Paper No. 1

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

DeFi Education Fund

Petitioner

v.

True Return Systems, LLC

Patent Owner

PETITION
To Institute an *Inter Partes* Review for U.S. Patent No. 10,025,797
under *37 C.F.R. § 42.100 et seq.*

IPR2023-01388

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I. RELIEF REQUESTED

Petitioner DeFi Education Fund (hereinafter "Petitioner"), respectfully requests institution of *inter partes* review ("IPR") under 35 U.S.C. §§ 311–319 and 37 C.F.R. § 42.100 et seq., and cancellation of claims 1-20 of U.S. Patent No. 10,025,797 to Fonss ("Fonss") (Ex. 1001), assigned to True Return Systems LLC (hereinafter "PO"), as being invalid under 35 U.S.C. § 103 in light of the grounds presented herein.

II. INTRODUCTION

Fonss restates a long-understood problem with storing transaction records on a distributed ledger (e.g., a blockchain) and, using its own cryptic lexicography, redescribes and claims a straightforward solution that several others had earlier proposed and implemented. Distributed ledgers store transaction information as a continually growing aggregated record validated through complex processing with each newly added block of transactions. Storing more than the minimum required information to identify and define each transaction in the distributed ledger tends to bog down the validation processing. The prior known solution to this problem has been to include minimal information in blockchain transactions and link the transactions to additional information in a separate storage system via timestamping or the like. Using nonstandard or atypical jargon to relabel basic transactional information such as a prices, currency type, volumes, and dates, Fonss feigns a novel solution that, in reality, is indistinguishable from other earlier solutions to provide companion storage for supplementary transaction data associated with transaction records on a distributed ledger.

III. BACKGROUND

Modern blockchain technology has an intriguing if relatively brief history, spanning a little over a decade. Modern blockchain technologies found their genesis in the creation of Bitcoin, the first and most well-known cryptocurrency. In October 2008, a person or group of people using the pseudonym "Satoshi Nakamoto" published the Bitcoin whitepaper titled "Bitcoin: A Peer-to-Peer Electronic Cash System." EX1011. This document outlined a decentralized digital currency that would operate on a blockchain, a public ledger to record all transactions without the need for a trusted intermediary. *See also* EX1003, ¶27.

A blockchain is a distributed and decentralized digital ledger that records transactions in a secure and transparent manner. It is maintained by a network of computers (nodes) that work together to validate and add new transactions to the ledger. Each block in the blockchain contains a batch of transactions, and once a block is added to the chain, it becomes immutable and cannot be altered retroactively. This immutability and the consensus mechanism used to validate transactions make blockchain a robust and tamper-resistant system. *See also* EX1003, ¶28.

Timestamps are used to order and validate the sequence of transactions or blocks added to a blockchain. Timestamps are used to record the exact time when a transaction is created or when a block is mined, ensuring that the chronological order of events is maintained within the blockchain network, resulting in a time-sequenced set of transactions within a blockchain. *See also* EX1003, ¶29.

a) Blockchain Storage Challenges

Shortly after the introduction of Bitcoin and its associated blockchain, work began on blockchain applications outside of the digital currency context. These applications included medical record storage and distribution (EX1009), Internet-of-Things (IoT) data storage and indexing (EX1010), and decentralized service marketplaces (EX1008), among others. One challenge faced in applying blockchain technologies to these use cases is data storage:

> Data storage on blockchains is extremely expensive due to full replication in the peer-to-peer network. … Additionally, since all data in a blockchain is stored on every node in the network, it is publicly visible.

EX1008, 4; *See also* EX1003, ¶30.

These challenges, however, were solved many times over prior to the earliest priority date for Fonss:

> MedRec accomplishes record management without creating any centralized data repositories; **a modular system design integrates**

> **with providers' existing, local data storage solutions**, facilitating interoperable data exchange between data sources and the patients.

EX1009, Abstract (emphasis added).

> We … **move computation and data off the blockchain**. Each pattern aims at maintaining the key properties of blockchains and includes techniques to ensure that they are not compromised to an unwanted degree.

EX1008, 7 (emphasis added).

> [W]e **combine the blockchain with an off-chain storage, for a scalable secure data storage** …

EX1010, 2 (emphasis added); *See also* EX1003, ¶31.

In fact, entire new file storage technologies were developed to address the storage challenges presented when blockchain technologies are used in non-currency applications:

- IPFS was introduced in a 2014 and allows linking between IPFS off-chain storage and blockchain smart contracts (EX1021);
- SIA, introduced in 2014, provides for a blockchain-based network that aims to create a secure and decentralized cloud storage system (EX1022);

- Storj, introduced in 2016, provides a decentralized cloud storage platform that utilizes blockchain and peer-to-peer technology to create a secure and cost-effective storage solution (EX1023); and
- Swarm, introduced in 2016, provides a decentralized and distributed file storage system that offers a decentralized storage solution for smart contracts (EX1024); *See also* EX1003, ¶32.

As these references exemplify, blockchain storage challenges were addressed prior to 2017 through new technologies (e.g., IPFS, Sia, Storj, Swarm, etc.) and implemented in numerous systems well in advance of the priority date of Fonss. *See also* EX1003, ¶33.

b) Blockchain External Data Challenges

As blockchain technology matured and gained attention beyond cryptocurrency transactions, developers started to recognize the limitations of the blockchain's isolation from external data. This led to the introduction of blockchain oracles that provide external data (exogenous data in Fonss parlance) integration with blockchains. *See also* EX1003, ¶34.

A blockchain oracle is a mechanism that enables communication and data exchange between a blockchain and the outside world. It serves as a bridge that connects smart contracts or decentralized applications (DApps) on the blockchain with off-chain data, systems, or events. EX1003, ¶35. Blockchain oracles were well established before the earliest priority date for Fonss. *Id.* For example, in 2017 Steve Ellis presented a whitepaper entitled "ChainLink: A Decentralized Oracle Network" which describes a decentralized network that serves as a bridge between smart contracts on the blockchain and external data sources or systems. EX1020, *see also* EX1003, ¶27. The disclosed oracle enables blockchain smart contracts to access and utilize real-world data in a secure, reliable, and trustless manner. By connecting blockchain-based smart contracts with off-chain data, the oracle expands the capabilities and use cases of blockchains. EX1003, ¶35.

As with the storage challenges, the challenge of providing blockchains with access to external or exogenous data was solved and well-established prior to Fonss' priority date. EX1003, ¶36.

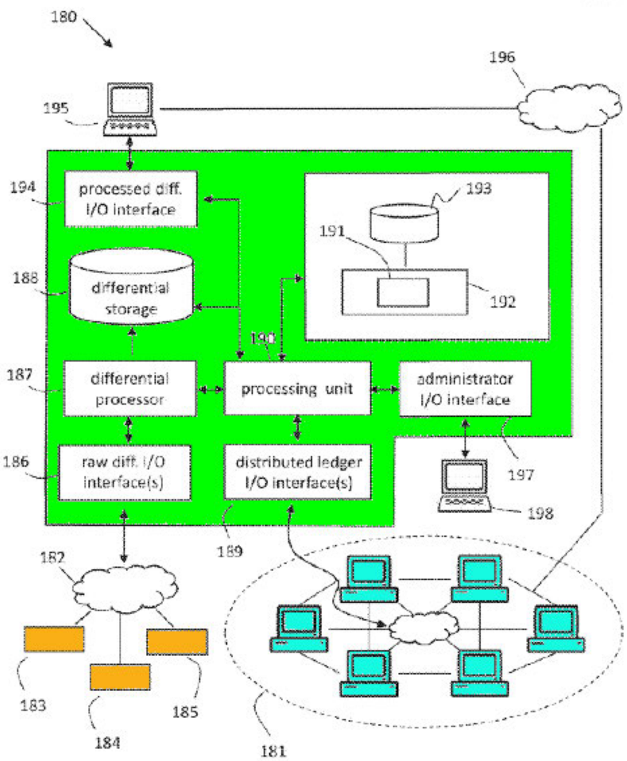
IV. SUMMARY OF FONSS AND THE CITED ART

a) Fonss

Fonss was filed on March 16, 2018, as U.S. Application No. 15/923,317 (the '317 application), claiming priority to U.S. Provisional Application No. 62/634,321 (the '321 provisional), filed on February 23, 2018. Accordingly, the earliest priority date for Fonss is February 23, 2018. The '317 application was allowed on May 29, 2018, with a first-action Notice of Allowance. EX1002, 10. The patent issued on July 17, 2018. EX1002, 8; EX1001, 1.

Fonss purports to describe "A non-conventional method and system used with computerized ledgers [that] provides advantages of computing efficiencies, data security, and universal use." EX1001, Abstract; s*ee also* EX1003, ¶39. The PO has characterized the patent's invention as follows:

FIG. 18



> An exemplary differentials processing/storage system (in green) includes a differentials computer node (item 191) and a differential storage unit (item 188) linked to one or more electronically published time-sequenced data streams or descriptive differentials (items 183, 184, 185, in orange). The system processes (187) data from the data stream / descriptive differentials (183, 184, 185) and stores the processed data on the differential storage unit (188). For example, the system may process logistical data provided by a shipping network,

> financial data and market prices provided by an exchange, or information provided by a news outlet.
>
> The differentials processing/storage system (in green) is also linked to a base distributed computer ledger ("DCL," 181, in cyan) that includes one or more transaction records. The system processes (187, 190, 191) differential data (188) to link the differential data (188) to the DCL, which can then, e.g., update a transaction record of the DCL (181) according to the differential data (188).
>
> This system improves over the prior-art distributed computerized ledgers in several ways including moving certain functionality and storage off the DCL while simultaneously allowing the DCL to utilize exogenous data to update transaction records on the DCL. This is possible because the differentials processing/storage system links the DCL to the exogenous data while keeping and implementing certain computing-intense processes and storage-intense data so that the DCL is not burdened with such. This provides several technological advantages.

EX1016, ¶¶24-27; *see also* EX1018.

While the PO's description is focused on exogenous/external sources of descriptive differentials, external sources are not required by the specification or claims of Fonss. As noted in the Specification, "descriptive differentials may be utilized with or without data stream differentials." EX1001, 9:38-39. In the claims, descriptive differentials and data stream differentials are recited in the alternative. *E.g.,* EX1001, claim 1; see also EX1003, ¶¶40-41.

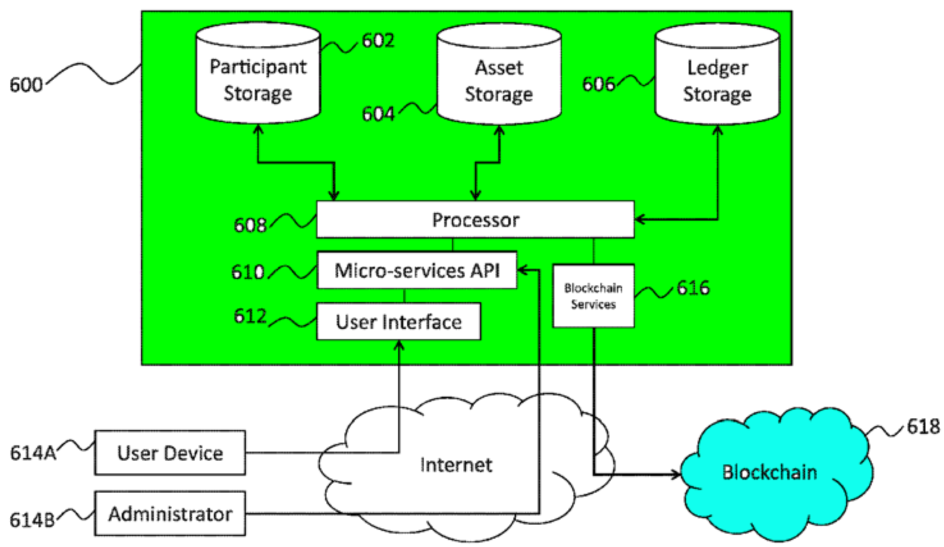
It should be further noted PO has indicated that it considers oracles as examples of the data stream differentials. *See, e.g.,* EX1017, 4-6; EX1003, ¶42; *see also* EX1019.

b) Zinder

U.S. Pre-Grant Publication No. 2017/0005804 to Zinder ("Zinder," EX1004) published on January 5, 2017, more than a year prior to the filing of the ‘321 provisional. Accordingly, Zinder is prior art to Fonss and is not subject to any of the prior art exceptions of 35 U.S.C. § 102(b)(post-AIA). Zinder is assigned to Nasdaq Inc., and the techniques described in Zinder are directed to a digital asset repository computer system 600, which provides storage in parallel with blockchain 618. Through the use of digital asset repository computer system 600 operating in parallel with blockchain 618, the functionality of blockchain 618 is increased to provide a computer system for buyers and sellers to connect and trade privately issued assets. EX1003, ¶44. The functionality of the blockchain is further increased to provide fully auditable records of every transaction in the blockchain 618 and to allow for editing and changing of the data contained in the parallel storage independent of the data contained in the transactions on the blockchain. *Id.*

The parallel storage of digital asset repository computer system 600 includes participant storage 602, which stores data about the participants or users of the system, asset storage 604, which stores information about the assets traded using the system, and ledger storage 606, which stores additional information about the transactions contained in the blockchain 618. EX1003, ¶45. The data contained in asset storage 604 and ledger storage 606 is linked to specific transactions in blockchain 618 using asset and transaction identifiers. *Id.*

As illustrated in the description below, which mirrors PO's description of Fonss, Zinder provides essentially identical systems and methods to those described in Fonss. EX1003, ¶¶45-46.



An exemplary digital asset repository computer system 600 (in green) includes a processor 608, participant storage 602, asset storage 604, and ledger storage 606 linked to blockchain 618. The digital asset repository computer system 600 stores data in asset storage 604 and ledger storage 606 describing financial transactions associated with, for example, privately issued assets. EX1004, ¶[0037];

see also EX1003, ¶¶45-47. For example, the system may store "a rule 144 date of the asset transaction, the price per share of the asset transaction, the investment value of the asset transaction, conditions associated with the asset transaction, etc." EX1004, ¶[0037]*; see also* EX1003, ¶¶45-47.

The digital asset repository computer system 600 (in green) is linked to a blockchain 618 (in cyan) that implements a distributed ledger (*e.g.,* EX1004, ¶[0128]) that includes one or more transaction records (*e.g.,* EX1004, ¶[0035]). The digital asset repository computer system 600 processes the data contained in asset storage 604 and ledger storage 606 to link the stored data to the blockchain 618, which can then, e.g., update a transaction record of the blockchain 618 according to the stored data. EX1003, ¶¶48-49.

