

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

ACTIV FINANCIAL SYSTEMS, INC.,

Petitioner,

v.

EXEGY, INC.

Patent Owner.

Case No. IPR2020-01010
U.S. Patent No. 10,062,115

PATENT OWNER'S RESPONSE
(37 C.F.R. §42.120)

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LIST OF EXHIBITS

<i>Exhibit #</i>	<i>Description</i>
2001	U.S. Patent No. 8,175,946 (“Hamati”)
2002	U.S. Patent No. 7,598,958 (“Kelleher”)
2003	Declaration of David E. Taylor

I. INTRODUCTION AND SUMMARY OF THE ARGUMENT

The Board should confirm challenged claims 43 and 44 of U.S. Patent No. 10,062,115 (“the ‘115 Patent”) as patentable, because Petitioner has not demonstrated that claims 43 and 44 are rendered obvious by Parsons (Grounds 1A and 1B).

The ‘115 Patent discloses new and nonobvious ticker plants for performing order feed processing such as normalization and price-aggregation in an accelerated and integrated fashion. Ex. 1001, 5:4-8. As a result, the inventive ticker plants experience increased system throughput and decreased processing latency as compared to traditional ticker plants that perform only feed normalization. Ex. 1001, 4:63-5:9. The inventive ticker plants employ coprocessors that serve as offload engines to accelerate the building of order books (*e.g.*, sorted listings of limit orders for each financial instrument). Ex. 1001, 3:54-55, 5:9-11. Financial market data such as limit order events received on feeds into the ticker plant may be transferred on a streaming basis to the coprocessor for high speed processing. Ex. 1001, 5:11-14. The coprocessors then enrich the stream of limit order events pertaining to financial instruments with order book data. Ex. 1001, 8:28-32.

For example, the coprocessors may update and maintain order and price aggregation data structures with order engines and price engines. Ex. 1001,

17:52-55, 18:6-16, 20:25-27. In such examples, the order engines access data structures and retrieve limit order records in the data structures based on the streaming limit order event data, and then compute updated limit order data based on the limit order records and the streaming data. Ex. 1001, 20:61-21:1, 22:61-67. Likewise, the price engines access data structures and retrieve price point records in the data structures based on the streaming limit order event data, and then compute updated price point data based on the price point records and the streaming data. Ex. 1001, 20:61-21:1, 23: 1-9. The coprocessors then enrich the stream of limit order events based on the updated limit order data and price point data to provide downstream subscribers with valuable information about market depth. Ex. 1001, 21:1-64.

A. Ground 1A: Claims 43 and 44 Have Not Been Shown to Be Obvious Based on Parsons' FPGA-Implemented Order Book Server (OBS)

Claim 43 recites an apparatus including a processor having an order engine and a price engine. The coprocessor is configured to receive streaming data representative of a plurality of limit order events pertaining to a plurality of financial instruments. The order engine is configured to (1) access a plurality of limit order records based on the streaming limit order event data, and (2) compute updated limit order data based on the accessed limit order records and the streaming limit order event data. The price engine is configured to (1) access a plurality of price point records based on the streaming limit order

event data, and (2) compute updated price point data based on the accessed price point records and the streaming limit order event data. The coprocessor is configured to enrich the streaming limit order events with financial market depth data based on the computed updated limit order data and price point data. The order engine and the price engine are configured to perform their respective operations in parallel with each other as the limit order event data streams through the coprocessor.

In contrast to Petitioner's assertion, Parsons' order book server (OBS) and order book cache (OBC) do not access price point records, and update price point data based on accessed price point records as recited by claims 43 and 44. Specifically, the Petition asserts sub-records that define price entries in Parsons' OBC are equivalent to the claimed "price point records." Petition, 39-40. Parsons' sub-records merely define individual price entries for a financial instrument that are used in maintaining a sorted list of bids and offers associated with outstanding orders for that financial instrument. Ex. 1006, ¶¶71, 96. Parsons' price entry sub-records do not store the claimed price point data such as data relating to price volume for a financial instrument at each unique price, or order count indicating a total number of orders for a financial instrument at each unique price. As such, Parsons' price entry sub-records are not the claimed "price point records," and

Parsons' OBS and OBC do not access price point records and update price point data based on accessed price point records as recited by claims 43 and 44.

