CLAIMS

What is claimed is:

1. A method for processing a transaction request, the method being applied to any one of transaction nodes in a transaction system, the transaction system comprising a plurality of the transaction nodes; the method comprising:

upon being elected as a leader node in the plurality of transaction nodes, receiving a first transaction request from a client, responding to the first transaction request and obtaining latest market data from a market data server based on the first transaction request, processing the first transaction request to obtain a transaction processing result based on the market data;

replicating the transaction processing result to other transaction nodes in the transaction system, causing the other transaction nodes to apply the transaction processing result to their own replicated state machines;

wherein, each of the transaction nodes in the transaction system is configured with a service layer and a data replication layer; and

wherein the receiving the first transaction request from the client, obtaining latest market data from the market data server based on the first transaction request, processing the first transaction request to obtain the transaction processing result based on the market data comprises:

receiving the first transaction request from the client via the service layer of current node;

obtaining a first node role and a first term from the data replication layer of the current node via the service layer of the current node;

obtaining a first historical term last obtained from the data replication layer of the current node;

detecting whether the first node role is a leader node and whether the first historical term is equal to the first term; and

upon detecting the first node role as a leader and the first historical term equal to the first term, obtaining the latest market data from the market data server based on the first transaction request via the service layer of the current node.

2. The method according to claim 1,

wherein the replicating the transaction processing result to the other transaction nodes in the transaction system, causing the other transaction nodes to apply the transaction processing result to their own replicated state machines comprises:

replicating the transaction processing result to the other transaction nodes in the transaction system via the data replication layer of the current node, causing the other transaction nodes to apply the transaction processing result to their own replicated state machines.

3. The method according to claim 1, further comprising:

upon detecting the first node role not as a leader and the first historical term not equal to the first term, rejecting the first transaction request from the client via the service layer of the current node.

4. The method according to claim 2, wherein the transaction processing result carries the first term;

the replicating the transaction processing result to the other

transaction nodes in the transaction system via the data replication layer of the current node is preceded by:

extracting the first term carried in the transaction processing result via the data replication layer of the current node;

obtaining a second node role and a second term;

detecting whether the second node role is the leader node and whether the first term carried in the transaction processing result is equal to the second term;

wherein the replicating the transaction processing result to the other transaction nodes in the transaction system via the data replication layer of current node comprises:

upon detecting the second node role as a leader and the first term equal to the second term, replicating the transaction processing result to the other transaction nodes in the transaction system via the data replication layer of the current node.

5. The method according to claim 4, further comprising:

upon detecting the second node role not as a leader and the first term not equal to the second term, discarding the transaction processing result from the service layer of the current node, and notifying the client that processing of the first transaction request has failed.

6. The method according to claim 3 or 5, further comprising:

obtaining node information of current leader node via the data replication layer of the current node;

sending the node information of the current leader node to the client via the service layer of the current node, causing the client to send a transaction request to the current leader node based on the node

information of the current leader node.

7. The method according to claim 1, wherein the replicating the transaction processing result to the other transaction nodes in the transaction system comprises:

appending the transaction processing result as a new log entry to local raft log;

replicating the transaction processing result to the other transaction nodes in the transaction system based on log replication mechanism of raft algorithm.

8. The method according to claim 1, further comprising:

obtaining latest snapshot locally after a reboot, or from a remote storage system after a boot from a new machine;

using the transaction processing result corresponding to the latest snapshot as a starting position and current latest generated transaction processing result as an ending position, and applying all transaction processing results from the starting position to the ending position in sequence;

joining a raft cluster consisting of the plurality of the transaction nodes;

upon receiving the transaction processing result sent by the current leader node, applying the received transaction processing result.

9. The method according to claim 8, wherein the receiving the first transaction request from the client is preceded by:

obtaining a plurality of unprocessed transaction records from a cross system, the unprocessed transaction records referring to transaction records that have been closed and not yet processed;

processing each unprocessed transaction record, updating account asset information of a user corresponding to each unprocessed transaction record based on processing result of each unprocessed transaction record, recovering a state of the replicated state machine of the current node to a state at the time of a first ex-leader node stepped down.

10. The method according to claim 2, further comprising: when the current node is a non-leader node, in response to receiving a second transaction request from the client via the service layer of the current node, obtaining a third node role and a third term from the data replication layer of the current node via the service layer of the current node;

obtaining a second historical term last obtained from the data replication layer of the current node;

detecting whether the third node role is a leader node and whether the second historical term is equal to the third term;

upon detecting the third node role as a leader node and the second historical term equal to the third term, recovering a state of the replicated state machine of the current node to a state at the time of a second ex-leader node stepped down and processing the second transaction request;

upon detecting the third node role not as a leader and the second historical term not equal to the third term, rejecting the second transaction request.

11. The method according to claim 1, further comprising: initiating a connection to a cross system after the current node becomes

a leader node to cause the cross system to send latest transaction records to the current node via the connection; and disconnecting the connection upon detecting the current node not as the leader node.

