

## Study of Block Chain Technology and its Applications

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**Abstract**— In the future most of market deals with the Blockchain Technology, because this technology has decentralized database that records the data such as finance contracts, physical assets, and supply chain information. It has achievement over the time and is currently dominated and used by Bitcoin. It is not a new technology but it shown up with the bitcoin, now a days some of the transactions are done with the cryptocurrency. It gives innovative solutions for FinTech Industry. This technology has energized the financial services industry globally. This concept already brought a disruption in the financial industry. Coming the some of the Industries, which already implementing this technology are, Deutsche Bank, DBS Bank, EBA (Euro Banking Association), US Federal Reserve are some of Financial Sector Banks are going to use this Technology in as like Digital Payments, Assets. This technology is Transparent Business way. So this is very secured and transparent. It is like as distributed ledger.

**Keywords**— *Cryptocurrency, blockchain, distributed ledger, digital payments*

### I. INTRODUCTION

Blockchain is a Technology the digital, distributed and centralized ledger underlying most cryptocurrency and virtual currencies (bitcoin, ethereum) that are responsible for transactions without the need for intermediary (Bank). Current banking system had flaws. In particular, banks acting as third-parties and unnecessary cuttings transactions fees as which is not needed. With Blockchain, real-time transactions are a possibility even across a borders, while banks, intermediaries are not involved in this technology. It is secured, inexpensive and fast transaction. The blockchain decentralized system is going to change the entire human life from the way the users transact business or manage assets, by the way that how you are using like car rents, vote in elections, along we can transform banks and other financial institutions, hospitals, and governments. Blockchain is a group of blocks (or) chain of blocks. It continuously increase the list of records called Blocks. Each block contains some data related to some context in blockchain which is ledger or transaction. It holds the ledger of transactions from the beginning of the time. The first block is called the genesis Block. Each block in the chain has reference to the previous block. The number of distributed blocks is linked and secured with the help of concept of cryptography. In this paper we are going to see about the Blockchain Technology, architecture, working, proof of work, and some of applications which is useful for the future.

### II. LITERATURE SURVEY

Blockchain has changed many business man, investors life. In this paper authors have precisely described that how bitcoin and blockchains are inter connected with each other. What actually blockchain is, key technologies, how it works using hash values also components of data. Drawback of current paper is lack of detail data Structure [1]. It is overcome in paper which mainly focuses on suspicious activities detected in android phones while transferring the bitcoins [2].

### III. WHAT IS BLOCKCHAIN

Blockchain technology is not a new technology it is in the year of the 1991. Blockchain Technology is one of the most innovations of the century. A Blockchain in the name only saying that Block and Chain is a decentralized, distributed database that is used to maintain a continuously growing list of records [6]. List of records is called Blocks, which are linked by using cryptography. Each and every block contains ledger/transaction data. Block is hashed by cryptographic hash functions. In 1991 Stuart Haber & Scott Stornetta who developed the concept of Blockchain. These two people have designed the concept of Blockchain but implementation not done. These two people released whitepaper that is what is blockchain and how it works, this is the starting point of blockchain. It is proposal of how the data is stored in the new way it is secured way and read-only way which is alternative

to database based on that a new type of development is started.

Blockchain is all about cryptocurrency and data structures very primitive for blockchain was the hash tree, AKA Merkle tree. This data structure was patented by Ralph Merkle in 1979. In a peer-to-peer network of computer based systems, validating data was important to make sure the data is not altered during the transferring. It also helped to ensure that false data is not sent. It essence that it is used to prove integrity of data being shared.

In 1991 Secured chain of Blocks – would be by using the Merkle tree. Secured chain of Blocks “A Series of data records”, each connected to the one before it. The newest record in the chain would contain the history of entire chain. By this the Blockchain has been successfully created. In 2008, Satoshi Nakamoto, was implemented the distributed blockchain. It contain the secured history of data exchanges, utilize the peer-to-peer network to its timestamp and verify each exchange with its proof of work, and could be managed without a central authority like bank and intermediaries. This became a backbone of Bitcoin.

