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Blockchain and its implementation in Indian banking industry

Darshan D Dighe S

PDVVPCOE, Ahmednagar

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Abstract

This study aims at elaborating the blockchain technology, working of blockchains, reliability of blockchain technology and its implementation in Indian banking sector. Blockchain technology is a core, rudimental technology with promising application prospects. The current banking industry is affected by financial innovations, cyber attacks, economic evolution, increased number of transactions. Accordingly, banking industry requires urgent modifications. However, as blockchain is a major breakthrough in data storage and information transmission, it might fundamentally transform the existing financial and economic models.this will bring a revolutionary change in the FinTech industry. Transfiguring the current blockchain technology(BCT) can lead the banking industry to greater triumphs. This paper also covers various advantages brought out by BCT such as automated verification process and eliminating the need for multiple parties to confirm manual validity of transactions. In India, many major and minor banks have initiated the implementation of blockchain technology(BCT) at different stages. Eventuually they all have noticed various advantages in various processes where BCT is put into use. With time and innovation in BCT, it will change the picture of banking in India. BCT also developed to provide 'Real-Time Early Warning Systems' which is first--ever real-time monitoring system to tackle Non performing Assets(NPA). this product is currently running in the top public and private sector banks in India and across the globe. "rt360- Real-Time Early Warning System for Credit Monitoring" is their AI-based innovative upgrade. Working on three core principles — integration with source systems, real-time scanning of transactions, and issuing reverse feedback, the real-time EWS has the potential to detect and prevent suspicious or fraudulent transactions, which is a huge step towards effortless and non time consuming transactons. BCT banking processes will eliminate the intermediaries with more faster, transparant and cost efficient transactions. BCT will also deliver trust, decentralisation and security in transactions.

Introduction

Blockchain Technology

A blockchain is a decentralized ledger of all transactions across a peer-to-peer network. Using this technology, participants can confirm transactions without a need for a central clearing authority. Blockchain is a system of recording information in a way that makes it difficult or impossible to change, hack, or cheat the system.The original Blockchain is an open-source technology which offers an alternative to the traditional intermediary for transfers of the crypto-currency. The intermediary is replaced by the collective verification of the ecosystem offering a huge degree of traceability, security and speed.

A blockchain is essentially a digital record of transactions that is duplicated and distributed across the entire network of computer systems on the blockchain. Each block in the chain contains a number of transactions, and every time a new transaction occurs on the blockchain, a record of that transaction is added to every participant's ledger. The decentralised database managed by multiple participants is recognised as Distributed Ledger Technology (DLT).Blockchain is a type of DLT in which transactions are recorded with an immutable cryptographic signature (hash).

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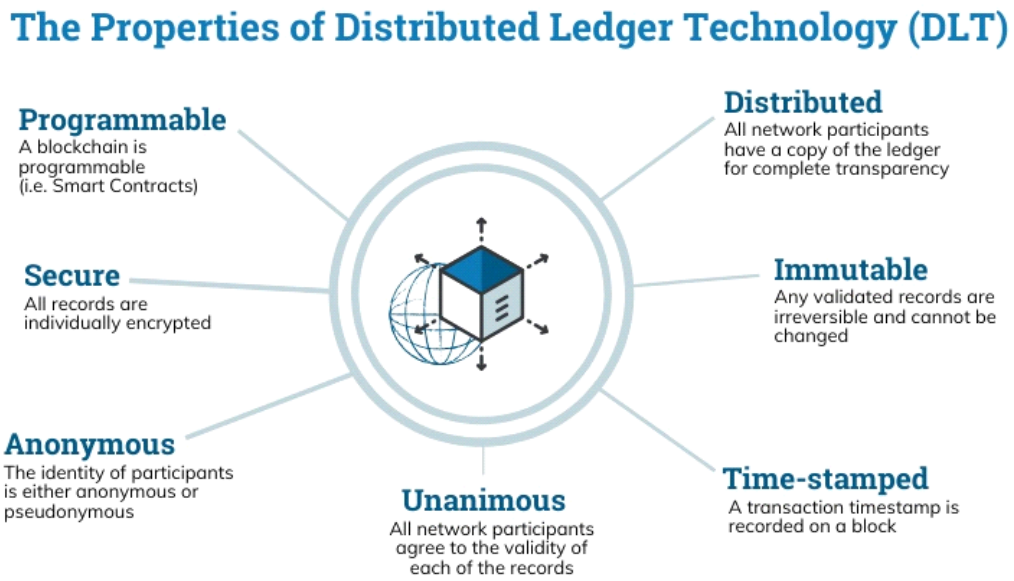