12. A device for processing a transaction request, the device being applied to any one of transaction nodes in a transaction system, the transaction system comprising a plurality of the transaction nodes; the device comprising:

a request processing module configured for, upon being elected as a leader node in the plurality of transaction nodes, receiving a first transaction request from a client, responding to the first transaction request and obtaining latest market data from a market data server based on the first transaction request, processing the first transaction request to obtain a transaction processing result based on the market data;

a processing result replication module configured for replicating the transaction processing result to other transaction nodes in the transaction system, causing the other transaction nodes to apply the transaction processing result to their own replicated state machines;

wherein the request processing module is configured with a service layer and the processing result replication module is configured with a data replication layer;

wherein the request processing module is specifically configured for: receiving the first transaction request from the client via the service layer of current node; obtaining a first node role and a first term from the data replication layer of the current node via the service layer of the current node; obtaining a first historical term last obtained from the

data replication layer of the current node; detecting whether the first node role is a leader node and whether the first historical term is equal to the first term; upon detecting the first node role as a leader and the first historical term equal to the first term, obtaining the latest market data from the market data server based on the first transaction request via the service layer of the current node.

13. The device according to claim 12, wherein

the processing result replication module is specifically configured for replicating the transaction processing result to the other transaction nodes in the transaction system via the data replication layer of the current node, causing the other transaction nodes to apply the transaction processing result to their own replicated state machines.

14. The device according to claim 12, wherein the request processing module is further configured for, upon detecting the first node role not as a leader and the first historical term not equal to the first term, rejecting the first transaction request from the client via the service layer of the current node.

15. The device according to claim 13, wherein the transaction processing result carries the first term;

the processing result replication module, before being configured for replicating the transaction processing result to the other transaction nodes in the transaction system via the data replication layer of the current node, is further configured for extracting the first term carried in the transaction processing result via the data replication layer of the current node; obtaining a second node role and a second term; detecting

whether the second node role is the leader node and whether the first term carried in the transaction processing result is equal to the second term;

the processing result replication module, upon being configured for replicating the transaction processing result to the other transaction nodes in the transaction system via the data replication layer of the current node, is specifically configured for, upon detecting the second node role as a leader and the first term equal to the second term, replicating the transaction processing result to the other transaction nodes in the transaction system via the data replication layer of the current node.

16. The device according to claim 15, wherein the processing result replication module is further configured for, upon detecting the second node role not as a leader and the first term not equal to the second term, discarding the transaction processing result from the service layer of the current node, and notifying the client that processing of the first transaction request has failed.

17. The device according to claim 14 or 16, wherein the processing result replication module is further configured for obtaining node information of current leader node via the data replication layer of the current node;

the request processing module is further configured for sending the node information of the current leader node to the client via the service layer of the current node, causing the client to send a transaction request to the current leader node based on the node information of the current leader node.

18. The device according to claim 12, wherein the processing result replication module, upon being configured for replicating the transaction processing result to the other transaction nodes in the transaction system, is specifically configured for appending the transaction processing result as a new log entry to local raft logs; replicating the transaction processing result to the other transaction nodes in the transaction system based on log replication mechanism of raft algorithm.

19. The device according to claim 12, further comprising the following modules:

a snapshot acquisition module configured for obtaining latest snapshot locally after a reboot, or from a remote storage system after a boot from a new machine;

a first result application module configured for using the transaction processing result corresponding to the latest snapshot as a starting position and current latest generated transaction processing result as an ending position, and applying all transaction processing results from the starting position to the ending position in sequence;

a cluster joining module configured for joining a raft cluster consisting of the plurality of the transaction nodes;

a second result application module configured for applying transaction processing result received from the current leader node.

20. The device according to claim 19, further comprising the following modules:

a transaction record acquisition module configured for obtaining a plurality of unprocessed transaction records from a cross system, the

unprocessed transaction records referring to transaction records that have been closed and not yet processed;

a transaction record processing module configured for processing each unprocessed transaction record, updating account asset information of a user corresponding to each unprocessed transaction record based on processing result of each unprocessed transaction record, recovering a state of the replicated state machine of the current node to a state at the time of a first ex-leader node stepped down.

21. The device according to claim 13, wherein the request processing module is further configured for performing the following steps:

when the current node is a non-leader node, in response to receiving a second transaction request from the client via the service layer of the current node, obtaining a third node role and a third term from the data replication layer of the current node via the service layer of the current node;

obtaining a second historical term last obtained from the data replication layer of the current node;

detecting whether the third node role is a leader node and whether the second historical term is equal to the third term;

upon detecting the third node role as a leader node and the second historical term equal to the third term, recovering a state of the replicated state machine of the current node to a state at the time of a second ex-leader node stepped down and processing the second transaction request;

upon detecting the third node role not as a leader and the second

historical term not equal to the third term, rejecting the second transaction request.

22. The device according to claim 12, further comprising a connection management module;

wherein the connection management module is configured for initiating a connection to a cross system after the current node becomes a leader node to cause the cross system to send latest transaction records to the current node via the connection; and disconnecting the connection upon detecting the current node not as the leader node.

23. A transaction node comprising a memory, a processor and a computer program stored on the memory and executable by the processor, wherein the processor performs the steps of the method according to any one of claims 1 to 11 when executing the computer program.

24. A computer readable storage medium on which a computer program is stored, wherein the computer program when executed by a processor performs the steps of the method according to any one of claims 1 to 11.