

DISTRIBUTED LEDGER TECHNOLOGY IN BANKING

M.Pavithra¹, R.Rajmohan², M.Pajany³, R.Rajesh⁴, D.Raghu Raman⁵

¹Department of ECE, PEC, Puducherry, India

^{2,3,4,5}Department of ECE, IFET, Villupuram, India

ABSTRACT—Banking sector is the essential need in today's environment. Millions of transaction can be handled by the banking industry per day, because of the impact of cloud and internet. Cloud makes everything as a centralized so it is easy to access the data. The major thing need to be considered here is security and trust. Of course cloud provides security through some cryptographic algorithm. What about trust? It is because all our details are maintained by a service provider who in turn is a third party. We can't ensure that third party providers are trustable. So in order to ensure the trust ability and high security an emerging technology will come into the picture called Decentralized Ledger Technology (DLT). Distributed Ledger Technology makes everything as decentralized and each and every user will maintain their own data they need not to be depend on any centralized third party. This paper will explain about changing a banking sector towards a decentralized network.

IndexTerms: Decentralized ledger technology (DLT), Banking, Trustability, Security.

INTRODUCTION

Conventional banking technology can have several advantages compared to traditional banking. Online banking an electronic payment system makes ease banking with the help of World Wide Web. Cloud computing paved a way to make banking as centralized and make everything as an online. Cloud computing makes a transaction very simple the user just need a social security number to perform the transaction. But the major problems faced by banking sector are maintenance cost is high, Fraudulent attacks because of centralized server, and the main challenge is to ensure trust, transparency and security. It may require manual processing and documentation which is mote time complexes. Moving a banking sector towards decentralized networks will ensure transparency, trust, security and it makes everything as digitalized so no manual work needed to maintain the user

data. Decentralization does not need any centralized party to maintain the data each and every user is responsible for their own data. This can be possible with the help of distributed ledger technology one of the recent technology proposed by the satoshi Nakamoto [1]. DLT is the technology behind the bit coin crypto currency; bit coin is one of the decentralized digital currencies where it does not need any central banking for transaction. In a private network every user share a ledger it maintains the transaction details of client in the network which can be observed by each other client in the network but they can't be modify without knowing private key of the particular node.

1. BLOCK CHAIN

Distributed ledger system is also known as the block chain [2]. Block chain is a distributed database shared by all nodes. The data's can be replicated across multiple peer to peer networks. It is based on the hashing technique that is each node maintains the details about its predecessor node. The key value of previous node is maintained by its pivot node. Block chain is a new buzz word in an internet world because of its security it will completely change a conventional internet into decentralized networks soon. And block chain [3] was first used at 2009 in the crypto world bit coin. Bit coin [1] is just a digital currency which does not need any third party bank t maintain its transaction details and every user know about the bit coin availability of the other user because of block chain. Later Block chain will trends towards different industries include education, finance, banking, healthcare and cyber security etc... because of its transparent, trust and its security nature. The block chain can have a major impact on banking sector it makes decentralized digital banking now multiple banks will try to shift towards a block chain technology.

A. Core concept behind block chain

In fact, in block chain [8, 9] the records can be gained access by anyone and it is public (transparent) to all with a

trustworthy environment. Consensus mechanism is an agreement that every block chain user must agree it will contain some rules and service level agreement. And fresh client are supplemented into the block chain network through mining algorithm different miners will work independently to solve the mathematical puzzle, this is not the simple problem it takes several steps to solve once the problem was solved new block can be generated and it will be added to the existing block chain network. And the mathematical puzzle will difficult, when the demand increases (Currency value in terms of banking) and easy when the demand decreases. The fresh block can be supplemented to the existing network through the merkle tree; it will maintain the sequential direction of the generated block in the block chain network. Merkle tree is based on the key concept called hashing. If new value is added in to the network then the hash key value of the previous node can be maintained by new node and so on.. So the ledger is publicly shared and trustable. The structure of Merkle tree is illustrated in the fig 1.1, the hash value of the child node will combined to form the root node. Merkle root combined four child nodes and now this root will added as a header of new block with some additional information includes previousblock's detail and time stamp. The previous block hash value ensures that the data can be hacked or cheated and the time stamp maintains the data existed time. Once the new block is created it will maintain all the details from the birth of the node it can be altered or erased by anyone in this world [11].

