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Blockchain: Study, Application and Future

Ms. Shital Chattar[1], Prof. M. S. Malkar[2], Mrs. S. S. Jogdand[3]
Lecturer, Department of Computer Engineering[1,3]
Head of Department, Department of Computer Engineering[2]
Pimpri Chinchwad Polytechnic, Pune, Maharashtra, India

Abstract: *Blockchain is the central technology which is used to create the cryptocurrencies, like bitcoin. From the invention of steam engine, electricity, and information technology, blockchain technology has been applied in many areas such as finance, judiciary, and commerce. The report is focused on its potential applications and explored how blockchain technology can be used to solve some problems. This report first introduced the feature,technologies and advantages of blockchain technology following by exploring some of the current block chain applications. Some innovative applications of using blockchain technology were proposed, and the benefits and challenges of using blockchain technology also discussed. This report explains the concept, need of Block chain. It attempts to highlights role of Blockchain in shaping the future of banking, financial institutions and in other sectors.*

I. INTRODUCTION

The block chain is one of the genuine digital registers of economic transactions. This can be programmed to record not only the financial transactions but virtually everything of value.In order to use a blockchain, it is required to create a P2P network with all the nodes interested in making use of such a blockchain. Every node of the network receives two keys: a public key, which is used by the other users for encrypting the messages sent to a node, and a private key, which allows a node to read such messages. Therefore, two different keys are used, one for encrypting and another for decrypting.

1.1 Blockchain Architecture

A Blockchain is a chain of blocks which contain information. The data which is stored inside a block depends on the type of blockchain. For Example, A Bitcoin Block contains information about the Sender, Receiver, number of bitcoins to be transferred.

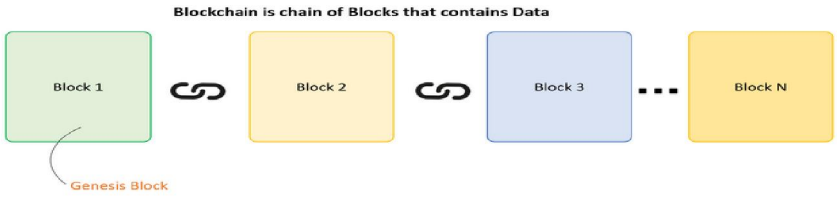

Figure 1: Blockchain Architecture

1.1.1 Block Chain Creation Structure

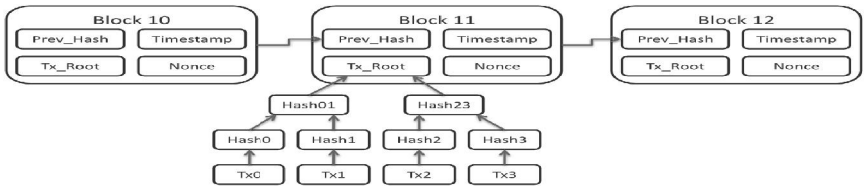

Figure 2: Blockchain Creation Structure

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Blocks are data structures whose purpose is to bundle sets of transactions and be distributed to all nodes in the network. Blocks are created by miners.Blocks contain a block header, which is the metadata that helps verify the validity of a block.

1.2 Blockchain Transaction

Blockchain Transaction

Step 1) Some person requests a transaction. The transaction could be involved cryptocurrency, contracts, records or other information.
Step 2) the requested transaction is broadcasted to a P2P network with the help of nodes.
Step 3) The network of nodes validates the transaction and the user's status with the help of known algorithms.
Step 4) Once the transaction is complete the new block is then added to the existing blockchain. In such a way that is permanent and unalterable.

1.3 Types of Blockchain

1. Public Block chain
   - **a)** A public blockchain as its name suggests is the blockchain of public, meaning a kind of blockchain which is'for the people, by the people and of the people'.
   - **b)** Example: Bitcoin, Lit coin etc.
   - **c)** On Bitcoin and Lit coin block chain networks anyone can do the following things that make it truly public blockchain.
     —>anyone can run BTC/LTC full node and start mining.
     —>anyone can make transactions on BTC/LTC chain.
     —>anyone can review/audit the blockchain in a Blockchain explorer.

2. Private Blockchain
   - **a.** Private blockchain as its name suggests is a private property of an individual or an organization.
   - **b.** Unlike public blockchain here there is an in charge who looks after of important things such as read/write or whom to selectively give access to read or vice versa.
   - **c.** Example: Bank chain
   - **d.** In such types of blockchain:
     —>anyone can't run a full node and start mining.
     —>anyone can't make transactions on the chain.
     —>anyone can't review/audit the blockchain in a Blockchain explorer.