**IV. ARCHITECTURE AND WORKING**

Blockchain records keeps records very secure and transparent and its data exchanges. This is called as “Ledger” in the cryptocurrency world and each data exchange is a “Transaction”. Each verified transaction is added to the ledger as a “block”. This technology utilized the distributed system to verify each and every transaction. As noted as peer-to-peer network of nodes. Once signed and verified, and new transaction is added to blockchain and cannot be modified or altered.

Let me see about the concept of “Keys”. With the set of cryptographic keys, you get a unique identity. The keys are the “Private key” and “Public Key”, and together they are combined to give you a digital signature. Your identification key as the Public key. Your Private key gives you the power to digitally sign and authorize different actions on behalf of this identity when used with your public key.

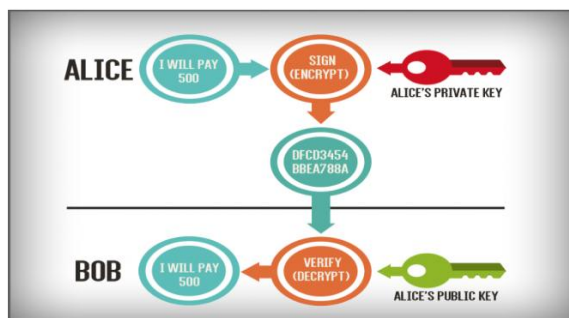


Figure 1. Architecture and working of Blockchain

In the cryptocurrency applications your public key represents your **wallet address** and private key is authorizations of transfers, withdrawals, and other actions like your digital property asserts and cryptocurrencies. So we can say that Private key is so important - anyone who knows your private key can assess your digital asserts associated with your public key and can be altered with their convenient.

Each and everytime a transaction occurs, that transaction is signed by whoever is authorize it. We can take an example like “Alice wants to send Bob 0.4 BTC” which includes Bob’s address that means public key, and will be signed by a digital signature using both Alice’s private key and public key. After validation now block is created successfully with the ledger which includes timestamp and a unique ID number. Now the transaction is successfully completed. When this transactions occurs it broadcasted to peer-to-peer network nodes, thus other digital entries that acknowledge this transaction occurs and adds it to the ledger.

Each transaction in the ledger will have the same data is A Digital signature, a public key, a time stamp and a unique ID(nonce). Each transaction is interconnected with other transaction. So you can’t altered or tampered the another transactions.

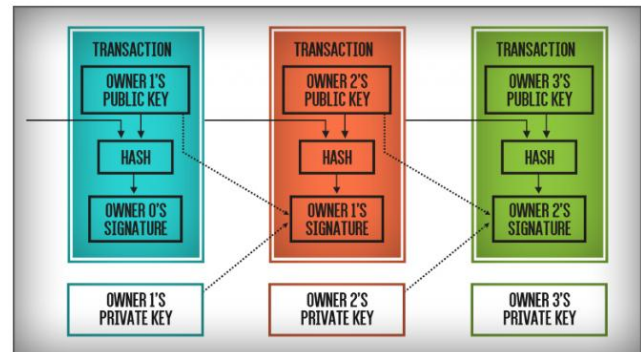


Figure 2. Structure of Blockchain

By seeing the above diagram we can say that each block structure and how it will be worked in the decentralized model.

**V. WHY DECENTRALIZATION IS IMPORTANT**

A blockchain is a distributed ledger. Blockchain technology get started in finance, we’ll use the example of a bank. When you use your debit card: You will swipe your card for a purchase at a shop. The merchant sends a bill request to your bank for the amount detecting acceptance. Bank verifies the request and it’s likely who authorized the purchase. Then the bank sends the money to the merchant. Finally, the bank makes a record of this information and detecting the amount in your balance and maintain ledger as transaction made. The final step is important - The bank keeps a record of all

transactions which is made by its customers. This ledger goes back to the very first transaction the bank made. That ledger is maintained and regulated by the bank. You may be able to read it in your mobile bank account in read only mode we can't altered. The transaction control authority is taken by the bank. There is fully authority on customers transactions they might be modified it according to their rules and regulations. Critically, if hacker get access to your account in bank ledgers, it's get a lot of problems like you never made transaction but the ledger show the transaction.

This is why a distributed ledger is very easy to implement the block.