Additionally, a person having ordinary skill in the art would not have been motivated to implement Parsons' OBC with the parallel processing techniques of Parsons' last value cache (LVC), as alleged by Petitioner. Petition, 24-27. The Petition recognized the shortcomings of Parsons, including its failure to even suggest using the OBC to access different types of records (*e.g.*, limit order records and price point records), and then compute updates for different types of data (*e.g.*, limit order data and price point data) in parallel. These shortcomings of Parsons are not overcome by Parsons' teachings related to its LVC. For example, a person having ordinary skill in the art would have had no motivation to use the LVC architecture in Parsons' OBC because the OBC is required to perform specific fundamental tasks, none of which are performed by Parsons' LVC architecture.

Therefore, for the reasons set forth below, Petitioner has not demonstrated that claims 43 and 44 are unpatentable pursuant to Ground 1A.

B. Ground 1B: Claims 43 and 44 Have Not Been Shown to Be Obvious Based on Parsons' OBS and LVC Deployed on the Same FPGA

Ground 1B, also based only on Parsons, is likewise insufficient to demonstrate that claims 43 and 44 are unpatentable. In Ground 1B, Petitioner relied on record fields maintained by Parsons' LVC as being equivalent to the

claimed “price point records.” Petition, 64. Specifically, the Petition asserts the record fields for “total trade volume at bid,” “total trade volume at ask,” “last trade price, best bid price, best ask price, high trade price, low trade price, and close price” are equivalent to the claimed “price point records.” *Id.*

However, Parsons’ above-mentioned record fields are not equivalent to the claimed “price point records,” and therefore Parsons’ LVC does not access price point records, and update price point data based on accessed price point records as recited by claims 43 and 44. Specifically, Parsons’ record fields for “last trade price, best bid price, best ask price, high trade price, low trade price, and close price” are fields relating to a single action (*e.g.*, an executed trade, or an updated quote containing the best bid or ask price) at a particular price, not an aggregated number of orders for a particular financial instrument at each unique price. Further, Parsons’ record fields for “total trade volume at bid” and “total trade volume at ask” are fields quantifying the size of executed trades occurring at a best bid price and a best ask price at the time of the trade execution. These fields do not relate to an aggregated number of orders for a particular financial instrument at each unique price. Thus, Parsons’ record fields maintained by the LVC are not equivalent to the claimed “price point records,” and Parsons’ LVC does not access price point records and update price point data based on accessed price point records as recited by claims 43 and 44.

Additionally, a person having ordinary skill in the art would not have been motivated to implement Parsons' OBC and LVC so that their operations are performed in parallel, as alleged by Petitioner. Petition, 50-56 and 69-72. Petitioner recognized the shortcomings of Parsons, including its failure to even suggest using the OBC or LVC to access different types of records (*e.g.*, limit order records and price point records), and then compute updates for different types of data (*e.g.*, limit order data and price point data) in parallel. These shortcomings of Parsons are not overcome by Parsons' teachings related to its OBC and LVC. For example, Parsons' OBC and LVC process different types of input messages. However, implementing Parsons' OBC and LVC as suggested by Petitioner would result in sending the same input messages to Parsons' OBC and LVC for processing. Thus, implementing Parsons' OBC and LVC as suggested by Petitioner would result in the OBC and LVC both processing needless and unnecessary input messages. A person having ordinary skill in the art would not have been motivated to implement Parsons' OBC and LVC in a way to cause needless and unnecessary processing.

Therefore, for the reasons set forth below, Petitioner has not demonstrated that claims 43 and 44 are unpatentable pursuant to Ground 1B.

II. LEVEL OF ORDINARY SKILL

For purposes of this proceeding, Patent Owner does not dispute Petitioner's proposed level of ordinary skill in the art.

