Voting blockchain for High Security NFT

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Abstract

- NFT secure blockchain architecture confirming the ownership of transaction and its implementation of secure payment method to avoid mistake of transfer is proposed.

- Escrow account confirms its transaction by J Node using unique voting method.

- Participant node can obtain mining reward by voting work, This is a motivation of generation of NFT blockchain, continuously.


NFT contents

NFT

- NFT is a unit of data stored on a blockchain digital ledger to represent items such as photos, videos, audio, and other intellectual property.

- NFT certifies a digital asset to be unique, it is not interchangeable.

- Current blockchain store the transaction from each node but it is required more high security of ownership.

Issues

- Higher transaction gas fee
- Latency time
- Risky token transfer
- Electricity cost of PoW mining

Proposed secure NFT blockchain

Secure NFT (NFTSBL)

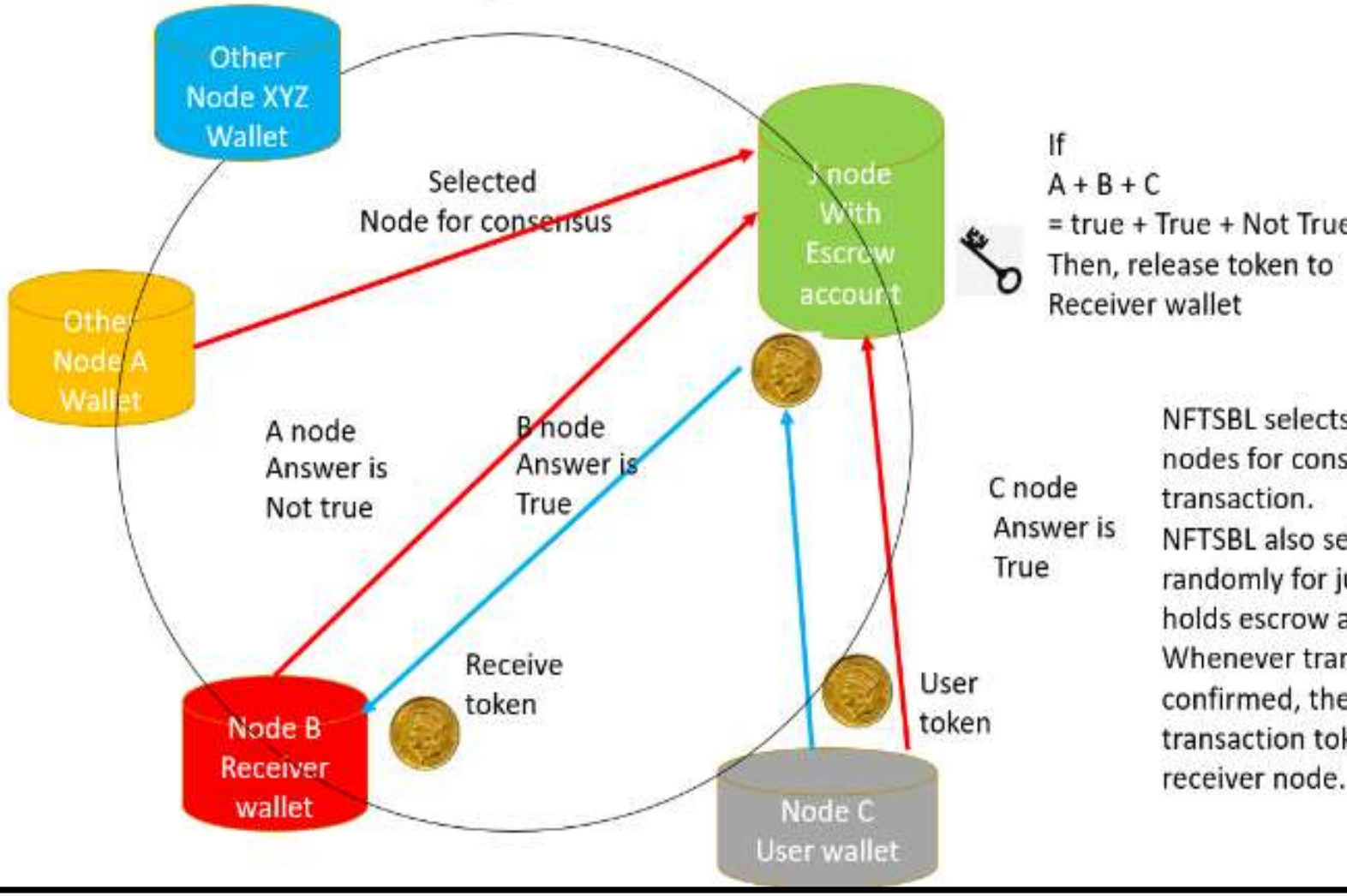
- NFTSBL (Non-Fungible Token) secure blockchain using voting function to establish consensus for each transaction and avoid mistake of coin transfer by escrow account on selected node which is called “J Node”.