This system improves over the prior-art distributed computerized ledgers in several ways, including moving certain functionality and storage off the blockchain 618 while simultaneously allowing the blockchain to utilize data stored in asset storage 604 and ledger storage 606 to update transaction records on the blockchain 618. EX1003, ¶¶45-50.

c) Toll

U.S Pre-Grant Publication No. 2017/0230189 to Toll et al. ("Toll," EX1005) published on August 10, 2017, and is the publication of U.S. Application No. 15/423,668, which was filed on February 3, 2017. Therefore, Toll is prior art to

Fonss. Like Zinder, Toll is assigned to a Nasdaq entity, Nasdaq Technology AB, and is directed a computer system which interfaces with a blockchain in which blockchain transactions are used to record asset transactions:

> [A] computer system is configured to communicate with a distributed blockchain computer system … [T]he computer system is configured to store trades and positions that are based on match messages. In certain instances, the trades and/or positions may be aggregated from the various blockchain transactions that are recorded to the blockchain.

EX1005, ¶¶[0006]-[0007]; *see also* EX1003, ¶51.

Like Zinder, Toll provides for parallel storage that includes data associated with the blockchain transactions that is not also included in the blockchain:

> Database 118 may be a traditional relational or centralized database that stores information that is not submitted to the blockchain. … In certain examples, master data 118 may keep a copy of data that is submitted to the blockchain for verification.

EX1005, ¶¶[0006]-[0007]; *see also* EX1003, ¶52.

The similarities between the techniques of Zinder and Toll are no coincidence. Toll explicitly incorporates by reference the entirety of the Zinder techniques. EX1005, ¶[0025]. Toll also explains that its computer system 100 may serve as an oracle for blockchain transactions:

> [T]he techniques used herein may use a trusted oracle technique where the blockchain (or more particularly the smart contracts on the blockchain) only trust events (e.g., blockchain transactions) from a "trusted" source (e.g., **<u>the CHC system 100</u>** or another computer system or source).

EX1005, ¶[0039] (emphasis added) FIG. 1A (annotated below); *see also* EX1003, ¶¶51-54.

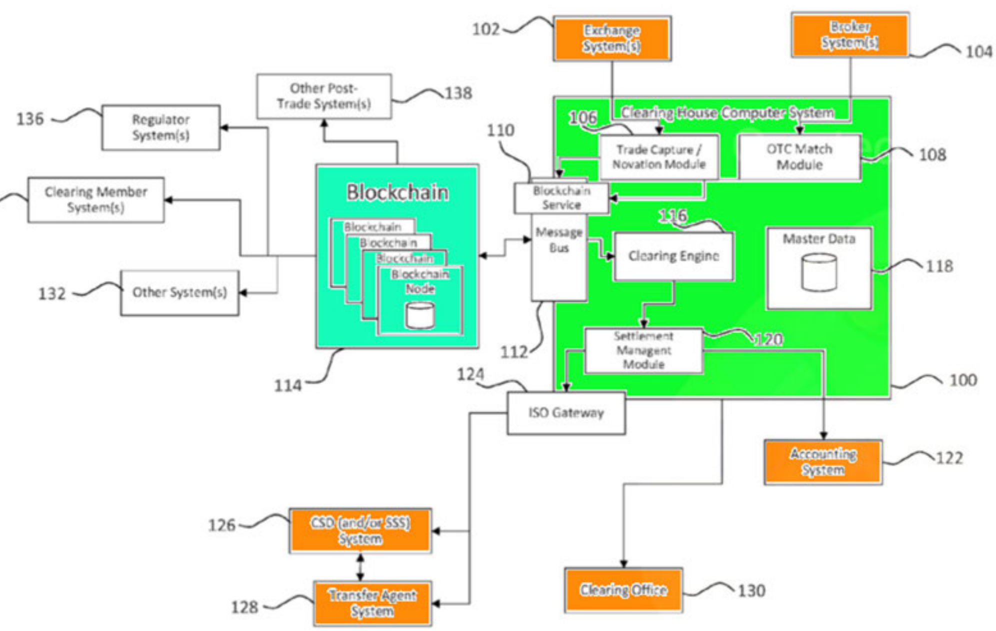


Fig. 1A

d) Zhang

U.S. Pre-Grant Publication No. 20170352027 to Zhang et al. ("Zhang," EX1006) was published on December 7, 2017, and is the publication of U.S. Application No. 15/615,216, which was filed on June 6, 2017, and claims priority to U.S. Provisional Application No. 62/346,604, which was filed on June 7, 2016. Therefore, Zhang is prior art to Fonss. Zhang is an early oracle patent (EX1003,

¶¶55-57.) which explains how an oracle, such as the oracle of Toll, receives external data from electronic data sources, such as stock ticker data. EX1006, ¶¶ [0006], [0072],[0116], [0117]; *see also* EX1003, ¶¶55-57. The data is received from electronically published data streams, such as "stock ticker data" (EX1006, ¶[0072]) received from hypertext transfer protocol data streams (EX1006, ¶[0082]). *See also* EX1003, ¶¶55-57. Once received at the trusted bridge, the data from the data streams may be used in conjunction with blockchain transactions. EX1006, ¶[0006]. EX1003, ¶¶55-57.

V. STANDING

Petitioner certifies that Fonss is available for IPR: (1) Petitioner is not an owner of Fonss, see § 42.101; (2) before the date on which this Petition for review was filed, none of Petitioner or Petitioner's real parties-in-interest or privies filed a civil action challenging the validity of a claim of Fonss, see § 42.101(a); (3) Petitioner has not filed this Petition more than one year after the date on which the Petitioner, Petitioner's real party-in-interest or privies were served with a complaint alleging infringement of Fonss, see § 42.101(b); and (4) Petitioner, Petitioner's real parties-in-interest or privies are not estopped from challenging the claims on the grounds identified in this Petition, see § 42.101(c).

VI. MANDATORY NOTICES

Pursuant to 37 C.F.R. § 42.8(b)(1), the DeFi Education Fund is the real parties-in-interest for this Petition. Without conceding that the following parties are in fact real-parties-in-interest, Petitioner also identifies the DAI Foundation, Andreessen Horowitz (a16z), and Paradigm. Each of these parties has agreed to be named as a potential real-party-in-interest. *See Proppant Express Investments, LLC v. Oren Techs., LLC*, IPR2017-01917, Paper 86 at 14-16 (PTAB Feb. 13, 2019) (precedential).

Pursuant to 37 C.F.R. § 42.8(b)(2), Petitioner identifies the following proceedings:

- True Return Systems, LLC v. MakerDAO, Case No. 1:22-cv-08478-VSB (SDNY), filed October 5, 2022; and
- True Return Systems, LLC v. Compound Protocol, Case No. 1:22-cv-08483-JGLC (SDNY), filed October 5, 2022.

Pursuant to 37 C.F.R. § 42.8(b)(3), Petitioner designates counsel as follows:

	Lead Counsel	**Back-Up Counsel**
	Mark J. DeBoy (Reg. # 66983)	Patrick Finnan (Reg. # 39189)
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Telephone:	301-424-3640	301-424-3640
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Pursuant to 37 C.F.R. § 42.8(b)(4), papers concerning this matter should be served on either Mark DeBoy or Patrick Finnan as identified above. Petitioner consents to electronic service via the email addresses set forth above.

VII. IDENTIFICATION OF CHALLENGES

a) Claims, Statutory Grounds and Prior Art

Petitioner is requesting IPR and cancellation of claims 1-20 of Fonss (the "challenged claims") under the following grounds:

Ground No.	Claim Nos.	Proposed Statutory Rejections
1	1-20	Obviousness under 35 U.S.C. § 103 over Zinder.
2	1-20	Obviousness under 35 U.S.C. § 103 over Zinder Toll and Zhang

b) Claim Construction

Claims in IPR are construed using the same claim construction standard as in a civil action. 37 C.F.R. § 42.100(b). The claims are construed in accordance with their ordinary and customary meaning as understood by a person of ordinary skill in the art ("POSITA"). *Id*. The POSITA is deemed to read the claim term in the context of the entire patent, including the specification and prosecution history. *Phillips v. AWH Corp.*, 415 F.3d 1303, 1313-1316 (Fed. Cir. 2005) (*en banc*). Claims must be construed so as to be consistent with the specification. *Id*.

i. "electronic parallel storage of a differences layer"

An "electronic parallel storage of a differences layer," found in independent claims 1, 7 and 19, would be understood by a POSITA to mean "a storage system that stores supplementary data, linked to a transaction record stored on a distributed computer ledger (DCL), whose value expresses time-variable data related to or descriptive characteristics of the transaction record." EX1003, ¶59.

Fonss explains that:

> The differences residing on a PDSL are applied to the units (or interests) of a DCL upon a system occurrence of an action or process including a value polling, a distribution, a resolution or settlement, or other processes requiring the **supplementary data** in the PSDL.

EX1001, 9:46-50 (emphasis added); EX1003, ¶60.

Additional passages describing the nature of the data stored in a PSDL include 6:6-11, 9:25-39, and 15:58-65, among others. EX1003, ¶¶59-60.

These passages of Fonss explain that the "electronic parallel storage of a differences layer" stores "supplementary data" that is linked to a basic transaction record on a DCL. EX1003, ¶60. “Differences" is used in "electronic parallel storage of a differences layer" to encompass two distinct types of supplementary data that can be stored in the layer: 1) a time-sequenced "difference" or "differential" whose value can change over time to reflect time-varying fluctuations in time-sequenced data from an electronically published data stream; and 2) a "descriptive differential" or "descriptive difference" whose value is one of a set of possible values, with each value in the set representing a different descriptive characteristic of the transaction record. Examples of such time-sequenced data-stream-based differences or differentials include time-varying markets prices, equity market indexes, currency exchange rates, trade flows, and economic variables. *See*, e.g., EX1001, 14:50-53, 14:63-67, 17:5-7; EX1003, ¶61. Examples of descriptive differences or differentials include types or grades of commodities in a transaction, timeframes or other discriminatory identifiers, "attributable" and "discriminatory properties" of transactions such as a bespoke financial instrument, and transaction settlement particulars such as volumes, dates, and payment and delivery details. *See*, e.g., EX1001, 5:35-38, 9:41-45, 11:5-7, 12:4-33. EX1003, ¶61.

ii. "distributed computer ledger" (DCL)

A "distributed computer ledger" or DCL, is a novel term coined by PO for a well-known mechanism for recording transactions. A POSITA would understand it to mean a "database of transaction records maintained by consensus of a network of independently connected computers." EX1003, ¶¶62-64.

The Background of Fonss explains that:

> Generally, **<u>computerized ledgers are databases operated on one or more servers by a specialized computer, or operated on a specialized network and controlled by separate computers</u>**.
>
> …
>
> A distributed computerized ledger (DCL) system is where **<u>all nodes are independently connected to each other</u>**, and the management and modifications to the computerized ledger in a distributed environment are generally performed by separate computers and **<u>each computer usually stores its own official copy of the computerized ledger which is proofed for accuracy by a consensus system</u>** running on the decentralized network.

EX1001, 1:29-48 (emphasis added); *see also* EX1003, ¶62-64.

While the specification introduces "DCL" as the acronym for "distributed computerized ledger," the claims use "DCL" to stand for "distributed computer ledger," i.e., the words "computerized" and "computer" are used interchangeably in this context. EX1003, ¶62-64. Dependent claims 2-6 forego "DCL" or "distributed computerized ledger" for "distributed electronic ledger" without antecedent basis. *Id.* Regardless, Fonss describes "DCLs" and "distributed electronic ledgers" as well-known mechanisms for securely maintaining transaction records, including prior art blockchain implementations that use "homogeneous" blocks to record cryptocurrency transactions. *See*, e.g., EX1001, 2:24-45, 2:66-67, 7:67-8:6, 14:8-15; *see also* EX1003, ¶62-64.

iii. "difference(s)" and "differential(s)"

The words "difference(s)" and "differential(s)" are used in several claim terms, including: "descriptive differential," "measurement differences," "descriptive differences," and "measured differential." These claim terms all describe the supplementary data stored in the PSDL. Whether in the context of creation, storage, accessing, or processing, the specification of Fonss uses the words "difference(s)" and "differential(s)" interchangeably. EX1003, ¶65. The passage in Fonss that first introduces these words in connection with the figures is representative:

> [T]he parallel **storage of differences** is indicated by parallel storage of difference layer (PSDL) 12 and PSDL 13. An implementation of the system includes at least one PSDL. Each PSDL will **store** at least one system written and system accessible **time sequenced differential or descriptor**, where differentials are created by the system from exogenous and electronically published data streams, and where at least one differences processing engine running on the system computes and **stores time sequenced differences** from values in the published data stream. **Differentials recorded** on a PSDL may also include **descriptive differentials** which can indicate difference types, grades, timeframes or other **discriminatory identifiers**; **descriptive differentials** may be utilized with or without **data stream differentials**. In certain implementations, a **descriptive**

> **differential** is an indirect reference to electronically published data streams

EX1001, 9:25-41 (emphasis added); *see also* EX1003, ¶65.

The specification is replete with other examples in which "difference(s)" and "differential(s)" are used interchangeably in the same context. A sampling of passages describing storage of "difference(s)" includes: "differences, measurements, or descriptors are stored in parallel," "differences storage array," "parallel storage of differences," "differences residing on a PSDL," "differences (on the PSDL)," "PDSL stored differences," "stored (and operative) differences," and "stored difference." *See*, EX1001, 6:23-24, 6:63, 6:65-66, 9:25-26, 9:46, 10:14, 10:31, 10:45-46, 15:10; EX1003, ¶66. A comparable sampling of passages describing storage of "differential(s)" includes: "stored and processed differentials," "stored differentials," "storage array of values and differentials," "storage array of differentials," "differential array storage," "differentials storage," "separated parallel storage of differentials," "differentials recorded on a PSDL," "differentials stored," and "storage of differentials." *See*, EX1001, 5:27, 6:50-53, 6:58, 6:61, 7:2, 7:19, 8:58-59, 8:65, 9:35, 10:67, 15:7, 15:40-41, 15:59, 15:62-63, 16:46-47, 16:50-51; EX1003, ¶66. Further, the specification repeatedly refers to "time sequenced" "difference(s)" and "differential(s)" without distinction and, similarly, "value(s)" of "difference(s)" and "differentials(s)" are described interchangeably. *See*, EX1001, 9:29-30, 9:34, 12:44, 12:45-46, 12:47-48, 12:51, 12:52-53, 12:57, 12:58-59, 14:19-20, 14:31; *see also* EX1003, ¶66. Likewise, the terms "descriptive difference(s)" and "descriptive differential(s)" are used synonymously throughout the specification. *See*, EX1001, 12:9, 12:13, 12:17, 12:22, 12:29, 14:35, 14:53-54, 14:49, 14:63-64; EX1003, ¶66. As described in sections VII.b.v and VII.b.vi, the tendency of Fonss to use the words "difference(s)" and "differential(s)" interchangeably carries over to the use of these terms in the claims. EX1003, ¶66.

iv. "time-sequenced electronically published data stream"

The term "time-sequenced electronically published data stream" would be understood by the POSITA to mean "a stream of data, from an available electronic source, indicating a changeable value at points in time." EX1003, ¶68.