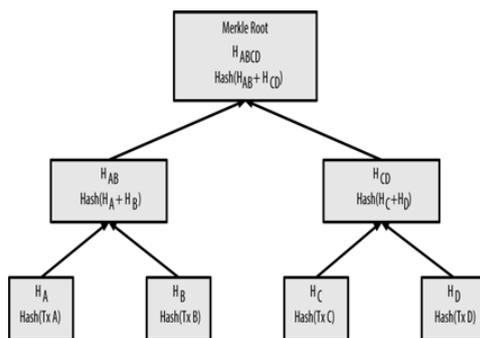


Figure 1: Structure of Merkle tree

B. .How Block Chain Works

Consider a simple example to know the working procedure of the block chain [7]. X wants to send some

amount (RS.3000) to Y. Actual amount in X is 6000 and Y is 2000. Now X will send an amount to Y before that it will encrypt X value using its private key which can be generated using block chain wallet. Now the encrypted digitally signed message will transform over the block chain network each node in that network will know about the transaction and they update its ledger but none of the node will able to decrypt the data. Once the node Y gets a message it will be able to update the value because Y is an authenticated user which will know X's public key with the help of the public key Y will decipher the info. If any node in the network will try to change the message the key value get affected so it is easy to identify the fraudulent attacks. No matter what's the message size was but the generated key value is founded on the Secure Hash algorithm length (SHA 256, 512,224 etc.). Diagram 1.1 illustrates a working mechanism of block chain technology.

C. Block Chain in Banking

Block chain [4] can be applied in banking to reduce the manual work and cost and to ensure security among the peers. Among 24% of the technical people will believe and start use of block chain technologies in all sectors [5]. In India ICICI and AXIS bank will step into a block chain technology [10]. The transaction in banking can be done as described in the above diagram. In banking Block chain can be implemented in five different sectors which can be discussed as follows.

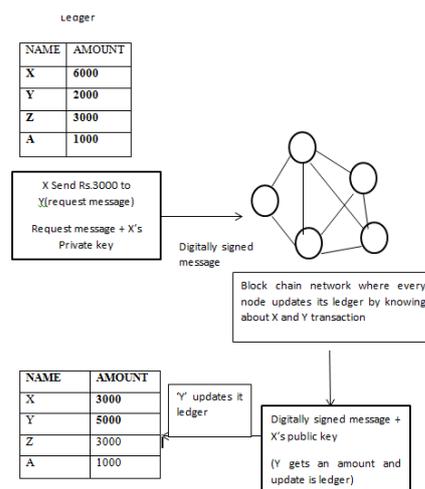


Figure 2: Block chain working mechanism

2. CLEARING AND SETTLEMENTS

Clearing is the process of ensuring the payment order; it is the prior step before the settlements. Settlements are the act of transaction or fund transfers between the two different parties. In this process the block chain can be used to improve the efficiency. Accenture ensure that biggest bank will save 10 billion dollar to improve efficiency in the clearing and settlement field by using block chain technology. Many banks will try to reconstruct their clearing and settlement process towards the block chain technology. For example Australian securities exchange will try to reconstruct their clearing and settlement process towards the block chain technology. And also DTCC will work with IBM to shift their finance process towards a block chain.

A. PAYMENTS

Payment is same as the above method illustrated in the above figure 1.2. For payment bit coin mechanism, is used and it needs a digital currency as an input. IBM launches a payment system using block chain in many banks and they will make an indenture with a customer in Indonesia and plan to record every transaction details in block chain. And some top banks in the world will replace the existing centralized payment into a decentralized payment through block chain. HSBC bank in UK plans to coordinate the 22 biggest banks in the world to make a international block chain payment system. AXIS bank in India has recently launched the block chain based internationally payment service with the help of Ripple block chain technology. Like this the world of block chain will make everything as an anonymous.

B. Identity

Identity is an important factor of every user in the network. Consider a banking network it provides four level authentications to identify a valid user in terms of electronic cash system. Even though it provides four level identities the unauthorized person will access user information once they will get a security number. And other thing is the user has to register every time if they are new to the particular service provider, but in block chain once the user get registered this information will enough for the all service provider because of its transparent nature. The user will know everything is going to a decentralized and publicly viewed by others so they will be aware of their privacy this will not blindly store all information in the ledger. One of the benefits of block

chain technology is the user will decide to whom their identity will be shared here the central authority are not there to validate your identity. Private Key management is an challenge in block chain technology the user's private key is the identity of an user. In centralized system if the private key was stolen by someone, the user identity will theft. But in block chain user will have rights to choose their third party and they have to decide to whom the private key can be shared.