III. CLAIM INTERPRETATION

A. "Price Point Records"

Claim 43 (and claim 44, which depends therefrom) recites a price engine "configured to (1) access a plurality of *price point records* based on the streaming limit order event data, and (2) compute updated price point data based on the accessed price point records and the streaming limit order event data." Properly construed, in the context of the intrinsic record, "price point records" means price point records in memory, where each price point record contains at least (a) a price associated with a financial instrument, (b) a price volume indicating a sum of order sizes for the financial instrument at that price, and (c) an order count indicating the total number of orders for the financial instrument at that price. Ex. 2003, ¶11.

The '115 specification discloses that "at minimum, the set of price point records preferably contain the price, volume (sum of order sizes at that price, which can be referred to as the price volume), and order count (total number of orders at that price)." Ex. 1001, 18:10-16. Additionally, Figs. 21(a)-(b) illustrate price point records 2100, 2150 as containing various data fields including price, volume, and order count data fields. Specifically, the price point record 2100 of Fig. 21(a)

includes “a price field 2110” associated with a financial instrument, “a volume field 2112, which identifies the volume of shares across all limit orders for the financial instrument (see the symbol field 2104) on the regional exchange (see the GEID field 2106) at the price identified in the price field 2110,” and “a count field 2114, which comprises a count of how many limit orders make up the volume 2112.” Ex. 1001, 19:15-30; Ex. 2003, ¶12. The price point record 2150 of Fig. 21(b) includes “a price field 2158,” “a volume field 2160,” and “a count field 2162.” Ex. 1001, 19:52-67. Although Figs. 21(a)-(b) each illustrate a specific number of defined data fields, the “price point records 2100 and 2150 can be configured to have more or fewer and/or different data fields.” Ex. 1001, 20:22-24; Ex. 2003, ¶13. The ‘115 specification, however, does not suggest specifically removing the “price field,” the “volume field,” or the “count field” from the price point records 2100, 2150. Ex. 2003, ¶14. Thus, even though a price point record may have more or fewer and/or different data fields than the price point records 2100, 2150 of Figs. 21(a)-(b), “at minimum,” the price point record contains “the price, volume (sum of order sizes at that price, which can be referred to as the price volume), and order count (total number of orders at that price).” Ex. 1001, 18:10-16.

Additionally, the ‘115 specification makes clear that price point records are in memory. Specifically, the ‘115 specification discloses data structures are “used to store price point records.” Ex. 1001, 19:4-7. For example, the price point records

may be stored on a single shared memory or across multiple memories. Ex. 1001, 20:46-66, Figs. 17-18. The price point records are then retrieved from memory based on streaming limit order events. Ex. 1001, 20:61-66; Ex. 2003, ¶15.

Thus, when properly construed, “price point records” means price point records in memory, where each price point record contains at least (a) a price associated with a financial instrument, (b) a price volume indicating a sum of order sizes for the financial instrument at that price, and (c) an order count indicating the total number of orders for the financial instrument at that price. Ex. 2003, ¶16.

IV. CLAIMS 43 AND 44 ARE NOT OBVIOUS OVER PARSONS’ OBS (GROUND 1A)

Many differences exist between the teachings of Parsons and the claimed subject matter of the ‘115 Patent. For example, one difference between the teachings of the ‘115 relative to Parsons is that price aggregations are computed and stored as price point records in memory. These price point records are maintained separate from limit order records. Ex. 1001, 20:61-21:8, Figs. 17, 18, 20, 21(a)-(b). The precomputed and stored price point records may be quickly retrieved when a request is received for a price-aggregated view of a book for a given financial instrument. Ex. 1001, 5:3-9; Ex. 2003, ¶17. As such, the work required to provide price aggregate data for a price-aggregated view is significantly reduced relative to the approach described by Parsons below. Ex. 1001, 5:11-14; Ex. 2003, ¶17.

Parsons requires price aggregations be generated from limit order records each and every time a price aggregate view is requested. Ex. 1006, ¶¶71, 96; Ex. 2003, ¶17. For example, when a price-aggregated view of a book for a given financial instrument is requested, Parsons' OBS is required to (a) retrieve an order book record for that instrument from the OBC, (b) group order entries in that record by price point, and (c) then aggregate various fields that share the same price point to compute the data for the price-aggregated view. Ex. 1006, ¶¶71, 96; Ex. 2003, ¶19. These steps would need to be repeated for each price aggregate view that is requested. Ex. 1006, ¶¶71, 96; Ex. 2003, ¶17. This leads to longer compute times and redundant computations as compared to the teachings of the '115 Patent. Ex. 2003, ¶17.

