent application. The application will be taken up for examination in due course. Applicant will be notified as to the results of the examination. Any correspondence concerning the application must include the following identification information: the U.S. APPLICATION NUMBER, FILING DATE, NAME OF APPLICANT, and TITLE OF INVENTION. Fees transmitted by check or draft are subject to collection. Please verify the accuracy of the data presented on this receipt. **If an error is noted on this Filing Receipt, please submit a written request for a Filing Receipt Correction. Please provide a copy of this Filing Receipt with the changes noted thereon. If you received a "Notice to File Missing Parts" for this application, please submit any corrections to this Filing Receipt with your reply to the Notice. When the USPTO processes the reply to the Notice, the USPTO will generate another Filing Receipt incorporating the requested corrections**

Applicant(s)

Yigal Mordechai Edery, Pardesia, ISRAEL;
Nirmrod Itzhak Vered, Goosh Tel Mond, ISRAEL;
David R. Kroll, San Jose, CA;
Shlomo Touboul, Kefar-Haim, ISRAEL;

Power of Attorney: The patent practitioners associated with Customer Number 74877

Domestic Priority data as claimed by applicant

This application is a CON of 12/471,942 05/26/2009
which is a CON of 11/370,114 03/07/2006 PAT 7,613,926
which is a CON of 09/861,229 05/17/2001 PAT 7,058,822
which claims benefit of 60/205,591 05/17/2000
and is a CIP of 09/539,667 03/30/2000 PAT 6,804,780
which is a CON of 08/964,388 11/06/1997 PAT 6,092,194
and said 09/861,229 05/17/2001
is a CIP of 09/551,302 04/18/2000 PAT 6,480,962

Foreign Applications (You may be eligible to benefit from the **Patent Prosecution Highway** program at the USPTO. Please see <http://www.uspto.gov> for more information.)

If Required, Foreign Filing License Granted: 11/17/2011

The country code and number of your priority application, to be used for filing abroad under the Paris Convention, is **US 13/290,708**

Projected Publication Date: To Be Determined - pending completion of Corrected Papers

Non-Publication Request: No

Early Publication Request: No
Title

Malicious Mobile Code Runtime Monitoring System and Methods

Preliminary Class

726

PROTECTING YOUR INVENTION OUTSIDE THE UNITED STATES

Since the rights granted by a U.S. patent extend only throughout the territory of the United States and have no effect in a foreign country, an inventor who wishes patent protection in another country must apply for a patent in a specific country or in regional patent offices. Applicants may wish to consider the filing of an international application under the Patent Cooperation Treaty (PCT). An international (PCT) application generally has the same effect as a regular national patent application in each PCT-member country. The PCT process **simplifies** the filing of patent applications on the same invention in member countries, but **does not result** in a grant of "an international patent" and does not eliminate the need of applicants to file additional documents and fees in countries where patent protection is desired.

Almost every country has its own patent law, and a person desiring a patent in a particular country must make an application for patent in that country in accordance with its particular laws. Since the laws of many countries differ in various respects from the patent law of the United States, applicants are advised to seek guidance from specific foreign countries to ensure that patent rights are not lost prematurely.

Applicants also are advised that in the case of inventions made in the United States, the Director of the USPTO must issue a license before applicants can apply for a patent in a foreign country. The filing of a U.S. patent application serves as a request for a foreign filing license. The application's filing receipt contains further information and guidance as to the status of applicant's license for foreign filing.

Applicants may wish to consult the USPTO booklet, "General Information Concerning Patents" (specifically, the section entitled "Treaties and Foreign Patents") for more information on timeframes and deadlines for filing foreign patent applications. The guide is available either by contacting the USPTO Contact Center at 800-786-9199, or it can be viewed on the USPTO website at <http://www.uspto.gov/web/offices/pac/doc/general/index.html>.

For information on preventing theft of your intellectual property (patents, trademarks and copyrights), you may wish to consult the U.S. Government website, <http://www.stopfakes.gov>. Part of a Department of Commerce initiative, this website includes self-help "toolkits" giving innovators guidance on how to protect intellectual property in specific countries such as China, Korea and Mexico. For questions regarding patent enforcement issues, applicants may call the U.S. Government hotline at 1-866-999-HALT (1-866-999-4158).

LICENSE FOR FOREIGN FILING UNDER

Title 35, United States Code, Section 184

Title 37, Code of Federal Regulations, 5.11 & 5.15

GRANTED

The applicant has been granted a license under 35 U.S.C. 184, if the phrase "IF REQUIRED, FOREIGN FILING LICENSE GRANTED" followed by a date appears on this form. Such licenses are issued in all applications where

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This license is to be retained by the licensee and may be used at any time on or after the effective date thereof unless it is revoked. This license is automatically transferred to any related applications(s) filed under 37 CFR 1.53(d). This license is not retroactive.

The grant of a license does not in any way lessen the responsibility of a licensee for the security of the subject matter as imposed by any Government contract or the provisions of existing laws relating to espionage and the national security or the export of technical data. Licensees should apprise themselves of current regulations especially with respect to certain countries, of other agencies, particularly the Office of Defense Trade Controls, Department of State (with respect to Arms, Munitions and Implements of War (22 CFR 121-128)); the Bureau of Industry and Security, Department of Commerce (15 CFR parts 730-774); the Office of Foreign Assets Control, Department of Treasury (31 CFR Parts 500+) and the Department of Energy.

NOT GRANTED

No license under 35 U.S.C. 184 has been granted at this time, if the phrase "IF REQUIRED, FOREIGN FILING LICENSE GRANTED" DOES NOT appear on this form. Applicant may still petition for a license under 37 CFR 5.12, if a license is desired before the expiration of 6 months from the filing date of the application. If 6 months has lapsed from the filing date of this application and the licensee has not received any indication of a secrecy order under 35 U.S.C. 181, the licensee may foreign file the application pursuant to 37 CFR 5.15(b).

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PATENT APPLICATION FEE DETERMINATION RECORD Substitute for Form PTO-875					Application or Docket Number 13/290,708	
APPLICATION AS FILED - PART I						
(Column 1)		(Column 2)		SMALL ENTITY		OR
FOR	NUMBER FILED	NUMBER EXTRA	RATE(\$)	FEE(\$)	OTHER THAN SMALL ENTITY	
BASIC FEE <small>(37 CFR 1.16(a), (b), or (c))</small>	N/A	N/A	N/A		N/A	380
SEARCH FEE <small>(37 CFR 1.16(k), (j), or (m))</small>	N/A	N/A	N/A		N/A	620
EXAMINATION FEE <small>(37 CFR 1.16(o), (p), or (q))</small>	N/A	N/A	N/A		N/A	250
TOTAL CLAIMS <small>(37 CFR 1.16(i))</small>	18	minus 20 = *			OR	x 60 = 0.00
INDEPENDENT CLAIMS <small>(37 CFR 1.16(h))</small>	2	minus 3 = *				x 250 = 0.00
APPLICATION SIZE FEE <small>(37 CFR 1.16(s))</small>	If the specification and drawings exceed 100 sheets of paper, the application size fee due is \$310 (\$155 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s).					0.00
MULTIPLE DEPENDENT CLAIM PRESENT <small>(37 CFR 1.16(j))</small>						0.00
* If the difference in column 1 is less than zero, enter "0" in column 2.			TOTAL		TOTAL	1250
APPLICATION AS AMENDED - PART II						
(Column 1)		(Column 2)		(Column 3)		SMALL ENTITY
AMENDMENT A	CLAIMS REMAINING AFTER AMENDMENT	HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA	RATE(\$)	ADDITIONAL FEE(\$)	OTHER THAN SMALL ENTITY
	Total <small>(37 CFR 1.16(i))</small>	*	Minus	**	=	RATE(\$)
	Independent <small>(37 CFR 1.16(h))</small>	*	Minus	***	=	ADDITIONAL FEE(\$)
	Application Size Fee <small>(37 CFR 1.16(s))</small>					OR
	FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM <small>(37 CFR 1.16(j))</small>					OR
			TOTAL		TOTAL	
			ADD'L FEE		ADD'L FEE	
AMENDMENT B						
(Column 1)		(Column 2)		(Column 3)		SMALL ENTITY
AMENDMENT B	CLAIMS REMAINING AFTER AMENDMENT	HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA	RATE(\$)	ADDITIONAL FEE(\$)	OTHER THAN SMALL ENTITY
	Total <small>(37 CFR 1.16(i))</small>	*	Minus	**	=	RATE(\$)
	Independent <small>(37 CFR 1.16(h))</small>	*	Minus	***	=	ADDITIONAL FEE(\$)
	Application Size Fee <small>(37 CFR 1.16(s))</small>					OR
	FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM <small>(37 CFR 1.16(j))</small>					OR
			TOTAL		TOTAL	
			ADD'L FEE		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 found in the appropriate box in column 1.						



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NUMBER	FILING OR 371(C) DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO./TITLE
13/290,708	11/07/2011	Yigal Mordechai Edery	FIN0001-CON1-CIP1-CON4 CONFIRMATION NO. 4120

74877

King and Spalding LLP
1700 Pennsylvania Ave, NW
Suite 200
Washington, DC 20006

FORMALITIES LETTER



Date Mailed: 11/21/2011

NOTICE TO FILE CORRECTED APPLICATION PAPERS

Filing Date Granted

An application number and filing date have been accorded to this application. The application is informal since it does not comply with the regulations for the reason(s) indicated below. Applicant is given TWO MONTHS from the date of this Notice within which to correct the informalities indicated below. Extensions of time may be obtained by filing a petition accompanied by the extension fee under the provisions of 37 CFR 1.136(a).

The required item(s) identified below must be timely submitted to avoid abandonment:

- A replacement abstract not exceeding 150 words in length and commencing on a separate sheet in compliance with 37 CFR 1.72(b) and 37 CFR 1.121 is required.

Applicant is cautioned that correction of the above items may cause the specification and drawings page count to exceed 100 pages. If the specification and drawings exceed 100 pages, applicant will need to submit the required application size fee.

Replies should be mailed to:

Mail Stop Missing Parts
Commissioner for Patents
P.O. Box 1450
Alexandria VA 22313-1450

Registered users of EFS-Web may alternatively submit their reply to this notice via EFS-Web.

<https://portal.uspto.gov/authenticate/AuthenticateUserLocalEPF.html>

For more information about EFS-Web please call the USPTO Electronic Business Center at **1-866-217-9197** or visit our website at <http://www.uspto.gov/ebc>.

If you are not using EFS-Web to submit your reply, you must include a copy of this notice.

/mkibret/

Office of Data Management, Application Assistance Unit (571) 272-4000, or (571) 272-4200, or 1-888-786-0101



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NUMBER	FILING OR 371(C) DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO./TITLE
13/290,708	11/07/2011	Yigal Mordechai Edery	FIN0001-CON1-CIP1-CON4 CONFIRMATION NO. 4120

74877

King and Spalding LLP
1700 Pennsylvania Ave, NW
Suite 200
Washington, DC 20006

POA ACCEPTANCE LETTER



Date Mailed: 11/21/2011

NOTICE OF ACCEPTANCE OF POWER OF ATTORNEY

This is in response to the Power of Attorney filed 11/07/2011.

The Power of Attorney in this application is accepted. Correspondence in this application will be mailed to the above address as provided by 37 CFR 1.33.

/llvuong/

Office of Data Management, Application Assistance Unit (571) 272-4000, or (571) 272-4200, or 1-888-786-0101

POWER OF ATTORNEY TO PROSECUTE APPLICATIONS BEFORE THE USPTO

I hereby revoke all previous powers of attorney given in the application identified in the attached statement under 37 CFR 3.73(b).

I hereby appoint:

☒ Practitioners associated with the Customer Number:

74877

OR

☐ Practitioner(s) named below (if more than ten patent practitioners are to be named, then a customer number must be used):

Name	Registration Number	Name	Registration Number

as attorney(s) or agent(s) to represent the undersigned before the United States Patent and Trademark Office (USPTO) in connection with any and all patent applications assigned only to the undersigned according to the USPTO assignment records or assignment documents attached to this form in accordance with 37 CFR 3.73(b).

Please change the correspondence address for the application identified in the attached statement under 37 CFR 3.73(b) to:

☒ The address associated with Customer Number:

74877

OR

<input type="checkbox"/> Firm or Individual Name			
Address			
City	State	Zip	
Country			
Telephone	Email		

Assignee Name and Address:

Finjan, Inc.

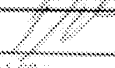
2025 Gateway Place, Suite 180

San Jose, CA 95110

A copy of this form, together with a statement under 37 CFR 3.73(b) (Form PTO/SB/96 or equivalent) is required to be filed in each application in which this form is used. The statement under 37 CFR 3.73(b) may be completed by one of the practitioners appointed in this form if the appointed practitioner is authorized to act on behalf of the assignee, and must identify the application in which this Power of Attorney is to be filed.

SIGNATURE of Assignee of Record

The individual whose signature and title is supplied below is authorized to act on behalf of the assignee

Signature		Date	5/21/10
Name	Daniel Chao	Telephone	
Title	Chief Executive Officer, Finjan, Inc.		

This collection of information is required by 37 CFR 1.31, 1.32 and 1.33. The information is required to obtain or retain a benefit by the public which is to be filed 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 take 3 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 burden 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 0.

STATEMENT UNDER 37 CFR 3.73(b)

Applicant/Patent Owner: Finjan, Inc.

Application No./Patent No.: To Be Assigned Filed/Issue Date: Herewith

Entitled: Malicious Mobile Code Runtime Monitoring System and Methods

Finjan, Inc., a corporation

(Name of Assignee)

(Type of Assignee, e.g., corporation, partnership, university, government agency, etc.)

states that it is:

1. ☒ the assignee of the entire right, title, and interest; or
2. ☐ an assignee of less than the entire right, title, and interest

The extent (by percentage) of its ownership interest is _____ %

in the patent application/patent identified above by virtue of either:

- A. ☐ An assignment from the inventor(s) of the patent application/patent identified above. The assignment was recorded in the United States Patent and Trademark Office at Reel _____, Frame _____, or for which a copy thereof is attached.

OR

- B. ☒ A chain of title from the inventor(s), of the patent application/patent identified above, to the current assignee as shown below:

1. From: Yigal M. Edery, Nimrod I. Vered, David R. Kroll To: Finjan Software, Ltd.

The document was recorded in the United States Patent and Trademark Office at
Reel 022885, Frame 0070, or for which a copy thereof is attached.

2. From: Shlomo Touboul To: Finjan Software, Ltd.

The document was recorded in the United States Patent and Trademark Office at
Reel 022885, Frame 0084, or for which a copy thereof is attached.

3. From: Finjan Software, Ltd. To: Finjan, Inc.

The document was recorded in the United States Patent and Trademark Office at
Reel 023556, Frame 0853, or for which a copy thereof is attached.

☐ Additional documents in the chain of title are listed on a supplemental sheet.

☒ As required by 37 CFR 3.73(b)(1)(i), the documentary evidence of the chain of title from the original owner to the assignee was, or concurrently is being, submitted for recordation pursuant to 37 CFR 3.11.

[NOTE: A separate copy (i.e., a true copy of the original document(s)) must be submitted to Assignment Division in accordance with 37 CFR Part 3, if the assignment is to be recorded in the records of the USPTO. See MPEP 302.08]

The undersigned (whose title is supplied below) is authorized to act on behalf of the assignee.

/Dawn-Marie Bey/

Signature

Dawn-Marie Bey

Printed or Typed Name

Partner, King & Spalding LLP

Title

November 7, 2011

Date

202-626-8978

Telephone Number

This collection of information is required by 37 CFR 3.73(b). 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 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.

Docket No. FIN0001-CON1-CIP1-CON4

PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Patent Application of

Yigal Mordechai EDERY, et al.

Serial No.: **To Be Assigned**

Group Art Unit: **To Be Assigned**

Filed: **Herewith**

Examiner: **To Be Assigned**

For: **MALICIOUS MOBILE CODE RUNTIME MONITORING SYSTEM AND METHODS**

**INFORMATION DISCLOSURE STATEMENT
UNDER 37 C.F.R. §§ 1.97 AND 1.98**

U.S. Patent and Trademark Office
Customer Window, Mail Stop Amendment
Randolph Building
401 Dulany Street
Alexandria , VA 22314

Sir:

In accordance with the requirements of 37 C.F.R. §§ 1.56, 1.97-1.98 and MPEP § 609, the references noted on the attached Form PTO-1449 are hereby brought to the attention of the Examiner.

