Blockchain Technology in Indian Banking System – Challenges and Scope

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1. One-page note

Abstract

There has been a buzz about BCT (Blockchain Technology) for quite some time now. It has been perceived as the disruptive technology that will transform the traditional banking system. In this study we aim to understand why BCT is immutable, less time consuming and secured. We will also investigate the Merkle tree or Hash tree and understand the immutability characteristic of blockchain. Having said so many advantages of BCT, we would also like to explore why it is still not implemented by the banking institutions in full swing. As a part of this study we will attempt to find the use cases of BCT in banking sector. We will conclude the study with the understanding of the future scope in the implementation of BCT in banking sector. We will be using the exploratory research technique for this study. We will be reviewing the literature available from earlier studies and the reports published by other institutions.

1.1 Motivation

There have been several drawbacks of traditional banking system. However, the sector has witnessed major evolution since 1995. BCT has taken the banking sector by storm. Earlier DLT (Distributed Ledger Technology) was considered as a plan on paper but the recent developments and application of DLT by several banks have carved a way for futuristic scope.

1.2 Problem Statement

In this study we will try to analyze why blockchain is being preferred over the traditional banking system. We aim to identify the use cases for the BCT to be implemented in banking sector. We will also investigate the drawbacks of implementing the BCT and the way forward for the financial institutions to mitigate it.

1.3 Methodology

For the study we will be using the exploratory research method. We will be reviewing the literature available on web for our study by various researchers and financial institutions. We have referred to the data which does not require any prior approval to be used in further
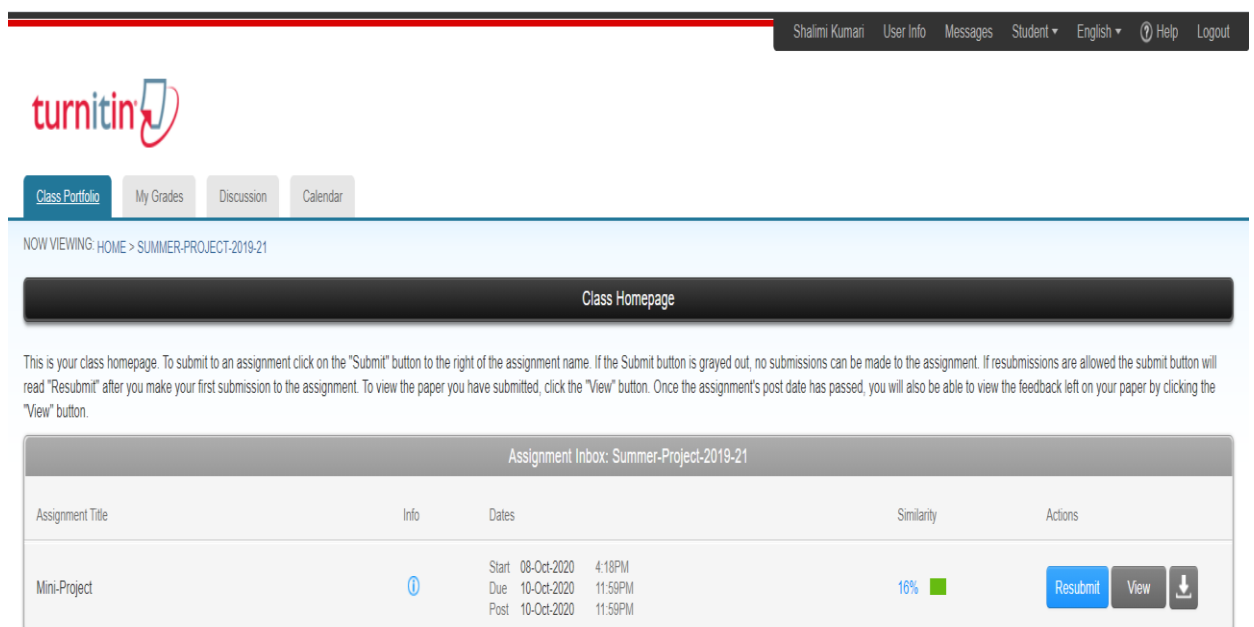
studies. We have also referred various YouTube channels for the understanding of the security and hash tree algorithm used in blockchain.