1.4 Blockchain Versions

- **Block chain 1.0: Currency**
  The implementation of DLT (distributed ledger technology) led to its first and obvious application: cryptocurrencies. This allows financial transactions based on blockchain technology. It is used in currency and payments. Bitcoin is the most prominent example in this segment.

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- **Blockchain 2.0: Smart Contracts**
  The new key concepts are Smart Contracts, small computer programs that "live" in the blockchain. They are free computer programs that execute automatically, and check conditions defined earlier like facilitation, verification or enforcement. It is used as a replacement for traditional contracts.

- **Blockchain 3.0: DApps:**
  DApps is an abbreviation of decentralized application. It has their backend code running on a decentralized peer-to-peer network. A DApp can have frontend code and user interfaces written in any language that can make a call to its backend, like a traditional App.

1.5 Blockchain Applications

1.5.1 Blockchain in Cryptocurrency

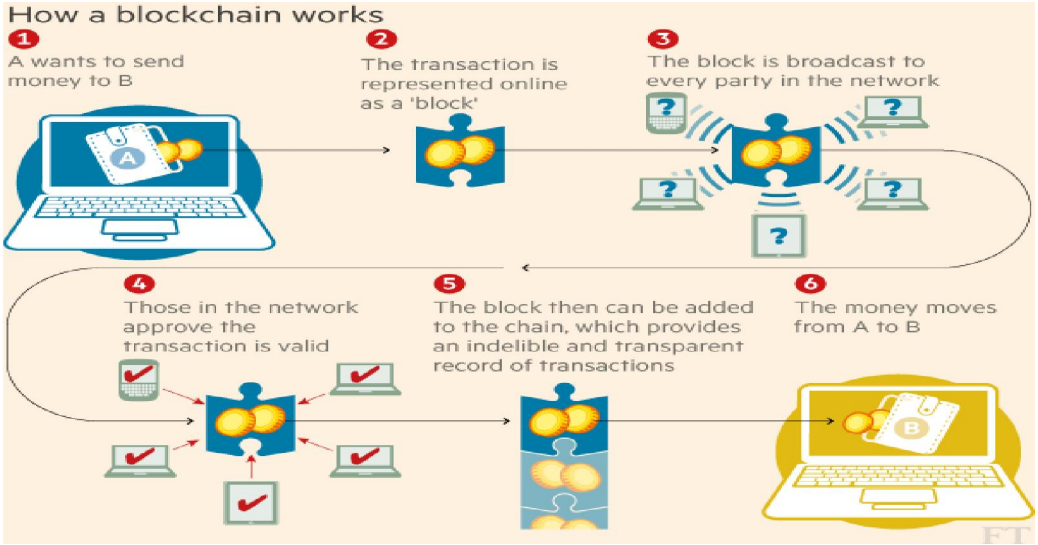

Figure: Blockchain in Cryptocurrency

Every individual peer on the network has the complete ledger of all transactions every carried out on a particular blockchain. Transaction confirmation is the job of miners on the network. Once a transaction is confirmed, it cannot be modified or reversed. It is broadcast across all network nodes to form an immutable record.
Cryptocurrency Transaction are carried out using sets of private and public keys. These respectively encode and decode digital information to allow for the movement of digital assets from one user to another. Such transactions attract relatively low fees and allow for easy payment processing.

1.5.2 Blockchain in Voting

- Just like a bitcoin user carry out transactions by sending bitcoin or any other digital currency to the receiver's digital wallet, blockchain voting systems involves designing wallets for every candidate.
- All voters assigned a digital coin that represents a vote, which can be cast by sending their coin to the wallet of their preferred candidate.
- Like is bitcoin transactions, all the transactions are recorded on the blockchain, voters can see that there was really counted.
- A New York-based initiative is working on the project that will deliver fraud-proof, open-source, completely anonymous digital voting solutions based on the blockchain.