Fonss explains the meaning of the term through specific examples:

> Examples of the time sequenced exogenous and electronically published data include: (i) the **<u>prices of computer memory storage devices</u>**, (ii) **<u>prices of crude oil of differing grades</u>**, at different delivery points, denominated in different currencies, (iii) voter counts in statewide election by demographic, party affiliation, and geographic location.

EX1001, 9:55-61 (emphasis added).

> The value of differences is generated by the system from one of more internet data streams, and where practical, the values of differences are generated, stored, and linked with a frequency which

> matches or exceeds the frequency used for appending transactions records to the base DCL 11 **during periods in which the values of difference published in an internet data streams are changing**. In each case, the value differences illustrated for TYPE W, TYPE B, TYPE D, EUR, USD, and SGD are **differences in percentage changes from the immediately preceding period; in alternate implementations, absolute values or other measured changes may be generated, stored and applied**.

EX1001, 12:45-57 (emphasis added); *see also* EX1001, 17:1-14 (emphasis added); *see also* EX1003, ¶68.

These passages explain that a "time-sequenced electronically published data stream" provides a sequence of data values from an available electronic (e.g., internet) source, where changes in the value of the data over time represent fluctuations in time-variable information. *See*, e.g., EX1001, 14:52, 14:64, 17:5; EX1003, ¶69.

v. "measurement differences" and "measured differential"

The terms "measurement differences" and "measured differential" would be understood by the POSITA to mean "supplementary data stored on the PSDL that relates to the time-sequenced electronically published data stream." EX1003, ¶70.

As explained in section VII.b.i, in general, "difference(s)" and "differentials(s)"can be either time-sequenced values that change over time to reflect fluctuations in time-sequenced data from an electronically published data stream or a "descriptive differential" or "descriptive difference" whose value is one of a set of possible values, with each value in the set representing a different descriptive characteristic of the transaction record on the DCL. EX1003, ¶71.

The terms "measurement differences" and "measured differential" do not appear *verbatim* in Fonss' specification. The context within which these terms are used in the claims, however, juxtaposed with the "descriptive" supplementary data, and the instances where the words "measurement" and "measured" appear in the specification indicate that these claim terms relate to time-sequenced "difference(s)" or "differential(s)" from a published data stream rather than descriptive supplementary data. See, e.g., EX1001, 6:22-25, 12:53-57, 13:56-61; *see also* EX1003, ¶72.

vi. "descriptive differential," "descriptive differences," and "descriptive identifier"

The terms "descriptive differential," "descriptive differences," and "descriptive identifier," found in independent claims 1, 7, and 19, would be understood by the POSITA to mean "supplementary data stored on the PSDL that relates to a descriptive characteristic of the transaction record."

As explained in section VII.b.iii, the words "difference(s)" and "differentials(s)" are used substantially interchangeably throughout the specification to refer to the supplementary data that can be stored on the PSDL. EX1003, ¶74. The terms "descriptive differential," "descriptive differences," and "descriptive identifier" all refer to the descriptive type of supplementary data whose value is one of a set of possible values, with each different value in the set representing a different descriptive characteristic of the transaction record on the DCL. *Id.*

The claim term "descriptive identifier" is not present in the specification of Fonss. The following passages from Fonss mentioning "identifier(s)," however, further indicate that a "descriptive identifier" refers to descriptive supplementary data stored on the PSDL.

> [D]escriptive differentials … can indicate difference types, grades, timeframes or **<u>other discriminatory identifiers</u>**; descriptive differentials may be utilized with or without data stream differentials.

EX1001, 9:35-39 (emphasis added).

> Table 111 indicates an example of a particular record where the fields are indicated as "**<u>identifier</u>**", "timestamp(0)", timestamp(t)" "val(0)", "val(t)", "dif(t)", and "cond". **<u>Identifier</u>** is an example of **<u>an encoding</u>** which is used to identify the subject of the stored differentials or descriptors.

EX1001, 15:2-7 (emphasis added); *see also* EX1003, ¶¶73-75. .

vii. "differences processing engine running on a specialized computer system"

The phrase "differences processing engine running on a specialized computer system" would be understood by the POSITA to mean "a computer processor that performs operations to enable a PSDL to store supplementary data." EX1003, ¶76.

The term "differences processing engine" appears only once in the specification; however, based on that passage and the description of the "differential processor" in Fig. 18, the claim term "differences processing engine running on a specialized computer system" simply refers to a computer processor tasked with carrying out specific operations that enable a PSDL to function. *See* EX1001, 9:28-35, 17:15-21. As explained in section VII.b.i, a PSDL functions to store at least one of two types of supplementary data related to a transaction record on the DCL: a time-sequenced "difference" or "differential" and a descriptive "difference" or "differential." EX1003, ¶¶76-77.

viii. "group" claim language

A Markush group is standard claim language specifying that a claimed element is one of a group of possible items and uses the phrase "from a/the group consisting of" to demark the Markush group. *Abbott Lab'ys v. Baxter Pharm. Prod., Inc.,* 334 F.3d 1274, 1280 (Fed. Cir. 2003).

Independent claim 19 and dependent claim 5 use substantially standard Markush group claim language (i.e., "from a group consisting of") to define Markush groups. Claim 19 recites:

> [T]he at least one electronic parallel storage of the differences layer accesses and stores values **<u>from a group consisting of</u>** at least one time sequenced electronically published data stream and a list of descriptive differentials, and

> wherein at least one differences processing engine running on a specialized computer system creates and stores parameters **from a group consisting of** measurement differences and descriptive differences

EX1001, 20:22-30 (emphasis added).

Consistent with the conventional meaning of Markush group language, these passages mean that the PSDL accesses and stores values either from "at least one time sequenced electronically published data stream" or from "a list of descriptive differentials" and the differences processing engine creates and stores parameters either from measurement differences or descriptive differences. The use of the term "consisting of" in Markush language defines a closed group, meaning that the claim element must be one of the listed items in the group.

Like claim 19, independent claims 1 and 7 also recite analogous "group" language in relation to the "value" and the "parameters." However, claims 1 and 7 recite groups "comprising of" or groups "comprised of." EX1001, 18:13-19, 19:24-27. The POSITA would nevertheless understand that these open group formulations would be met by only one item in their respective listed groups, as is clear from the usage of these terms throughout the Specification. *See, e.g.,* EX1001, 9:28-39, 17:15-19, 6:11-13, 10:14-16, 6:22-24; EX1003, ¶¶78-81.

VIII. PERSON OF ORDINARY SKILL IN THE ART

The person of ordinary skill in the art would have a computer science undergraduate degree and 2-4 years of experience with distributed system design or blockchain protocol design. *See, e.g.,* EX1003, ¶37.

IX. HOW THE CLAIMS ARE UNPATENTABLE

As explained in section IV.a, example embodiments of Fonss' techniques purport to provide new functionality on blockchains through supplementary data residing on the parallel storage of differences layer. EX1001, 9:45-46; 11:5-7 ("The differences residing on a PDSL are applied to the units (or interests) of a DCL … where differentials relate to any number of objects or transactions including … **a bespoke financial instrument**.") (emphasis added); EX1003, ¶¶82-83. This is the same functionality provided by the repository computer system 600 of Zinder. EX1004, ¶[0037] ("Certain example embodiments provide a digital asset repository computer system for buyers and sellers to connect and trade **privately issued assets**.") (emphasis added); EX1003, ¶¶82-83. It is, therefore, no surprise that Zinder teaches or renders obvious all of the recitations of claim 1 of Fonss. To facilitate the organization of the grounds of rejection set forth below, Petitioner has labeled the recitations of the claims as set forth in the Claims Listing Appendix. Petitioner refers to those recitation labels in the following explanations for how the Fonss claims are unpatentable. EX1003, ¶¶82-83.

a) Ground 1

i. Claim 1

1. Recitation 1a.

<u>*The distributed computer ledger containing the time-sequenced value or time-sequenced string*</u>

As explained in section VII.b.ii*,* a DCL refers to a "database of transaction records maintained by consensus of a network of independently connected computers." Per Fonss, DCLs include "blockchain implementations of cryptocurrencies (including Bitcoin, Ethereum and the like)." EX1001, 2:35-40; *see also* 3:21-35; 14:9-15; EX1003, ¶85.

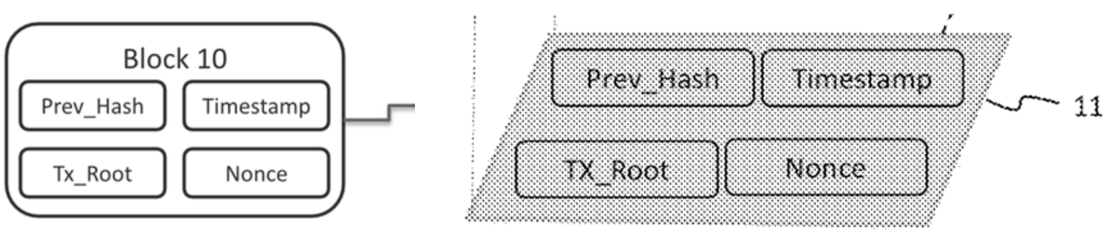
First, DCLs are PO admitted prior art (*see, e.g.,* EX1001, 1:29-3:47), and one of the intended goals of Fonss is to supplement a conventional DCL with parallel storage (*see, e.g.,* EX1001, 3:62-4:3); *s* EX1003, ¶85. Zinder also provides this feature of claim 1 through its implementation of a blockchain, of which a Bitcoin blockchain is an example:

> In certain example embodiments, and as shown in FIG. 2A, creating a new asset may also involve an initial blockchain transaction "to" the unique identifier for the asset in the form of an amount of cryptographic currency. For example, a blockchain transaction that moves an amount of <u>**bitcoin (or other cryptographic currency)**</u> from the digital wallet associated with the digital asset repository computer system 600 (e.g., a unique identifier for that digital wallet).

EX1004, ¶¶ [0061]-[0062]; EX1003, ¶¶85-86.

Accordingly, Zinder uses blockchains, and the Bitcoin blockchain in particular, which are DCLs according to Fonss. EX1003, ¶¶85-86.

Furthermore, it would have been obvious from the teachings of Zinder that the blockchain 618 contains "an electronic transaction record by a time-sequenced value or a time-sequenced string." EX1003, ¶¶86-91. As explained by Petitioner's expert, as well as in Nakamoto, "Bitcoin: A Peer-to-Peer Electronic Cash System" (2008) (EX1011) (incorporated by reference in the EX1004, ¶[0034], among other prior art references [1]), the Bitcoin blockchain is a time-sequenced chain of transactions. EX1003, ¶¶86-91. "The [Bitcoin] network timestamps transactions by hashing them into an ongoing chain of hash-based proof-of-work." EX1011, Abstract; EX1003, ¶¶86-91. The time-sequenced structure of the DCL illustrated in FIG. 4 of Fonss is nothing more than the structure of a Bitcoin blockchain transaction, as illustrated below:



[1] *See, e.g.,* EX1012,¶[0018] (published 10/13/2016); EX1013, ¶[0061] (filed 12/14/2017); EX1014, ¶[0077] (published 10/01/2015); EX1015, ¶[0209] (filed 02/01/2018)

EX1003, ¶¶86-91. Accordingly, the use of the Bitcoin blockchain in Zinder renders obvious "a DCL contain[ing] an electronic transaction record by a time-sequenced value or a time-sequenced string." EX1003, ¶¶86-91. Specifically, it would have been obvious, at the time of invention, to use such a DCL in the Zinder techniques because Zinder explicitly teaches the use of the Bitcoin blockchain, which is such a DCL. Furthermore, using such a DCL is "the predictable use of prior art elements according to their established functions" and is therefore a known and obvious use of the Bitcoin blockchain. *KSR Int'l Co. v. Teleflex Inc.*, 550 U.S. 398, 401, 127 S. Ct. 1727, 1731, 167 L. Ed. 2d 705 (2007); EX1003, ¶¶86-91.

The parallel storage of differences layers linked to a distributed computer ledger

As discussed above, a parallel storage of a differences layer refers to "a storage system that stores supplementary data, linked to a transaction record stored on a distributed computer ledger (DCL), whose value expresses time-variable data related to or descriptive characteristics of the transaction record." EX1003, ¶¶92-97. Such parallel storage is provided by one or both of asset storage 604 and ledger storage 606 of the repository computer system 600 of Zinder. *Id*. Asset storage 604 includes information regarding the assets tracked by the blockchain 618, including a specific asset type. EX1004, ¶[0057]; EX1003, ¶¶92-97. Asset storage 604 includes information regarding assets that is not stored on the blockchain and that is linked to the blockchain via a unique identifier:

> An asset or resource record [of asset storage 604] may include the participant identifier (e.g., for a corresponding company) that the asset is associated with, **a unique identifier that is used to uniquely identify the asset on the blockchain (e.g., which may be, for example, a 160 bit hash value of a public key associated with the asset)**, a public key that may be used to generate the unique identifier, a private key that may be used to generate the public key (e.g., via elliptical curve cryptography or the like), attributes that define the type of asset (**e.g., asset type, class of shares, specific issuance**), a number of shares that have been issued for this asset type, when the asset was created, etc. . . .

EX1004, ¶[0057] (emphasis added); EX1003, ¶¶92-97.

As noted above, asset storage 604 includes the same kinds of data as embodiments of the claims of Fonss, such as the type of asset associated with a blockchain transaction. *Compare* EX1001, 5:42-46 ("examples of the parameters include: **type**") *with* EX1004, ¶[0057] ("attributes that define **the type of asset**"); EX1003, ¶¶92-97. Accordingly, asset storage 604 is an "electronic parallel storage of a differences layer linked to a distributed computer ledger (DCL)." EX1003, ¶¶92-97.

Ledger storage 606 is also a PSDL linked to a DCL. EX1003, ¶¶92-97. Ledger storage 606 includes information regarding the asset transactions recorded on blockchain 618 not stored on the blockchain, but linked thereto:

> Ledger storage 606, in conjunction with blockchain services 616, interfaces with the blockchain 618 to store records of validated (or to-be-validated) blockchain transactions. A record in ledger storage 606 may include source and destination identifiers that are mapped back to respective participants (e.g., stored in participant storage 602), a blockchain transaction ID, the unique identifier for the asset, an asset transaction quantity, a transaction date (e.g., when the transaction was submitted to the blockchain), a validation date (e.g., when this transaction was ultimately validated by the blockchain), a price per share, and/or a price of the asset transaction, etc. . . .
>
> **Other data that corresponds to the transaction may be added to ledger storage 606 and linked to the created blockchain transaction**.