- NFTSBL is minable original Blockchain.

- The escrow account refers and judges the transaction between sender to receiver with selected multiple number of witness nodes.

- Eventually, escrow account stores the status of the final judgment of transaction and it transfers NFT token from sender to receiver wallet if transaction was confirmed.

Voting for consensus of NFTSBL



NFTSBL selects multiple nodes for consensus of transaction.
NFTSBL also selected J node randomly for judgment and holds escrow account.
Whenever transaction was confirmed, then release the transaction token to receiver node.

Voting Blockchain sample code

```
function voter_registration(string memory _ ip address) public {

// for bytes conversion of msg.sender and _ip address
uint _size = abi.encodePacked(msg.sender).length + bytes(_ip address).length;
bytes memory _data = new bytes(_size);
uint counter=0;
for (uint i=0;i<abi.encodePacked(msg.sender).length;i++)
{
 _data[counter]=abi.encodePacked(msg.sender)[i];
 counter++;
}
 for (uint i=0;i<bytes(_ip address).length;i++)
{
 _data[counter]=bytes(_ip address)[i];
 counter++;
}
require(!voters[keccak256(_data)]);
 voters[keccak256(_data)] = true;
}
```

```
function vote_casting(string memory _ ip address, string memory _category) {
// for bytes conversion of _ ip address and _category
uint _size = bytes(_ip address).length + bytes(_category).length;
bytes memory _data = new bytes(_size);
uint counter=0;
for (uint i=0;i<bytes(_ip address).length;i++)
{
 _data[counter]=bytes(_ip address)[i];
 counter++;
 }
for (uint i=0;i<bytes(_category).length;i++)
{
  _data[counter]=bytes(_category)[i];
  counter++;
}

 urlData[keccak256(_data)].voteCount++;

 emit votedEvent(keccak256(_data));
}
```

J node

- J node is voting transaction confirmation node.
- Randomly selected, and receives the transaction confirmation status from multiple nodes.
- J node decides whether the transaction is true or not by decision making formula.
- If sum of transaction result is more than 75% (threshold value) then, then the token of transaction is released.

Escrow account

- Escrow account on J-Node helps in avoiding the mistake of token transfer to the wrong party.
- J node keeps the token until the transaction in the escrow account is confirmed by selected multiple nodes.
- Upon confirmation of transaction is true, J node releases the token to the receiver’s wallet and complete this task.

Escrow account decision making

$$D = \sum_{i=1}^{n}(R_i) - \theta j$$

θ j is bias factor of judgment condition if any NFT content has comment to deal.

There are seven nodes were selected and six node replied True answer but one node was non true answer, Therefore accuracy of this transaction is 6/7 which is 85.71%. It is accepted as True transaction if threshold value was set under 75%.

User Type	Node	Reply Signal	Result
FTX buyer	A	T	True
NFT Provider	B	T	True
other User	C	NT	True
other services	D	NT	True
other User	E	NT	True
other services	F	T	Not True
other User	G	NT	True