1.4 Possible outcomes

At the end of the study we will have a clear understanding of BCT and why it is being foreseen as the future technology. This study will also impact our thinking process and will leave our minds to explore deeper into the advancements of BCT in the banking sector.

2. Plagiarism report

We have checked the plagiarism using the Turnitin application. The detailed report of the similarity is attached.

3. Introduction

In India we have observed the evolution in banking technology in majorly three phases. We have categorized them in three-time periods. The first era began in the year 1995 and lasted until 2005. During this period distribution was the core. Distribution emphasized on reaching the masses including the rural areas. The technology which came in during this period were ATMs, core banking and internet banking. The business goal evolved around being complete incumbent and having large branch network. The second phase began in the year 2005 and lasted until 2015. The essence of this phase was product. The business goal evolved around deepening relationship with multiple products. The technological

advancements during this phase were data warehouse coming into picture, one view of the customer and virtualization including automation and efficiency. The third phase is being observed from 2015 and till date. Digitalization is the essence of this phase. We have seen revamped core, APIs and SDKs and various marketing platforms. Artificial Intelligence has transitioned tech productivity enhancement tool to business enablers. We have BCT driving the country towards digitally sound and robust economy. Blockchain will disrupt and revolutionize many banking and financial institutions. BCT can be considered as mathematical model for processing, securing and finalizing transactions. In this study we have attempted to find the use cases of BCT in banking sector. We will also be addressing the challenges in the implementation of BCT and then investigate how it can be mitigated.

4. Literature review

We have referred to the work of Varghese, Sharma and Singh who have mentioned in their study how BCT has helped India in digitizing its economy. To understand the application of blockchain we have referred to the paper 'Blockchain application and outlook in banking' by Guo-Liang. In both papers the limitations of blockchain have not been discussed. To understand the limitations of the BCT in banking system we have referred to the report published by Deloitte and IDRBT. In these papers the comparison of the traditional banking and the BCT implementation in banking is mentioned. In the various papers referred to the hash algorithm is not explained properly. We have referred to different channels to gain knowledge on the hashing and then we have mentioned it in our study. Also, the progress in the banks in India in blockchain have been mentioned in our study

5. Problem statement

There are several issues which can be highlighted in the traditional banking system as below.

   i.   Transaction fee – There is a high amount of transaction fee that is being levied by the banks for the transfer of funds. For e.g.: If a party1 wants to transfer Rs. 100 to party2 through a bank that charges a transaction fee of 2%, then party2 gets only Rs. 98. There is report from SNL financial and CNN money which says that JP

Morgan Chase, Bank of America, and Wells Fargo earned more than $6 Million from ATM and overdraft fees in 2015.

ii. Net frauds and Account hacking – There are several incidents in the banking history of net frauds and account hacking by asking for the OTP token or password or pin.

iii. Financial crisis and crashes – Many of the times banks give money to some blindly trusted third party and then it is lost somewhere due to internal fraud. Also, several times banks provide loan to individuals who are unable to repay it back and account for NPAs which are the major concern for banking sector these days.

To avoid the above issues in future, banks are adopting the blockchain technology. Blockchain is a decentralized, distributed ledger that is completely open to everyone. Solutions provided by blockchain are as follows:
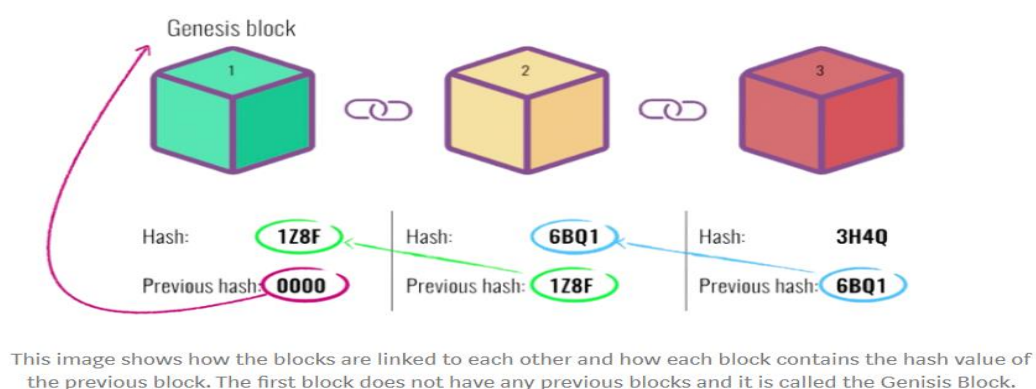
i. Decentralized System – Blockchain provides a decentralized approach. We have banks that are controlled and governed by the central or federal authorities. In the decentralized system everyone who is part of the system becomes equally responsible for the growth and downfall. Everyone has the power.