No fees are believed to be necessary since the references cited in this statement are being submitted before the First Office Action. However, the Commissioner is hereby authorized to charge any additional fees which may be required, or to credit any overpayment, to Deposit Account No. 50-4402.

The above information is presented so that the United States Patent and Trademark Office may, in the first instance, determine any materiality thereof to the claimed invention. See

**U.S. Serial No.: To Be Assigned
Information Disclosure Statement**

- 2 - Docket No. FIN0001-CON1-CIP1-CON4

37 C.F.R. §§ 1.104(a) conferring the PTO duty to consider and use any such information. It is respectfully requested that the information be expressly considered during the prosecution of this application, and that the references be made of record therein and appear among the "References Cited" on any patent to issue therefrom.

Respectfully submitted,

Dated: November 7, 2011

By: /Dawn-Marie Bey - 44,442/
Dawn-Marie Bey
Registration No. 44,442

KING & SPALDING LLP
1700 Pennsylvania Avenue, N.W.
Suite 200
Washington, DC 20006
(202) 737-0500

15157/105032
Doc. No. 17208908

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.

UTILITY PATENT APPLICATION TRANSMITTAL <i>(Only for new nonprovisional applications under 37 C.F.R. 1.53(b))</i>	Attorney Docket No.	FIN0001-CON1-CIP1-CON4
	First Inventor	Yigal Mordechai EDERY, et al.
	Title	Malicious Mobile Code Runtime Monitoring System and Methods
	Express Mail Label No.	

APPLICATION ELEMENTS <i>See MPEP chapter 600 concerning utility patent application contents.</i>	ADDRESS TO: Commissioner for Patents P.O. Box 1450 Alexandria VA 22313-1450
1. <input type="checkbox"/> Fee Transmittal Form (e.g., PTO/SB/17) <i>(Submit an original and a duplicate for fee processing)</i> 2. <input type="checkbox"/> Applicant claims small entity status. See 37 CFR 1.27. 3. <input checked="" type="checkbox"/> Specification [Total Pages <u>33</u>] Both the claims and abstract must start on a new page <i>(For information on the preferred arrangement, see MPEP 608.01(a))</i> 4. <input checked="" type="checkbox"/> Drawing(s) (35 U.S.C. 113) [Total Sheets <u>10</u>] 5. Oath or Declaration [Total Sheets <u>5</u>] a. <input type="checkbox"/> Newly executed (original or copy) b. <input checked="" type="checkbox"/> A copy from a prior application (37 CFR 1.63 (d)) <i>(for a continuation/divisional with Box 18 completed)</i> i. <input type="checkbox"/> DELETION OF INVENTOR(S) Signed statement attached deleting inventor(s) named in the prior application, see 37 CFR 1.63(d)(2) and 1.33(b). 6. <input type="checkbox"/> Application Data Sheet. See 37 CFR 1.76 7. <input type="checkbox"/> CD-ROM or CD-R in duplicate, large table or Computer Program <i>(Appendix)</i> <input type="checkbox"/> Landscape Table on CD 8. Nucleotide and/or Amino Acid Sequence Submission <i>(if applicable, items a.-c. are required)</i> a. <input type="checkbox"/> Computer Readable Form (CRF) b. <input type="checkbox"/> Specification Sequence Listing on: i. <input type="checkbox"/> CD-ROM or CD-R (2 copies); or ii. <input type="checkbox"/> Paper c. <input type="checkbox"/> Statements verifying identity of above copies	ACCOMPANYING APPLICATIONS PARTS 9. <input type="checkbox"/> Assignment Papers (cover sheet & document(s)) Name of Assignee _____ 10. <input checked="" type="checkbox"/> 37 C.F.R. 3.73(b) Statement <input checked="" type="checkbox"/> Power of Attorney <i>(when there is an assignee)</i> 11. <input type="checkbox"/> English Translation Document <i>(if applicable)</i> 12. <input checked="" type="checkbox"/> Information Disclosure Statement (PTO/SB/08 or PTO-1449) <input type="checkbox"/> Copies of citations attached 13. <input type="checkbox"/> Preliminary Amendment 14. <input type="checkbox"/> Return Receipt Postcard (MPEP 503) <i>(Should be specifically itemized)</i> 15. <input type="checkbox"/> Certified Copy of Priority Document(s) <i>(if foreign priority is claimed)</i> 16. <input type="checkbox"/> Nonpublication Request under 35 U.S.C. 122(b)(2)(B)(i). Applicant must attach form PTO/SB/35 or equivalent. 17. <input checked="" type="checkbox"/> Other: Filed Electronically _____
18. If a CONTINUING APPLICATION, check appropriate box, and supply the requisite information below and in the first sentence of the specification following the title, or in an Application Data Sheet under 37 CFR 1.76: <input checked="" type="checkbox"/> Continuation <input type="checkbox"/> Divisional <input type="checkbox"/> Continuation-in-part (CIP) of prior application No: <u>12 / 471,942</u> Prior application information: Examiner <u>Christopher A. Revak</u> Art Unit: <u>2431</u>	
19. CORRESPONDENCE ADDRESS <input checked="" type="checkbox"/> The address associated with Customer Number <u>74877</u> OR <input type="checkbox"/> Correspondence address below Name _____ Address _____ City _____ State _____ Zip Code _____ Country _____ Telephone _____ Email _____	
Signature _____ /Dawn-Marie Bey/ Date <u>November 7, 2011</u> Name (Print/Type) <u>Dawn-Marie Bey</u> Registration No. (Attorney/Agent) <u>44,442</u>	

This collection of information is required by 37 CFR 1.53(b). 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 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: Mail Stop Patent Application, 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.

**MALICIOUS MOBILE CODE RUNTIME MONITORING
SYSTEM AND METHODS**

PRIORITY REFERENCE TO RELATED APPLICATIONS

[0001] This application is a continuation of assignee's pending U.S. patent application serial no. 12/471,942, filed May 26, 2009 by inventors Yigal Mordechai Edery, et al., entitled "Malicious Mobile Code Runtime Monitoring System and Methods," which is a continuation of assignee's U.S. patent application serial no. 11/370,114, filed March 7, 2006 by inventors Yigal Mordechai Edery, et al., now U.S. Patent No. 7,613,926, entitled "Method and System for Protecting a Computer and a Network from Hostile Downloadables," which is a continuation of assignee's U.S. patent application serial no. 09/861,229, filed on May 17, 2001 by inventors Yigal Mordechai Edery, et al., now U.S. Patent No. 7,058,822, entitled "Malicious Mobile Code Runtime Monitoring System And Methods", all of which are hereby incorporated by reference. U.S. patent application serial no. 09/861,229 claims benefit of provisional U.S. patent application serial no. 60/205,591, entitled "Computer Network Malicious Code Run-time Monitoring," filed on May 17, 2000 by inventors Nimrod Itzhak Vered, et al., which is hereby incorporated by reference. U.S. patent application serial no. 09/861,229 is also a Continuation-In-Part of assignee's U.S. patent application serial no. 09/539,667, entitled "System and Method for Protecting a Computer and a Network From Hostile Downloadables" filed on March 30, 2000 by inventor Shlomo Touboul, now U.S. Patent No. 6,804,780, and hereby incorporated by reference, which is a continuation of assignee's U.S. patent application serial no. 08/964,388, filed on November 6, 1997 by inventor Shlomo Touboul, now U.S. Patent No. 6,092,194, also entitled "System and Method for Protecting a Computer and a Network from Hostile Downloadables" and hereby incorporated by reference. U.S. Serial No. 09/861,229 is also a Continuation-In-Part of assignee's U.S. patent application serial no. 09/551,302, entitled "System and Method for Protecting a Client During Runtime From Hostile Downloadables", filed on April 18, 2000 by inventor Shlomo Touboul, now U.S. Patent No. 6,480,962, which is hereby incorporated by reference.

BACKGROUND OF THE INVENTION**Field of the Invention**

[0002] This invention relates generally to computer networks, and more particularly provides a system and methods for protecting network-connectable devices from undesirable downloadable operation.

Description of the Background Art

[0003] Advances in networking technology continue to impact an increasing number and diversity of users. The Internet, for example, already provides to expert, intermediate and even novice users the informational, product and service resources of over 100,000 interconnected networks owned by governments, universities, nonprofit groups, companies, etc. Unfortunately, particularly the Internet and other public networks have also become a major source of potentially system-fatal or otherwise damaging computer code commonly referred to as “viruses.”

[0004] Efforts to forestall viruses from attacking networked computers have thus far met with only limited success at best. Typically, a virus protection program designed to identify and remove or protect against the initiating of known viruses is installed on a network firewall or individually networked computer. The program is then inevitably surmounted by some new virus that often causes damage to one or more computers. The damage is then assessed and, if isolated, the new virus is analyzed. A corresponding new virus protection program (or update thereof) is then developed and installed to combat the new virus, and the new program operates successfully until yet another new virus appears - and so on. Of course, damage has already typically been incurred.

[0005] To make matters worse, certain classes of viruses are not well recognized or understood, let alone protected against. It is observed by this inventor, for example, that Downloadable information comprising program code can include distributable components (e.g. Java™ applets and JavaScript scripts, ActiveX™ controls, Visual Basic, add-ins and/or others). It can also include, for example, application programs, Trojan horses, multiple compressed programs such as zip or meta files, among others. U.S. Patent 5,983,348 to Shuang, however, teaches a protection system for protecting against only distributable components including “Java

applets or ActiveX controls”, and further does so using resource intensive and high bandwidth static Downloadable content and operational analysis, and modification of the Downloadable component; Shuang further fails to detect or protect against additional program code included within a tested Downloadable. U.S. Patent 5,974,549 to Golan teaches a protection system that further focuses only on protecting against ActiveX controls and not other distributable components, let alone other Downloadable types. U.S. patent 6,167,520 to Touboul enables more accurate protection than Shuang or Golan, but lacks the greater flexibility and efficiency taught herein, as do Shuang and Golan.

[0006] Accordingly, there remains a need for efficient, accurate and flexible protection of computers and other network connectable devices from malicious Downloadables.

SUMMARY OF THE INVENTION

[0007] The present invention provides protection systems and methods capable of protecting a personal computer (“PC”) or other persistently or even intermittently network accessible devices or processes from harmful, undesirable, suspicious or other “malicious” operations that might otherwise be effectuated by remotely operable code. While enabling the capabilities of prior systems, the present invention is not nearly so limited, resource intensive or inflexible, and yet enables more reliable protection. For example, remotely operable code that is protectable against can include downloadable application programs, Trojan horses and program code groupings, as well as software “components”, such as Java™ applets, ActiveX™ controls, JavaScript™/Visual Basic scripts, add-ins, etc., among others. Protection can also be provided in a distributed interactively, automatically or mixed configurable manner using protected client, server or other parameters, redirection, local/remote logging, etc., and other server/client based protection measures can also be separately and/or interoperably utilized, among other examples.

[0008] In one aspect, embodiments of the invention provide for determining, within one or more network “servers” (e.g. firewalls, resources, gateways, email relays or other devices/processes that are capable of receiving-and-transferring a Downloadable) whether received information includes executable code (and is a “Downloadable”). Embodiments also provide for delivering static, configurable and/or extensible remotely operable protection policies to a Downloadable-destination, more typically as a sandboxed package including the mobile

protection code, downloadable policies and one or more received Downloadables. Further client-based or remote protection code/policies can also be utilized in a distributed manner. Embodiments also provide for causing the mobile protection code to be executed within a Downloadable-destination in a manner that enables various Downloadable operations to be detected, intercepted or further responded to via protection operations. Additional server/information-destination device security or other protection is also enabled, among still further aspects.

[0009] A protection engine according to an embodiment of the invention is operable within one or more network servers, firewalls or other network connectable information re-communicating devices (as are referred to herein summarily one or more “servers” or “re-communicators”). The protection engine includes an information monitor for monitoring information received by the server, and a code detection engine for determining whether the received information includes executable code. The protection engine also includes a packaging engine for causing a sandboxed package, typically including mobile protection code and downloadable protection policies to be sent to a Downloadable-destination in conjunction with the received information, if the received information is determined to be a Downloadable.

[00010] A sandboxed package according to an embodiment of the invention is receivable by and operable with a remote Downloadable-destination. The sandboxed package includes mobile protection code (“MPC”) for causing one or more predetermined malicious operations or operation combinations of a Downloadable to be monitored or otherwise intercepted. The sandboxed package also includes protection policies (operable alone or in conjunction with further Downloadable-destination stored or received policies/MPCs) for causing one or more predetermined operations to be performed if one or more undesirable operations of the Downloadable is/are intercepted. The sandboxed package can also include a corresponding Downloadable and can provide for initiating the Downloadable in a protective “sandbox”. The MPC/policies can further include a communicator for enabling further MPC/policy information or “modules” to be utilized and/or for event logging or other purposes.

[00011] A sandbox protection system according to an embodiment of the invention comprises an installer for enabling a received MPC to be executed within a Downloadable-destination (device/process) and further causing a Downloadable application program,

distributable component or other received downloadable code to be received and installed within the Downloadable-destination. The protection system also includes a diverter for monitoring one or more operation attempts of the Downloadable, an operation analyzer for determining one or more responses to the attempts, and a security enforcer for effectuating responses to the monitored operations. The protection system can further include one or more security policies according to which one or more protection system elements are operable automatically (e.g. programmatically) or in conjunction with user intervention (e.g. as enabled by the security enforcer). The security policies can also be configurable/extensible in accordance with further downloadable and/or Downloadable-destination information.

[00012] A method according to an embodiment of the invention includes receiving downloadable information, determining whether the downloadable information includes executable code, and causing a mobile protection code and security policies to be communicated to a network client in conjunction with security policies and the downloadable information if the downloadable information is determined to include executable code. The determining can further provide multiple tests for detecting, alone or together, whether the downloadable information includes executable code.

[00013] A further method according to an embodiment of the invention includes forming a sandboxed package that includes mobile protection code ("MPC"), protection policies, and a received, detected-Downloadable, and causing the sandboxed package to be communicated to and installed by a receiving device or process ("user device") for responding to one or more malicious operation attempts by the detected-Downloadable from within the user device. The MPC/policies can further include a base "module" and a "communicator" for enabling further up/downloading of one or more further "modules" or other information (e.g. events, user/user device information, etc.).

[00014] Another method according to an embodiment of the invention includes installing, within a user device, received mobile protection code ("MPC") and protection policies in conjunction with the user device receiving a downloadable application program, component or other Downloadable(s). The method also includes determining, by the MPC, a resource access attempt by the Downloadable, and initiating, by the MPC, one or more predetermined operations corresponding to the attempt. (Predetermined operations can, for example, comprise initiating

user, administrator, client, network or protection system determinable operations, including but not limited to modifying the Downloadable operation, extricating the Downloadable, notifying a user/another, maintaining a local/remote log, causing one or more MPCs/policies to be downloaded, etc.)

[00015] Advantageously, systems and methods according to embodiments of the invention enable potentially damaging, undesirable or otherwise malicious operations by even unknown mobile code to be detected, prevented, modified and/or otherwise protected against without modifying the mobile code. Such protection is further enabled in a manner that is capable of minimizing server and client resource requirements, does not require pre-installation of security code within a Downloadable-destination, and provides for client specific or generic and readily updateable security measures to be flexibly and efficiently implemented. Embodiments further provide for thwarting efforts to bypass security measures (e.g. by “hiding” undesirable operation causing information within apparently inert or otherwise “friendly” downloadable information) and/or dividing or combining security measures for even greater flexibility and/or efficiency.

[00016] Embodiments also provide for determining protection policies that can be downloaded and/or ascertained from other security information (e.g. browser settings, administrative policies, user input, uploaded information, etc.). Different actions in response to different Downloadable operations, clients, users and/or other criteria are also enabled, and embodiments provide for implementing other security measures, such as verifying a downloadable source, certification, authentication, etc. Appropriate action can also be accomplished automatically (e.g. programmatically) and/or in conjunction with alerting one or more users/administrators, utilizing user input, etc. Embodiments further enable desirable Downloadable operations to remain substantially unaffected, among other aspects.