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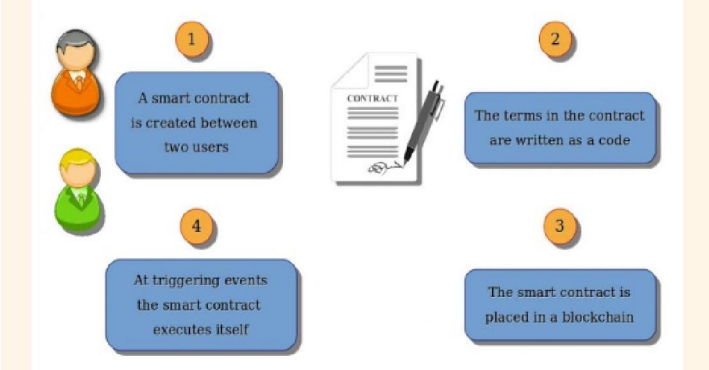
1.5.3 Blockchain in the Smart Contract



It typically works in the following way:

- A user requests a transaction. The transaction can involve contracts, records or cryptocurrency
- The request is broadcast to a P2P network consisting of computers,called nodes
- The transaction and the user's status are verified using known algorithm.
- On successful verification, the verified transaction is added to a block with other transaction
- The block is added to the blockchain.

1.5.4 Cross Border Payments

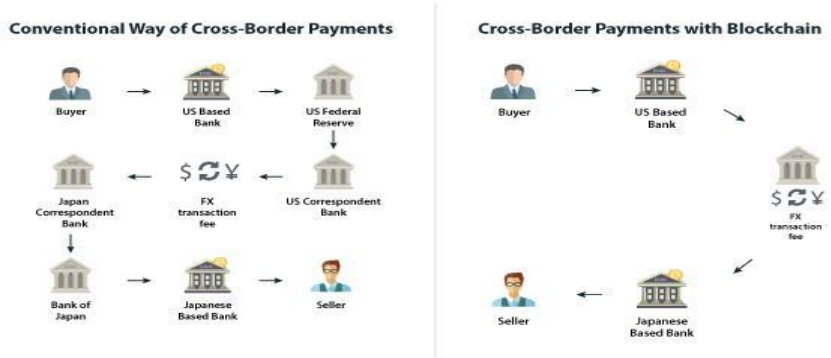


Figure: Cross Border Payment

Traditionally, the transfer of value has been both expensive and slow, and especially for payments taking place across international borders. One reason for this is that, when multiple currencies are involved, the transfer process typically requires multiple banks in multiple locations before the intended recipient can actually collect his or her money. There are existing services to help facilitate this process in a faster way, but these tend to be quite expensive.

Blockchain technology has the potential to provide a much faster and cheaper alternative to traditional cross-border payments methods. Indeed, while typical money remittance costs might be as high as 20% of the transfer amount, blockchain may allow for costs as low as 2%, as well as guaranteed and real-time transaction processing speeds. There are hurdles to be passed, including regulation of cryptocurrencies in different parts of the world and security concerns. Nonetheless, this is one of the most promising and talked about areas of block chain technology application.

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II. FUTURE OF BLOCKCHAIN

2.1 Google will be working on its own Blockchain

- Google will come out with Enhanced version of blockchain.
- ShridharRamaswamy, Google advertising chief, looking at blockchain and said existing core technology can't handle a lot of transaction quickly.
- Technology like IBM corporation (IBM),Microsoft and Accenture are leading the pack of blockchain service providers.
- Facebook founder Mark Zuckerberg also expressing interest in virtual tokens encryption and other decentralized technology.

2.2 Block chain will help in changing the Government services

Recent media attention on blockchain has mostly focused on the technology's applications in the finance industry or on the numerous coins being generated on its platform. But the extent of its utility goes beyond immediate headlines. Blockchain's distributed ledger can be used to store, maintain and prosecute a wide variety of services.

Governments around the world have established pilot projects to integrate blockchain technology into their operations. In developed countries, blockchain will help streamline government functions to make them more efficient. In emerging economies, blockchain has the potential to help governments achieve policy goals by leapfrogging intermediate layers of technology. For example, it can help in social welfare objectives by eliminating the need for credit cards or bank accounts to disburse funds to those who are unbanked.

Example: Dubai Government is one of the most powerful Blockchain government

The online payment portal Dubai Pay will now use blockchain technology for real-time reconciliation and settlement of transactions. This is another step towards Dubai's goal of becoming the world's first blockchain-powered government by 2020.

Dubai's government is currently working on some use cases for blockchain technology to complement its existing operations. Dubai's government has strategic partnerships with IBM and Consensys as advisors to help them and Smart Dubai further their goals.

SmartDubai and its government arm Smart Dubai Government Establishment (SDG) aims to drive the city's success and global competitiveness via smart technology. SDG include the move to blockchain in their remit.