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Hype around Blockchain technology

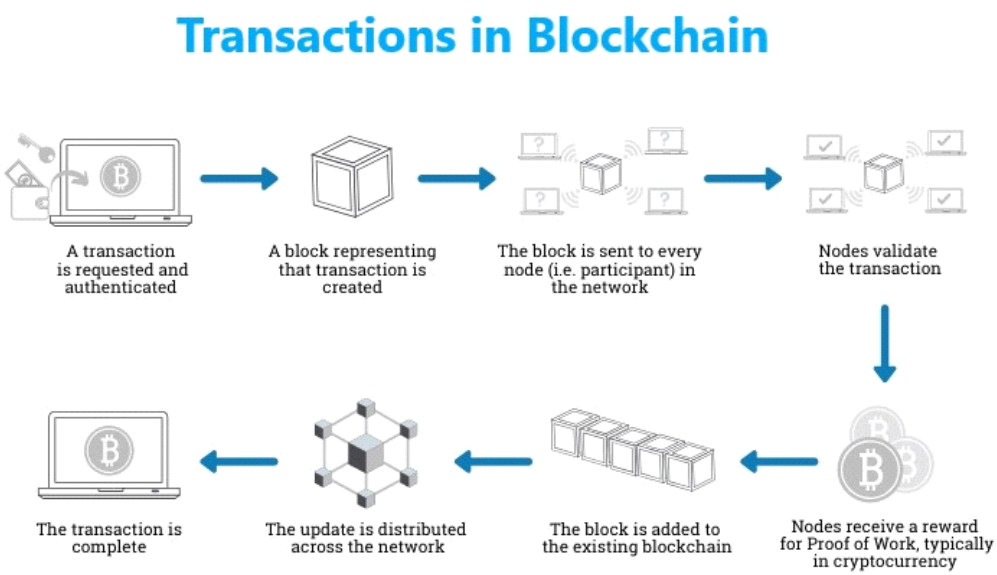
There have been many attempts to create digital money in the past, but they have always failed.

The prevailing issue is trust. If someone creates a new currency called the X dollar, how can we trust that they won't give themselves a million X dollars, or steal your X dollars for themselves?

Bitcoin was designed to solve this problem by using a blockchain dattabase. Most normal databases, such as an SQL database, have someone in charge who can change the entries (e.g. giving themselves a million X dollars). Blockchain is different because nobody is in charge; it's run by the people who use it. What's more, bitcoins can't be faked, hacked or double spent – so people that own this money can trust that it has some value.

Transactions in a Blockchain

There are several key steps a transaction goes through before it is added to the blockchain. Most important parts of it is authentication using cryptographic keys, authorisation via proof of work, the role of mining, and the more recent adoption of proof of stake protocols in later blockchain networks.



Authentication

The original blockchain was designed to operate without a central authority (i.e. with no bank or regulator controlling who transacts), but transactions still have to be authenticated.

This is done using cryptographic keys, a string of data (like a password) that identifies a user and gives access to their "account" or "wallet" of value on the system.

Each user has their own private key and a public key that everyone can see. Using them both creates a secure digital identity to authenticate the user via digital signatures and to 'unlock' the transaction they want to perform.

Authorisation

Once the transaction is agreed between the users, it needs to be approved, or authorised, before it is added to a block in the chain.

For a public blockchain, the decision to add a transaction to the chain is made by consensus. This means that the majority of "nodes" (or computers in the network) must agree that the transaction is valid. The people who own the computers in the network are incentivised to verify transactions through rewards. This process is 'proof of work'.

Proof of Work

Proof of Work requires the people who own the computers in the network to solve a complex mathematical problem to be able to add a block to the chain. Solving the problem is known as mining, and 'miners' are usually rewarded for their work in cryptocurrency.

But mining isn't easy. The mathematical problem can only be solved by trial and error and the odds of solving the problem are about 1 in 5.9 trillion. It requires substantial computing power which uses considerable amounts of energy. The rewards for undertaking the mining must outweigh the cost of the computers and the electricity cost of running them, as one computer alone would take years to find a solution to the mathematical problem.