BRIEF DESCRIPTION OF THE DRAWINGS

[00017] FIG. 1a is a block diagram illustrating a network system in accordance with an embodiment of the present invention;

[00018] FIG. 1b is a block diagram illustrating a network subsystem example in accordance with an embodiment of the invention;

[00019] FIG. 1c is a block diagram illustrating a further network subsystem example in accordance with an embodiment of the invention;

[00020] FIG. 2 is a block diagram illustrating a computer system in accordance with an embodiment of the invention;

[00021] FIG. 3 is a flow diagram broadly illustrating a protection system host according to an embodiment of the invention;

[00022] FIG. 4 is a block diagram illustrating a protection engine according to an embodiment of the invention;

[00023] FIG. 5 is a block diagram illustrating a content inspection engine according to an embodiment of the invention;

[00024] FIG. 6a is a block diagram illustrating protection engine parameters according to an embodiment of the invention;

[00025] FIG. 6b is a flow diagram illustrating a linking engine use in conjunction with ordinary, compressed and distributable sandbox package utilization, according to an embodiment of the invention;

[00026] FIG. 7a is a flow diagram illustrating a sandbox protection system operating within a destination system, according to an embodiment of the invention;

[00027] FIG. 7b is a block diagram illustrating memory allocation usable in conjunction with the protection system of FIG. 7a, according to an embodiment of the invention;

[00028] FIG. 8 is a block diagram illustrating a mobile protection code according to an embodiment of the invention;

[00029] FIG. 9 is a flowchart illustrating a protection method according to an embodiment of the invention;

[00030] FIG. 10a is a flowchart illustrating method for determining if a potential-Downloadable includes or is likely to include executable code, according to an embodiment of the invention;

[00031] FIG. 10b is a flowchart illustrating a method for forming a protection agent, according to an embodiment of the invention;

[00032] FIG. 11 is a flowchart illustrating a method for protecting a Downloadable destination according to an embodiment of the invention;

[00033] FIG. 12a is a flowchart illustrating a method for forming a Downloadable access interceptor according to an embodiment of the invention; and

[00034] FIG. 12b is a flowchart illustrating a method for implementing mobile protection policies according to an embodiment of the invention.

DETAILED DESCRIPTION

[00035] In providing malicious mobile code runtime monitoring systems and methods, embodiments of the invention enable actually or potentially undesirable operations of even unknown malicious code to be efficiently and flexibly avoided. Embodiments provide, within one or more “servers” (e.g. firewalls, resources, gateways, email relays or other information re-communicating devices), for receiving downloadable-information and detecting whether the downloadable-information includes one or more instances of executable code (e.g. as with a Trojan horse, zip/meta file etc.). Embodiments also provide for separately or interoperably conducting additional security measures within the server, within a Downloadable-destination of a detected-Downloadable, or both.

[00036] Embodiments further provide for causing mobile protection code (“MPC”) and downloadable protection policies to be communicated to, installed and executed within one or more received information destinations in conjunction with a detected-Downloadable. Embodiments also provide, within an information-destination, for detecting malicious operations of the detected-Downloadable and causing responses thereto in accordance with the protection policies (which can correspond to one or more user, Downloadable, source, destination, or other parameters), or further downloaded or downloadable-destination based policies (which can also be configurable or extensible). (Note that the term “or”, as used herein, is generally intended to mean “and/or” unless otherwise indicated.)

[00037] FIGS. 1a through 1c illustrate a computer network system **100** according to an embodiment of the invention. FIG. 1a broadly illustrates system **100**, while FIGS. 1b and 1c of 1c illustrate exemplary protectable subsystem implementations corresponding with system **104** or **106** of FIG. 1a.

[00038] Beginning with FIG. 1a, computer network system **100** includes an external computer network **101**, such as a Wide Area Network or “WAN” (e.g. the Internet), which is coupled to one or more network resource servers (summarily depicted as resource server-1 **102** and resource server-N **103**). Where external network **101** includes the Internet, resource servers 1-N (**102**, **103**) might provide one or more resources including web pages, streaming media, transaction-facilitating information, program updates or other downloadable information, summarily depicted as resources **121**, **131** and **132**. Such information can also include more traditionally viewed “Downloadables” or “mobile code” (i.e. distributable components), as well as downloadable application programs or other further Downloadables, such as those that are discussed herein. (It will be appreciated that interconnected networks can also provide various other resources as well.)

[00039] Also coupled via external network **101** are subsystems **104-106**. Subsystems **104-106** can, for example, include one or more servers, personal computers (“PCs”), smart appliances, personal information managers or other devices/processes that are at least temporarily or otherwise intermittently directly or indirectly connectable in a wired or wireless manner to external network **101** (e.g. using a dialup, DSL, cable modem, cellular connection, IR/RF, or various other suitable current or future connection alternatives). One or more of subsystems **104-106** might further operate as user devices that are connectable to external network **101** via an internet service provider (“ISP”) or local area network (“LAN”), such as a corporate intranet, or home, portable device or smart appliance network, among other examples.

[00040] FIG. 1a also broadly illustrates how embodiments of the invention are capable of selectively, modifiably or extensibly providing protection to one or more determinable ones of networked subsystems **104-106** or elements thereof (not shown) against potentially harmful or other undesirable (“malicious”) effects in conjunction with receiving downloadable information. “Protected” subsystem **104**, for example, utilizes a protection in accordance with the teachings herein, while “unprotected” subsystem-N **105** employs no protection, and protected subsystem-M **106** might employ one or more protections including those according to the teachings herein, other protection, or some combination.

[00041] System **100** implementations are also capable of providing protection to redundant elements **107** of one or more of subsystems **104-106** that might be utilized, such as

backups, failsafe elements, redundant networks, etc. Where included, such redundant elements are also similarly protectable in a separate, combined or coordinated manner using embodiments of the present invention either alone or in conjunction with other protection mechanisms. In such cases, protection can be similarly provided singly, as a composite of component operations or in a backup fashion. Care should, however, be exercised to avoid potential repeated protection engine execution corresponding to a single Downloadable; such “chaining” can cause a Downloadable to operate incorrectly or not at all, unless a subsequent detection engine is configured to recognize a prior packaging of the Downloadable.

[00042] FIGS. 1b and 1c further illustrate, by way of example, how protection systems according to embodiments of the invention can be utilized in conjunction with a wide variety of different system implementations. In the illustrated examples, system elements are generally configurable in a manner commonly referred to as a “client-server” configuration, as is typically utilized for accessing Internet and many other network resources. For clarity sake, a simple client-server configuration will be presumed unless otherwise indicated. It will be appreciated, however, that other configurations of interconnected elements might also be utilized (e.g. peer-peer, routers, proxy servers, networks, converters, gateways, services, network reconfiguring elements, etc.) in accordance with a particular application.

[00043] The FIG. 1b example shows how a suitable protected system **104a** (which can correspond to subsystem-l **104** or subsystem-M **106** of FIG. 1) can include a protection-initiating host “server” or “re-communicator” (e.g. ISP server **140a**), one or more user devices or “Downloadable-destinations” **145**, and zero or more redundant elements (which elements are summarily depicted as redundant client device/process **145a**). In this example, ISP server **140a** includes one or more email, Internet or other servers **141a**, or other devices or processes capable of transferring or otherwise “re-communicating” downloadable information to user devices **145**. Server **141a** further includes protection engine or “PE” **142a**, which is capable of supplying mobile protection code (“MPC”) and protection policies for execution by client devices **145**. One or more of user devices **145** can further include a respective one or more clients **146** for utilizing information received via server **140a**, in accordance with which MPC and protection policies are operable to protect user devices **145** from detrimental, undesirable or otherwise “malicious” operations of downloadable information also received by user device **145**.

[00044] The FIG. 1c example shows how a further suitable protected system **104b** can include, in addition to a “re-communicator”, such as server **142b**, a firewall **143c** (e.g. as is typically the case with a corporate intranet and many existing or proposed home/smart networks.) In such cases, a server **141b** or firewall **143** can operate as a suitable protection engine host. A protection engine can also be implemented in a more distributed manner among two or more protection engine host systems or host system elements, such as both of server **141** and firewall **143**, or in a more integrated manner, for example, as a standalone device. Redundant system or system protection elements **11**) can also be similarly provided in a more distributed or integrated manner (see above).

[00045] System **104b** also includes internal network **144** and user devices **145**. User devices **145** further include a respective one or more clients **146** for utilizing information received via server **140a**, in accordance with which the MPCs or protection policies are operable. (As in the previous example, one or more of user devices **145** can also include or correspond with similarly protectable redundant system elements, which are not shown.)

[00046] It will be appreciated that the configurations of FIGS 1a-1c are merely exemplary. Alternative embodiments might, for example, utilize other suitable connections, devices or processes. One or more devices can also be configurable to operate as a network server, firewall, smart router, a resource server servicing deliverable third-party/manufacture postings, a user device operating as a firewall/server, or other information-suppliers or intermediaries (i.e. as a “re-communicator” or “server”) for servicing one or more further interconnected devices or processes or interconnected levels of devices or processes. Thus, for example, a suitable protection engine host can include one or more devices or processes capable of providing or supporting the providing of mobile protection code or other protection consistent with the teachings herein. A suitable information-destination or “user device” can further include one or more devices or processes (such as email, browser or other clients) that are capable of receiving and initiating or otherwise hosting a mobile code execution.

[00047] FIG. 2 illustrates an exemplary computing system **200**, that can comprise one or more of the elements of FIGS. 1a through 1c. While other application-specific alternatives might be utilized, it will be presumed for clarity sake that system **100** elements (FIGS. 1a-c) are

implemented in hardware, software or some combination by one or more processing systems consistent therewith, unless otherwise indicated.

[00048] Computer system **200** comprises elements coupled via communication channels (e.g. bus **201**) including one or more general or special purpose processors **202**, such as a Pentium® or Power PC®, digital signal processor (“DSP”), etc. System **200** elements also include one or more input devices **203** (such as ~ mouse, keyboard, microphone, pen, etc.), and one or more output devices **204**, such as a suitable display, speakers, actuators, etc., in accordance with a particular application.

[00049] System **200** also includes a computer readable storage media reader **205** coupled to a computer readable storage medium **206**, such as a storage/memory device or hard or removable storage/memory media; such devices or media are further indicated separately as storage device **208** and memory **209**, which can include hard disk variants, floppy/compact disk variants, digital versatile disk (“DVD”) variants, smart cards, read only memory, random access memory, cache memory, etc., in accordance with a particular application. One or more suitable communication devices **207** can also be included, such as a modem, OSL, infrared or other suitable transceiver, etc. for providing inter-device communication directly or via one or more suitable private or public networks that can include but are not limited to those already discussed.

[00050] Working memory further includes operating system (“OS”) elements and other programs, such as application programs, mobile code, data, etc. for implementing system **100** elements that might be stored or loaded therein during use. The particular OS can vary in accordance with a particular device, features or other aspects in accordance with a **110** particular application (e.g. Windows, Mac, Linux, Unix or Palm OS variants, a proprietary OS, etc.). Various programming languages or other tools can also be utilized, such as C++, Java, Visual Basic, etc. As will be discussed, embodiments can also include a network client such as a browser or email client, e.g. as produced by Netscape, Microsoft or others, a mobile code executor such as an OS task manager, Java Virtual Machine (“JVM”), etc., and an application program interface (“API”), such as a Microsoft Windows or other suitable element in accordance with the teachings herein. (It will also become apparent that embodiments might also be implemented in conjunction with a resident application or combination of mobile code and resident application components.)

[00051] One or more system **200** elements can also be implemented in hardware, software or a suitable combination. When implemented in software (e.g. as an application program, object, downloadable, servlet, etc. in whole or part), a system **200** element can be communicated transitionally or more persistently from local or remote storage to memory (or cache memory, etc.) for execution, or another suitable mechanism can be utilized, and elements can be implemented in compiled or interpretive form. Input, intermediate or resulting data or functional elements can further reside more transitionally or more persistently in a storage media, cache or more persistent volatile or non-volatile memory, (e.g. storage device **207** or memory **208**) in accordance with a particular application.

[00052] FIG. 3 illustrates an interconnected re-communicator **300** generally consistent with system **140b** of FIG. 1, according to an embodiment of the invention. As with system **140b**, system **300** includes a server **301**, and can also include a firewall **302**. In this implementation, however, either server **301** or firewall **302** (if a firewall is used) can further include a protection engine (**310** or **320** respectively). Thus, for example, an included firewall can process received information in a conventional manner, the results of which can be further processed by protection engine **310** of server **301**, or information processed by protection engine **320** of an included firewall **302** can be processed in a conventional manner by server **301**. (For clarity sake, a server including a singular protection engine will be presumed, with or without a firewall, for the remainder of the discussion unless otherwise indicated. Note, however, that other embodiments consistent with the teachings herein might also be utilized.)

[00053] FIG. 3 also shows how information received by server **301** (or firewall **302**) can include non-executable information, executable information or a combination of non-executable and one or more executable code portions (e.g. so-called Trojan horses that include a hostile Downloadable within a friendly one, combined, compressed or otherwise encoded files, etc.). Particularly such combinations will likely remain undetected by a firewall or other more conventional protection systems. Thus, for convenience, received information will also be referred to as a “potential-Downloadable”, and received information found to include executable code will be referred to as a “Downloadable” or equivalently as a “detected-Downloadable” (regardless of whether the executable code includes one or more application programs, distributable “components” such as Java, ActiveX, add-in, etc.).

[00054] Protection engine **310** provides for detecting whether received potential-Downloadables include executable code, and upon such detection, for causing mobile protection code (“MPC”) to be transferred to a device that is a destination of the potential-Downloadable (or “Downloadable-destination”). Protection engine **310** can also provide protection policies in conjunction with the MPC (or thereafter as well), which MPC/policies can be automatically (e.g. programmatically) or interactively configurable in accordance user, administrator, downloadable source, destination, operation, type or various other parameters alone or in combination (see below). Protection engine **310** can also provide or operate separately or interoperably in conjunction with one or more of certification, authentication, downloadable tagging, source checking, verification, logging, diverting or other protection services via the MPC, policies, other local/remote server or destination processing, etc. (e.g. which can also include protection mechanisms taught by the above-noted prior applications; see FIG. 4).

[00055] Operationally, protection engine **310** of server **301** monitors information received by server **301** and determines whether the received information is deliverable to a protected destination, e.g. using a suitable monitor/data transfer mechanism and comparing a destination-address of the received information to a protected destination set, such as a protected destinations list, array, database, etc. (All deliverable information or one or more subsets thereof might also be monitored.) Protection engine **310** further analyzes the potential-Downloadable and determines whether the potential-Downloadable includes executable code. If not, protection engine **310** enables the not executable potential-Downloadable **331** to be delivered to its destination in an unaffected manner.

[00056] In conjunction with determining that the potential-Downloadable is a detected-Downloadable, protection engine **310** also causes mobile protection code or “MPC” **341** to be communicated to the Downloadable-destination of the Downloadable, more suitably in conjunction with the detected-Downloadable **343** (see below). Protection engine **310** further causes downloadable protection policies **342** to be delivered to the Downloadable-destination, again more suitably in conjunction with the detected-Downloadable. Protection policies **342** provide parameters (or can additionally or alternatively provide additional mobile code) according to which the MPC is capable of determining or providing applicable protection to a Downloadable-destination against malicious Downloadable operations.

[00057] (One or more “checked”, tag, source, destination, type, detection or other security result indicators, which are not shown, can also be provided as corresponding to determined non-Downloadables or Downloadables, e.g. for testing, logging, further processing, further identification tagging or other purposes in accordance with a particular application.)

[00058] Further MPCs, protection policies or other information are also deliverable to a the same or another destination, for example, in accordance with communication by an MPC/protection policies already delivered to a downloadable-destination. Initial or subsequent MPCs/policies can further be selected or configured in accordance with a Downloadable-destination indicated by the detected-Downloadable, destination-user or administrative information, or other information providable to protection engine **310** by a user, administrator, user system, user system examination by a communicated MPC, etc. (Thus, for example, an initial MPC/policies can also be initially provided that are operable with or optimized for more efficient operation with different Downloadable-destinations or destination capabilities.)

[00059] While integrated protection constraints within the MPC might also be utilized, providing separate protection policies has been found to be more efficient, for example, by enabling more specific protection constraints to be more easily updated in conjunction with detected-Downloadable specifics, post-download improvements, testing, etc. Separate policies can further be more efficiently provided (e.g. selected, modified, instantiated, etc.) with or separately from an MPC, or in accordance with the requirements of a particular user, device, system, administration, later improvement, etc., as might also be provided to protection engine **310** (e.g. via user/MPC uploading, querying, parsing a Downloadable, or other suitable mechanism implemented by one or more servers or Downloadable-destinations).