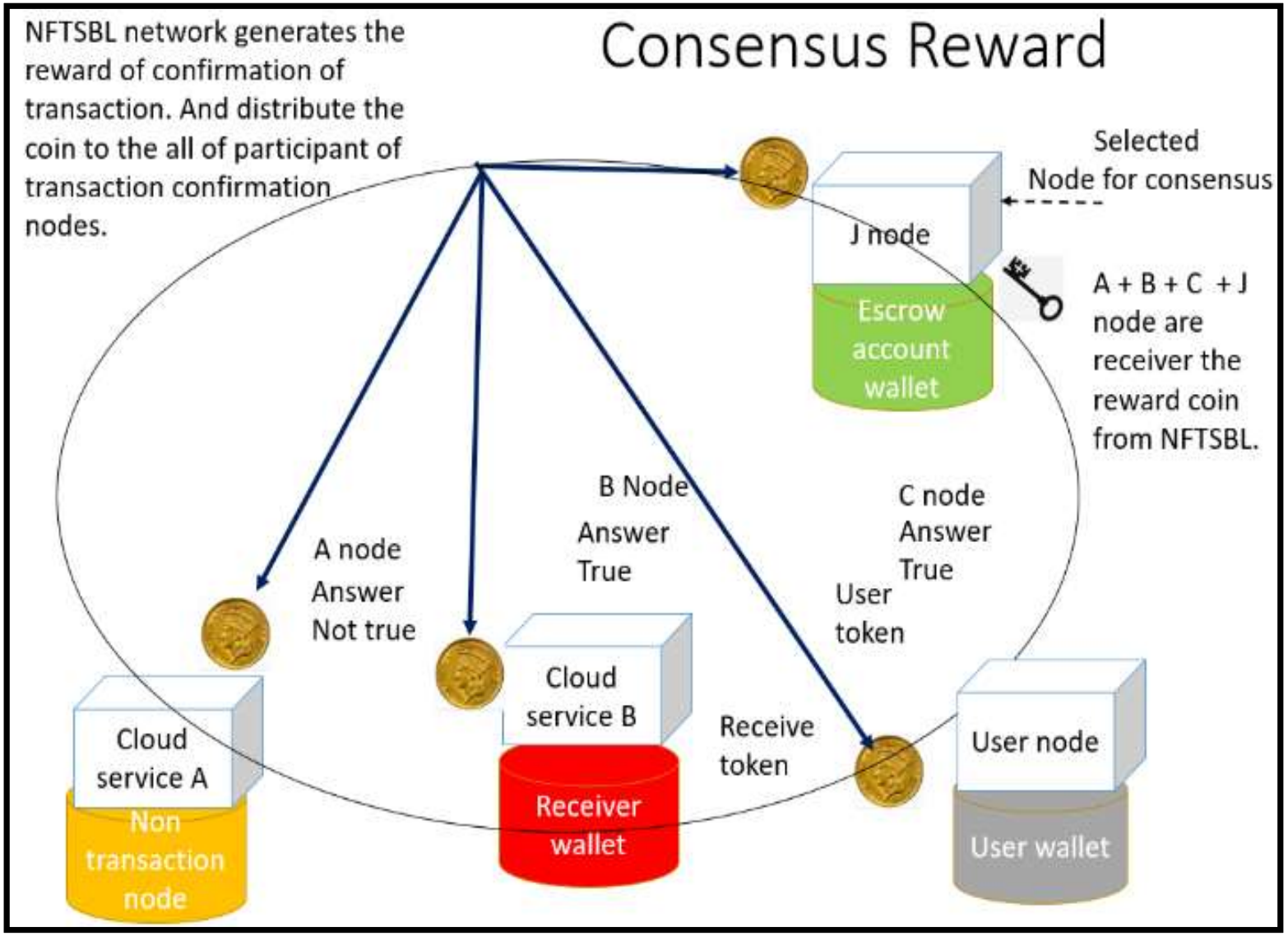
Voting Mining (PoW)

- The motivation of maintain NFTSBL blockchain, it has a function of PoW mining which is using voting of confirmation for each transaction.

- PoW and reward distribution are defined by NFTSBL algorithm. It selects multiple nodes for confirm a transaction node randomly.

- If the consensus was established, then all of selected nodes are received the reward of token.