EX1004, ¶¶[0058], [0087]; EX1003, ¶¶92-97.

The data stored in ledger storage 606 includes the same kinds of data as embodiments of the claims of Fonss, such as timeframes, prices, and values. EX1003, ¶¶92-97. For example, Fonss describes the differentials stored in the PSDLs as including "difference types, grades, **timeframes** or other discriminatory identifiers," as well as imparting "a delivery obligation or **value** which aligns with one or more electronically published data streams." EX1001, 9:35-45 (emphasis added); EX1003, ¶¶92-97.

Zinder stores this same type of data in ledger storage 606:

> Other data that corresponds to the transaction may be added to ledger storage 606 and linked to the created blockchain transaction. Such information may include … whether the transaction has been validated on the blockchain, what block in the chain the validation is associated with, **a rule 144 date of the asset transaction**, the price per share of the asset transaction, **the investment value of the asset transaction**, conditions associated with the asset transaction, etc. . .

EX1004, ¶[0087] (emphasis added); EX1003, ¶¶92-97.

Accordingly, ledger storage 606 may store a rule 144 date, which indicates a timeframe after which the holder of a security may sell the security without restriction or limitation pursuant to SEC rule 144. *See* 17 C.F.R. § 230.144. Such a value would be a descriptive differential "timeframe" according to Fonss. As also indicated in the above-quoted language, ledger storage 606 may store an "investment value of the asset transaction," which would be a "value" descriptive differential according to Fonss. EX1003, ¶¶92-97.

Accordingly, Zinder would have rendered recitation 1a obvious at the time of invention. *Id.*

2. Recitation 1b

Accessing and storing a value through the at least one electronic PSDL

Recitation 1b adds little to that of 1a, simply stating that the PSDL stores data for its intended purpose. As shown above, the asset storage 604 and the ledger storage 606 of Zinder both store values of the same type of data as the PSDLs of

Fonss. *See, e.g.,* EX1004, ¶¶[0057], [0087]. Accordingly, asset storage 604 and ledger storage 606 each "access[] and stor[e] a value through the at least one electronic parallel storage of the differences layer." EX1003, ¶99.

The value from a group comprising of at least one time-sequenced electronically published data stream and at least one descriptive differential

For purposes of this ground, Petitioner addresses the alternative claim language of "the value from a group comprising … at least one descriptive differential." "Descriptive differential" values are clearly stored in asset ledger 604 and transaction ledger 606. As explained in section VII.b.vi, a descriptive differential refers to a "supplementary data stored on the PSDL that relates to a descriptive characteristic of the transaction record." EX1003, ¶¶100-103. As explained in Fonss, "descriptive differentials … can indicate difference **types**, grades, **timeframes** or other discriminatory identifiers." EX1001, 9:35-45 (emphasis added); EX1003, ¶¶100-103. Asset storage 604 stores asset records that include "attributes that define the **type** of asset" associated with a blockchain record. EX1004, ¶[0057] (emphasis added); EX1003, ¶¶100-103. Therefore, asset storage 604 stores a "value from a group comprising … at least one descriptive differential." EX1003, ¶¶100-103.

Ledger storage 606 stores records that include "**a transaction date** (e.g., when the transaction was submitted to the blockchain), [and] **a validation date** (e.g., when this transaction was ultimately validated by the blockchain)." EX1004, ¶[0058] (emphasis added); EX1003, ¶¶100-103. Accordingly, transaction ledger 606 stores values that indicate "timeframes," and therefore, these values are descriptive differentials as claimed in Fonss. *Id.* Also, as discussed above, ledger storage 606 stores a rule 144 date, which is a timeframe descriptive differential. *Id.*

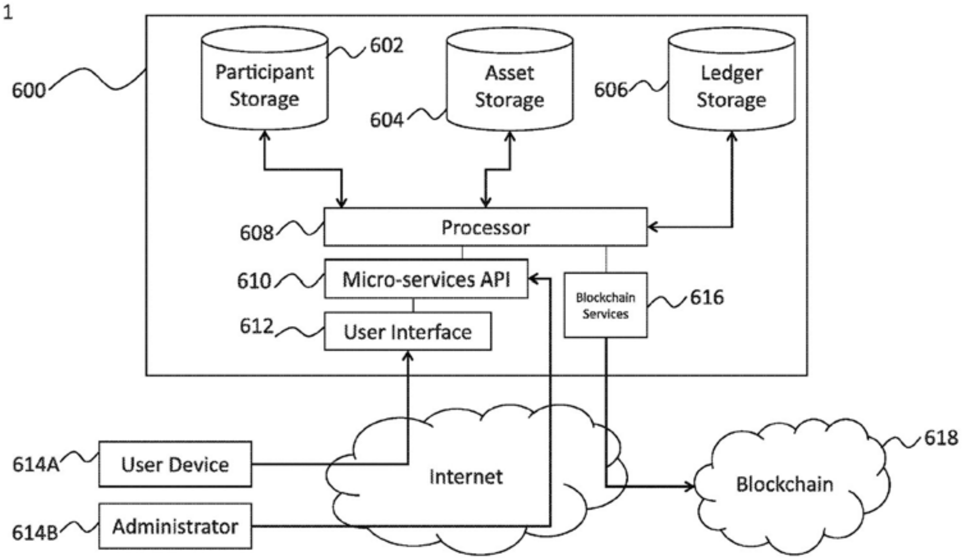
Accordingly, the values stored in asset storage 604 and ledger storage 606 are values "from a group comprising … at least one descriptive differential." *Id.*

For completeness, Petitioner notes that "the value from a group comprising of at least one time-sequenced electronically published data stream" alternative would also have been obvious at the time of invention from the teachings of the Zinder. It was well understood at the time of invention that financial asset price data could be received via "time-sequenced electronically published data streams." *See, e.g.,* EX1006; EX1003, ¶103.

<u>At least one differences processing engine running on a specialized computer system creates and stores parameters from a group comprised of a measurement differences and a descriptive differences</u>

As explained in section VII.b.vii, a "differences processing engine running on a specialized computer system" refers to "a computer processor that performs operations to enable a PSDL to store supplementary data." EX1003, ¶¶104-106. Zinder provides such a specialized computer system through digital asset repository computer system 600, illustrated below in FIG. 1 from Zinder. EX1003, ¶¶104-106.

Fig. 1



As explained in Zinder:

> The digital asset repository computer system 600 may include a combination of software and hardware interfaces, programmed business logic, processing resources, and electronically addressable storage. The digital asset repository computer system 600 is responsible for tracking and executing computer programs for the purpose of maintaining an accurate digital ledger of asset ownership.

EX1004, ¶[0038]; EX1003, ¶¶104-106.

As noted in the above quoted language, "digital asset repository computer system 600 is responsible for tracking and executing computer programs for the purpose of maintaining an accurate digital ledger of asset ownership," which is accomplished through the records contained in asset storage 604 and ledger storage 606 based on operations performed by processor 608. EX1004, ¶¶[0038], [0041], [0045], [0052], [0057]-[0064], [0078]-[0080], [0083], [0088]; EX1003, ¶¶104-106.

As explained above, the records are **<u>created and stored</u>** in asset storage 604 and ledger storage 606 and are the descriptive differentials of claim 1. *Id;* EX1003, ¶¶104-106. Accordingly, Zinder teaches recitation 1b. EX1003, ¶¶104-106.

3. Recitation 1c

<u>Storing the DCL containing an electronic transactions record on at least one of a distributed network of connected independent computers or a decentralized network of computers wherein the electronic transaction record is time sequenced</u>

First, as noted above, a DCL as recited here is PO admitted prior art. *See e.g.,* EX1001, 1:29-3:47, *see also* Section IX.a.i.1; EX1003, ¶¶107-109. In fact, the entire point of Fonss is to take conventional DCLs and store supplemental information in parallel therewith. *See, e.g.,* Ex1001, 4:1-2; EX1003, ¶¶107-109. Put differently, recitation 1c is nothing more than a restatement of the conventional DCL. *See, e.g.,* EX1001, 1:29-47; EX1003, ¶¶107-109. Accordingly, Fonss concedes that this recitation of claim 1 is known in the prior art. EX1003, ¶¶107-109.

Regardless, Zinder teaches this step of claim 1. As illustrated in FIG. 1, from Zinder (reproduced above), the techniques of Zinder implement a DCL through blockchain 618. EX1003, ¶¶107-109. Zinder explains that blockchain 618 contains an electronic transactions record on at least one of a distributed network of connected independent computers or a decentralized network of computers:

> Once one node receives a transaction it may propagate the transaction to other nodes within **<u>the distributed computer system that provides the blockchain 618</u>**. **<u>In certain examples, different</u>**

> **<u>entities may control different ones of the computer nodes that are responsible for maintaining the blockchain.</u>**

EX1004, ¶¶[0042], [0043] (emphasis added); EX1003, ¶¶107-109.

As indicated from the above-quoted text, blockchain 618 includes electronic transactions and is implemented on a "distributed computer system" in which "different entities may control different ones of the computer nodes." *Id*. Furthermore, as explained above, Zinder teaches the use of the Bitcoin blockchain in which transactions are time sequenced. *See* IXa.i.1. Accordingly, Zinder teaches this limitation of claim 1. EX1003, ¶¶107-109.

<u>A writing or an appending of the electronic transaction records is performed on the distributed network of connected independent computers or the decentralized network of computers</u>

First, Petitioner notes that this recitation is nothing more than a description of how conventional DCLs operate, and is PO admitted prior art. EX1001, 1:29-47; EX1003, ¶¶110-112. Regardless, the blockchain 618 of Zinder is also configured such that "writing or an appending of the electronic transaction records is performed on the distributed network of connected independent computers or the decentralized network of computers." EX1003, ¶¶110-112. As explained in Zinder:

> The blockchain 618 is maintained, stored, and updated, by multiple different computer nodes that each operate to "mine" and thereby validate transactions submitted to the blockchain 618. … Once one node receives a transaction it may propagate the transaction to other

> nodes within the distributed computer system that provides the blockchain 618.

EX1004, ¶¶[0042], [0043].

In other words, when a new transaction is submitted to blockchain 618, the transaction is validated and stored as a new transaction on the blockchain. EX1003, ¶¶110-112. The new transaction may also be propagated from the receiving node to other nodes within the distributed computer system. *Id.* Accordingly, Zinder teaches this limitation of claim 1. *Id.*

4. Recitation 1d

<u>*Storing the at least one electronic parallel storage of the differences layer on at least one of a centralized storage device controlled by the specialized computer system or a decentralized storage device controlled by the specialized computer system*</u>

As explained above with reference to recitation 1c, asset storage 604 and ledger storage 606 are under the control of the specialized computer system comprising processor 608, micro-services API 610, and blockchain services 616 of computer system 600. EX1003, ¶¶113-116. As illustrated in FIG. 1 of Zinder, asset storage 604 and ledger storage 606 are stored on storage devices of computer system 600. EX1004, ¶¶[0042], [0043] ("the storage repositories of the digital asset repository computer system 600 are located in-memory and/or on separate logical **<u>or physical devices</u>**.")(emphasis added); EX1003, ¶¶113-116. Accordingly, the storage of the supplemental data in asset storage 604 and ledger storage 606 is controlled by specialized computer system 600. Furthermore, Zinder describes digital asset repository 600 being under the control of a particular entity. *See, e.g.,* EX1004, ¶¶[0043], [0068]; EX1003, ¶¶113-116. Accordingly, Zinder teaches this limitation of claim 1. EX1003, ¶¶113-116.

Increasing functionality and utility of the DCL, reducing data storage requirements, eliminating transmission of redundant data, and improving data security

Claim recitation 1d includes a list of benefits, mainly "increasing functionality and utility of the DCL, reducing data storage requirements, eliminating transmission of redundant data, and improving data security." EX1003, ¶¶117-123. All of these benefits would be inherent in Zinder's techniques as Zinder implements or renders obvious the same functionality disclosed in Fonss. *See* sections IV.a-b, IX.a.i.1-3; EX1003, ¶¶117-123. Nevertheless, Zinder explicitly describes each of these benefits. EX1003, ¶¶117-123.

Zinder describes increased functionality through the ability to trade privately issued assets and through the ability to update data not directly stored on the blockchain:

> Certain example embodiments **provide a digital asset repository computer system for buyers and sellers to connect and trade privately issued assets**.

EX1004, ¶[0009] (emphasis added).

> [T]he metadata that is stored in the ledger storage may be updated independently of the blockchain transaction that is associated

> with it. For example, the SEC rule 144 date may be a data field that only exists in ledger storage. **Thus, the rule 144 date may be updated without reference to the corresponding blockchain transaction**. Other fields in ledger or asset storage may be similarly updated.

EX1004, ¶[0116] (emphasis added).

Zinder describes reducing data storage requirements and eliminating the transmission of redundant data by having some information stored off of the blockchain:

> A new blockchain transaction is generated and published to the blockchain. In correspondence with publishing to the blockchain, the transaction storage is updated with information that makes up the blockchain transaction and **some information that was not included as part of the blockchain transaction**.

EX1004, Abstract (emphasis added); see also ¶[0116].

Specifically, because there is information included in asset storage 604 and ledger storage 606, and not in blockchain 618, Zinder's techniques eliminate the need to transmit and store this information in the blockchain, reducing data storage requirements and eliminating the transmission of redundant data to each node storing a copy of the blockchain. EX1003, ¶¶117-123.

Zinder describes increased security by storing confidential information off of the blockchain:

> **Other information (e.g., that may be confidential in nature) is stored outside of the blockchain thus securing information that is related to the blockchain transaction** that is on the blockchain.

EX1004, ¶[0009] (emphasis added), *see also* ¶¶ [0013], [0033], [0147]. .

Accordingly, Zinder teaches these limitations of claim 1. EX1003, ¶¶117-123.

5. Recitation 1e

Zinder explicitly describes "linking the electronic transaction record in the DCL to records of the at least one electronic parallel storage of the differences layer utilizing at least one time sequenced value, string, code, or key":

> A record in ledger storage 606 may include source and destination identifiers that are mapped back to respective participants (e.g., stored in participant storage 602), **a blockchain transaction ID**,
>
> …
>
> The information stored in ledger storage may include **the blockchain transaction ID,** a reference to the source and destination digital wallets (or the unique identifiers), an asset identifier, and an amount of the asset that is subject to the transaction. **Other data that corresponds to the transaction may be added to ledger storage 606 and linked to the created blockchain transaction**.
>
> …
>
> a transaction repository that includes **a plurality of blockchain transaction identifiers that correspond to blockchain transactions** submitted to the distributed blockchain computing system;

EX1004, ¶¶[0058], [0087], claim 1 (emphasis added); EX1003, ¶¶124-126.

Such a transaction identifier is precisely the type of "string, code or key" disclosed in Fonss:

> [A]ll other data, functionality, and processing is stored in a system of decentralized or centralized storage and processing, linked to the distributed ledger through a combination including timestamps, cryptographic strings, cryptographic nonces, or **identifying keys**.