The Power of Mining

The Cambridge Bitcoin Electricity Consumption Index estimates the bitcoin mining network consumes almost 70 terawatt-hours (TWh) of electricity per year, ranking it the 40th largest consumer of electricity by 'country'. By way of comparison, Ireland (ranked 68th) uses just over a third of Bitcoin's consumption, or 25 TWh, and Austria at number 42 consumes 64.6 TWh of electricity per year, according to 2016 data compiled by the CIA.

Proof of Stake

Later blockchain networks have adopted "Proof of Stake" validation consensus protocols, where participants must have a stake in the blockchain - usually by owning some of the cryptocurrency - to be in with a chance of selecting, verifying & validating transactions. This saves substantial computing power resources because no mining is required.

In addition, blockchain technologies have evolved to include "Smart Contracts" which automatically execute transactions when certain conditions have been met.

Merkle Trees serve the purpose of significantly reducing the amount of data required to be stored and transmitted or broadcast over the network by summarising sets of hashed transactions into a single root hash. As each transaction is hashed, then combined and hashed again, the final root hash will still be a standard size

Security and storage of blockchain data

Blockchain works by including the identifier of the last block into the identifier in the following block to create an unbreakable and immutable chain. inspite of addition of more and more blocks, blockchain data still remains manageable through an algorith calledd hashing in combination with consolidating data structures (Merkle Tree).

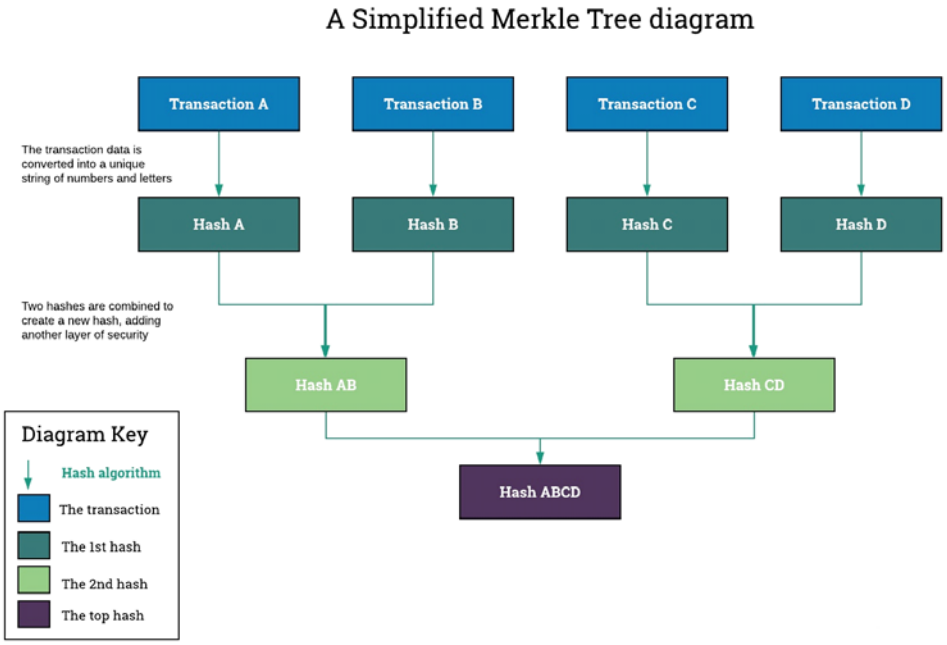
Hashing

When a transaction has been verified and needs to be added to a block in a chain, it will be put through a hash algorithm to convert it into set of unique numbers and letters, similar to what would be created by a random password generator. Then two transaction hashes will be combined, and put through the hash algorithm to produce another unique hash. This process of combining multiple transactions into new hashes continues until finally there remains just one hash – the 'root' hash of several transactions.

Unique and key feature of blockchain is that they only work one way. While the same data will always produce the same hash of numbers and letters, it is impossible to 'un-hash', or reverse the process, using the numbers and letters to decipher the original data.

Merkle Tree

If the hashing process is repeated with exactly the same transactions, exactly the same hashes will be created. This allows anyone using the blockchain to check that the data has not been tampered with, because ANY change in any part of the data will result in a completely different hash, affecting every iteration of hashes all the way to the root. This is known as a Merkle Tree.