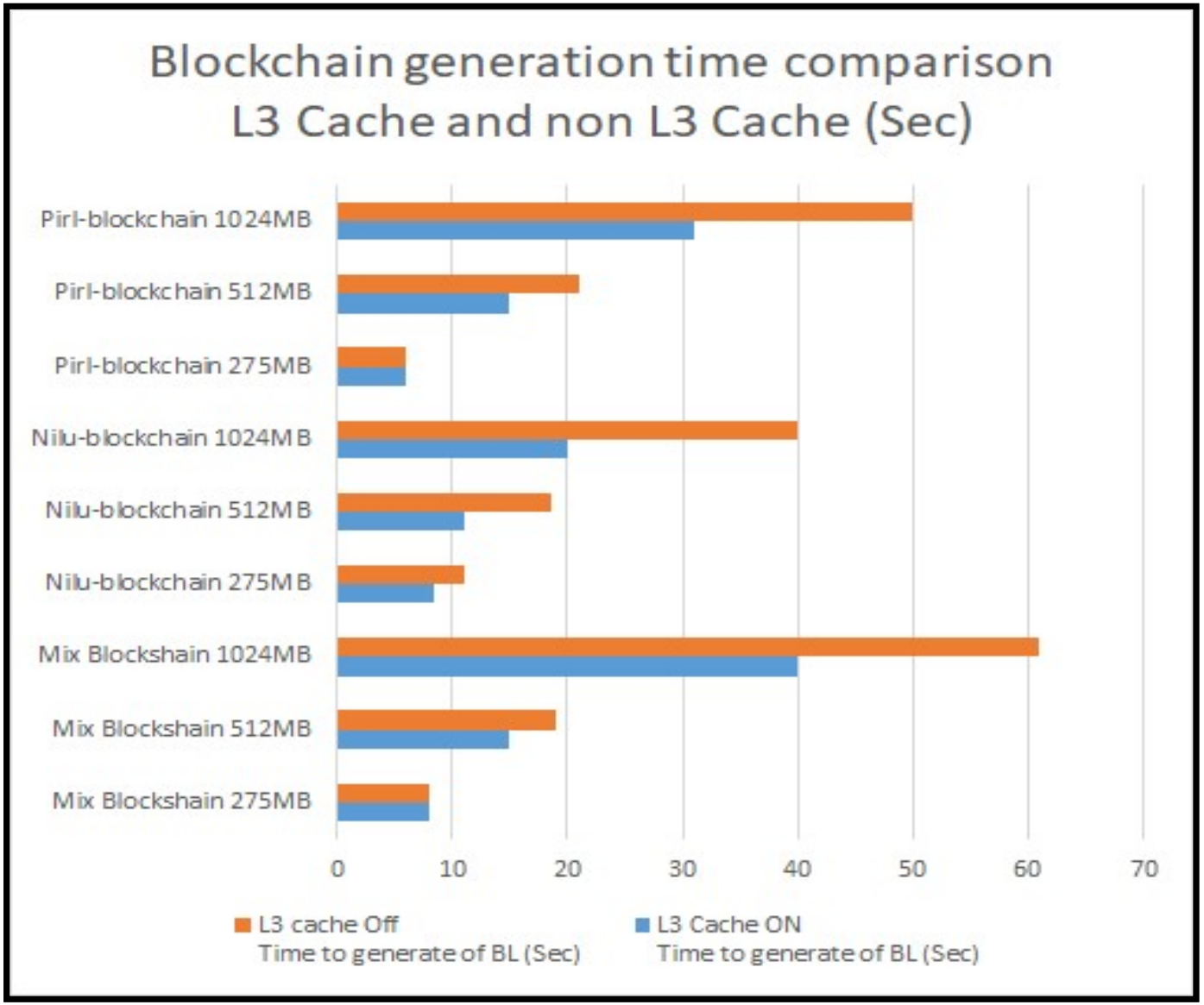
- Thus, all participating nodes can get the reward opportunity if they reply the transaction confirmation within a time period.


Consensus Reward
NFTSBL network generates the reward of confirmation of transaction. And distribute the coin to the all of participant of transaction confirmation nodes.
Selected Node for consensus
J node
Escrow account wallet
A + B + C + J node are receiver the reward coin from NFTSBL.
B Node Answer True
C node Answer True
A node Answer Not true
User token
Cloud service A
Non transaction node
Cloud service B
Receiver wallet
Receive token
User node
User wallet

Latency time enhancement

- To achieve low latency NFT transaction consensus, kernel level cache on node memory was implemented.

- Environment of test computer system is 1) Kernel Cache Size: 1 GB with write back policy, 2) Platform: Windows Ultimate 64-bit Edition, 3) Blockchain utilized: mix, nilu & pirl blockchain, 4) Time measurement by stopwatch. Three different blockchain 275 MB, 500 MB and 1 GB were selected.


Blockchain generation time comparison
L3 Cache and non L3 Cache (Sec)
Pirl-blockchain 1024MB
Pirl-blockchain 512MB
Pirl-blockchain 275MB
Nilu-blockchain 1024MB
Nilu-blockchain 512MB
Nilu-blockchain 275MB
Mix Blockshain 1024MB
Mix Blockshain 512MB
Mix Blockshain 275MB
0
10
20
30
40
50
60
70
L3 cache Off
Time to generate of BL (Sec)
L3 Cache ON
Time to generate of BL (Sec)

Conclusion

- NFTSBL (Non-Fungible Token) secure blockchain using voting function with escrow account on J node is proposed.
- The system architecture was shown along with reward distribution policy. The concept of escrow account to avoid mistake of coin transfer was proposed also.
- To enhance the confirmation time, we had implemented kernel level cache.
- The evaluation of latency time in NFT blockchain was shown at implementation session. It shows around 50% reduction of time of blockchain generation at 1024MB size packet.

Any question, please contact to us.

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