[00060] (It will also become apparent that performing executable code detection and communicating to a downloadable-Destination an MPC and any applicable policies as separate from a detected-Downloadable is more accurate and far less resource intensive than, for example, performing content and operation scanning, modifying a Downloadable, or providing completely Downloadable-destination based security.)

[00061] System **300** enables a single or extensible base-MPC to be provided, in anticipation or upon receipt of a first Downloadable, that is utilized thereafter to provide protection of one or more Downloadable-destinations. It is found, however, that providing an

MPC upon each detection of a Downloadable (which is also enabled) can provide a desirable combination of configurability of the MPC/policies and lessened need for management (e.g. given potentially changing user/destination needs, enabling testing, etc.).

[00062] Providing an MPC upon each detection of a Downloadable also facilitates a lessened demand on destination resources, e.g. since information-destination resources used in executing the MPC/policies can be re-allocated following such use. Such alternatives can also be selectively, modifiably or extensibly provided (or further in accordance with other application-specific factors that might also apply.) Thus, for example, a base-MPC or base-policies might be provided to a user device that is/are extensible via additionally downloadable “modules” upon server **301** detection of a Downloadable deliverable to the same user device, among other alternatives.

[00063] In accordance with a further aspect of the invention, it is found that improved efficiency can also be achieved by causing the MPC to be executed within a Downloadable-destination in conjunction with, and further, prior to initiation of the detected Downloadable. One mechanism that provides for greater compatibility and efficiency in conjunction with conventional client-based Downloadable execution is for a protection engine to form a sandboxed package **340** including MPC **341**, the detected-Downloadable **343** and any policies **342**. For example, where the Downloadable is a binary executable to be executed by an operating system, protection engine **310** forms a protected package by concatenating, within sandboxed package **340**, MPC **341** for delivery to a Downloadable-destination first, followed by protection policies **342** and Downloadable **343**. (Concatenation or techniques consistent therewith can also be utilized for providing a protecting package corresponding to a Java applet for execution by a NM of a Downloadable-destination, or with regard to ActiveX controls, add-ins or other distributable components, etc.)

[00064] The above concatenation or other suitable processing will result in the following. Upon receipt of sandboxed package **340** by a compatible browser, email or other destination-client and activating of the package by a user or the destination-client, the operating system (or a suitable responsively initiated distributed component host) will attempt to initiate sandboxed package **340** as a single Downloadable. Such processing will, however, result in initiating the MPC **341** and -in accordance with further aspects of the invention- the MPC will initiate the

Downloadable in a protected manner, further in accordance with any applicable included or further downloaded protection policies **342**. (While system **300** is also capable of ascertaining protection policies stored at a Downloadable-destination, e.g. by poll, query, etc. of available destination information, including at least initial policies within a suitable protecting package is found to avoid associated security concerns or inefficiencies.)

[00065] Turning to FIG. 4, a protection engine **400** generally consistent with protection engine **310** (or **320**) of FIG. 3 is illustrated in accordance with an embodiment of the invention. Protection engine **400** comprises information monitor **401**, detection engine **402**, and protected packaging engine **403**, which further includes agent generator **431**, storage **404**, linking engine **405**, and transfer engine **406**. Protection engine **400** can also include a buffer **407**, for temporarily storing a received potential-Downloadable, or one or more systems for conducting additional authentication, certification, verification or other security processing (e.g. summarily depicted as security system **408**.) Protection engine **400** can further provide for selectively re-directing, further directing, logging, etc. of a potential/detected Downloadable or information corresponding thereto in conjunction with detection, other security, etc., in accordance with a particular application.

[00066] (Note that FIG. 4, as with other figures included herein, also depicts exemplary signal flow arrows; such arrows are provided to facilitate discussion, and should not be construed as exclusive or otherwise limiting.)

[00067] Information monitor **401** monitors potential-Downloadables received by a host server and provides the information via buffer **407** to detection engine **402** or to other system **400** elements. Information monitor **401** can be configured to monitor host server download operations in conjunction with a user or a user-device that has logged-on to the server, or to receive information via a server operation hook, servlet, communication channel or other suitable mechanism.

[00068] Information monitor **401** can also provide for transferring, to storage **404** or other protection engine elements, configuration information including, for example, user, MPC, protection policy, interfacing or other configuration information (e.g. see FIG. 6). Such configuration information monitoring can be conducted in accordance with a user/device logging onto or otherwise accessing a host server, via one or more of configuration operations, using an

applet to acquire such information from or for a particular user, device or devices, via MPC/policy polling of a user device, or via other suitable mechanisms.

[00069] Detection engine **402** includes code detector **421**, which receives a potential-Downloadable and determines, more suitably in conjunction with inspection parameters **422**, whether the potential-Downloadable includes executable code and is thus a “detected-Downloadable”. (Code detector **421** can also include detection processors for performing me decompression or other “decoding”, or such detection-facilitating processing as decryption, utilization/support of security system **408**, etc. in accordance with a particular application.)

[00070] Detection engine **402** further transfers a detected-downloadable (“XEQ”) to protected packaging engine **403** along with indicators of such detection., or a determined non-executable (“NXEQ”) to transfer engine **406**. (Inspection parameters **422** enable analysis criteria to be readily updated or varied, for example, in accordance with particular source, destination or other potential Downloadable impacting parameters, and are discussed in greater detail with reference to FIG. 5). Detection engine **402** can also provide indicators for delivery of initial and further MPCs/policies, for example, prior to or in conjunction with detecting a Downloadable and further upon receipt of an indicator from an already downloaded MPC/policy. A downloaded MPC/policy can further remain resident at a user device with further modules downloaded upon or even after delivery of a sandboxed package. Such distribution can also be provided in a configurable manner, such that delivery of a complete package or partial packages are automatically or interactively determinable in accordance with user/administrative preferences/policies, among other examples.

[00071] Packaging engine **403** provides for generating mobile protection code and protection policies, and for causing delivery thereof (typically with a detected-Downloadable) to a Downloadable-destination for protecting the Downloadable-destination against malicious operation attempts by the detected Downloadable. In this example, packaging engine **403** includes agent generator **431**, storage **404** and linking engine **405**.

[00072] Agent generator **431** includes an MPC generator **432** and a protection policy generator **433** for “generating” an MPC and a protection policy (or set of policies) respectively upon receiving one or more “generate MPC/policy” indicators from detection engine **402**, indicating that a potential-Downloadable is a detected-Downloadable. MPC generator **432** and

protection policy generator **433** provide for generating MPCs and protection policies respectively in accordance with parameters retrieved from storage **404**. Agent generator **431** is further capable of providing multiple MPCs/policies, for example, the same or different MPCs/policies in accordance with protecting ones of multiple executables within a zip file, or for providing initial MPCs/policies and then further MPCs/policies or MPC/policy “modules” as initiated by further indicators such as given above, via an indicator of an already downloaded MPC/policy or via other suitable mechanisms. (It will be appreciated that pre-constructed MPCs/policies or other processing can also be utilized, e.g. via retrieval from storage **404**, but with a potential decrease in flexibility.)

[00073] MPC generator **432** and protection policy generator **433** are further configurable. Thus, for example, more generic MPCs/policies can be provided to all or a grouping of serviced destination-devices (e.g. in accordance with a similarly configured/administered intranet), or different MPCs/policies that can be configured in accordance with one or more of user, network administration, Downloadable-destination or other parameters (e.g. see FIG. 6). As will become apparent, a resulting MPC provides an operational interface to a destination device/process. Thus, a high degree of flexibility and efficiency is enabled in providing such an operational interface within different or differently configurable user devices/processes or other constraints.

[00074] Such configurability further enables particular policies to be utilized in accordance with a particular application (e.g. particular system uses, access limitations, user interaction, treating application programs or Java components from a particular known source one way and unknown source ActiveX components, or other considerations). Agent generator **431** further transfers a resulting MPC and protection policy pair to linking engine **405**.

[00075] Linking engine **405** provides for forming from received component elements (see above) a sandboxed package that can include one or more initial or complete MPCs and applicable protection policies, and a Downloadable, such that the sandboxed package will protect a receiving Downloadable-destination from malicious operation by the Downloadable. Linking engine **405** is implementable in a static or configurable manner in accordance, for example, with characteristics of a particular user device/process stored intermittently or more persistently in storage **404**. Linking engine **405** can also provide for restoring a Downloadable, such as a compressed, encrypted or otherwise encoded file that has been decompressed, decrypted or

otherwise decoded via detection processing **20** (e.g. see FIG. 6b). It is discovered, for example, that the manner in which the Windows OS initiates a binary executable or an ActiveX control can be utilized to enable protected initiation of a detected-Downloadable. Linking engine **405** is, for example, configurable to form, for an ordinary single-executable Downloadable (e.g. an application program, applet, etc.) a sandboxed package **340** as a concatenation of ordered elements including an MPC **341**, applicable policies **342** and the Downloadable or “XEQ” **343** (e.g. see FIG. 4).

[00076] Linking engine **405** is also configurable to form, for a Downloadable received by a server as a compressed single or multiple-executable Downloadable such as a zipped or meta file, a protecting package **340** including one or more MPCs, applicable policies and the one or more included executables of the Downloadable. For example, a sandboxed package can be formed in which a single MPC and policies precede and thus will affect all such executables as a result of inflating and installation. An MPC and applicable policies can also, for example, precede each executable, such that each executable will be separately sandboxed in the same or a different manner according to MPC/policy configuration (see above) upon inflation and installation. (See also FIGS. 5 and 6.) Linking engine is also configurable to form an initial MPC, MPC-policy or sandboxed package (e.g. prior to upon receipt of a downloadable) or an additional MPC, MPC-policy or sandboxed package (e.g. upon or following receipt of a downloadable), such that suitable MPCs/policies can be provided to a Downloadable-destination or other destination in a more distributed manner. In this way, requisite bandwidth or destination resources can be minimized (via two or more smaller packages) in compromise with latency or other considerations raised by the additional required communication.

[00077] A configurable linking engine can also be utilized in accordance with other requirements of particular devices/processes, further or different elements or other permutations in accordance with the teachings herein. (It might, for example be desirable to modify the ordering of elements, to provide one or more elements separately, to provide additional information, such as a header, etc., or perform other processing in accordance with a particular device, protocol or other application considerations.)

[00078] Policy/authentication reader-analyzer **481** summarily depicts other protection mechanisms that might be utilized in conjunction with Downloadable detection, such as already

discussed, and that can further be configurable to operate in accordance with policies or parameters (summarily depicted by security/authentication policies **482**). Integration of such further protection in the depicted configuration, for example, enables a potential-Downloadable from a known unfriendly source, a source failing authentication or a provided-source that is confirmed to be fictitious to be summarily discarded, otherwise blocked, flagged, etc. (with or without further processing). Conversely, a potential-Downloadable from a known friendly source (or one confirmed as such) can be transferred with or without further processing in accordance with particular application considerations. (Other configurations including pre or post Downloadable detection mechanisms might also be utilized.)

[00079] Finally, transfer engine **406** of protection agent engine **303** provides for receiving and causing linking engine **405** (or other protection) results to be transferred to a destination user device/process. As depicted, transfer engine **406** is configured to receive and transfer a Downloadable, a determined non-executable or a sandboxed package. However, transfer engine **406** can also be provided in a more configurable manner, such as was already discussed for other system **400** elements. (Anyone or more of system **400** elements might be configurably implemented in accordance with a particular application.) Transfer engine **406** can perform such transfer, for example, by adding the information to a server transfer queue (not shown) or utilizing another suitable method.

[00080] Turning to FIG. 5 with reference to FIG. 4, a code detector **421** example is illustrated in accordance with an embodiment of the invention. As shown, code detector **421** includes data fetcher **501**, parser **502**, file-type detector **503**, inflator **504** and control **506**; other depicted elements. While implementable and potentially useful in certain instances, are found to require substantial overhead, to be less accurate in certain instances (see above) and are not utilized in a present implementation; these will be discussed separately below. Code detector elements are further configurable in accordance with stored parameters retrievable by data fetcher **501**. (A coupling between data fetcher **501** and control **506** has been removed for clarity sake.)

[00081] Data fetcher **501** provides for retrieving a potential-Downloadable or portions thereof stored in buffer **407** or parameters from storage **404**, and communicates such information or parameters to parser **502**. Parser **502** receives a potential-Downloadable or portions thereof

from data fetcher **501** and isolates potential-Downloadable elements, such as file headers, source, destination, certificates, etc. for use by further processing elements.

[00082] File type detector **502** receives and determines whether the potential-Downloadable (likely) is or includes an executable file type. File-reader **502** can, for example, be configured to analyze a received potential-Downloadable for a file header, which is typically included in accordance with conventional data transfer protocols, such as a portable executable or standard “.exe” file format for Windows OS application programs, a Java class header for Java applets, and so on for other applications, distributed components, etc. “Zipped”, meta or other compressed files, which might include one or more executables, also typically provide standard single or multi-level headers that can be read and used to identify included executable code (or other included information types). File type detector **502** is also configurable for analyzing potential-Downloadables for all potential file type delimiters or a more limited subset of potential file type delimiters (e.g. “.exe” or “.com” in conjunction with a DOS or Microsoft Windows as Downloadable-destination).

[00083] Known file type delimiters can, for example, be stored in a more temporary or more persistent storage (e.g. storage **404** of FIG. 4) which file type detector **502** can compare to a received potential-Downloadable. (Such delimiters can thus also be updated in storage **404** as a new file type delimiter is provided, or a more limited subset of delimiters can also be utilized in accordance with a particular Downloadable-destination or other considerations of a particular application.) File type detector **502** further transfers to controller **506** a detected file type indicator indicating that the potential-Downloadable includes or does not include (i.e. or likely include) an executable file type.

[00084] In this example, the aforementioned detection processor is also included as pre-detection processor or, more particularly, a configurable file inflator **504**. File inflator **504** provides for opening or “inflating” compressed files in accordance with a compressed file type received from file type detector **503** and corresponding file opening parameters received from data fetcher **501**. Where a compressed file (e.g. a meta file) includes nested file type information not otherwise reliably provided in an overall file header or other information, inflator **504** returns such information to parser **502**. File inflator **504** also provides any now-accessible included

executables to control **506** where one or more included files are to be separately packaged with an MPC or policies.

[00085] Control **506**, in this example, operates in accordance with stored parameters and provides for routing detected non-Downloadables or Downloadables and control information, and for conducting the aforementioned distributed downloading of packages to Downloadable-destinations. In the case of a non-Downloadable, for example, control **506** sends the non-Downloadable to transfer engine **406** (FIG. 4) along with any indicators that might apply. For an ordinary single-executable Downloadable, control **506** sends control information to agent generator **431** and the Downloadable to linking engine **405** along with any other applicable indicators (see **641** of FIG. 6b). Control **506** similarly handles a compressed single-executable Downloadable or a multiple downloadable to be protected using a single sandboxed package. For a multiple-executable Downloadable, control **506** sends control information for each corresponding executable to agent generator **431**, and sends the executable to linking engine **405** along with controls and any applicable indicators, as in **643b** of FIG. 6b. (The above assumes, however, that distributed downloading is not utilized; when used - according to applicable parameters- control **506** also operates in accordance with the following.)

[00086] Control **506** conducts distributed protection (e.g. distributed packaging) by providing control signals to agent generator **431**, linking engine **405** and transfer engine **406**. In the present example, control **506** initially sends controls to agent generator **431** and linking engine **405** (FIG. 4) causing agent generator to generate an initial MPC and initial policies, and sends control and a detected-Downloadable to linking engine **405**. Linking engine **405** forms an initial sandboxed package, which transfer engine causes (in conjunction with further controls) to be downloaded to the Downloadable destination (**643a** of FIG. 6b). An initial MPC within the sandboxed package includes an installer and a communicator and performs installation as indicated below. The initial MPC also communicates via the communicator controls to control **506** (FIG. 5) in response to which control **506** similarly causes generation of MPC-M and policy-M modules **643c**, which linking engine **405** links and transfer engine **406** causes to be sent to the Downloadable destination, and so on for any further such modules.

[00087] (It will be appreciated, however, that an initial package might be otherwise configured or sent prior to receipt of a Downloadable in accordance with configuration

parameters or user interaction. Information can also be sent to other user devices, such as that of an administrator. Further MPCs/policies might also be coordinated by control **506** or other elements, or other suitable mechanisms might be utilized in accordance with the teachings herein.)