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implementation of Blockchain Technology globally

Recently, international institutions, including the United Nations and the International Monetary Fund, (The First Digital Currency Report of the International Monetary Fund [EB/OL]) as well as developed nations, such as the US, the UK, and Japan, have paid close attention to the development of blockchains and explored their application in various fields. Furthermore, China, Russia, India, South Africa, and other countries have also successively initiated research on blockchain technology. In February 2016, the governor of the People's Bank of China (PBOC), Zhou Xiaochuan, mentioned during a discussion on issues related to digital currencies that blockchain technology is a possible option. As such, PBOC has spent considerable resources researching the application of blockchain technology.

Since 2015, a number of major international financial institutions have begun to formulate plans for the blockchain sector. Goldman Sachs, J.P. Morgan, UBS, and other banking giants have all established their own blockchain laboratories, working in close collaboration with blockchain platforms, and published a series of studies on this topic. Goldman Sachs even filed a patent for transaction settlement based on blockchain technology. Additionally, various national stock exchanges, such as the Nasdaq Stock Market and the New York Stock Exchange have also conducted in-depth research on blockchain technology. On December 30, 2015, Nasdaq announced that it had completed its first securities transaction using the blockchain transaction platform Linq. Furthermore, the US Depository Trust & Clearing Corporation, Visa, the Society for Worldwide Interbank Financial Telecommunication, etc. have also expanded their plans in the blockchain technology sector.

Different types of blockchain industrial consortiums have emerged in order to promote the development of blockchain technology and its applications, the R3 blockchain consortium being the most influential among them. It has brought together over 40 of the world's leading financial institution, including Bank of America, Citigroup, Morgan Stanley, Deutsche Bank, and Barclays Bank. As of May 2016, Ping An Bank and China Merchants Bank (CMB) have also joined the R3 blockchain consortium, thus strengthening the exchange and cooperation of top financial institutions in the blockchain technology. Additionally, WeBank, Ping An Bank, CMB Network Technology, among others, have formed the China Financial Blockchain Consortium. The major financial institutions have a relatively positive attitude toward improving the back-end processing efficiency of blockchain technology, and place significant emphasis on its potential to reduce operational costs.

implementation of Blockchain technology in Indian Banking Industry

In a report issued by the steering committee on Fintech related issues, by the Ministry of Finance, Government of India mentioned the importance of Blockchain with a special mention to four applications of blockchain in Fintech. Blockchain technology in India will solve certain issues faced by Indian banks these days.

Blockchain was first used in a cross-border payement. Advantage that BCT provided in the cross-border transaction is jettison of intermediaries involved in the transaction. Using BCT also benifited the Central Banks as they need not keep a tab on the intra-day liquidity as all stakeholders will hold a copy of balances and transaction of every participant. Some of the other virtues of Blockchain in cross border transactions include inalterable audit trails, data and privacy protection by ensuring private or permissioned blockchains, riddance of multiple currencies, and last but not the least, it enables fast-tracked payment process.

The second adduced application in the report was the settlement of securities. The key feature of Blockchain technology is the mechanism of managing distributed and decentralized records. Using Blockchain one can store and facilitate KYC data across all nodes enabling permanent traceability of securities records and transaction.

The third one is utility of Blockchain in trade finance. In trade finance, a letter of credit (LC) facilitate trade and settlement of receivables. The process of issuing LC comes with a whole lot of issues such as incorrect invoicing, multiple invoicing against same collateral, incorrect receivables etc. With the advent of Blockchain, all the aforesaid issues can be eliminated by increasing transaction transparency and security.

Indian Banks are also gaining considerable momentum in adapting the Blockchain technology in the banking industry. There was a consortium formed within the top Indian banks. The main porpous of this collaboration is to implement the blockchain technology in the banking sector. At this point 11 Indian banks have aligned in the consortium to introduce and execute a blockchain-based loan system for small and medium enterprises (SMEs) in India. The banks in the consortium include ICICI Bank, Axis Bank, Yes Bank, HDFC, Kotak Mahindra, Standard Chartered, RBL, and South Indian Bank. India's largest public sector bank State Bank of India (SBI) along with two other banks the Bank of Baroda and the IndusInd Bank are party to the consortium as external members. Another notable development is submission of a national blockchain strategy by NITI Aayog, the Indian government's policy think tank, which is a shot in the arm for the Blockchain technology proponents to garner the relevance of blockchain technology in Fintech.