A. Ground 1A of the Petition Fails because there are no Price Point Records in Parsons

Parsons discloses that its OBC maintains a cache of financial instrument records. Ex. 1006, ¶96. Each financial instrument record "consists of an array of sub-records that define individual price or order entries for that financial instrument." Ex. 1006, ¶96. Parsons' "OBC includes the ability to generate" a price-aggregated view to show orders at the same price point "aggregated together to create entries that are indicative of the total number of orders available at each price point." Ex. 1006, ¶¶71, 96; Ex. 2003, ¶18.

The Petition asserts sub-records in Parsons' OBC defining price entries are equivalent to the claimed "price point records." Petition, 39-40. Specifically, the Petition asserts the price entries are used to support the price-aggregated view, and therefore the price entries are price-aggregated entries corresponding to "entries that are indicative of the total number of orders available at each price point" shown by the price-aggregated view. Petition, 38-39.

Parsons' sub-records defining price entries are not equivalent to "price point records," where each record contains "at least (a) a price associated with a financial instrument, (b) a price volume indicating a sum of order sizes for the financial instrument at that price, **and** (c) an order count indicating the total number of orders for the financial instrument at that price," as required by claims 43 and 44. Instead, Parsons merely discloses sub-records defining price entries that are used for a sort order. Ex. 1006, ¶96; Ex. 2003, ¶19. Parsons fails to disclose or suggest that its price entries are entries relating to a price volume for a financial instrument at each unique price, or an order count indicating a total number of orders for a financial instrument at each unique price, as required by claims 43 and 44. *Id.*

Nor does Parsons disclose or suggest the aggregated data shown in its generated price-aggregated view is stored in memory. For example, while Parsons' price-aggregated view shows "the total number of orders available at each price point" (Ex. 1006, ¶¶71, 96), Parsons fails to disclose or suggest the "total number of

orders available at each price point” is a stored entry in its sub-record. Ex. 2003, ¶20. Instead, Parsons teaches generating a view showing “the total number of orders available at each price point” by retrieving records for a financial instrument, grouping order entries in that record by price point, and then aggregating various fields that share the same price point to compute the data for the price-aggregated view. Ex. 1006, ¶¶71, 96; Ex. 2003, ¶21. Each of these steps are repeated for each price aggregate view. *Id.* Thus, the aggregated data shown in Parsons’ price-aggregated views is repeatedly generated, not stored in memory.

Thus, Parsons’ sub-records defining price entries are not equivalent to price point records in memory, where each price point record contains at least (a) a price associated with a financial instrument, (b) a price volume indicating a sum of order sizes for the financial instrument at that price, and (c) an order count indicating the total number of orders for the financial instrument at that price, as required by claims 43 and 44. Ex. 2003, ¶22.

B. Ground 1A of the Petition Fails Because Parsons Does Not Disclose a Price Engine “Configured to (1) Access a Plurality of Price Point Records Based on the Streaming Limit Order Event Data, and (2) Compute Updated Price Point Data Based on the Accessed Price Point Records and the Streaming Limit Order Event Data.”

Because Parsons fails to disclose or suggest the claimed “price point records,” Parsons also fails to disclose a price engine “configured to (1) access a plurality of **price point records** based on the streaming limit order event data, and

(2) compute updated price point data based on the **accessed price point records** and the streaming limit order event data,” as recited by claims 43 and 44.

C. Ground 1A of the Petition Also Fails Because a Person Having Ordinary Skill in the Art Would Not Have Been Motivated to Access and Update Sub-Records in Parson’s OBC Using the LVC Architecture

The Petition asserts Parsons’ OBC includes the claimed “order engine” and “price engine” because the OBC updates sub-records for order entries and price entries. Petition, 29-31 and 33-42. As recognized by Petitioner, Parsons fails to disclose accessing and updating the sub-records for order entries and price entries in parallel. However, the Petition asserts a person having ordinary skill in the art would have been motivated to implement Parsons’ OBC with the parallel processing techniques of Parsons’ last value cache (LVC). Petition, 24-27.