[00088] Regarding the remaining detection engine elements illustrated in FIG. 5, where content analysis is utilized, parser **502** can also provide a Downloadable or portions thereof to content detector **505**. Content detector **505** can then provide one or more content analyses. Binary detector **551**, for example, performs detection of binary information; pattern detector **552** further analyzes the Downloadable for patterns indicating executable code, or other detectors can also be utilized. Analysis results therefrom can be used in an absolute manner, where a first testing result indicating executable code confirms Downloadable detection, which result is then sent to control **506**. Alternatively, however, composite results from such analyses can also be sent to control **506** for evaluation. Control **506** can further conduct such evaluation in a summary manner (determining whether a Downloadable is detected according to a majority or minimum number of indicators), or based on a weighting of different analysis results. Operation then continues as indicated above. (Such analysis can also be conducted in accordance with aspects of a destination user device or other parameters.)

[00089] FIG. 6a illustrates more specific examples of indicators/parameters and known (or “knowledge base”) elements that can be utilized to facilitate the above-discussed system **400** configurability and detection. For clarity sake, indicators, parameters and knowledge base elements are combined as indicated “parameters.” It will be appreciated, however, that the particular parameters utilized can differ in accordance with a particular application, and indicators, parameters or known elements, where utilized, can vary and need not correspond exactly with one another. Any suitable explicit or referencing list, database or other storage structure(s) or storage structure configuration(s) can also be utilized to implement a suitable user/device based protection scheme, such as in the above examples, or other desired protection schema.

[00090] Executable parameters **601** comprise, in accordance with the above examples, executable file type parameters **611**, executable code parameters **612** and code pattern parameters **613** (including known executable file type indicators, header/code indicators and

patterns respectively, where code patterns are utilized). Use parameters **602** further comprise user parameters **621**, system parameters **622** and general parameters **623** corresponding to one or more users, user classifications, user-system correspondences or destination system, device or processes, etc. (e.g. for generating corresponding MPCs/policies, providing other protection, etc.). The remaining parameters include interface parameters **631** for providing MPC/policy (or further) configurability in accordance with a particular device or for enabling communication with a device user (see below), and other parameters **632**.

[00091] FIG. 6b illustrates a linking engine **405** according to an embodiment of the invention. As already discussed, linking engine **405** includes a linker for combining MPCs, policies or agents via concatenation or other suitable processing in accordance with an OS, JVM or other host executor or other applicable factors that might apply. Linking engine **405** also includes the aforementioned post-detection processor which, in this example, comprises a compressor **508**. As noted, compressor **508** receives linked elements from linker **507** and, where a potential-Downloadable corresponds to a compressed file that was inflated during detection, reforms the compressed file. (Known file information can be provided via configuration parameters, substantially reversal of inflating or another suitable method.) Encryption or other post-detection processing can also be conducted by linking engine **508**.

[00092] FIGS. 7a, 7b and 8 illustrate a “sandbox protection” system, as operable within a receiving destination-device, according to an embodiment of the invention.

[00093] Beginning with FIG. 7a, a client **146** receiving sandbox package **340** will “recognize” sandbox package **340** as a (mobile) executable and cause a mobile code installer **711** (e.g. an OS loader, JVM, etc.) to be initiated. Mobile code installer **711** will also recognize sandbox package **340** as an executable and will attempt to initiate sandbox package **340** at its “beginning.” Protection engine **400** processing corresponding to destination **700** use of a such a loader, however, will have resulted in the “beginning” of sandbox package **340** as corresponding to the beginning of MPC **341**, as noted with regard to the above FIG. 4 example.

[00094] Such protection engine processing will therefore cause a mobile code installer (e.g. OS loader **711**, for clarity sake) to initiate MPC **341**. In other cases, other processing might also be utilized for causing such initiation or further protection system operation. Protection engine processing also enables MPC **341** to effectively form a protection “sandbox” around

Downloadable (e.g. detected-Downloadable or “XEQ”) **343**, to monitor Downloadable **343**, intercept determinable Downloadable **343** operation (such as attempted accesses of Downloadable **343** to destination resources) and, if “malicious”, to cause one or more other operations to occur (e.g. providing an alert, offloading the Downloadable, offloading the MPC, providing only limited resource access, possibly in a particular address space or with regard to a particularly “safe” resource or resource operation, etc.).

[00095] MPC **341**, in the present OS example, executes MPC element installation and installs any policies, causing MPC **341** and protection policies **342** to be loaded into a first memory space, PI. MPC **341** then initiates loading of Downloadable **343**. Such Downloadable initiation causes OS loader **711** to load Downloadable **343** into a further working memory space-P2 **703** along with an API import table (“IAT”) **731** for providing Downloadable **631** with destination resource access capabilities. It is discovered, however that the IA T can be modified so that any call to an API can be redirected to a function within the MPC. The technique for modifying the IA T is documented within the MSDN (Microsoft Developers Network) Library CD in several articles. The technique is also different for each operating system (e.g. between Windows **9x** and Windows NT), which can be accommodated by agent generator configurability, such as that given above. MPC **341** therefore has at least initial access to API IAT **731** of Downloadable **632**, and provides for diverting, evaluating and responding to attempts by Downloadable **632** to utilize system APIs **731**, or further in accordance with protection policies **342**. In addition to API diverting, MPC **341** can also install filter drivers, which can be used for controlling access to resources such as a Downloadable-destination file system or registry. Filter driver installation can be conducted as documented in the MSDN or using other suitable methods.

[00096] Turning to FIG. 8 with reference to FIG. 7b, an MPC **341** according to an embodiment of the invention includes a package extractor **801**, executable installer **802**, sandbox engine installer **803**, resource access diverter **804**, resource access (attempt) analyzer **805**, policy enforcer **806** and MPC de-installer **807**. Package extractor **801** is initiated upon initiation of MPC **341**, and extracts MPC **341** elements and protection policies **342**. Executable installer **802** further initiates installation of a Downloadable by extracting the downloadable from the protected package, and loading the process into memory in suspended mode (so it only loads into memory, but does not start to run). Such installation further causes the operating system to

initialize the Downloadable's IAT **731** in the memory space of the downloadable process, **P2**, as already noted.

[00097] Sandbox engine installer **803** (running in process space **PI**) then installs the sandbox engine (**803-805**) and policies **342** into the downloadable process space **P2**. This is done in different way in each operating system (e.g. see above). Resource access diverter **804** further modifies those Downloadable-API IAT entries that correspond with protection policies **342**, thereby causing corresponding Downloadable accesses via Downloadable-API IAT **731** to be diverted resource access analyzer **805**.

[00098] During Downloadable operation, resource access analyzer or “RAA” **805** receives and determines a response to diverted Downloadable (i.e. “malicious”) operations in accordance with corresponding protection policies of policies **342**. (RAA **805** or further elements, which are not shown, can further similarly provide for other security mechanisms that might also be implemented.) Malicious operations can for example include, in a Windows environment: file operations (e.g. reading, writing, deleting or renaming a file), network operations (e.g. listen on or connect to a socket, send/receive data or view intranet), OS registry or similar operations (read/write a registry item), OS operations (exit as/client, kill or change the priority of a process/thread, dynamically load a class library), resource usage thresholds (e.g. memory, CPU, graphics), etc.

[00099] Policy enforcer **806** receives RAA **805** results and causes a corresponding response to be implemented, again according to the corresponding policies. Policy enforcer **806** can, for example, interact with a user (e.g. provide an alert, receive instructions, etc.), create a log file, respond, cause a response to be transferred to the Downloadable using “dummy” or limited data, communicate with a server or other networked device (e.g. corresponding to a local or remote administrator), respond more specifically with a better known Downloadable, verify accessibility or user/system information (e.g. via local or remote information), even enable the attempted Downloadable access, among a wide variety of responses that will become apparent in **20** view of the teachings herein.

[000100] The FIG. 9 flowchart illustrates a protection method according to an embodiment of the invention. In step **901**, a protection engine monitors the receipt, by a server or other re-communicator of information, and receives such information intended for a protected

information-destination (i.e. a potential-Downloadable) in step **903**. Steps **905-911** depict an adjunct trustworthiness protection that can also be provided, wherein the protection engine determines whether the source of the received information is known to be “unfriendly” and, if so, prevents current (at least unaltered) delivery of the potential-Downloadable and provides any suitable alerts. (The protection engine might also continue to perform Downloadable detection and nevertheless enable delivery or protected delivery of a non-Downloadable, or avoid detection if the source is found to be “trusted”, among other alternatives enabled by the teachings herein.)

[000101] If, in step **913**, the potential-Downloadable source is found to be of an unknown or otherwise suitably authenticated/certified source, then the protection engine determines whether the potential-Downloadable includes executable code in step **915**. If the potential-Downloadable does not include executable code, then the protection engine causes the potential-Downloadable to be delivered to the information-destination in its original form in step **917**, and the method ends. If instead the potential-Downloadable is found to include executable code in step **915** (and is thus a “detected-Downloadable”), then the protection engine forms a sandboxed package in step **919** and causes the protection agent to be delivered to the information-Destination in step **921**, and the method ends. As was discussed earlier, a suitable protection agent can include mobile protection code, policies and the detected-Downloadable (or information corresponding thereto).

[000102] The FIG. 10a flowchart illustrates a method for analyzing a potential-Downloadable, according to an embodiment of the invention. As shown, one or more aspects can provide useful indicators of the inclusion of executable code within the potential-Downloadable. In step **1001**, the protection engine determines whether the potential-Downloadable indicates an executable file type, for example, by comparing one or more included file headers for file type indicators (e.g. extensions or other descriptors). The indicators can be compared against all known file types executable by all protected Downloadable destinations, a subset, in accordance with file types executable or desirably executable by the Downloadable-destination, in conjunction with a particular user, in conjunction with available information or operability at the destination, various combinations, etc.

[000103] Where content analysis is conducted, in step **1003** of FIG. 10a, the protection engine analyzes the potential-Downloadable and determines in accordance therewith whether the potential-Downloadable does or is likely to include binary information, which typically indicates executable code. The protection engine further analyzes the potential-Downloadable for patterns indicative of included executable code in step **1003**. Finally, in step **1005**, the protection engine determines whether the results of steps **1001** and **1003** indicate that the potential-Downloadable more likely includes executable code (e.g. via weighted comparison of the results with a suitable level indicating the inclusion or exclusion of executable code). The protection engine, given a suitably high confidence indicator of the inclusion of executable code, treats the potential-Downloadable as a detected-Downloadable.

[000104] The FIG. 10b flowchart illustrates a method for forming a sandboxed package according to an embodiment of the invention. As shown, in step **1011**, a protection engine retrieves protection parameters and forms mobile protection code according to the parameters. The protection engine further, in step **1013**, retrieves protection parameters and forms protection policies according to the parameters. Finally, in step **1015**, the protection engine couples the mobile protection code, protection policies and received-information to form a sandboxed package. For example, where a Downloadable-destination utilizes a standard windows executable, coupling can further be accomplished via concatenating the MPC for delivery of MPC first, policies second, and received information third. (The protection parameters can, for example, include parameters relating to one or more of the Downloadable destination device/process, user, supervisory constraints or other parameters.)

[000105] The FIG. 11 flowchart illustrates how a protection method performed by mobile protection code (“MPC”) according to an embodiment of the invention includes the MPC installing MPC elements and policies within a destination device in step **1101**. In step **1102**, the MPC loads the Downloadable without actually initiating it (i.e. for executables, it will start a process in suspended mode). The MPC further forms an access monitor or “interceptor” for monitoring or “intercepting” downloadable destination device access attempts within the destination device (according to the protection policies in step **1103**, and initiates a corresponding Downloadable within the destination device in step **1105**.

[000106] If, in step **1107**, the MPC determines, from monitored/intercepted information, that the Downloadable is attempting or has attempted a destination device access considered undesirable or otherwise malicious, then the MPC performs steps **1109** and **1111**; otherwise the MPC returns to step **1107**. In step **1109**, the MPC determines protection policies in accordance with the access attempt by the Downloadable, and in step **1111**, the MPC executes the protection policies. (protection policies can, for example, be retrieved from a temporary, e.g. memory/cache, or more persistent storage.)

[000107] As shown in the FIG. 12a example, the MPC can provide for intercepting Downloadable access attempts by a Downloadable by installing the Downloadable (but not executing it) in step **1201**. Such installation will cause a Downloadable executor, such as a the Windows operating system, to provide all required interfaces and parameters (such as the IAT, process ill, etc.) for use by the Downloadable to access device resources of the host device. The MPC can thus cause Downloadable access attempts to be diverted to the MPC by modifying the Downloadable IAT, replacing device resource location indicators with those of the MPC (step **1203**).

[000108] The FIG. 12b example further illustrates an example of how the MPC can apply suitable policies in accordance with an access attempt by a Downloadable. As shown, the MPC receives the Downloadable access request via the modified IAT in step **1211**. The MPC further queries stored policies to determine a policy corresponding to the Downloadable access request in step **1213**.

[000109] The foregoing description of preferred embodiments of the invention is provided by way of example to enable a person skilled in the art to make and use the invention, and in the context of particular applications and requirements thereof. Various modifications to the embodiments will be readily apparent to those skilled in the art, and the generic principles defined herein may be applied to other embodiments and applications without departing from the spirit and scope of the invention. Thus, the present invention is not intended to be limited to the embodiments shown, but is to be accorded the widest scope consistent with the principles, features and teachings disclosed herein. The embodiments described herein are not intended to be exhaustive or limiting. The present invention is limited only by the following claims.

CLAIMS

What is claimed is:

1. A computer-based method, comprising the steps of:
receiving an incoming Downloadable;
deriving security profile data for the Downloadable, including a list of suspicious computer operations that may be attempted by the Downloadable; and
storing the Downloadable security profile data in a database.
2. The computer-based method of claim 1 further comprising storing a date & time when the Downloadable security profile data was derived, in the database.
3. The computer-based method of claim 1 wherein the Downloadable includes an applet.
4. The computer-based method of claim 1 wherein the Downloadable includes an active control.
5. The computer-based method of claim 1 wherein the Downloadable includes program script.
6. The computer-based method of claim 1 wherein suspicious computer operations include calls made to an operating system, a file system, a network system, and to memory.
7. The computer-based method of claim 1 wherein the Downloadable security profile data includes a URL from where the Downloadable originated.
8. The computer-based method of claim 1 wherein the Downloadable security profile data includes a digital certificate.
9. The computer-based method of claim 1 wherein said deriving Downloadable security profile data comprises disassembling the incoming Downloadable.
10. A system for managing Downloadables, comprising:
a receiver for receiving an incoming Downloadable;

a Downloadable scanner coupled with said receiver, for deriving security profile data for the Downloadable, including a list of suspicious computer operations that may be attempted by the Downloadable; and

a database manager coupled with said Downloadable scanner, for storing the Downloadable security profile data in a database.

11. The system of claim 10 wherein said database manager also stores a date & time when the Downloadable security profile data was derived by said Downloadable scanner, in the database.
12. The system of claim 10 wherein the Downloadable includes an applet.
13. The system of claim 10 wherein the Downloadable includes an active control.
14. The system of claim 10 wherein the Downloadable includes program script.
15. The system of claim 10 wherein suspicious computer operations include calls made to an operating system, a file system, a network system, and to memory.
16. The system of claim 10 wherein the Downloadable security profile data includes a URL from where the Downloadable originated.
17. The system of claim 10 wherein the Downloadable security profile data includes a digital certificate.
18. The system of claim 10 wherein said Downloadable scanner comprises a disassembler for disassembling the incoming Downloadable.

ABSTRACT

Protection systems and methods provide for protecting one or more personal computers (“PCs”) and/or other intermittently or persistently network accessible devices or processes from undesirable or otherwise malicious operations of Java TN applets, ActiveX™ controls, JavaScript™ scripts, Visual Basic scripts, add-ins, downloaded/uploaded programs or other “Downloadables” or “mobile code” in whole or part. A protection engine embodiment provides, within a server, firewall or other suitable “recommunicator,” for monitoring information received by the communicator, determining whether received information does or is likely to include executable code, and if so, causes mobile protection code (MPC) to be transferred to and rendered operable within a destination device of the received information, more suitably by forming a protection agent including the MPC, protection policies and a detected-Downloadable. An MPC embodiment further provides, within a Downloadable-destination, for initiating the Downloadable, enabling malicious Downloadable operation attempts to be received by the MPC, and causing (predetermined) corresponding operations to be executed in response to the attempts, more suitably in conjunction with protection policies.