Accenture recently worked with Microsoft to create a block chain identity system to know their customer [12]. In finance and banking know your customer (KYC) will help them to develop their companies.

C. Smart Assets

It will make everything as a digitalized. In trade and finance the paper works including an invoice, copy rights etc. into digitalized. These details can be shared in the real time shared ledger and can be accessed by the two business parties who will exchange their goods. Already it revolutionized trading sector. World's first block chain smart assets NEM initially released with the crypto currency symbol XEM which maintains a secured shared ledger for transaction. The smart assets system developed by NEM contains four basic components called address, mosaics, namespaces, and transactions.

- 1) ADDRESSES: It can be unique and it will stores the business deals, contracts, properties etc. with these it will hold some et of coins for transaction
- 2) MOSAICS: It will in maintain the reward points, stock shares and customer tokens (tokens may be something like a digital coin).
- 3) NAMESPACE: Unique place to access the NEM sites. It may be your web address or home address through which you can access the NEM site.
- 4) TRANSACTIONS: It maintains transferring details. The address transaction between the mosaics and also maintain some transactions configurations.

3. BLOCK CHAIN ADVANTAGES

The decentralized environment has led block chain to have lots of advantages in different sectors. In terms of banking the advantages of banking can be elucidated as follows [6]:

1) **Cost Savings:** It reduces the work of central coordinator so user need not to pay any cost to the centralized network and also it reduces the documentary fraud in centralized network. The user need not worry about the currency volatility due to the use of inter payment system. And the payment and settlement is a simultaneous process in the block chain technology so it reduces the additional cost required to the independent process.

2) **Efficiency:** If single nodes in the network will fail other nodes will able to operate efficiently. Single point of failure is not experienced and it is a time consuming process because there is no centralized authority to verify and responds the validation to the end user.

3) **Transparency:** Merkle tree will maintain all the transactions in sequential imperative and the transactions will be purely immutable transaction which can be publicly viewed and updated by the end user. It makes everything visible to everyone in the network.

4) **Security:** The network is highly secure without knowing the private key the identity cannot be theft and key idea here is the private key itself will be handled by the owner of the key. And they will share their identity only to the trusted entity that's why security is more in the block chain network.

4. CONCLUSION

DLT will make great impact towards the banking technology now days it makes everything as a decentralized and completely remove the need of central authority like cloud to maintain the user data's. Many banks will change their environment into a decentralized network. In future everything will be a decentralized because of rapid growth in block chain technology and only digital currencies are the trends in future decades. Not only in the field of banking the block chain technology involved it will change the need of centralized authority in every filed including health care, education, Automation , cyber security. Future decades must completely rely on the block chain network.

REFERENCES

- [1] Block chain and Distributed Ledger Technology, available at: <https://blockchainhub.net/blockchains-and-distributed-ledger-technologies-in-general/>
- [2] A Measured Approach” White paper cognizant report, 2017
- [3] “Application of block chain technologies to finance and banking sectors in India” White paper Institute of development and research in banking technology (IDRBT),2017
- [4] “Block chain in banking” White paper , Deloitte, 2017.
- [5] Morgan Stanley, “Global insight block chain in banking” , 2016.
- [6] Ye Guo* and Chen Liang, “Blockchain application and outlook in the banking industry”, 2016
- [7] Block chain working, available at: <https://medium.com/@micheledaliessi/how-does-the-blockchain-work-98c8cd01d2ae>
- [8] Block chain basics, available at: <https://inc42.com/buzz/understanding-basics-blockchain/>
- [9] Block chain tutorial, available at: <https://www.edureka.co/blog/blockchain-tutorial/>
- [10] Block chain in banking, available at: <https://www.accenture.com/in-en/insight-blockchain-technology-how-banks-building-real-time>
- [11] Block Chain insights, available at: <https://tangelo.co/insights/blog/techs-must-have-reference-guide-to-blockchain-and-cryptocurrency>
- [12] Block chain power up , available at: <http://www.scmp.com/tech/innovation/article/2099212/blockchain-powered-system-help-11-billion-people-establish-their>