A person having ordinary skill in the art would not have been motivated to access and update sub-records in the OBC using the LVC architecture because the OBC and LVC are performing fundamentally different tasks. Ex. 2003, ¶23. Specifically, Parsons’ OBC performs sorting functions whereas Parsons’ LVC does not. *Id.* For example, Parsons’ OBC maintains a sorted listing of limit order records for each financial instrument. Ex. 1006, ¶¶71, 96; Ex. 2003, ¶23. Each limit order record corresponds to one limit order resting on the market for that financial instrument, and the position of a limit order record in each sorted listing (for a given financial instrument) changes when limit order records are added or removed

from that sorted listing. Ex. 1006, ¶96; Ex. 2003, ¶23. This results in a one-to-many relationship between each financial instrument and order records. Ex. 2003, ¶23.

In contrast, Parsons' LVC performs the function of looking up a field to update a record representing the current state of a financial instrument. Ex. 1006, ¶¶62, 95; Ex. 2003, ¶24. In this way, Parsons' LVC maintains a one-to-one relationship between each financial instrument and an order record. Ex. 2003, ¶24. Parson does not disclose or suggest that its LVC maintains a sorted listing of records, or a one-to-many relationship between each financial instrument and order records. Because Parsons' LVC does not perform sorting or maintaining one-to-many relationship between each financial instrument and order records, a person having ordinary skill in the art would have had no motivation to use the LVC architecture in Parsons' OBC that requires sorting and maintaining one-to-many relationship between each financial instrument and order records. *Id.*

D. Ground 1A of the Petition Fails Because Petitioner Has Not Pled a Reasonable Expectation of Success for its Proposed Use of Parsons' LVC Architecture in Parsons' OBC

Ground 1A of the Petition asserts it would have been obvious to implement Parsons' OBC with the parallel processing techniques of Parsons' LVC. Petition, 24-27. *However, Petitioner never pleads a reasonable expectation of success with respect to Ground 1A.*

A petitioner in an *inter partes* review bears the unshifting burden of proving unpatentability, and the Petition here should be rejected as failing to demonstrate that a person having ordinary skill in the art would have had a reasonable expectation of success in using parallel processing techniques of Parsons' LVC in Parsons' OBC. Indeed, the Petition is devoid of any explanation, or even a single assertion, as to why a person having ordinary skill in the art would have had a reasonable expectation of success — a critical requirement of an obviousness challenge under *Graham v. John Deere Co.*, 383 U.S. 1 (1966).

To demonstrate the challenged claims are obvious, a petitioner bears the burden of demonstrating “that a skilled artisan would have been motivated to combine the teachings of the prior art references to achieve the claimed invention, *and* that the skilled artisan would have had a reasonable expectation of success in doing so.” *ActiveVideo Networks, Inc. v. Verizon Commc'ns, Inc.*, 694 F.3d 1312, 1327-28 (Fed. Cir. 2012).

As such, to prove obviousness, a petitioner has a separate burden to show that at the time of the invention there was a reasonable expectation of success for its proposed combination. *KEYnetik, Inc. v. Samsung Electronics Co., LTD.*, No. 2020-1271, 2021 WL 274723, at *6–7 (Fed. Cir. Jan. 27, 2021) (nonprecedential) (“It was [Petitioner’s] ‘burden’ to demonstrate ‘that the skilled artisan would have had a reasonable expectation of success’ in combining references. . . . The Board

erred in assigning no burden to [Petitioner] and making no finding as to reasonable expectation of success in combining the contested references.”).