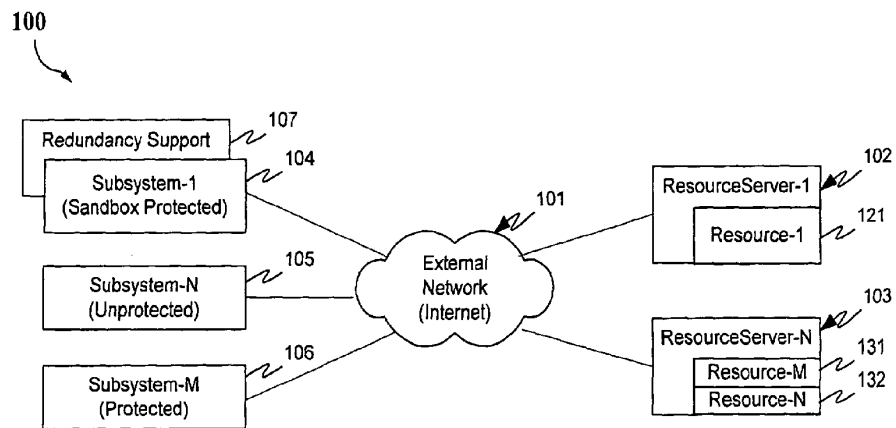


FIG. 1a

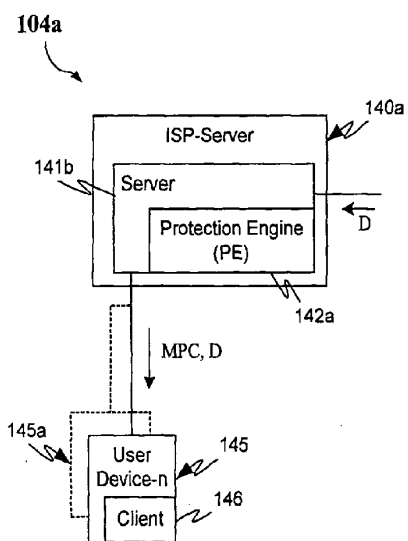


FIG. 1b

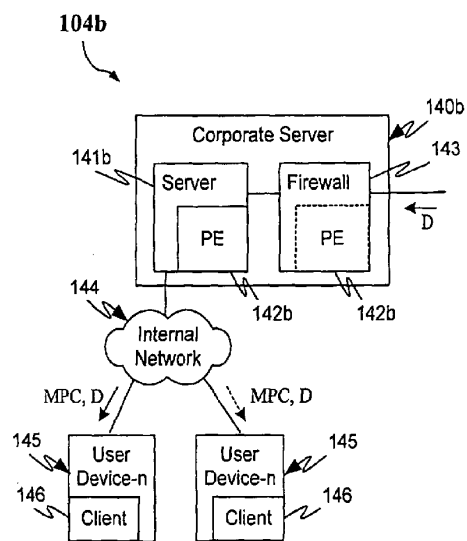


FIG. 1c

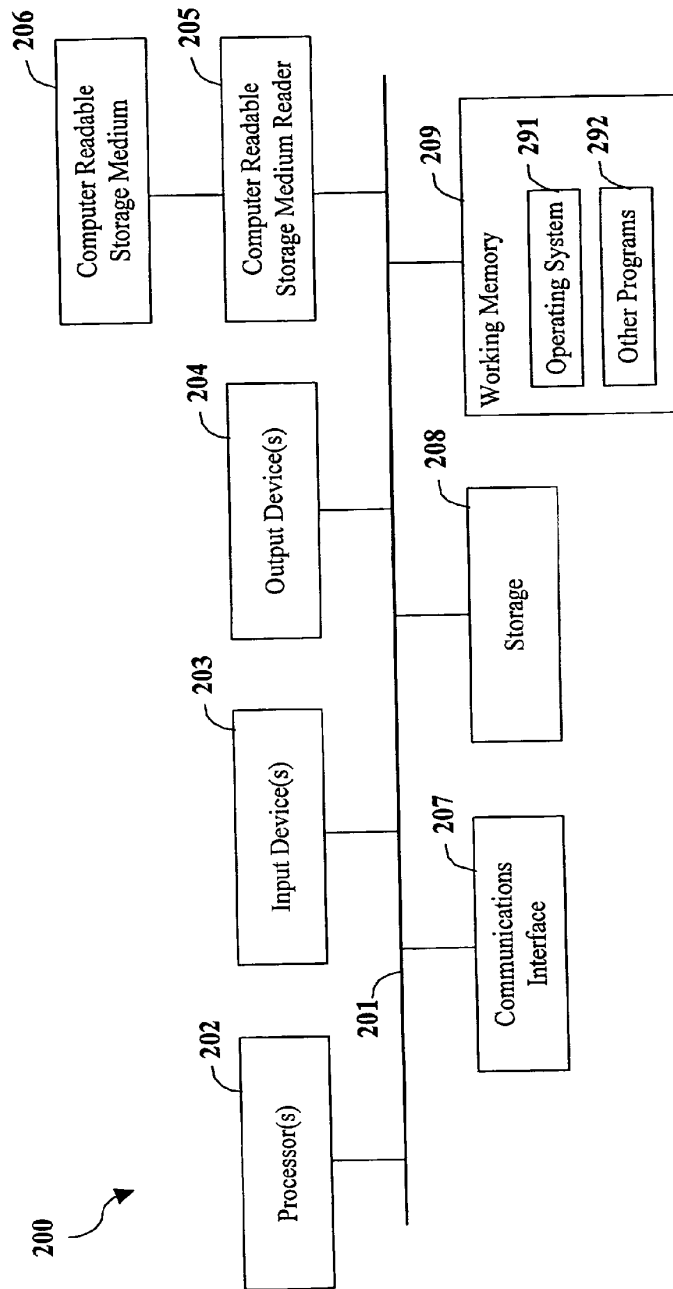


FIG. 2

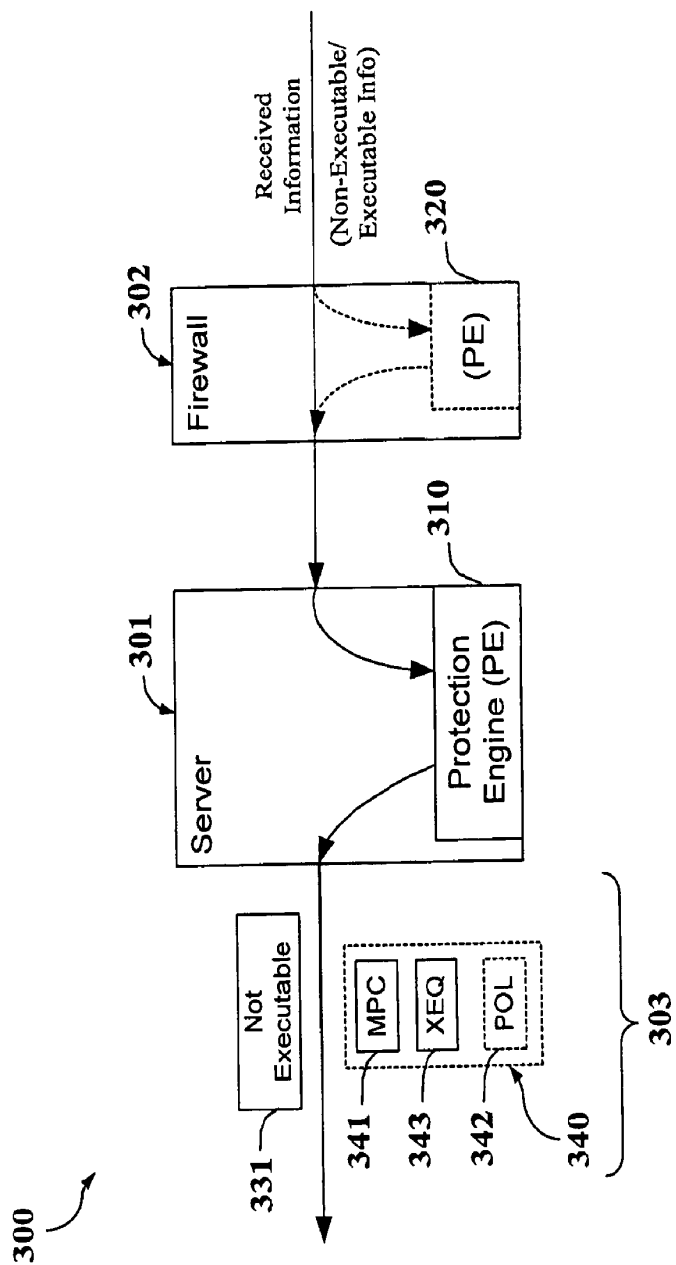


FIG. 3

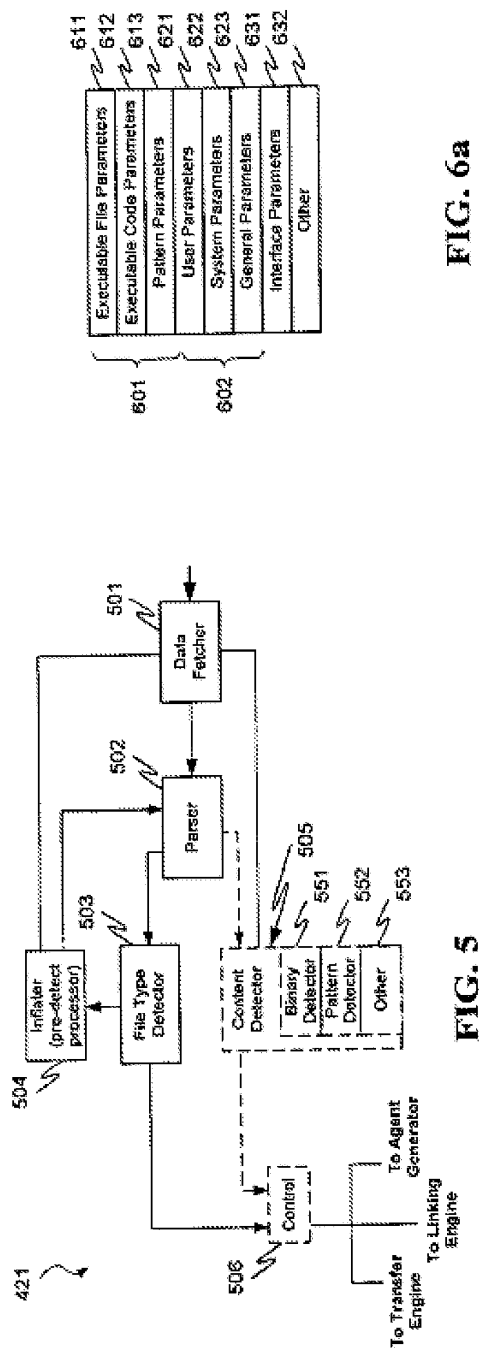
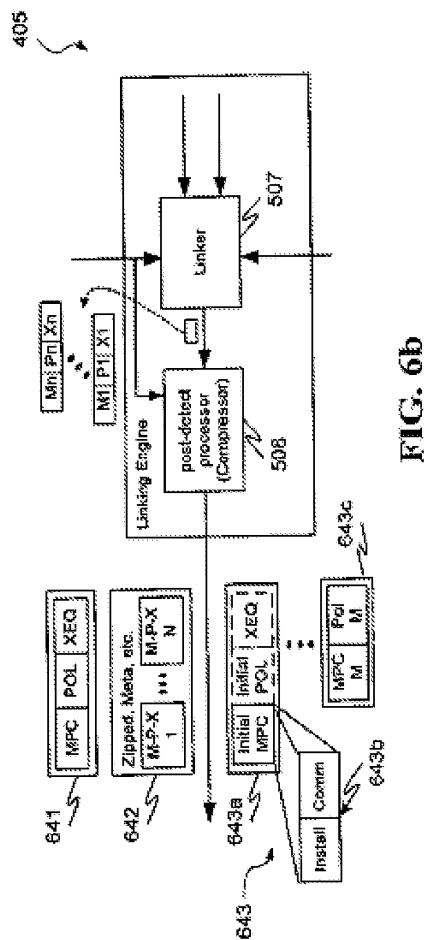