Mira Sultan Obaid Abdul Rahman, director of the smart services enablement department at SDG, it plans to increase government efficiency by moving all transactions to blockchain. The Dubai Department of Finance (DoF) works behind the scenes to enable the transactions on Dubai Pay and addresses any issues and disputes. The Dubai Pay portal handles transactions from 27 government entities and a further 14 non-government entities.

Dubai's Road and Transport Authority announced plans for a blockchain-based vehicle management system earlier in the year. The largest bank in Dubai, Emirates NBD launched a blockchain-based project to reduce cheque fraud in April 2018, and Dubai Tourism revealed plans in March 2018, to use blockchain and smart contract technology to overhaul its systems.

III. LITERATURE SURVEY

Paper 1:de la Rosa, JosepLluis, et al. "A survey of blockchain technologies for open innovation", 4rdAnnual World Open Innovation Conf. WOIC. 2017.

This paper exploresthe distributed nature of open innovation meets the distributed nature of the blockchain technology. This is especially true for the open innovation platforms, because They show limitations that demand reinvention on the basis of renewed confidence and Expectancies. With this perspective, their synergies with blockchain technological approaches are worth of being surveyed the BT, however, supports much more

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than cryptocurrencies. With the launch of the ethereal platform and the related virtual currency Ether (ETH) in 2015, it is possible to build blockchain-based applications for use within practically any sector.
These are used to record any transaction of value through smart contracts, whether it is current "fiat" money, commodities such as gold or oil, energy, real estate contracts – or for that matter – intellectual property rights (IPR) that are central in OI.

Paper 2: Bayu Adhi Tama, Bruno Joachim Kweka, Youngho Park, Kyung-Hyune Rhee, A Critical Review of Blockchain and Its Current Applications, International Conference on Electrical Engineering and Computer Science (ICECOS) 2017.
This paper explores about Blockchain Technology.Blockchain is a type of distributed ledger (data structure) which contains information about transactions or events. It is replicated and shared among the participants in the network.The size of chain unceasingly increases since blocks are added and chained to the previous block using a hash function. A cryptographic hash function is used to produce a hash. For instance, Bitcoin uses SHA-256, whilst Lite coin and Prime coin use Script and Cunningham chain, respectively. In addition, it enables us to simply verify the input mapping to a given hash value. It would not be feasible for two different inputs having the same hash. Each node keeps a complete replica of the entire ledger.

Paper 3: Songara, Ankit, and Lokesh Chouhan. "Blockchain: A Decentralized Technique for Securing Internet of Things".
This paperdiscusses about the cryptocurrency, bitcoin and its advantages, security of a bitcoin transaction and the process behind it. This paper also talks about blockchain, its working and how it can be used in different areas like banking sectors, Internet of Things (IoT), etc. Also, this paper discusses the benefits and limitations of blockchain. Some major advantages of blockchain are security of the network, faster transactions, etc. Whereas, major drawbacks of using blockchain technology are scalability and high computation power.

Paper 4: Zheng, Zibin, et al. "An overview of blockchain technology: Architecture, consensus, and future trends." Big Data (BigData Congress), 2017 IEEE International Congress onIEEE, 2017.
This paper provides an overview of blockchain architecture firstly and compare some typical consensus algorithms used in different block chains. Furthermore, technical challenges and recent advances are briefly listed. We also lay out possible future trends for blockchain.
Blockchain has shown its potential for transforming traditional industry with its key characteristics: decentralization, persistency, anonymity and auditability. In this paper, we present a comprehensive overview on blockchain. We first give an overview of blockchain technologies including blockchain architecture and key characteristics of blockchain. We then discuss the typical consensus algorithms used in blockchain. We analyzed and compared these protocols in different respects.
Furthermore, we listed some challenges and problems that would hinder blockchain development and summarized someexisting approaches for solving these problems. Some possible future directions are also proposed. Nowadays blockchainbased applications are springing up and we plan to conductIn-depth investigations on blockchain-based applications in the future.
In this paper we have seen what bitcoin is, its advantages and how its decentralized nature can play an important role in various sectors. Process behind securing the bitcoin transactions.

IV. CONCLUSION

The application of the Block chain concept and technology has grown beyond its use for bitcoin generation and transaction. The properties of its security, privacy, traceability, inherent data provenance and time stamping have seen its adoption beyond its initial application areas. Thus, the invention of the block chain can be seen to be vital and much needed additional component of the internet that was lacking in security and trust before.

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