Moreover, the petition actually needs “to address the expectation of success for a proposed modification or combination.” *See Apple Inc. v. California Inst. of Tech.*, IPR2017-00219, Paper No. 76 at 20 (PTAB Dec. 27, 2018). Indeed, in *Apple*, the petitioner’s lack of expectation of success evidence and argument proved fatal to its obviousness case. *Id.*

Here, the Petition does not even address the reasonable expectation of success element of obviousness. By ignoring this issue altogether and omitting any explanation regarding a reasonable expectation of success for its proposed modification, Petitioner has failed to meet its burden of demonstrating that claims 43 and 44 would have been obvious over Parsons.

E. A Person Having Ordinary Skill in the Art Would Not Have Expected Petitioner’s Modified OBC to Operate as Intended

A person having ordinary skill in the art would *not* have had a reasonable expectation of success in using Parsons’ LVC architecture in Parsons’ OBC for at least the same reasons (explained in Section IV.C above) that a person having ordinary skill in the art would not have been motivated to use Parsons’ LVC architecture in Parsons’ OBC as Petitioner suggests. For example, a person having ordinary skill in the art would have no reasonable expectation of success because

Parsons' OBC is required to perform specific fundamental tasks, none of which are performed by Parsons' LVC architecture. Ex. 2003, ¶25.

V. CLAIMS 43 AND 44 ARE NOT OBVIOUS OVER THE OBS AND LVC DEPLOYED ON THE SAME FPGA

A. Ground 1B of the Petition Fails Because Parsons Does Not Disclose Price Point Records

Parsons discloses that its LVC maintains a cache of financial instrument records. Ex. 1006, ¶95. The records include fields such as “last trade price, last trade size, last trade time, best bid price, best bid size, best bid time, best ask price, best ask size, best ask time, total trade volume, daily change, tick direction, price direction, high trade price, high price time, low trade price, low price time, and close price,” and derived fields such as “total trade volume at bid, total trade volume at ask, traded value, traded value at bid, traded value at ask, and volume-weighted average price (VWAP).” Ex. 1006, ¶126.

The Petition asserts the fields for “total trade volume at bid,” “total trade volume at ask,” “last trade price, best bid price, best ask price, high trade price, low trade price, and close price” are equivalent to the claimed “price point records.” Petition, 64.

The fields associated with Parsons' LVC are not equivalent to “price point records,” where each record contains “at least (a) a price associated with a financial instrument, (b) a price volume indicating a sum of order sizes for the financial

instrument at that price, **and** (c) an order count indicating the total number of orders for the financial instrument at that price,” as required by claims 43 and 44. Ex. 2003, ¶27.

Specifically, none of the fields relate to an order count indicating a total number of orders for a particular financial instrument at a particular price, as required by “price point records” of claims 43 and 44. Instead, “last trade price, best bid price, best ask price, high trade price, low trade price, and close price” are fields relating to a single action (e.g., an executed trade, or an updated quote containing the best bid or ask price) at a particular price, not an aggregated number of orders for a particular financial instrument at each unique price. Ex. 2003, ¶28. Additionally, “total trade volume at bid” and “total trade volume at ask” are fields quantifying the aggregate size of executed trades occurring at a price equal to the best bid price and the best ask price at the time of the trade execution. Ex. 2003, ¶29. The “total trade volume at bid” and “total trade volume at ask” fields do not relate to an order count indicating a total number of resting limit orders for a particular financial instrument at a particular price. *Id.* As such, the fields associated with Parsons’ LVC clearly do not include fields relating to an order count indicating a total number of orders for a particular financial instrument at a particular price as required by the “price point records” of claims 43 and 44. *Id.*

Thus, Parsons' fields for "total trade volume at bid," "total trade volume at ask," "last trade price, best bid price, best ask price, high trade price, low trade price, and close price" are not equivalent to the claimed "price point records," each containing "at least (a) a price associated with a financial instrument, (b) a price volume indicating a sum of order sizes for the financial instrument at that price, and (c) an order count indicating the total number of orders for the financial instrument at that price," as required by claims 43 and 44. Ex. 2003, ¶30.

B. Ground 1B of the Petition Fails Because Parsons Does Not Disclose a Price Engine "Configured to (1) Access a Plurality of Price Point Records Based on the Streaming Limit Order Event Data, and (2) Compute Updated Price Point Data Based on the Accessed Price Point Records and the Streaming Limit Order Event Data."