EX1001, 5:11-21 (emphasis added); EX1003, ¶¶124-126.

Accordingly, Zinder teaches these limitations of claim 1. EX1003, ¶¶124-126.

6. Recitation 1f

The plain and ordinary meaning of "impute" is to "attribute or ascribe." EX1003, ¶¶124127-132. Accordingly, "imputing at least one measured differential with a descriptive identifier or at least one descriptive identifier to the electronic transaction record of the DCL through data storage and processing on the at least one electronic parallel storage of the differences layer" refers to attributing or ascribing a descriptive identifier to the DCL transaction record using the values stored in the PSDLs. EX1003, ¶¶124127-132.

A "descriptive identifier," a term used only in the claims of Fonss, refers to a descriptive supplementary data stored on the PSDL. EX1003, ¶¶124127-132. A descriptive identifier may indicate a particular descriptive differential (*see, e.g.,* EX1001, 12:29-32) or be identical to the descriptive differential (*see, e.g.,* EX1001, 6:23-25 ("the **differences, measurements, or descriptors** are stored in parallel, modular and linked arrangements and not within the transaction records."); 10:66-67 ("stored **differentials or descriptors**"); 15:5:7 ("stored **differentials or descriptors**.")); EX1003, ¶¶124127-132. Accordingly, recitation 1f simply refers to the ascribing or attributing of a descriptive differential stored on the PSDL to a transaction record stored on the DCL. EX1003, ¶¶124127-132.

Finally, the sole use of "impute" in Fonss indicates that "imputing" may be performed through linked storage systems:

> [I]tems can generally be dynamically **imputed to the DCL interests through linked and modular storage systems**.

EX1001, 8:43-57 (emphasis added); EX1003, ¶¶124127-132.

Accordingly, Zinder teaches the imputation of descriptive identifiers to electronic transaction records of a DCL through the linkage of asset storage 604 and/or ledger storage 606 to blockchain 618. EX1004, ¶[0057] ("An asset or resource record may include the participant identifier (e.g., for a corresponding company) that the asset is associated with, **a unique identifier that is used to uniquely identify the asset on the blockchain**") (emphasis added); EX1004, ¶[0087] ("Other data that corresponds to the transaction may be added to ledger storage 606 and **linked to the created blockchain transaction**.") (emphasis added); EX1003, ¶¶124127-132.

Zinder also describes "imputing" of descriptive differentials to electronic transactions stored on the DCL through user interfaces that provide user displays of blockchain transactions with the data stored in asset storage 604 and ledger storage 606. EX1003, ¶¶127-132. For example, Zinder includes screenshots in FIGs. 7A-7H which "are example screen shots of user interfaces that show how **blockchain transactions and their associated data** may be displayed for consumption by a user according to certain example embodiments." *Id*.

Accordingly, Zinder teaches these limitations of claim 1. *Id*.

ii. Claim 2

1. Recitation 2a.

As illustrated in the annotated version of FIG. 1 from Zinder, the blockchain 618 is stored separately from asset storage 604 and ledger storage 606 in precisely the same way that differential storage 188 is stored separately from DCL 181, as illustrated in the annotated version of FIG. 18 from Fonss. *See also* EX1004, ¶ [0013] ("Accordingly, the provenance information … is stored outside of the blockchain (**e.g., in a separate database**) … ")(emphasis added); EX1003, ¶¶134-135.

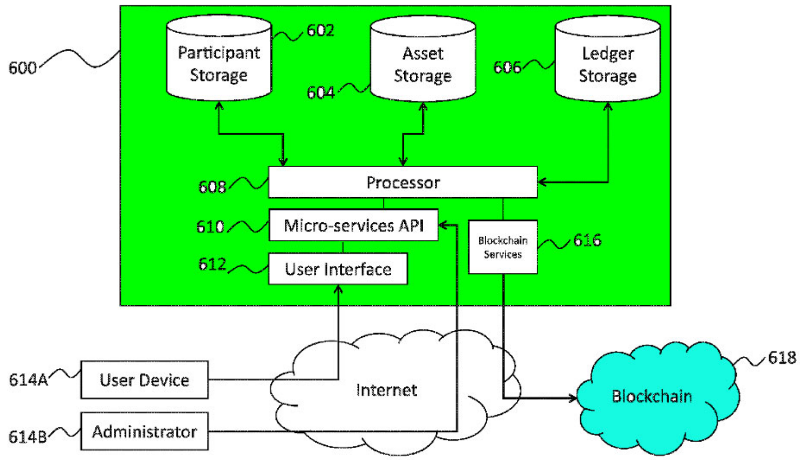
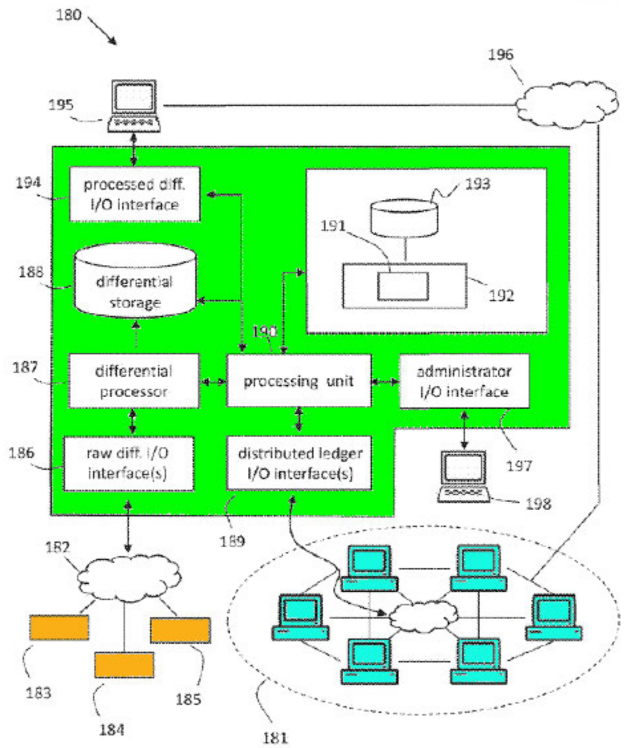


FIG. 18



Accordingly, Zinder teaches "wherein records of the at least one electronic parallel storage of the differences layer are written and stored separately from the distributed electronic ledger containing electronic transaction records." EX1003, ¶¶134-135.

2. Recitation 2b.

As explained in Fonss, "through a computer generated timestamp, a timestamp sequenced key, a unique character string, a cryptographic nonce, or similar unique identifier; records of the modular layers which differ in value or descriptor and time will have a unique alignment with records in the base DCL." EX1001, 11:13-16; EX1003, ¶¶136-140. As explained in Zinder, the entries in ledger storage 606 are linked to the transactions in blockchain 618:

> Other data that corresponds to the transaction may be added to ledger storage 606 and linked to the created blockchain transaction.

EX1004, ¶[0087]; EX1003, ¶¶136-140.

Furthermore, the data contained in *at least* ledger storage 606 is time sequenced:

> A record in ledger storage 606 may include source and destination identifiers that are mapped back to respective participants (e.g., stored in participant storage 602), a blockchain transaction ID, the unique identifier for the asset, an asset transaction quantity, a **transaction date (e.g., when the transaction was submitted to the blockchain), a validation date (e.g., when this transaction was ultimately validated by the blockchain)**, a price per share, and/or a price of the asset transaction, etc. . .

EX1004, ¶¶[0058], [0087], claim 1 (emphasis added); EX1003, ¶¶136-140.

Finally, the values in Zinder's ledger storage 606 may change, and such changes are recorded in the ledger storage 606 such that they remain in time-sequence alignment with the values in blockchain 618:

> In certain examples, **<u>the metadata that is stored in the ledger storage may be updated independently of the blockchain transaction that is associated with it.</u>** For example, the SEC rule 144 date may be a data field that only exists in ledger storage. Thus, the rule 144 date may be updated without reference to the corresponding blockchain transaction. Other fields in ledger or asset storage may be similarly updated.

EX1004, ¶[0116] (emphasis added); EX1003, ¶¶136-140.

Accordingly, the data contained in *at least* ledger storage 606 "are encoded for time-sequenced alignment with the electronic transaction records when values from a group comprised of the at least one time-sequenced electronically published data stream and the at least one descriptive differential change in value or specification." EX1003, ¶¶136-140.

In view of the above, Petitioner respectfully submits that every recitation of claim 2 would have been obvious from Zinder at the time of invention. *Id.*

iii. Claim 3

Claim 3 introduces "values and descriptors" which "alter the functionality and transactional value of the electronic transaction records of the distributed electronic ledger." In Fonss, values refer to numerical values while descriptors refer to textual values. *See, e.g.,* EX1001, 13:9-13; EX1003, ¶¶141-144. Claim 3 also recites that the disclosed techniques alter the functionality of the DCL, for example, from simply implementing a cryptocurrency to providing for the sale of privately issued assets. *See, e.g.,* EX1001, 8:20-46 (emphasis added); EX1003, ¶¶141-144.

Zinder's techniques include numerical and textual values which alter the functionality of, for example, the Bitcoin blockchain. *E.g.,* EX1004, ¶¶[0083], [0087]; EX1003, ¶¶141-144. Values such as dates and price information alter the function of the blockchain to provide for the sale of privately issued assets. *See, e.g.,* EX1004, ¶[0087]; EX1003, ¶¶141-144. Zinder also provides descriptors, such as asset types and participant identifiers which also provide for the sale of privately issued assets. *See, e.g.,* EX1004, ¶¶[0083], [0087]; EX1003, ¶¶141-144.

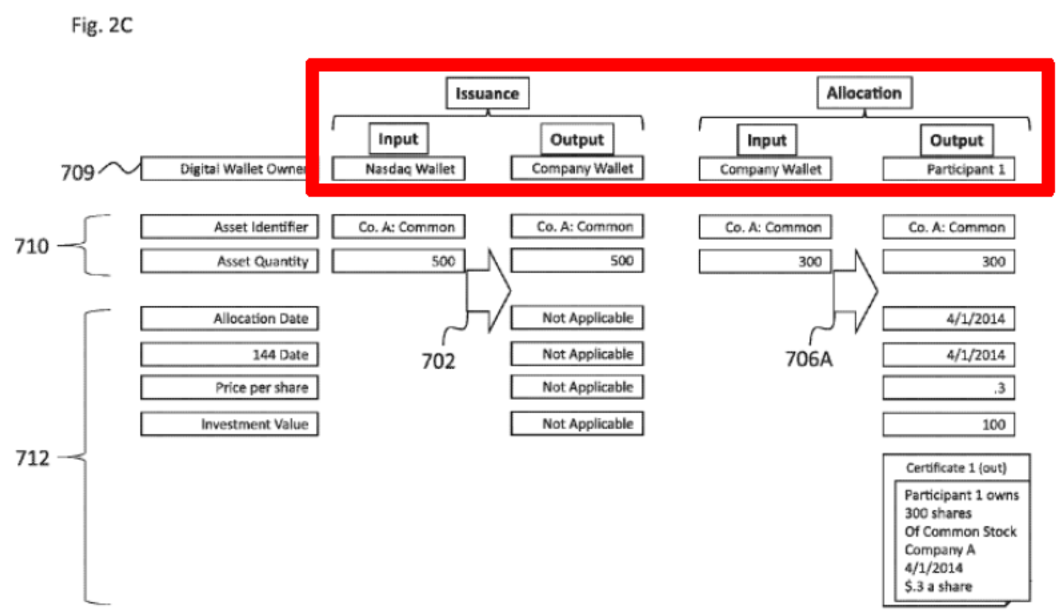
iv. Claim 4

As explained in Fonss, an "operative entitlement" refers to how a particular participant is obligated to provide or entitled to receive an asset with respect to a particular asset:

> PSDL 52 is an example where the exogenous data streams are Type B (Brent Crude Oil), and U.S. Dollars currency (USD), and a descriptive difference of +1, where +1 may indicate **<u>an obligation (or operative entitlement) to take delivery of Brent Crude Oil</u>** denominated in USD.

EX1001, 12:15-24 (emphasis added); EX1003, ¶¶145-148.

As illustrated in FIG. 2C, the values (e.g., prices per share and investment amounts) and descriptors (e.g., participant identifiers) included in Zinder's ledger storage 606 includes an indication of the function of a transaction as well as the party issuing an asset (i.e., an obligation) and the party allocated an asset (an operative entitlement):



See also EX1004, ¶¶ [0046], [0058] ("A record in ledger storage 606 may include source and destination identifiers that are mapped back to respective participants (e.g., stored in participant storage 602) …"); EX1003, ¶¶145-148. Accordingly, the digital asset repository computer system 600 provides for "at least one descriptive differential [that] define[s] the functionality and operative entitlement of the electronic transaction records of the distributed electronic ledger." EX1003, ¶¶145-148.

v. Claim 5

As explained in section IV.a.1.1-5*,* Zinder's asset storage 604 is linked to the blockchain via a unique identifier, as is ledger storage 606. EX1003, ¶¶149-153. Accordingly, the digital asset repository computer system 600 of Zinder includes "at least one descriptive differential [that] are linked to the electronic transaction records within the distributed electronic ledger." *Id.*

Moreover, DCL records that "are homogeneous on the distributed electronic ledger as identified by a timestamp or other unique record identifier" are notoriously well known in the prior art. *Id.* First, the homogenous nature of the DCL is PO admitted prior art. EX1001, 2:46-50. Regardless, Zinder also explains that data contained in the blockchain 618 remains the same while the data contained in ledger storage 606 may change. *Id.* Illustrated in FIG. 2C is the data 710 that is included in the blockchain 618:

> Referring to FIG. 2C**, a blockchain transaction may be created based on a combination of the information represented in fields 709 and 710.**

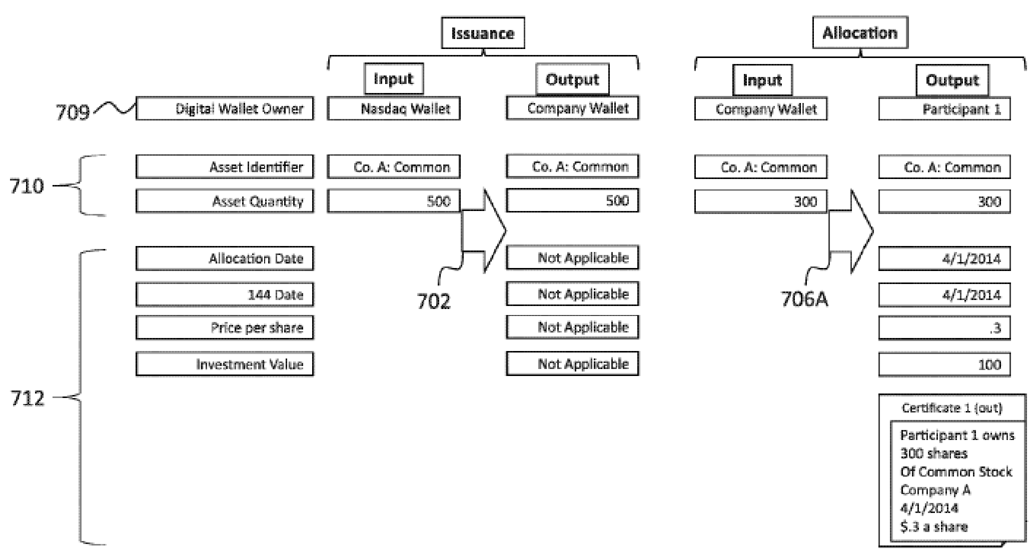
EX1004, ¶[0085] (emphasis added); EX1003, ¶¶149-153.

