

CLAIMS

I claim:

1. A system comprising:
 - a custodian node comprising a processor and a computer-readable storage device storing instructions for operating a custodian module to perform operations comprising:
 - creating a blockchain ledger on a blockchain node of a blockchain network, the blockchain network comprising a plurality of distributed nodes operating a consensus algorithm to record transactions across a distributed blockchain ledger;
 - receiving a request to tokenize assets;
 - tokenizing, based on the request, the assets onto the distributed blockchain ledger to yield tokens;
 - receiving a redemption request;
 - burning, based on the redemption request, the tokens off the distributed blockchain ledger;
 - performing atomic transaction commitment; and
 - performing net settlement computations based on trading transactions in blocks, the net settlement computation further comprising net settlement movements comprising instructions to outside services separate from the custodian node;
 - a trader module operating on a trader device, the trader module configured to interact with the custodian module and to perform operations comprising:
 - reading, via a wallet, unspent transaction outputs and sums for balances;
 - enabling access to traders to an order entry system;
 - initiating issuance and redemption requests to the custodian module; and
 - managing public keys and private keys for the traders;
 - an atomic swap module configured on a node, the atomic swap module configured to perform operations comprising:
 - receiving transactions from a matching engine that matches traders;
 - obtaining a signing of the transactions with the private key to yield signed transactions;
 - adding the signed transactions to a mempool;
 - ensuring that an atomic swap occurs that changes ownership of assets concurrently with two respective distributed blockchain ledgers to yield a trade execution; and

notifying the matching engine or other systems of a successful or failed trade execution; and

a cross-custodian net settlement module configured on a node, the cross-custodian net settlement module configured to perform operations comprising:

calculating net settlement amounts due for all users in each asset between any two custodian modules and their related distributed blockchain ledgers;

generating, based on the net settlement amounts, a full allocation report for all users, all assets all related unspent outputs and proofs, the full allocation report comprising netted quantities and residual quantities;

loading the residual quantities into a blockchain-based smart contract or otherwise creating movement instructions over non-blockchain ledger rails; and

creating an atomic transaction that burns and reallocates the netted quantities and invokes the blockchain-based smart contract or other traditional rail payments.

2. The system of claim 1, wherein the custodian module further is configured to perform operations comprising:

performing arbitrary payment transactions between blockchain ledger addresses.

3. The system of claim 1, wherein the consensus algorithm comprises on of a just-in-time consensus algorithm.

4. The system of claim 1, wherein the atomic swap module is further configured to perform one or more of the following operations:

performing a credit check against an unspent output set totals for users in question;

and

receiving as blockchain transactions or creating blockchain transactions that spend the unspent output associated with the users in question.

5. The system of claim 1, wherein obtaining the signing of the transactions with a private key as performed by the atomic swap module occurs via (1) the trader module performing a delegated signing with a supplied private key from the trader; or (2) sending the transactions to the trader module for signing by the private key.

6. The system of claim 1, wherein ensuring that the atomic swap changes ownership of the assets as performed by the atomic swap module further comprises calling a governance blockchain node which validates transactions and changes status of mempool transactions and invoking a two-phase commit protocol with custodial distributed blockchain ledgers related to affected unspent output.

7. The system of claim 1, wherein the order entry system is configured to perform operations comprising:
 - performing a real-time pre-trade credit check;
 - entering bids and offers or request for quote or otherwise negotiating pricing;
 - submitting orders to the matching engine;
8. The system of claim 7, wherein the order entry system is further configured to perform operations comprising:
 - connecting to a credit engine and margin engine and performing calculations for determining a client buying power.
9. The system of claim 8, wherein the order entry system is further configured to perform operations comprising:
 - performing one-way payment orders.
10. The system of claim 1, wherein the matching engine is configured to perform operations comprising:
 - receiving quotes and orders from third parties; and
 - executing order matches in lit book or dark book or both.
11. The system of claim 10, wherein the matching engine is further configured to perform operations comprising:
 - maintaining and publishing an order book; and
 - aggregating outside order books and routing orders to the outside order books for execution.
12. The system of claim 1, further comprising:
 - a virtual custodian module configured to perform operations comprising:
 - interacting via a wallet with the blockchain-based smart contract for time-locked transactions related to an atomic swap; and
 - facilitating the atomic swap between smart contract-held assets and the custodian module with assets on distributed blockchain ledgers.
13. The system of claim 1, wherein the system is configured to perform operations comprising:
 - lending as an on-chain repossession transaction wherein the on-chain repossession transaction that is expected to be and can be forced to be unwound with a countervailing transaction based on collateral and risk rules.

14. The system of claim 13, wherein the system is further configured to perform operations comprising:
- performing programmatic intraday borrowing based on preset rules and preferences managed within the trader module.
15. The system of claim 14, wherein the system is further configured to perform operations comprising:
- executing on the blockchain network between assets on different distributed blockchain ledgers at one of more custodian modules.
16. The system of claim 1, wherein the system is integrated with a decentralized exchange and both puts liquidity into the decentralized exchange and takes liquidity off of the decentralized exchange.
17. The system of claim 16, wherein the system is further configured to perform operations comprising:
- maintaining atomic swaps between the blockchain-based smart contract and the custodian distributed blockchain ledger.
18. The system of claim 1, wherein the blockchain network comprises:
- one or more governance modules with a governance module blockchain node;
 - a plurality of custodian modules with a custodial module blockchain node;
 - a plurality of blockchain ledgers per custodian module;
 - a plurality of trader modules; and
 - a peer-to-peer messaging capability, wherein the blockchain network implements the consensus algorithm and uses a transaction broadcasting protocol and a privacy level.
19. A blockchain network comprising:
- a first blockchain node at a governance module of an exchange network;
 - a second blockchain node at a custodian network that holds financial assets, wherein the custodian network comprises a plurality of custodian modules that each create blockchain ledgers, receive requests to tokenize assets, tokenize the assets on the blockchain ledgers into tokens, receive redemption requests for the tokens, burn the tokens off the blockchain ledgers, perform atomic transaction commitment and perform net settlement computations based on trading transactions in blocks;

a plurality of blockchain ledgers per custodian module of the plurality of custodian modules, wherein each created blockchain ledger of the plurality of blockchain ledgers records transactions per asset, credit line or other instrument;

a messaging component; and

a consensus algorithm operating on the first blockchain node and the second blockchain node that uses the messaging component to reach a common agreement about a present state of the plurality of blockchain ledgers.

20. A method comprising:

receiving, from a first trading module associated with a first trader, a first new order;

submitting the first new order to a matching engine;

receiving, from a second trading module associated with a second trader, a second new order;

submitting the second new order to the matching engine;

determining at the matching engine whether there is a match between the first new order and the second new order to yield a determination; and

if the determination is a match, the method comprises:

checking a first balance of the first trader at a blockchain ledger associated with a governance node of an exchange network;

checking a second balance of the second trader at the blockchain ledger associated with the governance node of the exchange network;

receiving a first signed request from the first trading module authorizing a trade associated with the first new order and the second new order;

receiving a second signed request from the second trading module authorizing the trade associated with the first new order and the second new order;

submitting, to accomplish the trade, a first atomic swap request to the blockchain ledger associated with the governance node;

submitting, to accomplish the trade, a second atomic swap request to a blockchain ledger associated with a first custodian node associated with the first trader;

submitting, to accomplish the trade, a third atomic swap request to a blockchain ledger associated with a second custodian node associated with the second trader; and

confirming the first atomic swap request, the second atomic swap request and the third atomic swap request.