FIG. 6a



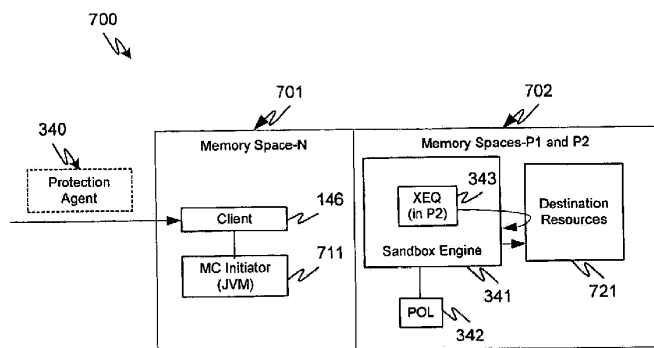


FIG. 7a

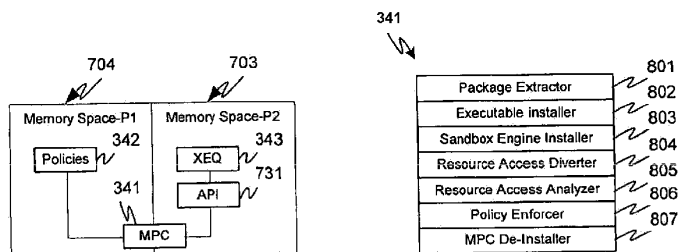


FIG. 7b

FIG. 8

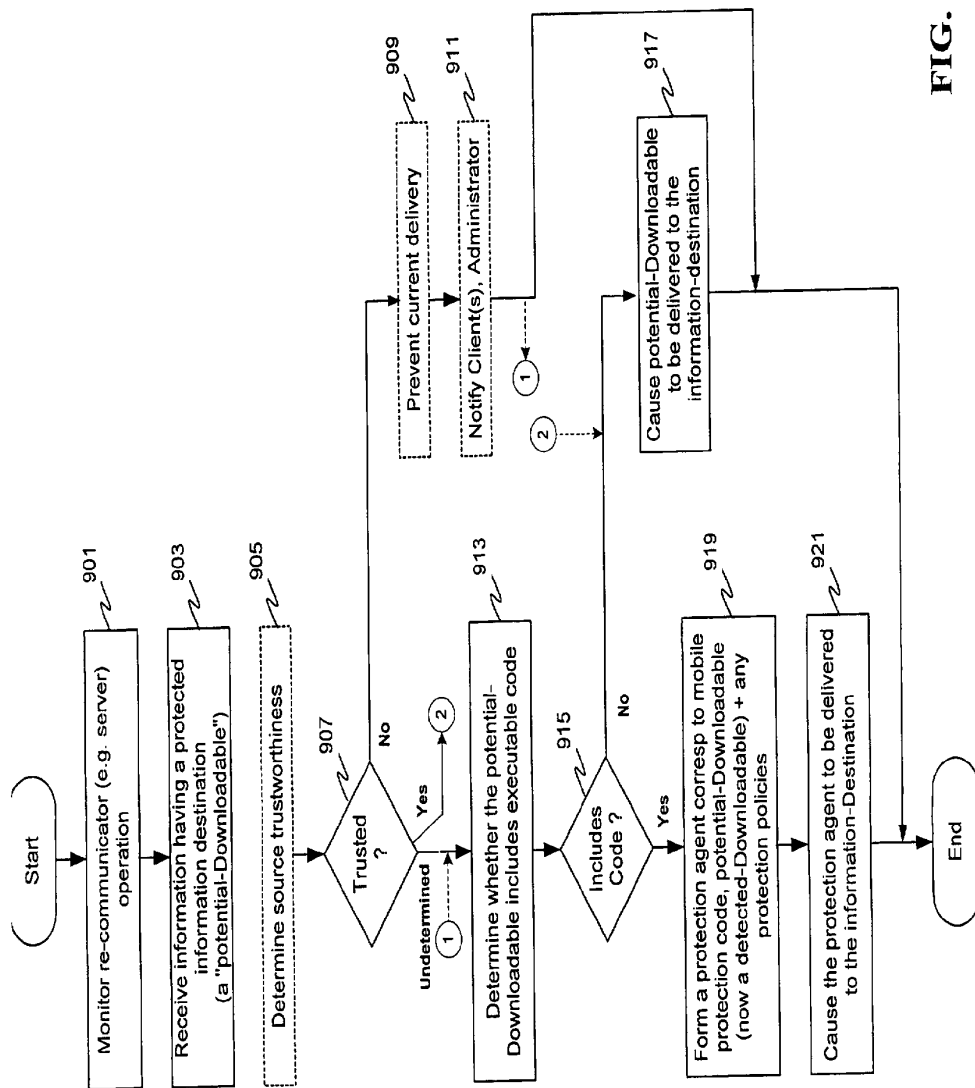


FIG. 9

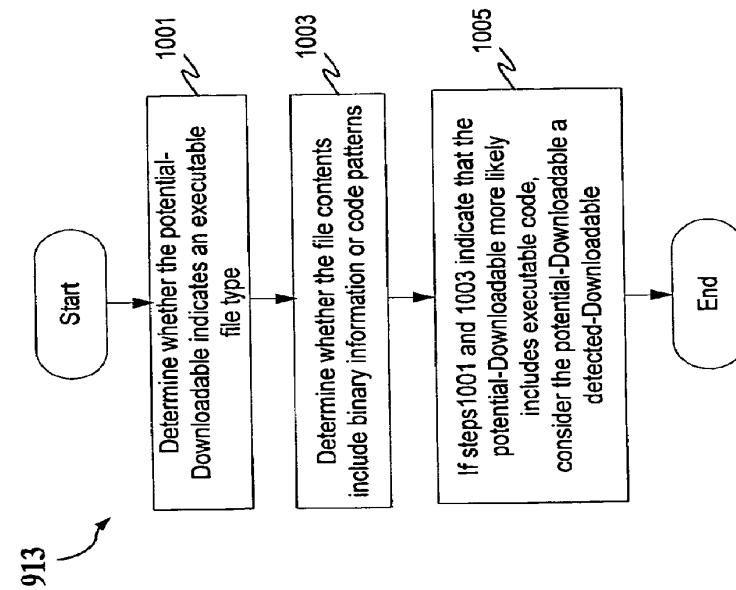


FIG. 10A

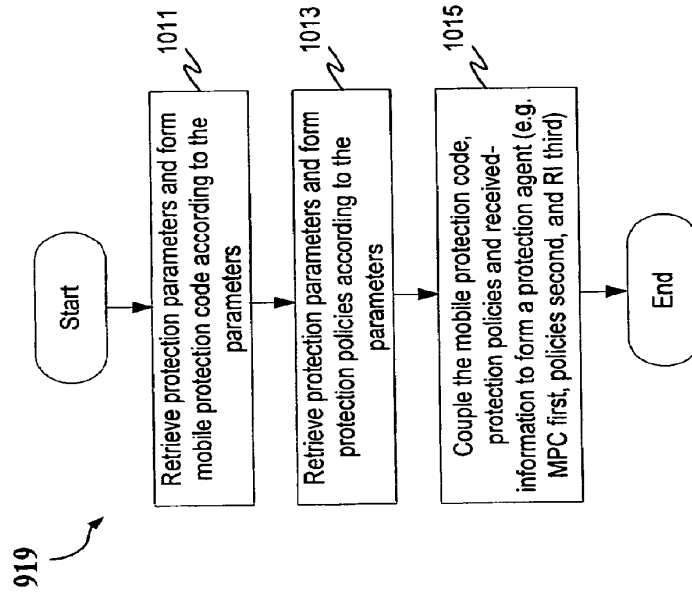


FIG. 10B

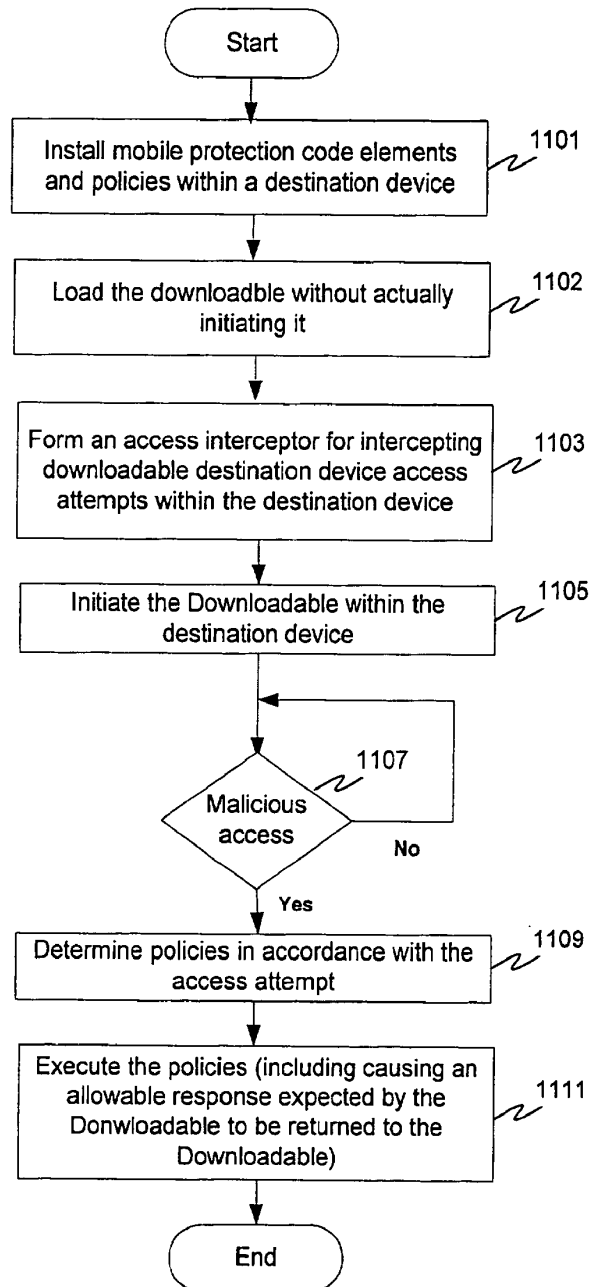


FIG. 11

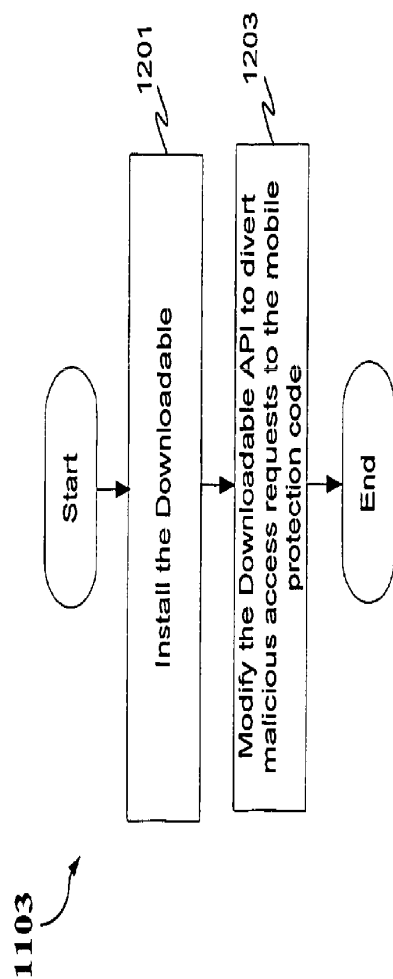


FIG. 12a

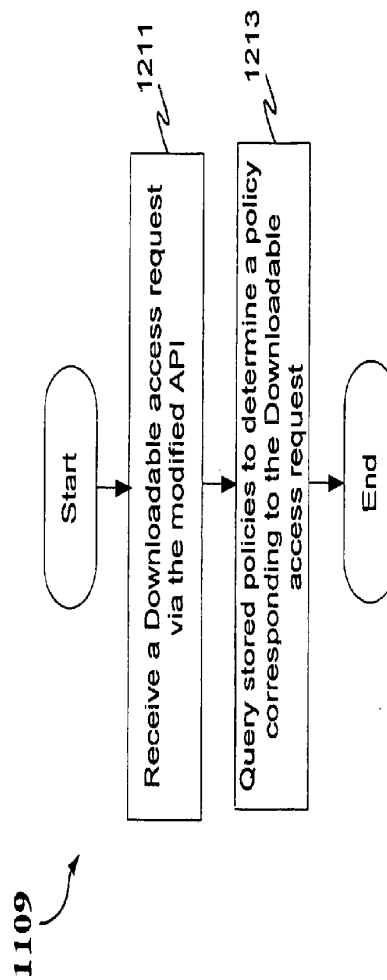


FIG. 12b

Attorney's Docket No.: FIN0001-CON1-CIP1-CON4

PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In Re Patent Application of:)		
)	Examiner:	To Be Assigned
Yigal Mordechai Eder)		
Nimrod Itzhak Vered)	Art Unit:	To Be Assigned
David R. Kroll)		
Shlomo Touboul)		
)		
Application No: To Be Assigned)		
)		
Filed: Herewith)		
)		
For: MALICIOUS MOBILE CODE)		
RUNTIME MONITORING)		
SYSTEM AND METHODS)		
)		

Mail Stop AMENDMENT
Commissioner for Patents
P. O. Box 1450
Alexandria, VA 22313-1450

PRELIMINARY AMENDMENT

Sir:

Prior to examination, please consider the following remarks relating to the above-identified application.

Remarks begin on page 2 of this paper.

REMARKS

Applicants' representative has carefully reviewed the June 15, 2011 Office Action for the parent application, U.S. Serial No. 12/471,942 (the "June 2011 Office Action"). In Paragraphs 12 and 13 of the June 2011 Office Action, claims **77 – 94 (renumbered as claims 1-18 in this application)** were rejected under 35 U.S.C. §102(e) as being anticipated by Ji, U.S. Patent No. 5,983,348 ("Ji").

In Applicants' preliminary amendment for the parent application, U.S. Serial No. 12/471,942, Applicants argued that Ji is not admissible prior art because Ji has a priority date of September 10, 1997, whereas the claimed invention is supported in the priority document of November 8, 1996, which pre-dates Ji. Moreover, Ji itself references the claimed invention at col. 1, line 64 – col. 2, line 42. In Paragraph 2 of the June 2011 Office Action, the Examiner requested a specific showing of support for the claimed invention in the priority document, U.S. Provisional Serial No. 60/030,639 filed on November 8, 1996, in order to overcome the prior art of Ji. Applicants are providing this showing in the details that follow.

Support for the Claimed Invention in Touboul, U.S. Provisional Patent Application No. 60/030,639 (“Touboul”)

Claim 77 (**now claim 1**) is supported in Touboul at least by page 8, lines 14 – 19: “Security database 240 stores ... Downloadable Security Profiles (DSPs) ... in a third data storage device 230 portion”; by page 15, lines 2 and 3: “... code scanner 325, which in step 650 decomposes the received Downloadable into DSP data ...”

Claim 79 (**now claim 3**) is supported in Touboul at least by page 2, line 4: “Examples of Downloadables include applets designed for use in the JavaTM distributing environment produced by Sun Microsystems ...”

Claim 80 (**now claim 4**) is supported in Touboul at least by page 2, lines 4 – 7: “Examples of Downloadables include applets designed for use ... in the Active X distributing environment produced by Microsoft Corporation.”

Claim 82 (**now claim 6**) is supported in Touboul at least by page 9, lines 9 – 13: “DSP data 310 ... may include READs, WRITEs, file management operations, system management operations, memory management operations and CPU allocation operations;” and by page 16, lines 3 – 8: “Code scanner 325 in step 720 decodes and registers the command and the command parameters as DSP data. Code scanner 325 in step 720 registers command and command parameters into a format based on command class, e.g., file system class, network system class, memory system class and CPU system class.”

Claim 85 (**now claim 9**) is supported in Touboul at least by page 15, line 15 – page 16, line 4: “FIG. 7 is a flowchart illustrating details of method 650 for decomposing a Downloadable. Method 650 begins in step 705 with code scanner 325 disassembling the machine code of the Downloadable. Code scanner 325 in step 710 resolves a respective command in the machine code. Code scanner 325 in step 715 determines whether the resolved command is a suspect command ... code scanner 325 in step 720 decodes and registers the command and the command parameters as DSP data ...”

Claim 86 (**now claim 10**) is supported in Touboul at least by page 8, lines 14 – 19: “Security database 240 stores ... Downloadable Security Profiles (DSPs) ... in a third data storage device 230 portion”; by page 10, lines 16 – 19: “Code scanner 325 receives unknown

Downloadables from first comparator 320 and uses conventional parsing techniques to decompose the byte code of the unknown Downloadable into DSP data;” and by page 11, lines 13 – 16: “... if second comparator 330 received the non-hostile Downloadable from code scanner 325, then ... its corresponding DSP data is stored in DSP data 310.”

Claim **88 (now claim 12)** is supported in Touboul at least by page 2, line 4: *“Examples of Downloadables include applets designed for use in the JavaTM distributing environment produced by Sun Microsystems ...”*

Claim **89 (now claim 13)** is supported in Touboul at least by page 2, lines 4 – 7: *“Examples of Downloadables include applets designed for use ... in the Active X distributing environment produced by Microsoft Corporation.”*

Claim **91 (now claim 15)** is supported in Touboul at least by page 9, lines 9 – 13: *“DSP data 310 ... may include READs, WRITEs, file management operations, system management operations, memory management operations and CPU allocation operations;”* and by page 16, lines 3 – 8: *“Code scanner 325 in step 720 decodes and registers the command and the command parameters as DSP data. Code scanner 325 in step 720 registers command and command parameters into a format based on command class, e.g., file system class, network system class, memory system class and CPU system class.”*

Claim **94 (now claim 18)** is supported in Touboul at least by page 15, line 15, lines 2 and 3: *“... code scanner 325 ... decomposes the received Downloadable into DSP data ...”*

Moreover, because claims **78 – 85 (now claims 2 - 9)** depend from claim **77 (now claim 1)** and include additional features, applicants respectfully submit that claims **78 – 85 (now claims 2-9)** are allowable.

Similarly, because claims **87 – 94 (now claims 11 - 18)** depend from claim **86 (now claim 10)** and include additional features, applicants respectfully submit that claims **87 – 94 (now claims 11-18)** are allowable.

For the foregoing reasons, applicants respectfully submit that the applicable objections and rejections have been overcome and that the claims are in condition for allowance.

Respectfully submitted,

Dated: November 7, 2011
KING & SPALDING LLP
1700 Pennsylvania Avenue, NW
Washington, D.C. 20006-4706
(202) 737-0500

By: /Dawn-Marie Bey - 44,442/
Dawn-Marie Bey
Registration No. 44,442

15157/105034



**DECLARATION FOR UTILITY OR
DESIGN
PATENT APPLICATION
(37 CFR 1.63)**

☐ Declaration Submitted With Initial Filing OR ☒ Declaration Submitted after Initial Filing (surcharge (37 CFR 1.16 (e)) required)

Attorney Docket Number 43426.00014

First Named Inventor Yigal EDERY

COMPLETE IF KNOWN

Application Number 09/861,229

Filing Date May 17, 2001

Art Unit 2152

Examiner Name Unknown

I hereby declare that:

Each inventor's residence, mailing address, and citizenship are as stated below next to their name.

I believe the inventor(s) named below to be the original and first inventor(s) of the subject matter which is claimed and for which a patent is sought on the invention entitled:

MALICIOUS MOBILE CODE RUNTIME MONITORING SYSTEM AND METHODS

the specification of which (Title of the Invention)

☐ is attached hereto

OR

☒ was filed on (MM/DD/YYYY) 5/17/2001 as United States Application Number or PCT International

Application Number 09/861,229 and was amended on (MM/DD/YYYY) (if applicable).

I hereby state that I have reviewed and understand the contents of the above identified specification, including the claims, as amended specifically referred to above.

I acknowledge the duty to disclose information which is material to patentability as defined in 37 CFR 1.56, including for continuation-in-part applications, material information which became available between the filing date of the prior application and the national or PCT International filing date of the continuation-in-part application.

I hereby claim foreign priority benefits under 35 U.S.C. 119(a)-(d) or (f), or 365(b) of any foreign application(s) for patent, inventor's or plant breeder's rights certificate(s), or 385(a) of any PCT international application which designated at least one country other than the United States of America, listed below and have also identified below, by checking the box, any foreign application for patent, inventor's or plant breeder's rights certificate(s), or any PCT International application having a filing date before that of the application on which priority is claimed.