Also illustrated in FIG. 2C is the data 712 included in ledger storage 606:

> Other data that corresponds to the transaction may be added to ledger storage 606 and linked to the created blockchain transaction. Such information may include the information represented in fields 712 shown in FIG. 2C. … **It will be appreciated that these fields may vary based on what type of asset is being transacted and the type of transaction (issuance, transfer, re-classification, cancelation**, etc. . .)

EX1004, ¶[0087] (emphasis added); EX1003, ¶¶149-153.

Fig. 2C

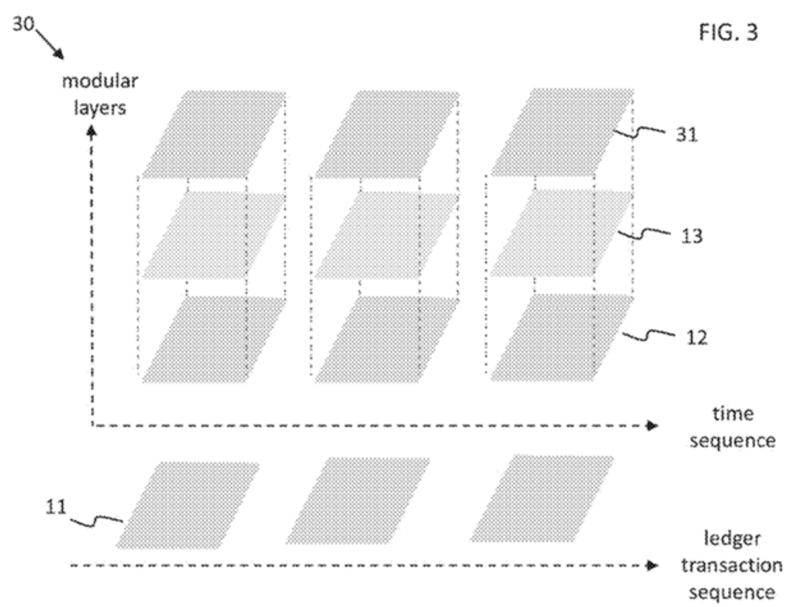


As indicated in the above-quoted language, the information on the blockchain transactions, which is data 710, remains the same, while the data contained in ledger storage 606 "vary based on what type of asset is being transacted and the type of transaction." EX1003, ¶¶149-153. Accordingly, the digital asset repository computer system 600 provides for "electronic transaction records [that] are homogeneous on the distributed electronic ledger as identified by a timestamp or other unique record identifier." *Id.*

vi. Claim 6

Fonss explains that the use of the term "modular" refers to different layers or levels of PSDLs:

> **Diagram 30 is an example of the modularity of the system and an illustration in the system's efficiency in storage operations.** The system's PSDLs are modular, and implementations of the system can create entirely new computerized storage of entirely new functional electronic ledger items using already implemented or new DCLs.



EX1001, 10:51-55; EX1003, ¶¶149-153.

Zinder's techniques also provide for modular layers of parallel storage through, for example, asset storage 604 providing a first modular layer of parallel storage and ledger storage 606 providing a second modular layer of parallel storage.

EX1003, ¶¶149-153. Similarly, the different fields of each of asset storage 604 and ledger storage 606 similarly provide modular layers of parallel storage. *See, e.g.,* EX1004, FIG. A-C, ref. num. 712. *Id.*

According to the techniques of Zinder, the content of ledger storage 606 is also "changeable" independent of the blockchain 618:

> In certain examples, **<u>the metadata that is stored in the ledger storage may be updated independently of the blockchain transaction that is associated with it</u>**.

EX1004, ¶[0116] (emphasis added); EX1003, ¶¶149-153.

Accordingly, Zinder discloses that "layers of the at least one electronic parallel storage of the differences layer linked are modular and changeable independent of the distributed electronic ledger containing electronic transaction records." EX1003, ¶¶149-153.

vii. Claim 7

Claim 7 is generally directed to a system claim whose recitations are analogous to those of claim 1. EX1003, ¶159.

1. Recitations 7a and 7b

Zinder includes a memory device further including a RAM and a processor connected to the memory device:

> Computing system 1300 includes a processing system 1302 with CPU 1, CPU 2, CPU 3, CPU 4, a system bus 1304 that communicates

> with **RAM 1306,** and storage 1308. … **Computing system 1300 includes a processing system 1302 with CPU 1, CPU 2, CPU 3, CPU 4, a system bus 1304 that communicates with RAM 1306,** and storage 1308.

EX1004, ¶[0146] (emphasis added); EX1003, ¶160.

2. Recitations 7c-7f

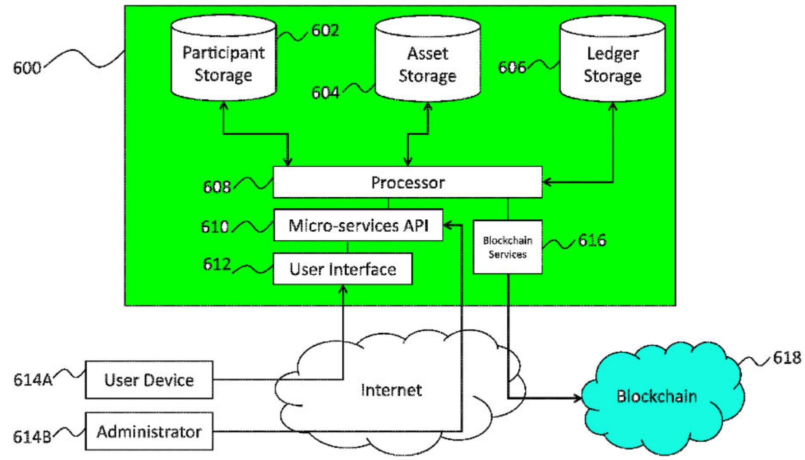
Recitations 7c is analogous to recitation 1a, recitations 7d and 7e are analogous to recitation 1b, recitation 7f is analogous to recitations 1d and 1e, and recitation 7g is analogous to recitation 1f. Therefore, these recitations are disclosed by Zinder as set forth in sections IX.a.i.1-6. EX1003, ¶¶162-163.

viii. Claims 8 and 9

As discussed above with reference to claim 2 (section IX.a.ii), blockchain 618 is stored separately from asset storage 604 and ledger storage 606 in precisely the same way that differential storage 188 is stored separately from DCL 181. Therefore, Zinder teaches the recitations of claims 8 and 9. EX1003, ¶¶167-170.

ix. Claim 10

As illustrated in the annotated version of FIG. 1 from Zinder, asset storage 604 and ledger storage 606 are stored in parallel. Accordingly, the digital asset repository computer system 600 of Zinder provides "a plurality of differences layer [] parallel stored to create a parallel storage of differences layer (PSDL)." EX1003, ¶¶171-172.



See also EX1004, ¶¶ [0052], [0057]-[0058], (describing asset storage and ledger storage providing a parallel, fully auditable record of every interaction on blockchain 618); EX1003, ¶¶171-172.

Similarly, the different fields of each of asset storage 604 and ledger storage 606 are parallel stored to create "a parallel storage of differences layer (PSDL)." *See, e.g.,* EX1004, FIG. A-C, ref. num. 712. EX1003, ¶¶171-172.

x. Claim 11

As illustrated in the annotated version of FIG. 1 from Zinder, blockchain 618 is stored separately from asset storage 604 and ledger storage 606 in precisely the same way that differential storage 188 is stored separately from DCL 181, as illustrated in the annotated version of FIG. 18 from Fonss. EX1003, ¶¶173-175.

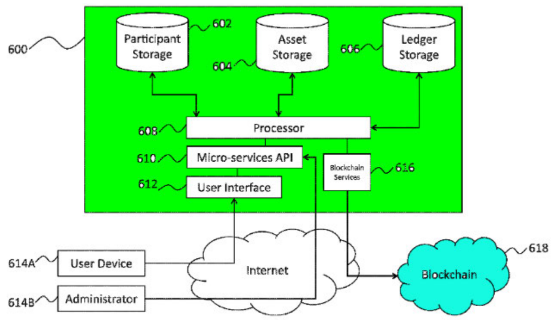
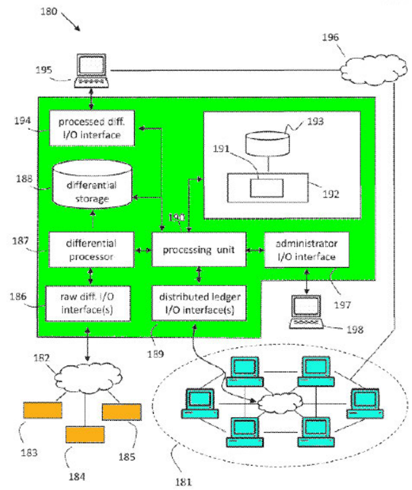


FIG. 18



Furthermore, Zinder discloses "a centralized computer system" that interfaces with a blockchain through blockchain services 616. *See, e.g.,* EX1004, ¶¶[0050], [0056], [0058], [0080], [0085], [0088], [0098]-[0101]; EX1003, ¶¶173-175. Accordingly, Zinder provides this recitation. EX1003, ¶¶173-175.

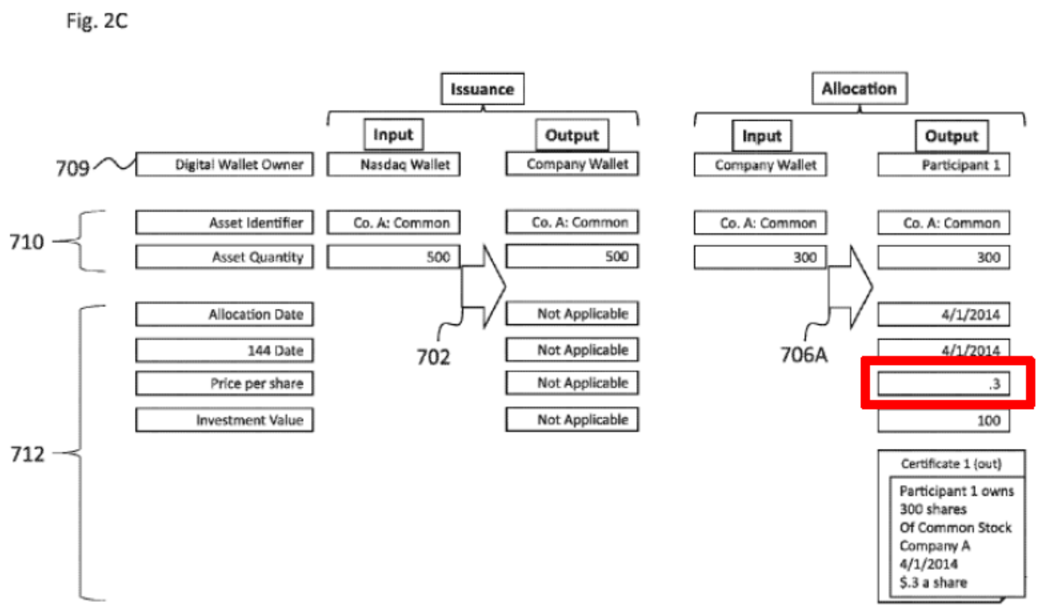
xi. Claim 12

As described in Fonss, the PSDLs impact the DCL by applying values on the PSDL to the DCL transactions, such as by performing some type of operation on a value stored in the DCL based on the value stored in the PSDL:

> Continuing with FIG. 6 diagram 60, one example of applying a PSDL to the units of the base DCL 11 is through the use of computer mathematic operators, where each layer's numerical difference storage layer is applied to produce an aggregate **impact**.

EX1001, 12:64-13:1 (emphasis added); EX1003, ¶¶176-180.

As illustrated in Zinder's FIG. 2C, the data 712 contained in ledger storage 606 is applied to the blockchain transaction data 710 to indicate the impact of the ledger storage data 606, in this particular example, the price per share of the transaction. EX1003, ¶¶176-180.