ii. Public Ledgers – In the general banking system if a customer wants to know the transactions done on a particular day in a year, he/she needs to go to the application of the bank or to the bank to get the passbook printed. The transaction detail is available only for that user. Whereas in the blockchain details of all transactions is open and robustly available to all. For this one must just join blockchain network and download the complete list of transactions since its initiation. Complete ledger is publicly accessible however details of the people involved in the transaction are completely anonymous.

iii. Verification – Double spending issue is being resolved by the verification technique in blockchain. Every single transaction in it is verified by cross-checking the ledger and signal of the transaction is sent after few minutes at a particular node. It uses several complex encryptions and hashing algorithm.

iv. Low or no transaction fees – Usually zero or low transaction fee is imposed by the BCT. The transaction fee imposed by banks are way more than the transaction fees imposed by the blockchain.

6. Methodology

In this study we have used exploratory research technique. We have referred to the literature available online regarding BCT. We have also referred to the reports by various financial institutions. All these reports are available on the web and does not require any prior approval for being studied further. To understand the underlying security mechanism of BCT we have referred to various YouTube channels. The reference of these channels is mentioned in the reference section.

7. Results or findings

Blockchain is a distributed open ledger. We also call it DLT (Distributed Ledger Technology). In BCT the database is spread among various nodes. Instead of maintaining central entity to manage, blockchain uses peer-to-peer technology. BCT has an interesting property that once a data is recorded inside a blockchain it becomes extremely difficult to change it. This is because SHA256 being the core hash algorithm used in BCT. This gives the immutability characteristic to BCT. It is a one-way cryptographic function and is a fixed size for any given source text. In the case of SHA-256 (Secured Hash Algorithm) no matter how large or small the data is, the output hash will be 256-bits in length. The important characteristic of hash function is that the slightest change in data will change the entire hash altogether. In blockchain, each block consists of data, hash and the hash of the previous block. The hash of the previous block allows the blocks to be represented as blockchain.

This image shows how the blocks are linked to each other and how each block contains the hash value of the previous block. The first block does not have any previous blocks and it is called the Genesis Block.

Hash can be compared to a fingerprint. It identifies a block and all its component and is unique. Once a block is created its hash is calculated. Changing something inside the

block will cause the hash to change. In the diagram above we can see the hash of each block is unique. The first block in the chain is known as the genesis block. The hash of the previous block is stored in each block. It is this technique that makes the block so secure. If the data of the second block is tampered, the hash of the block gets changed. This in turn makes the block 3 and all the following blocks invalid because they no longer store a valid hash of the previous block. However, due to fast paced technology one can tamper the block and recalculate the hash of other blocks easily to make blockchain fall in place. To overcome this, we have proof of work. This mechanism slows down the creation of new block. It specifically depends how much time one would spend to create a new block and add to the chain. So, if one tampers the blockchain, they need to recalculate the proof of work for all the following blocks. So, the security of blockchain comes from hashing and proof of work mechanism. There is one more way in which BCT secure themselves and that is being distributed. It enables peer-to-peer network and everyone can join. Now when a new block is created, that block is sent to everyone in the network. Each node verifies the block to make sure it has not been tampered with and if everything checks out each node adds that block to the blockchain. This gives way to the integrity of the BCT. All the nodes in the network create consensus.

BCT also has a distinguishing feature known as Smart Contracts. In this feature a predetermined terms and conditions are stored in the lines of code and they are executed automatically when those conditions are met. For example, if party A and party B are entering in a bet that if India wins a match the winner gets all the amount. The betting amount is taken to be Rs. 100. Now Rs.100 is collected from both the parties and is kept safely as per smart contract and whichever party wins the total of Rs. 200 will be cashed in their respective account. Smart contracts make the money lending and loan system unavoidable and the risk involved in money lending is reduced.