Because Parsons fails to disclose or suggest the claimed "price point records," Parsons also fails to disclose a price engine "configured to (1) access a plurality of **price point records** based on the streaming limit order event data, and (2) compute updated price point data based on the **accessed price point records** and the streaming limit order event data," as recited by claims 43 and 44.

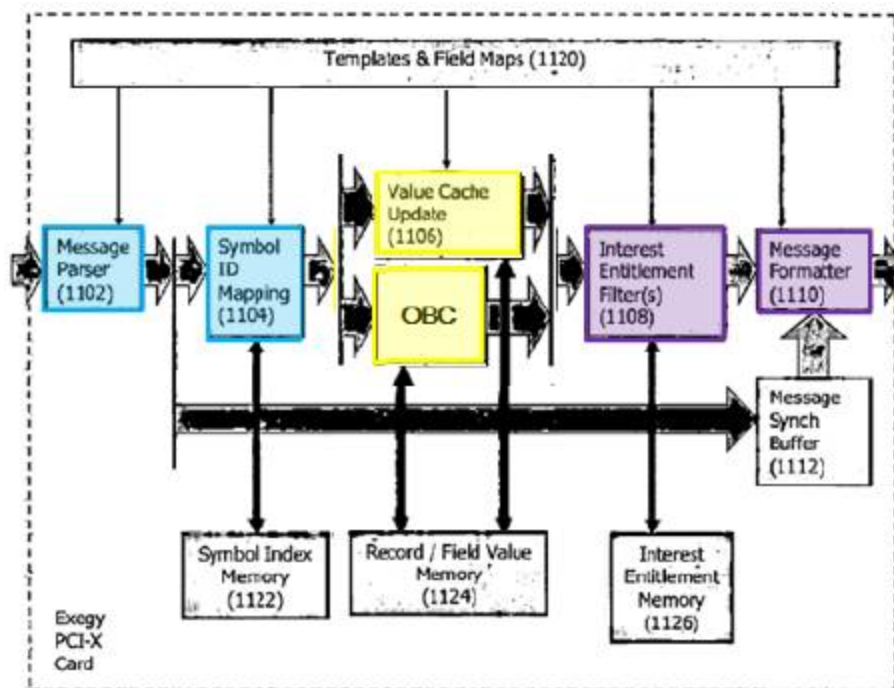
C. Ground 1B of the Petition Also Fails Because Parsons Does Not Disclose the Claimed "Price Engine"

The Petition asserts Parsons' LVC meet the claimed "price engine." Petition, 61. However, the '115 Patent makes clear the claimed "price engine" is not equivalent to an LVC such as Parsons' LVC. Ex. 2003, ¶31. Specifically, the '115 Patent discloses an LVC that is separate from a price engine. For example, Figs. 29

and 30 of the ‘115 Patent illustrate pipelines including “an Order Normalization and Price Aggregation (ONPA) module” having an order engine and a price engine, and a value cache update (VCU) module 2900 for updating “a Last Value Cache (LVC) data structure.” Ex. 1001, 17:52-55, 18:6-12, 20:61-21:3, 25:6-20, 28:19-34. The VCU module 2900 updates its LVC data structure based on an output of the ONPA module (which includes the price engine). Ex. 1001, 28:22-34, Figs. 29-30; Ex. 2003, ¶31. Further, the ‘115 Patent makes clear that the VCU module and LVC data structure are described in Parsons. Ex. 1001, 28:46-49. As such, when properly construed in light of the ‘115 specification, one skilled in the art would not equate the claimed “price engine” to Parsons’ LVC. Ex. 2003, ¶32.

D. Ground 1B of the Petition Fails Because a Person Having Ordinary Skill in the Art Would Not Have Been Motivated To Implement Parsons’ OBC and LVC in Parallel

The Petition asserts Parsons’ OBC includes the claimed “order engine” and Parsons’ LVC includes the claimed “price engine.” Petition, 60-66. As recognized by Petitioner, Parsons does not disclose accessing and updating records in the OBC and LVC in parallel. However, the Petition asserts a person having ordinary skill in the art would have been motivated to implement Parsons’ OBC and LVC so that their operations are performed in parallel, as shown in Petitioner’s modified Fig. 11 of Parsons (reproduced below). Petition, 50-56 and 69-72.