For example, the price per share value in ledger storage 606 operates on the asset quantity value stored in blockchain 618 via multiplication to indicate a total value of the transaction such that the "the electronic transaction record of the DCL is impacted by a parallel storage of differences layer." *See, e.g.,* EX1004, ¶ [0087]; EX1003, ¶¶176-180. Accordingly, Zinder provides an "electronic transaction record of the DCL [that] is impacted by a parallel storage of differences layer." EX1003, ¶¶176-180.

xii. Claim 13

As illustrated in Zinder's FIG. 2C, numerous values from data 712 are applied to the blockchain transaction data 710 in an individual manner, separate from other data values. EX1003, ¶¶181-182. For example, the validation date and 144 date values are applied to the blockchain transaction data 710 in an individual manner. *See, e.g.,* EX1004, ¶¶ [0058], [0087], [0116]; EX1003, ¶¶181-182. Accordingly, Zinder provides this recitation. EX1003, ¶¶181-182.

xiii. Claim 14

The data contained in *at least* ledger storage 606 is time sequenced:

> A record in ledger storage 606 may include … a **transaction date (e.g., when the transaction was submitted to the blockchain), a validation date (e.g., when this transaction was ultimately validated by the blockchain)**,

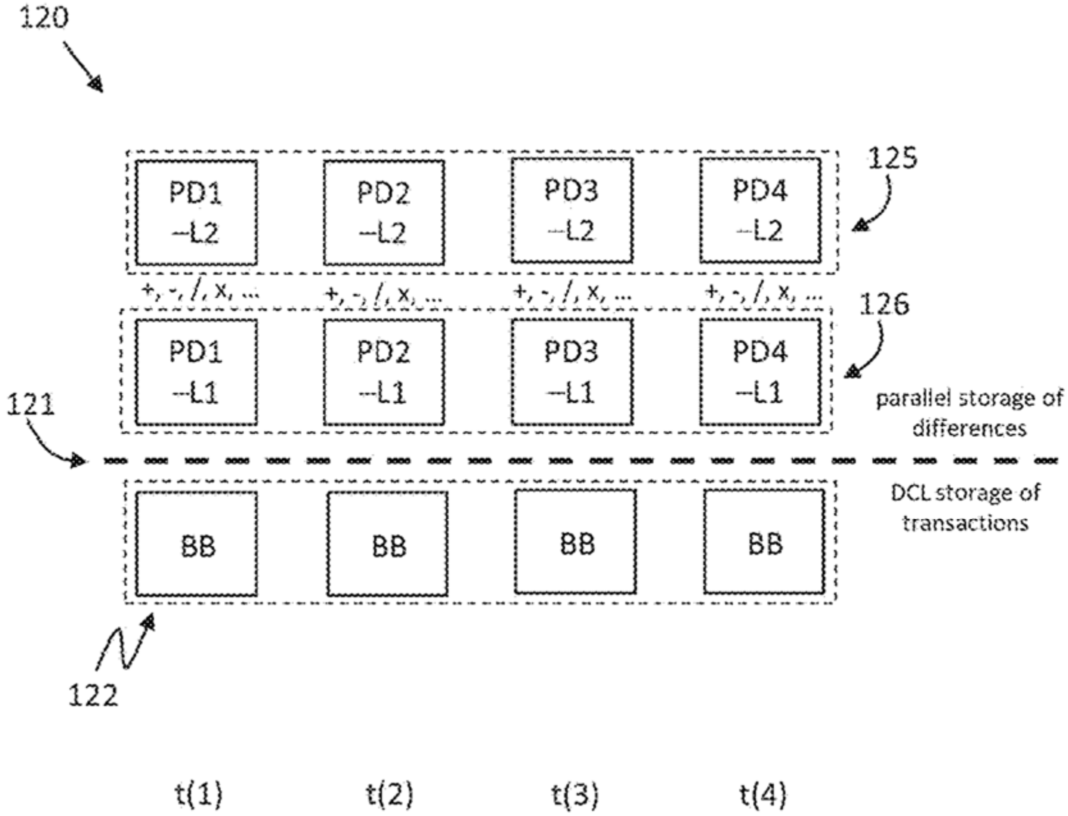
EX1004, ¶¶[0058], [0087], claim 1 (emphasis added); EX1003, ¶¶183-186.

Additionally, each entry in ledger storage 606 is individually and independently linked to a blockchain transaction in blockchain 618. EX1003, ¶¶183-186. Specifically, ledger storage contains a separate record for each transaction within blockchain 618. *See* EX1004, ¶[0058] EX1003, ¶¶183-186. Each of these records is independently linked to a transaction within blockchain 618. *See* EX1004, ¶[0087]; EX1003, ¶¶183-186. Accordingly, Zinder's ledger storage 606 provides "a time-sequence entry, and each time-sequenced entry is independent in the PSDL." EX1003, ¶¶183-186.

xiv. Claim 15

As explained in Fonss, a "cumulative impact … based on a time indicator" refers to a PSDL impact that cumulates as time moves "from left to right" in FIG. 12 (reproduced below), while a compounding impact refers to an impact generated from two or more PSDL differentials. *See, e.g.,* EX1001, 15:40:53; EX1003, ¶¶187-189. While Petitioner need show only one of these impacts to invalidate the claim, Zinder's ledger storage 606 provides both "cumulative" and "compounding" impacts. EX1003, ¶¶187-189.

FIG. 12



"A record in ledger storage 606 may include … a transaction date (e.g., when the transaction was submitted to the blockchain), [and] a validation date (e.g., when this transaction was ultimately validated by the blockchain)." EX1004, ¶[0058]; EX1003, ¶¶187-189. These descriptive differences provide a "cumulative impact … based on a time indicator" to show the time it took the transaction to be validated on the blockchain. EX1003, ¶¶187-189. Another example of a cumulative impact provided by Zinder is the description of how computer system 600 may be used to "show the full timeline of a given resource, asset, or equity that is being transferred among the listed participants." EX1004, ¶ [0070] EX1003, ¶¶187-189. In other words, the contents of asset storage 604 and ledger storage 606 are applied cumulatively to illustrate a cumulative impact of their contents on a particular asset and multiple blockchain transactions. EX1003, ¶¶187-189.

As also explained in Zinder, "A record in ledger storage 606 may include … an asset transaction quantity, … a price per share." EX1004, ¶[0058]; EX1003, ¶¶187-189. By applying these differences to the transaction records in the blockchain 618, ledger storage 606 may provide a compounding impact to derive, for example, a total value of a transaction. EX1003, ¶¶187-189. Accordingly, Zinder provides this recitation. *Id.*

xv. Claim 16

First, Petitioner notes that claim 16 essentially covers every embodiment of time sequenced entries in a PSDL – the entries will either be dependent or independent (i.e., not dependent).[2] EX1003, ¶¶190-191. Regardless, the entries in ledger storage are each independently linked to a transaction in blockchain 618. *See, e.g.,* EX1004, ¶¶ [0058], [0087], claim 1; EX1003, ¶¶190-191. Therefore, the elements of claim 16 are disclosed in Zinder. *Id.*

xvi. Claims 17 and 18

2 See, e.g., https://en.wikipedia.org/wiki/Law_of_excluded_middle (last accessed September 6, 2023).

Claim 17 is analogous to claim 11, and claim 18 is analogous to claim 13. Zinder discloses the features of these claims for analogous reasons. *See* sections IX.a.x, xii. EX1003, ¶192-193.

xvii. Claim 19

Claim 19 is a software claim that is generally analogous to claims 1 and 7. Zinder teaches the use of software to implement the disclosed techniques. EX1004, ¶[0146]; EX1003, ¶¶194-196.

For the most part, recitation 19b is analogous to recitations 1a and 1b of claim 1. Recitation 19b differs in that it recites "**a list**" of descriptive differentials," as opposed to the "at least one descriptive differential." EX1003, ¶¶197-198. As used in Fonss, a "list of descriptive differentials" refers to a set of possible descriptive differential values. *See, e.g.,* EX1001, 14:38-40, 15:55-58; EX1003, ¶¶194-198. Zinder provides for such a set of possible descriptive differentials, such as series A or series B asset types. *E.g.,* EX1004, ¶¶[0057], [0060], [0071]; EX1003, ¶¶197-198.

Recitation 19c is analogous to recitation 1c, recitation 19d is analogous to recitation 1d, recitation 19e is analogous to recitation 1e. EX1003, ¶¶199-201. Zinder discloses these features for analogous reasons. *See* sections IX.a.i.4-5; EX1003, ¶¶199-201.

Recitation 19f is analogous to recitation 1f with the added language that "a data storage and a processing of the imputing resides on a centralized device or a decentralized device controlled by the specialized computer system." EX1003, ¶202. As described above with reference to recitation 1d, asset repository computer system 600 of Zinder, which provides the linking corresponding to the "imputing" of recitation 19e resides on a centralized computer system. *See, e.g.*, EX1004, ¶¶ [0042], [0043]; EX1003, ¶202. Zinder discloses the features of recitation 19e for reasons analogous to those presented above with respect to recitations 1d and 1f. *See* sections IX.a.i.4-6**;** EX1003, ¶202.

xviii. Claim 20

Claim 20 is analogous claims 17 and 18. Zinder renders claim 20 obvious for reasons analogous to those presented with respect to claims 17 and 18, above. *See* sections IX.a.xvi; EX1003, ¶204.

b) Ground 2

As discussed in section VII.b.viii*,* the "at least one time-sequenced electronically published data stream" and the "at least one descriptive differential" are recited in the alternative. Both alternatives would have been obvious from Zinder (EX1003, ¶204), but Ground 1 focuses on the "at least one descriptive differential." For completeness, Petitioner provides the following second ground based on Zinder in view of Toll and Zhang, which focuses on the "at least one time-sequenced electronically published data stream" element.

i. Obviousness Rationale

Initially, Petitioner addresses the obviousness rationale for combining the teachings of Zinder, Toll and Zhang. Specifically, and as discussed in the background section above, both Zinder and Toll are Nasdaq publications directed to computer systems for recording financial instrument transactions in blockchains. EX1004, ¶¶[0037], [0146]; EX1005, ¶¶[0006]-[0007]; EX1003, ¶206. Moreover, Toll explicitly teaches that its system may implement the techniques of Zinder, and in fact, incorporates the contents of Zinder by reference. EX1005, ¶[0025] EX1003, ¶206. Even assuming *arguendo* that Toll does not already contain all the teachings of Zinder, it is irrefutable that it would have been obvious to the POSITA to combine the teachings of the two references due *at least* to the explicit instruction in Toll to do so. EX1003, ¶207.

As discussed in the background section, Toll teaches that its clearing house computer (CHC) system 100 may serve as an oracle for financial instrument price information, a trusted entity that provides external data, including external data received from electronically published data streams, to blockchains. EX1005, ¶[0039] (emphasis added); EX1003, ¶208. According to the specific examples discussed in Toll, the data provided to the blockchain via the CHC system 100 may include financial instrument price. *Id.* Absent from Toll is a description of how the CHC system 100 receives the external data that it provides as an oracle. Zhang, however, describes how an oracle couples external financial instrument price data streams to blockchain transactions:

> The processing platform implements a trusted bridge configured for at least temporary **coupling between one or more data sources and a smart contract program of a blockchain**.
>
> …
>
> We provide three examples that demonstrate TC's capabilities: (1) A financial derivative (cash-settled put option) that consumes stock ticker data
>
> …
>
> We model the authentication of on-chain messages **by an oracle**.

EX1006, Abstract, ¶¶[0116], [0136] (emphasis added); EX1003, ¶¶208-209.

As explained by Petitioner's expert, Zhang is directed to oracles, but sometimes uses other terms to describe the oracle due to the early priority date for the publication relative to other oracle disclosures. EX1003, ¶¶51-54, 210.

It would have been obvious to combine the teachings of Zhang with those of Zinder and Toll as providing an example of how the oracle of Toll receives data from external data sources. EX1003, ¶¶205-211. Specifically, Zhang discloses established functions for how an oracle, such as the oracle provided by the CHC system in Toll, provides an interface between external data sources and a blockchain.

EX1003, ¶¶205-2011. In other words, combining the teachings of Zhang with those of Zinder and Toll is nothing more "than the predictable use of prior art elements according to their established functions" – the hallmark of an obvious combination. *KSR Int'l Co. v. Teleflex Inc.*, 550 U.S. 398, 401 (2007).

ii. Claim 1

1. Recitation 1a.

As explained in Ground 1, Zinder discloses these features of claim 1 through its blockchain 618, asset storage 604 and ledger storage 606. EX1003, ¶212. Furthermore, Toll and Zhang provide additional descriptions of blockchains, which provide "an electronic transaction record by a time-sequenced value or a time-sequenced string." *E.g.,* EX1005, *passim;* EX1006, *passim;* EX1003, ¶212.

2. Recitation 1b

Accessing and Storing a Value Through the at least one Electronic PSDL

As explained in Ground 1, Zinder teaches "accessing and storing a value through the at least one electronic parallel storage of the differences layer" through asset storage 604 and ledger storage 606. EX1003, ¶213.

The value from a group comprising of at least one time-sequenced electronically published data stream and at least one descriptive differential

For purposes of Ground 2, Petitioner addresses the alternative claim language of "the value from a group comprising of at least one time-sequenced electronically published data stream." As explained in section VII.b.iv, "at least one time-sequenced electronically published data stream" would be understood by the

POSITA to mean "a stream of data, from an available electronic source, indicating a changeable value at points in time." EX1003, ¶215. As explained in Fonss "a time-sequenced data stream may relate to **prices**, trade flows, trade variables, shipping details, economic variables, performance measures or **other numerical or descriptive data**." EX1001, 17:5-8 (emphasis added); EX1003, ¶215.

Zinder's ledger storage 606 stores prices … and/or other numerical or descriptive data":

> A record in ledger storage 606 may include … a transaction date (e.g., when the transaction was submitted to the blockchain), a validation date (e.g., when this transaction was ultimately validated by the blockchain), **a price per share, and/or a price of the asset transaction**, etc. . . .

EX1004, ¶[0058] (emphasis added); EX1003, ¶216.

The CHC system 100 of Toll, which "incorporate[s] the blockchain techniques discussed in [Zinder]" unsurprisingly stores "prices … and/or other numerical or descriptive data" that are applied to blockchain transactions:

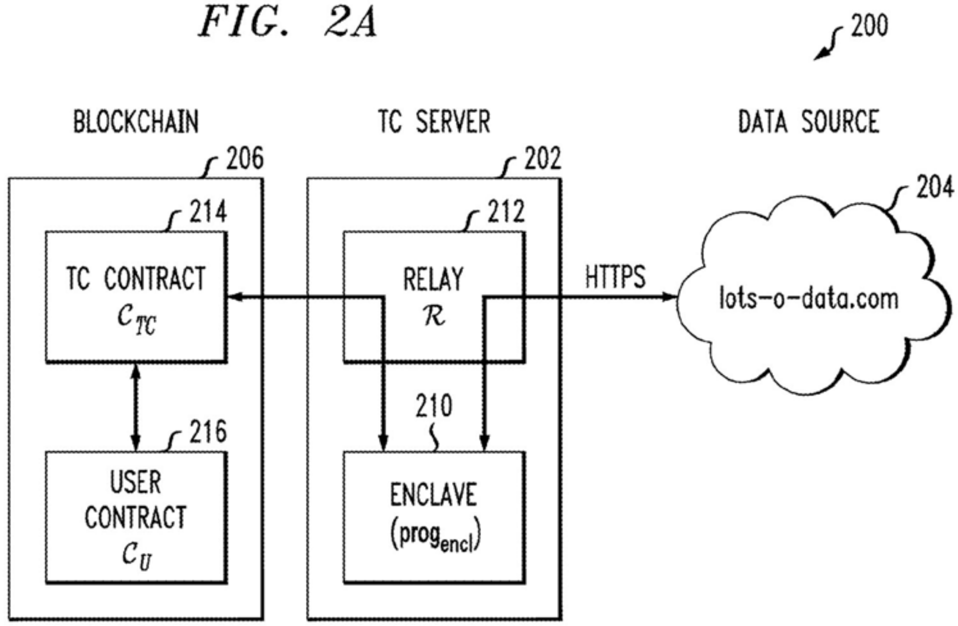
> Events that are provided by a trusted oracle may include a current margin fee, the current weather, **the current price of an instrument** traded on an external system, **a closing price of an index** **or other instrument**, **and the like**.

EX1005, ¶[0039] (emphasis added); EX1003, ¶216-217.

The only question that remains is whether it would have been obvious for the "prices … and/or other numerical or descriptive data" used by the digital asset repository computer system 600 of Zinder and the CHC system 100 of Toll to have come from "an electronically published data stream." As illustrated by Zhang, the answer is decidedly yes. EX1003, ¶218.