The use cases identified as the part of our study are below:

i. KYC – Know Your Customer is one of the time consuming and costly operations at bank. Collection of documents from the customers and updating the KYC documents after each transaction is a tedious task. BCT can help in doing this very conveniently and in lesser time. This can be done by automatically by updating the documents after each successful transaction.

ii.   Trade Finance – Transfer of funds across the border are very costly if we do it the traditional way. The 3rd parties charge a handsome amount of money. This can be minimized, and the process can be made faster and secured by using BCT

iii. Credit and Loans – The repayment of loan and recovery of the amount is exceedingly difficult in the traditional banking system. The banks are struggling these days with NPAs. The smart-contracts in BCT helps in more reliable loan-execution. The repayments are assured with BCT.

iv.   Faster Payments – The removal of the 3rd parties will assure faster and cheaper payments.

v.   Record Keeping – The immutable characteristic of BCT has enabled bankers and other financial institutions to consider it for record keeping.

8. Analysis or discussions or managerial implications

As a part of our study we have found various advantages of using BCT, they are:

i.   Consensus among the nodes – The data in BCT is transferred using peer-to-peer technology and this happens after all the nodes approve the transaction. The complex multi network transaction helps is providing extra security to the data.

ii.   Security – The encryption used in BCT helps it to be immutable and the data cannot be changed. The transactions done over BCT are secured and nearly impossible to be tampered.

iii. Authenticity of the data – The digital signature used in BCT provides non-repudiation and maintains its authenticity.

iv.   Safer and cheaper cross-border transactions – The ease of transferring money cross-borders have been made easier and cheaper due to removal of 3rd parties in BCT.

v.   Transparency – The transactions are transparent and available to each node in the network

vi.   Consistency – The consistency of the data is maintained over the peer-to-peer network transaction. The approval of everyone in the network is required to make a successful transaction. If any of the individual finds any malicious activity the transaction is denied.

Despite all the advantages, the banks and other financial institutions have not yet implemented BCT and replaced the traditional banking system. The limitations of BCT can be concluded as below:

i. Knowledge on BCT – This technology has prevailed in the market since 1995 but still not many people are aware of the implementation part of BCT. Various other institutions are trying to figure out how it can be implemented. The true value of BCT is yet to be discovered.

ii. Professionals working on BCT – There are very few developers who are working on the BCT. The technical talent is a hindrance in the development of BCT.

iii. Immutability – As we have discussed earlier the data stored in blockchain is immutable and it is nearly impossible to alter this data. However, in banks and other financial institutions it becomes necessary in certain situations to change and modify the data.

iv. Issues related to key – Cryptography is used in BCT, so we know that there is an involvement of various keys like private key and public key. Sometimes individuals tend to forget the keys which results in loss of money.

v. Consensus in the transaction – The complex multi-node network requires many backs and forth approval for transaction. This becomes a cumbersome task, and a considerable amount of time and resources is wasted in the process.

vi. Regulations – There are no regulations in the Indian Constitution to legalize the transactions made over BCT and to prevent fraud over the channel.

Developments of Blockchain in India

❖ ICICI bank is the first among all the other banks in this race. It has used blockchain technology in the year 2017. They have executed the cross-border trade finance using BCT. They have done this in partnership with Emirates NBD and Infosys Finacle.

❖ ssss Bank in collaboration with Bajaj Electricals used BCT for vendor financing (or supplier financing).

❖ State Bank of India has used BCT for KYC process and smart contracts.

❖ Deloitte and IDRBT have studied the scope of implementing BCT along with various financial institutions. The reports have been published by Deloitte and IDRBT

separately and it was also presented by IDRBT in 2017 in a conference in Hyderabad IDRBT separately and

9. Conclusion

At the end of this study we now know the advantages of using the BCT in banking system. We have a clear understanding how BCT will revamp the traditional banking system. But we cannot deny the fact that end to end implementation of BCT in the banking system is not possible due to its limitations. However, implementation of BCT along with the centralized banking system will automate the organizational processes.

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