**Figure 11
(Modified)**

Implementing Parsons' OBC and LVC as suggested by Petitioner would result in sending the same input messages to Parsons' OBC and LVC for processing. Ex. 2003, ¶34. A person having ordinary skill in the art would not have been motivated to implement Parsons' OBC and LVC as suggested by Petitioner because Parsons' OBC and LVC process different types of input messages. *Id.* Specifically, Parsons' OBC consumes input messages relating to multiple entries showing each outstanding limit order to buy and sell (bids and offers) resting on an exchange for each financial instrument. Ex. 1006, ¶¶71, 96; Ex. 2003, ¶34. Those skilled in the art commonly refer to the types of input messages consumed by Parsons' OBC as "Level 3" messages. Ex. 2003, ¶34.

Parsons' LVC consumes a different type input message than the OBC. Ex. 2003,

¶35. Specifically, Parsons' LVC consumes input messages relating to a single entry showing a current state to buy and sell (e.g., a best bid, a best offer, a best price level) resting on an exchange for each financial instrument. *See* Ex. 1006, ¶¶62, 126; Ex. 2003, ¶35. Those skilled in the art commonly refer to the types of input messages consumed by Parsons' LVC as "Level 1" messages. Ex. 2003, ¶35. Thus, implementing Parsons' OBC and LVC as suggested by Petitioner would result in the OBC and LVC both processing needless and unnecessary input messages. Ex. 2003, ¶36. A person having ordinary skill in the art would not have been motivated to implement Parsons' OBC and LVC in a way to cause needless and unnecessary processing. Ex. 2003, ¶37.

E. Ground 1B of the Petition Also Fails Because Petitioner Has Not Pled a Reasonable Expectation of Success for its Proposed Implementation of Parsons' OBC and LVC performing their Operations in Parallel

Once again, *the Petition does not even address the reasonable expectation of success element of obviousness* with regard to Ground 1B. By ignoring this issue altogether and omitting any explanation regarding a reasonable expectation of success for its proposed modification of Parsons' OBC and LVC, Petitioner has failed to meet its burden of demonstrating that claims 43 and 44 would have been obvious over Parsons.

**F. A Person Having Ordinary Skill in the Art Would Not Have Expected
Petitioner's Modified OBC and LVC to Operate as Intended**

A person having ordinary skill in the art would *not* have had a reasonable expectation of success in implementing Parsons' OBC and LVC so that their operations are performed in parallel for at least the same reasons (explained in Section V.D above) that a person having ordinary skill in the art would not have been motivated to modify Parsons' OBC and LVC so that their operations are performed in parallel, as Petitioner suggests. For example, a person having ordinary skill in the art would have no reasonable expectation of success because modifying Parsons' OBC and LVC as suggested by Petitioner would have introduced needless and unnecessary processing of input message. Ex. 2003, ¶38.

VI. CONCLUSION

For the reasons set forth above, Challenged Claims 43 and 44 should be confirmed as patentable.

Dated: March 1, 2021

Respectfully submitted,

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CERTIFICATE OF COMPLIANCE

The undersigned hereby certifies that this brief complies with the type volume limitations of 37 C.F.R. § 42.24(b)(1). This brief contains 5,445 words as calculated by the “Word Count” feature of Microsoft Word 2010, the word processing program used to create this.

The undersigned further certifies this brief complies with the typeface requirements of 37 C.F.R. § 42.6(a)(2)(ii) and typestyle requirements of 37 C.F.R. § 42.6(a)(2)(iii). This brief has been prepared in a proportionally spaced typeface using Microsoft Word 2010 in Times New Roman 14-point font.

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CERTIFICATE OF SERVICE

Pursuant to 37 C.F.R. 42.6(e), I certify that on this 1st day of March, 2021, a true and correct copy of the foregoing **Patent Owner's Response** was served by electronic mail on Petitioner's lead and backup counsel at the following addresses:

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