Reproduced below is FIG. 2A from Zhang which illustrates how TC server 202 receives data from a data stream data source and serves as an oracle providing this data stream to a blockchain system. EX1003, ¶219. Specifically, TC server 202 receives data from data source 204 using the secure hypertext transfer protocol (HTTPS). *See also* EX1006, ¶[0029] EX1003, ¶219. HTTPS is an internet communication protocol, and therefore, represents electronic data. *See also* EX1006, ¶¶[0029], [0060], [0062], [0078], [0082]; EX1003, ¶219.

FIG. 2A



Furthermore, Zhang explicitly describes the data received via HTTPs as coming from data streams:

> TC exploits an important feature of HTTPS, namely that it can be partitioned into interoperable layers: an HTTP layer interacting with web servers, a TLS layer handling handshakes and secure communication, and a Transmission Control Protocol (TCP) layer **providing reliable data streams**.

EX1006, ¶[0082] (emphasis added) EX1003, ¶220.

Finally, Zhang explicitly describes receiving "prices … and/or other numerical or descriptive data" in the form of "time-sequenced" data. EX1003, ¶221. Zhang provides an example in which its electronic data source is a "stock ticker data." EX1006, Abstract, ¶¶[0116], [0136] EX1003, ¶221. As understood by the

POSITA, "stock ticker data" is a report of the price for certain securities, updated continuously throughout the trading session by the various stock exchanges. Accordingly, these features would have been obvious from Zinder, Toll and Zhang. EX1003, ¶221.

<u>At least one differences processing engine running on a specialized computer system creates and stores parameters from a group comprised of a measurement differences and a descriptive differences</u>

As explained in section VII.b.v, a "measurement difference" relates to time-sequenced "difference(s)" or "differential(s)" from a published data stream rather than descriptive supplementary data. EX1003, ¶222. Accordingly, "a specialized computer system creates and stores parameters from a group comprised of a measurement differences and a descriptive differences" refers to a computer system configured to create and store, in the PSDL, "the value from … at least one time-sequenced electronically published data stream." EX1003, ¶222. Zinder provides such as specialized computer system through digital asset repository computer system 600 which stores "prices … and/or other numerical or descriptive data" in ledger storage 606:

> A record in ledger storage 606 may include … **<u>a price per share, and/or a price of the asset transaction</u>**, etc. . . .

EX1004, ¶[0058] (emphasis added); *see also* section IX.a.i.2-4 (explaining how digital asset repository computer system 600 represents a specialized computer system); EX1003, ¶222.

As discussed above, it would have been obvious for the digital asset repository computer system 600 to have acquired this "prices … and/or other numerical or descriptive data" from the time-sequenced electronically published data stream utilized by TC server 202 of Zhang. EX1003, ¶223. Accordingly, these features would have been obvious at the time of invention from the teachings of the Zinder, Toll and Zhang. *Id.*

3. Recitation 1c-1e

As explained in Ground 1, Zinder discloses the features of recitations 1c-1e. EX1003, ¶¶224-226.

4. Recitation 1f

Fonss explains that "imputing" may be performed through linked storage systems. EX1001, 8:43-57; EX1003, ¶¶227-228. Zinder teaches such imputation through the linkage of asset storage 604 and/or ledger storage 606 to blockchain 618:

> **<u>Other data that corresponds to the transaction may be added to ledger storage 606 and linked to the created blockchain transaction</u>**. Such information may include the information represented in fields **712** shown in FIG. 2C. For example, whether the transaction has been validated on the blockchain, what block in the chain the validation is associated with, a rule **144** date of the asset

> transaction, **<u>the price per share of the asset transaction, the investment value of the asset transaction</u>**, conditions associated with the asset transaction, etc. . . .

EX1004, ¶[0087] (emphasis added); EX1003, ¶¶227-228.

Accordingly, Zinder teaches "imputing at least one measured differential with a descriptive identifier or at least one descriptive identifier to the electronic transaction record of the DCL through data storage and processing on the at least one electronic parallel storage of the differences layer." EX1003, ¶¶227-230. Zinder, however, does not explicitly indicate that this "price per share" information, for example, comes from an electronically published data stream. *Id.* While such a source for this information would have been obvious from Zinder alone (*id*), Toll and Zhang explicitly illustrate that it would have been obvious for computing system 600 of Zinder to receive this data from an electronically published data stream. EX1003, ¶¶227-230; *see also* sections IX.b.i, IX.b.ii.

iii. Claims 2-6

With respect to claims 2-6, Petitioner submits that the elements of these claims are taught by the combination of Zinder, Toll, and Zhang for reasons analogous to those presented with respect Ground 1 directed to claims 2-6 and Ground 2 with respect to claim 1. Specifically, the obviousness of sourcing the data stored in, for example, ledger storage 606, from an electronically published data stream is illustrated in the teachings of Zinder, Toll and Zhang as described above with respect to claim 1 of Ground 2. The application of this data to blockchain techniques as recited in claims 2-6 would have been obvious for reasons analogous to those presented with respect to claims 2-6 in Ground 1. EX1003, ¶¶205-231.

iv. Claim 7

Zinder would have rendered recitation 7a obvious for reasons analogous to those presented above in the rejection of claim 7 in Ground 1. Zinder would have rendered recitation 7b obvious for reasons analogous to those presented above in the rejection of claim 7 in Ground 1. Recitations 7c-7f would have been rendered obvious for reasons analogous to those set forth for the rejection of claim 1 in Ground 2 in section IX.b.ii.1-4. Zinder would have rendered recitation 7g obvious for reasons analogous to those presented above in the rejection of claim 7 in Ground 1. EX1003, ¶¶232-234.

v. Claims 8-18

Petitioner submits that the elements of these claims are rendered obvious by the combination of Zinder, Toll, and Zhang for reasons analogous to those presented with respect Ground 1 directed to claims 8-18. EX1003, ¶235.

vi. Claim 19

Claim 19 is a software claim that is analogous to claims 1 and 7. EX1003, ¶236.

1. Recitation 19a

Zinder teaches the use of software to implement the disclosed techniques. EX1004, ¶[0146]. EX1003, ¶237.

2. Recitation 19b-19f

Recitation 19b is analogous to recitation 1c, recitation 19c is analogous to recitation 1d, recitation 19d is analogous to recitation 1e. Therefore, Zinder discloses these features for analogous reasons. *See* section IX.b.ii.3; EX1003, ¶238. Recitation 19e is analogous to recitation 1f, with the added language that " a data storage and a processing of the imputing resides on a centralized device or a decentralized device controlled by the specialized computer system." *Id*. Therefore, Zinder discloses the features of recitation 19e for reasons analogous to those presented above with respect to recitations 1d and 1f. *See* section IX.b.ii.3-4 Therefore, Zinder discloses these features for analogous reasons. *Id*.

vii. Claim 20

Claim 20 is analogous to claims 17 and 18. Therefore, the cited art renders claim 20 obvious for reasons analogous to those presented with respect to claims 17 and 18, above. EX1003, ¶239.

X. CONCLUSION

In view of the foregoing, there is a reasonable likelihood that one of claims 1-20 is unpatentable and this Petition for *inter partes* review should be granted.

September 7, 2023
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CLAIMS LISTING APPENDIX

Claims Language	Recitation Label
1. A computer based method comprising:	Preamble 1
creating at least one electronic parallel storage of a differences layer linked to a distributed computer ledger (DCL); the DCL contains an electronic transaction record by a time-sequenced value or a time-sequenced string;	1a
accessing and storing a value through the at least one electronic parallel storage of the differences layer, the value from a group comprising of at least one time-sequenced electronically published data stream and at least one descriptive differential, wherein at least one differences processing engine running on a specialized computer system creates and stores parameters from a group comprised of a measurement differences and a descriptive differences;	1b
storing the DCL containing an electronic transactions record on at least one of a distributed network of connected independent computers or a decentralized network of computers wherein the electronic transaction record is time sequenced, and a writing or an appending of the electronic transaction records is performed on the distributed network of connected independent computers or the decentralized network of computers;	1c
storing the at least one electronic parallel storage of the differences layer on at least one of a centralized storage device controlled by the specialized computer system or a decentralized storage device controlled by the specialized computer system for increasing functionality and utility of the DCL, reducing data storage requirements, eliminating transmission of redundant data, and improving data security;	1d
linking the electronic transaction record in the DCL to records of the at least one electronic parallel storage of the differences layer utilizing at least one time sequenced value, string, code, or key; and	1e
imputing at least one measured differential with a descriptive identifier or at least one descriptive identifier to	1f

Claims Language	Recitation Label
the electronic transaction record of the DCL through data storage and processing on the at least one electronic parallel storage of the differences layer.	
2. The method of claim 1, wherein records of the at least one electronic parallel storage of the differences layer are written and stored separately from the distributed electronic ledger containing electronic transaction records,	2a
where the records of the at least one electronic parallel storage of the differences layer are encoded for time-sequenced alignment with the electronic transaction records when values from a group comprised of the at least one time-sequenced electronically published data stream and the at least one descriptive differential change in value or specification.	2b
3. The method of claim 1, wherein values and descriptors from a group comprised of the at least one time-sequenced electronically published data stream and the at least one descriptive differential alter the functionality and transactional value of the electronic transaction records of the distributed electronic ledger.	3
4. The method of claim 1, wherein values and descriptors from a group comprised of the at least one time-sequenced electronically published data stream and the at least one descriptive differential define the functionality and operative entitlement of the electronic transaction records of the distributed electronic ledger.	4
5. The method of claim 1, wherein values from a group consisting of at least one time-sequenced electronically published data stream and at least one descriptive differential are linked to the electronic transaction records within the distributed electronic ledger and the electronic transaction records are homogeneous on	5

Claims Language	Recitation Label
the distributed electronic ledger as identified by a timestamp or other unique record identifier.	
6. The method of claim 1, wherein layers of the at least one electronic parallel storage of the differences layer linked are modular and changeable independent of the distributed electronic ledger containing electronic transaction records.	6
7. A system comprising:	Preamble 7
a system having a memory device, the memory device further including a Random Access Memory (RAM);	7a
a processor connected to the memory device, the processor is configured to:	7b
create at least one electronic parallel storage of a differences layer linked to a distributed computer ledger (DCL), both the electronic parallel storage of the differences layer and the DCL containing a respective electronic transaction record, a time-sequenced value, or a time-sequenced string;	7c
access a value from a group comprising of at least one time-sequenced electronically published data stream and at least one descriptive differential;	7d
store the values from a group comprising of at least one time-sequenced electronically published data stream and at least one descriptive differential on the at least one electronic parallel storage of the differences layer;	7e
align and link a stored value record of the at least one electronic parallel storage of the differences layer to the electronic transaction record of the DCL utilizing at least one time sequenced value, string, code, or key; and	7f
impute at least one measured differential with a descriptive identifier or at least one descriptive identifier to the electronic transaction record of the DCL.	7g
8. The system of claim 7, wherein the memory device includes a separation of storage of the differences layer.	8

Claims Language	Recitation Label
9. The system of claim 8, wherein the separation of storage is between the electronic transaction record of the DCL and the differences layer.	9
10. The system of claim 9, wherein a plurality of differences layer is parallel stored to create a parallel storage of differences layer (PSDL).	10
11. The system of claim 7, wherein the difference layer is stored on a centralized storage or a decentralized storage apart from the electronic transaction record of the DCL.	11
12. The system of claim 11, wherein the electronic transaction record of the DCL is impacted by a parallel storage of differences layer.	12
13. The system of claim 12, wherein impact is done from each of the parallel storage of differences layer (PSDL) in an individual manner.	13
14. The system of claim 13, wherein the parallel storage of differences layer (PSDL) has a time-sequence entry, and each time-sequenced entry is independent in the PSDL.	14
15. The system of claim 12, wherein impact is done from the parallel storage of differences layer (PSDL) in a cumulative manner, or a compounding manner, wherein impact is cumulative based on a time indicator.	15
16. The system of claim 15, wherein the parallel storage of differences layer (PSDL) has a time-sequence entry, and each time-sequenced entry is independent or dependent in the PSDL.	16

Claims Language	Recitation Label
17. The system of claim 7, wherein the difference layer is stored on a distributed network, a centralized network, or a decentralized network, and wherein the difference layer is stored apart from the electronic transaction record of the DCL.	17
18. The system of claim 17, wherein the electronic transaction record of the DCL is impacted by the differences layer.	18
19. A non-transitory computer readable storage medium, comprising storage, retrieval, modification, and linking system software which instructs at least one computer processor residing on a specialized computer system to implement a process to:	19a
create at least one electronic parallel storage of a differences layer linked to a distributed computer ledger (DCL) containing an electronic transaction record arranged by a time-sequenced value or time-sequenced string, wherein the at least one electronic parallel storage of the differences layer accesses and stores values from a group consisting of at least one time-sequenced electronically published data stream and a list of descriptive differentials, and wherein at least one differences processing engine running on a specialized computer system creates and stores parameters from a group consisting of measurement differences and descriptive differences;	19b
store the DCL containing the electronic transactions records on at least one of a distributed network of connected independent computers or a decentralized network of computers wherein the electronic transaction records are time sequenced, and the writing or appending of the electronic transaction records is performed on the distributed network of connected independent computers or the decentralized network of computers;	19c

Claims Language	Recitation Label
store the at least one electronic parallel storage of the differences layer on at least one of a centralized storage device controlled by the specialized computer system or a decentralized storage device for increasing functionality and utility of the DCL, reducing data storage requirements, eliminating transmission of redundant data, and improving data security;	19d
link the transaction records in the DCL to the at least one electronic parallel storage of the differences layer utilizing at least one time sequenced value, string, code, or key; and	19e
impute at least one measured differential with a descriptive identifier or at least one descriptive identifier to the electronic transaction records of the DCL, wherein a data storage and a processing of the imputing resides on a centralized device or a decentralized device controlled by the specialized computer system.	19f
20. The non-transitory computer readable storage medium of claim 19, wherein the difference layer is stored apart from the electronic transaction record of the DCL, and the electronic transaction record of the DCL is impacted by the differences layer.	20

CERTIFICATION OF WORD COUNT

I hereby certify that this petition conforms with the word count limits of 37 C.F.R. § 42.24(a)(i). This petition contains 13961 words, excluding the parts of the petition exempted by 37 C.F.R. § 42.24(a), as calculated using Microsoft Word.

The undersigned further certifies that this petition complies with the requirements of 37 C.F.R. § 42.6. This brief has been prepared in a proportionally spaced typeface using Microsoft Word 2010 in Times New Roman 14 point font.

September 7, 2023

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CERTIFICATE OF SERVICE

I certify that the foregoing **Petition to Institute an *Inter Partes* Review for U.S. Patent No. 10,025,797 under *37 C.F.R. § 42.100 et seq.*** and accompanying **EXHIBITS** was served September 7, 2023 by Federal Express to:

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