Prior Foreign Application Number(s)	Country	Foreign Filing Date (MM/DD/YYYY)	Priority Not Claimed	Certified Copy Attached?	
				YES	NO
			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

☐ Additional foreign application numbers are listed on a supplemental priority data sheet PTO/SB/02B attached hereto:

[Page 1 of 3]

This collection of information is required by 35 U.S.C. 115 and 37 CFR 1.63. 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 21 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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NAME OF SOLE OR FIRST INVENTOR:		<input type="checkbox"/> A petition has been filed for this unsigned inventor	
Given Name (first and middle (if any)) <u>Yigal Mordechai</u>		Family Name or Surname <u>EDERY</u>	
Inventor's Signature 		Date <u>17/4/2005</u>	
Residence: City <u>Pardesia</u>	State <u>N/A</u>	Country <u>Israel</u>	Citizenship <u>Israel</u>
Mailing Address <u>Hashikma 11, POB 1115</u>			
City <u>Pardesia</u>	State <u>N/A</u>	Zip <u>42815</u>	Country <u>Israel</u>
NAME OF SECOND INVENTOR:		<input type="checkbox"/> A petition has been filed for this unsigned inventor	
Given Name (first and middle (if any)) <u>Nimrod Itzhak</u>		Family Name or Surname <u>VERED</u>	
Inventor's Signature		Date	
Residence: City <u>Gosh Tel-Mond</u>	State <u>N/A</u>	Country <u>Israel</u>	Citizenship <u>Israel</u>
Mailing Address <u>Moshav Mismaret #81</u>			
City <u>Gosh Tel-Mond</u>	State <u>N/A</u>	Zip <u>40695</u>	Country <u>Israel</u>
<input checked="" type="checkbox"/> Additional inventors or a legal representative are being named on the 1 supplemental sheet(s) PTO/SB/02A or 02LR attached hereto.			

[Page 2 of 3]

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PTO/SB/01 (09-03)

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NAME OF SOLE OR FIRST INVENTOR:		<input type="checkbox"/> A petition has been filed for this unsigned inventor	
Given Name (first and middle (if any)) Yigal Mordechai		Family Name or Surname EDERY	
Inventor's Signature		Date	
Residence: City Pardesia	State N/A	Country Israel	Citizenship Israel
Mailing Address Hashikma 11, POB 1115			
City Pardesia	State N/A	Zip 42815	Country Israel
NAME OF SECOND INVENTOR:		<input type="checkbox"/> A petition has been filed for this unsigned inventor	
Given Name (first and middle (if any)) Nimrod Itzhak		Family Name or Surname VERED	
Inventor's Signature 		Date 19/5/05	
Residence: City Gosh Tel-Mond	State N/A	Country Israel	Citizenship Israel
Mailing Address Moshav Miameret #81			
City Gosh Tel-Mond	State N/A	Zip 40895	Country Israel
<input checked="" type="checkbox"/> Additional inventors or a legal representative are being named on the supplemental sheet(s) PTO/SB/02A or 02LR attached hereto.			

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P. 02

TOTAL P.02

PTO/SB/02A (05-04)

Approved for use through 07/31/2006. Case 0551-0002
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Under the Password Protection Act of 1999, no network log-in is required to respond to a collection of information unless it contains a valid OMB control number.

DECLARATION	ADDITIONAL INVENTOR(S) Supplemental Sheet	Page 3 of 3
--------------------	---	-------------

Name of Additional Inventor, if any		<input type="checkbox"/> A petition has been filed for this unsigned inventor	
Given Name (first and middle if any)		Family Name or Surname	
David R.		KSOIL	
Inventor's Signature		Date May 8, 2005	
Residence: City	San Jose	State	CA
Country	USA	Citizenship	USA
Mailing Address			
4050 Kingsbrook Drive			
Mailing Address			
City	San Jose	State	CA
Zip	95134	Country	USA
Name of Additional Inventor, if any		<input type="checkbox"/> A petition has been filed for this unsigned inventor	
Given Name (first and middle if any)		Family Name or Surname	
Shlomo		TOURQUIL	
Inventor's Signature		Date MARCH 6, 2005	
Residence: City	Kefar-Haim	State	N/A
Country	Israel	Citizenship	Israel
Mailing Address			
Mailing Address			
City	Kefar-Haim	State	N/A
Zip	43946	Country	Israel
Name of Additional Inventor, if any		<input type="checkbox"/> A petition has been filed for this unsigned inventor	
Given Name (first and middle if any)		Family Name or Surname	
Inventor's Signature		Date	
Residence: City		State	
Country		Citizenship	
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Mailing Address			
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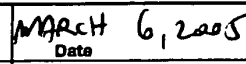
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Page 3 of 3	

Name of Additional Inventor, if any				<input type="checkbox"/> A petition has been filed for this unsigned inventor	
Given Name (first and middle [if any])			Family Name or Surname		
David R.			KROLL		
Inventor's Signature 				Date 	
Residence: City	San Jose	State	CA	Country	USA
Mailing Address		4856 Kingbrook Drive			
Mailing Address					
City	San Jose	State	CA	ZIP	95124
Country		USA			
Name of Additional Inventor, if any				<input type="checkbox"/> A petition has been filed for this unsigned inventor	
Given Name (first and middle [if any])			Family Name or Surname		
Shlomo			TOUBOUL		
Inventor's Signature 				Date 	
Residence: City	Kefar-Haim	State	N/A	Country	Israel
Mailing Address					
Mailing Address					
City	Kefar-Haim	State	N/A	ZIP	42945
Country		Israel			
Name of Additional Inventor, if any				<input type="checkbox"/> A petition has been filed for this unsigned inventor	
Given Name (first and middle [if any])			Family Name or Surname		
Inventor's Signature				Date	
Residence: City		State		Country	
Mailing Address					
Mailing Address					
City		State		ZIP	
Country					

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Form PTO-1449 (Rev. 2-32)		U.S. Department of Commerce Patent & Trademark Office		Atty. Docket No. FIN0001-CON1-CIP1- CON4		Serial No. To Be Assigned	
INFORMATION DISCLOSURE STATEMENT							
(Use several sheets if necessary)				Applicant Yigal Mordechai EDERY, et al.			
				Filing Date Herewith		Group To Be Assigned	
U.S. PATENT DOCUMENTS							
Examiner Initial		Document Number	Date	Name	Class	Sub- Class	Filing Date (if appropriate)
		2010/0195909	8/5/10	Wasson, et al.	382	176	1/19/10
		7,647,633	1/12/10	Edery, et al.	726	22	6/22/05
		7,613,926	11/3/09	Edery, et al.	713	181	3/7/06
		7,418,731	8/26/08	Touboul	726	22	5/3/04
		2008/0066160	3/13/08	Becker, et al.	726	4	9/11/06
		7,343,604	3/11/08	Grabarnik, et al.	719	313	7/25/03
		7,308,648	12/11/07	Buchthal, et al.	715	234	11/27/02
		7,210,041	4/24/07	Gryaznov, et al.	713	188	4/30/01
		7,143,444	11/28/06	Porras, te al.	726	30	11/28/01
		7,058,822	6/6/06	Edery, et al.	726	22	5/17/01
		2006/0048224	3/2/06	Duncan, et al.	726	22	8/30/04
		2006/0031207	2/9/06	Bjarnestam, et al.	707	3	6/8/05
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		6,917,953	7/12/05	Simon, et al.	707	204	12/17/01
		2005/0050338	3/3/05	Liang, et al.	713	188	10/9/03
		6,804,780	10/12/04	Touboul	713	181	3/30/00
		2004/0088425	5/6/04	Rubinstein, et al.	709	230	10/31/02
		6,732,179	5/4/04	Brown, et al.	709	229	10/26/99
EXAMINER							
EXAMINER:				DATE CONSIDERED			
Initial if citation 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.							

**Serial No. To Be Assigned (Docket No. FIN0001-CON1-CIP1-CON4)
Information Disclosure Statement**

Page 2 of 8

U.S. PATENT DOCUMENTS CONT'D.							
		2004/0073811	4/15/04	Sanin	726	13	10/15/02
		6,598,033	7/22/03	Ross, et al.	706	46	7/14/97
		2003/0101358	5/29/03	Porras, et al.	726	4	11/28/01
		6,519,679	2/11/03	Devireddy, et al.	711	114	6/11/99
		2003/0014662	1/16/03	Gupta, et al.	726	23	6/13/02
		6,487,666	11/26/02	Shanklin, et al.	726	23	1/15/99
		6,480,962	11/12/02	Touboul	726	22	4/18/00
		6,434,669	8/13/02	Arimilli, et al.	711	128	9/7/99
		6,434,668	8/13/02	Arimilli, et al.	711	128	9/7/99
		6,425,058	7/23/02	Arimilli, et al.	711	134	9/7/99
		6,339,829	1/15/02	Beadle, et al.	726	15	7/30/98
		6,167,520	12/26/00	Touboul	726	23	1/29/97
		6,154,844	11/28/00	Touboul, et al.	726	24	12/22/97
		6,092,194	7/18/00	Touboul	726	24	11/6/97
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EXAMINER				DATE CONSIDERED			
EXAMINER: Initial if citation 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.							

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Page 3 of 8

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EXAMINER				DATE CONSIDERED			
EXAMINER: Initial if citation 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.							

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EXAMINER				DATE CONSIDERED			
EXAMINER: Initial if citation 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.							

* Reference cited in parent (Serial No. 12/471,942), and not provided herewith.

**Serial No. To Be Assigned (Docket No. FIN0001-CON1-CIP1-CON4)
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Page 5 of 8

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15157/105032
Doc. No. 17208862

* Reference cited in parent (Serial No. 12/471,942), and not provided herewith.

Electronic Patent Application Fee Transmittal				
Application Number:				
Filing Date:				
Title of Invention:		Malicious Mobile Code Runtime Monitoring System and Methods		
First Named Inventor/Applicant Name:		Yigal Mordechai Edery		
Filer:		Dawn-Marie Bey./Jeanne Paolella-Bald		
Attorney Docket Number:		FIN0001-CON1-CIP1-CON4		
Filed as Large Entity				
Utility under 35 USC 111(a) Filing Fees				
Description	Fee Code	Quantity	Amount	Sub-Total in USD(\$)
Basic Filing:				
Utility application filing	1011	1	380	380
Utility Search Fee	1111	1	620	620
Utility Examination Fee	1311	1	250	250
Pages:				
Claims:				
Miscellaneous-Filing:				
Petition:				
Patent-Appeals-and-Interference:				

Description	Fee Code	Quantity	Amount	Sub-Total in USD(\$)
Post-Allowance-and-Post-Issuance:				
Extension-of-Time:				
Miscellaneous:				
Total in USD (\$)				1250

Electronic Acknowledgement Receipt	
EFS ID:	11352338
Application Number:	13290708
International Application Number:	
Confirmation Number:	4120
Title of Invention:	Malicious Mobile Code Runtime Monitoring System and Methods
First Named Inventor/Applicant Name:	Yigal Mordechai Edery
Customer Number:	74877
Filer:	Dawn-Marie Bey./Jeanne Paolella-Bald
Filer Authorized By:	Dawn-Marie Bey.
Attorney Docket Number:	FIN0001-CON1-CIP1-CON4
Receipt Date:	07-NOV-2011
Filing Date:	
Time Stamp:	16:49:48
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	Credit Card
Payment was successfully received in RAM	\$1250
RAM confirmation Number	3726
Deposit Account	
Authorized User	

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
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1	Transmittal of New Application	fin0001con1cip1con4_utiltrans.pdf	121040 fbba7298421dd9e0f0a31c1c558332f5a52e2bb2	no	1
Warnings:					
Information:					
2	Specification	fin0001con1cip1con4_spec.pdf	178668 b9e76a32f9489f148d53e676137d2b6153c5a512	no	33
Warnings:					
Information:					
3	Drawings-only black and white line drawings	fin0001con1cip1con4_figs.pdf	382915 fa887782cde124ff5d6d99b89acbc6e5c8e4589fb	no	10
Warnings:					
Information:					
4	Preliminary Amendment	fin0001con1cip1con4_prelima mndmt.pdf	123574 9892457818b73a876f1bf4f2a1cb7caa7bcb0ff62	no	5
Warnings:					
Information:					
5	Oath or Declaration filed	fin0001con1cip1con4_dec.pdf	248478 12e9bf41f6d6b07713250217d20c1236b2e2f1e1	no	5
Warnings:					
Information:					
6	Power of Attorney	fin0001con1cip1con4_poa.pdf	505089 77f01be906d59a30c1f52d47aa38e93d7a9fb07a	no	1
Warnings:					
Information:					
7	Assignee showing of ownership per 37 CFR 3.73(b).	fin0001con1cip1con4_373b.pdf	99023 3d0c968b892d9ebb95f3ec8c81cd4a882c4e6066	no	1
Warnings:					
Information:					
8	Transmittal Letter	fin0001con1cip1con4_idstrans.pdf	101405 655fd8a0c3d9da180c3edb32ab15832af15862ef	no	2
Warnings:					
Information:					
9	Information Disclosure Statement (IDS) Form (SB08)	fin0001con1cip1con4_1449frm.pdf	160528 d87d34bfe1490c9320dbedc942ef1f29be241cfa	no	8
Warnings:					
Information:					

This is not an USPTO supplied IDS fillable form

10	Fee Worksheet (SB06)	fee-info.pdf	33051	no	2
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Warnings:

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New Applications Under 35 U.S.C. 111

If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371

If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office

If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

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.

PATENT APPLICATION FEE DETERMINATION RECORD Substitute for Form PTO-875					Application or Docket Number 13/290,708		Filing Date 11/07/2011		<input type="checkbox"/> To be Mailed	
APPLICATION AS FILED – PART I										
(Column 1)			(Column 2)			SMALL ENTITY <input type="checkbox"/> OR		OTHER THAN SMALL ENTITY		
FOR	NUMBER FILED	NUMBER EXTRA	RATE (\$)	FEE (\$)	OR	RATE (\$)	FEE (\$)			
<input checked="" type="checkbox"/> BASIC FEE (37 CFR 1.16(a), (b), or (c))	N/A	N/A	N/A			N/A	380			
<input checked="" type="checkbox"/> SEARCH FEE (37 CFR 1.16(k), (i), or (m))	N/A	N/A	N/A			N/A	620			
<input checked="" type="checkbox"/> EXAMINATION FEE (37 CFR 1.16(o), (p), or (q))	N/A	N/A	N/A			N/A	250			
TOTAL CLAIMS (37 CFR 1.16(i))	18 minus 20 =	* 0	X \$ =		OR	X \$60 =	0			
INDEPENDENT CLAIMS (37 CFR 1.16(h))	2 minus 3 =	* 0	X \$ =			X \$250 =	0			
<input type="checkbox"/> APPLICATION SIZE FEE (37 CFR 1.16(s))			If the specification and drawings exceed 100 sheets of paper, the application size fee due is \$250 (\$125 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s).							
<input type="checkbox"/> MULTIPLE DEPENDENT CLAIM PRESENT (37 CFR 1.16(j))										
* If the difference in column 1 is less than zero, enter "0" in column 2.			TOTAL			TOTAL		1250		
APPLICATION AS AMENDED – PART II										
(Column 1)			(Column 2)			(Column 3)		SMALL ENTITY OR OTHER THAN SMALL ENTITY		
AMENDMENT	11/07/2011	CLAIMS REMAINING AFTER AMENDMENT	HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA	RATE (\$)	ADDITIONAL FEE (\$)	OR	RATE (\$)	ADDITIONAL FEE (\$)	
	Total (37 CFR 1.16(i))	* 18	Minus	** 20	= 0	X \$ =		OR	X \$60=	0
	Independent (37 CFR 1.16(h))	* 2	Minus	*** 3	= 0	X \$ =		OR	X \$250=	0
	<input type="checkbox"/> Application Size Fee (37 CFR 1.16(s))							OR		
	<input type="checkbox"/> FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))							OR		
					TOTAL ADD'L FEE			OR	TOTAL ADD'L FEE	
AMENDMENT	CLAIMS REMAINING AFTER AMENDMENT	HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA	RATE (\$)	ADDITIONAL FEE (\$)	OR	RATE (\$)	ADDITIONAL FEE (\$)		
	Total (37 CFR 1.16(i))	*	Minus	**	=	X \$ =		OR	X \$ =	
	Independent (37 CFR 1.16(h))	*	Minus	***	=	X \$ =		OR	X \$ =	
	<input type="checkbox"/> Application Size Fee (37 CFR 1.16(s))							OR		
	<input type="checkbox"/> FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))							OR		
					TOTAL ADD'L FEE			OR	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.										

Legal Instrument Examiner:
/SUSAN HAY/

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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