Internationally, the enterprise blockchain software firm R3 is making great strides by collaborating with several multinational banks to implement Blockchain technology. Recently, R3 signed a strategic partnership with Fintech service provider, Wethaq to develop a platform to seamlessly transact sharia compliant bonds also referred as Sukuk, in Islamic capital markets. Another, notable development was the declaration by top Indian banks ICICI Bank, Axis Bank, and Yes Bank in September 2019 that they would be joining the Interbank Information Network (IIN), an international blockchain-based platform that enables faster cross-border payments that was launched by J.P. Morgan in 2017, which now has an extensive network of about 400 banks worldwide.

In a first, 15 banks in India have come together to establish a new company which will use blockchain technology for processing inland letters of credit (LCs). The company, named Indian Banks' Blockchain Infrastructure Co Pvt Ltd (IBBIC), will have equal shareholding from 10 private sector banks, four public sector banks and one foreign bank.

This include RBL Bank, ICICI Bank, HDFC Bank, Kotak Mahindra Bank, Axis Bank, IndusInd Bank, Yes Bank, South Indian Bank, Federal Bank, IDFC First Bank, State Bank of India (SBI), Bank of Baroda (BoB), Indian Bank, Canara Bank and Standard Chartered. Each bank will invest INR 5 Crore in the company, making the total capital INR 75 Crores. As per reports, the Reserve Bank of India (RBI) has also been kept in loop on the developments and the regulator has no objection in this new venture. This is an interesting development, as Institute for Development and Research in Banking Technology (IDRBT), the technology and research arm of RBI, is also in the process of developing a model blockchain platform for banking needs.

IBBIC will use Infosys Finacle Connect platform to digitise and automate inter-organisation trade finance process on a unified distributed, trusted and shared network. With this, the banking system in India is taking a new leap in digitisation of trade finance, which has traditionally been bogged down by legacy systems and paper-driven processes. The move comes at a time when blockchain technology prototypes across the globe are fast-moving out from experimentation phase to deployment and the government is set to introduce blockchain and cryptocurrency regulations in India.

IBBIC, the newly incorporated entity with stakes from top banks in the country is a potential game-changer for BFSI (Banking, financial services and insaurances) sector in India. Though the scope is currently limited to addressing issues in trade financing, the company can also bring focus to research, exploration and implementation of new blockchain solutions and keep the financial services sector in India at the leading edge of innovation. The company can also collaborate with GoI and regulators to shape regulations in a meaningful way so that the full potential of blockchain technology is unlocked and an enabling environment is created for new advances.

In near future, we will witness more collaborations, regulatory framework, blockchain technology will not only be limited to secific industries like Fintech but we will also notice seeping of the technology inadvertently into our daily lives.

Results and Discussion

There has been a significant growth in the implementation of blockchain technology in the Indian banking industry. India has imerged as a major participant in the race of blockchain research and its implementation. but still there is a wide scope in the research of blockchain technology. Banking sector of India is massively benifited with the implementation of blockchain. India is moving forward in the research and implementation of blockchain technology. Blockchain technology is used in several ways by the Indian Bank's Blockchain Infrastructure Co Pvt Ltd (IBBIC) to mmake a gradual evolution in the traditional banking..

Conclusion

Blockchain technology is an underlying technology which has a great potential to minimize the human interaction in a normal banking transaction. Blockchaint technology basically is a decentralized, distributed ledger which works with the liquid assets. This technology is very sequre and nearly impossible to trace. This features provides a great advantage in the trasactions. As the mediators are eliminated in the process of transaction with the blockchain technology, the transaction becomes treansperant and consumes very less time to complete compared to the traditional way of trasacting. ndia has started implementing the blockchai technology in the banking industry and observed an ease to the central banking body as the paper work gets terminated with the use of this technology. Indian Fintech industry has gained a world wide atttention because of its rapid development that was a result of implementation

of blockchain technology. With time, india is going to develop the blockchain platforms and utilize the technology in banking sector. There's also going to be an evolutionary change in the blockchain technology to miximize the output of various indian sectors.

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