If a bank can operated on a distributed ledger, every customer of the bank would have a copy of the ledger going back until the beginning of the bank's existence. And whenever any member of the bank made a purchase, they did tell every other customer of the bank. Each customer would verify the transaction and add it to the ledger (the added record is called a "block"). This has some serious benefits, as there's no centralized authority that could altered or tampered the record. And hackers getting access to one ledger be a huge problem, because the other ledgers could easily verify it. There is also a lot of different blockchain applications.

## VI. PROOF OF WORK IN BLOCKCHAIN

This is most useful algorithm in the Blockchain Technology. We can say it with consensus algorithm in blockchain. In Blockchain, this algorithm is to confirm transactions and produce new Block to the chain. This is most algorithm which is used by currencies such as Bitcoin and Ethereum, each one its own differences. Hash function is any function that can be used to map data of arbitrary size to data multiple the fixed size.

*If a hash function is secure, its output is indistinguishable from random.*

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Example:
keccak256("hello") =
1c8aff950685c2e4bc3174f3472287b56d9517b9c948127319a09a7a36deac8
keccak256("hello1") =
57c65f1718e8297f4048bfff2419e134656b7a856872b27ad77846e395f13ffe
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In a network users send each other digital token request transactions. All the transactions are gathered into a decentralized network which is into blocks. Thus, it should be taken to confirm the transactions and arrange in blocks.

This responsibility was taken by special nodes called miners, and a process is called mining.

The main working principles are a difficult mathematical puzzle and a possibility to easily prove the solution. With this

PoW, miners who compete against each other to complete transactions on the network and get rewarded.

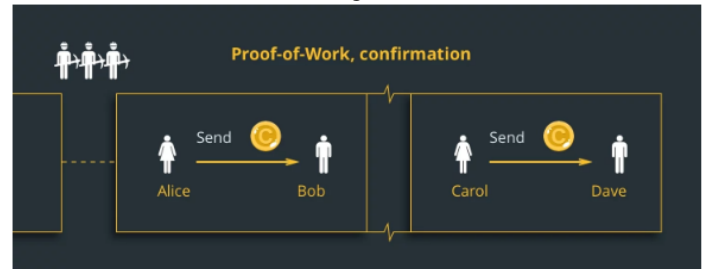


Figure 3. Proof of work

## VII. REAL TIME APPLICATIONS IN BLOCKCHAIN TECHNOLOGY

Here are some the real time application which are used this Blockchain Technology. This are the potential applications which are uses now. These application will be an ideology to change global security and versatile environment.

### A. Processing of payment and money transfers:

The logical use for blockchain is means to expedite the transactions from one customer to another customer. As we can note that with intermediaries such as banks and financial corporations are removed from this equation, and validating of transactions ongoing with 24/7 working hours, many transactions processed in the blockchain can be completed [5].

### B. Monitor supply chains:

Blockchain Technology also comes in particularly, when it comes to monitoring the supply chains. By removing paper-based trails, businesses should be able to point to point inefficiencies within their supply chains property quickly, it locates items in real time. Further, blockchain also allows businesses, consumer, to view how products performed from a quality of control perspective as they travelled from their place from origin to the retailer.

### C. Retail loyalty rewards programs:

Blockchain gets revolutionize the retail experiences by becoming the go-to for loyalty rewards. By doing their shopping it creates a token-based system that rewards consumers, and storing these tokens within a blockchain, it would incentivize consumers to return to a certain store or chain. It should also eliminate the fraud and waste commonly linked with paper- and card-based loyalty rewards programs.

### D. Digital IDs

More than 1 Million people worldwide face identity challenges. Going far Microsoft (NASDAQ:MSFT) will would solve this problem by using this Technology. It's creating digital IDs within its Authentication app -- currently used by Lakh's of people -- which would give customer a way to control their digital identities. This will allow folks in

poor regions to get access to financial services, or start their own business, as an example. Of course, Microsoft's attempts to create a decentralized digital ID are still in the starting stages.

#### E. Data sharing

Cryptocurrency IOTA launched a beta version of its Data Marketplace in November, it indicate that blockchain could be used as a marketplace to transfer or sell unused data. Since most enterprise data goes unused, blockchain could act as an mediator to store and move this data to improve a host of industries. While still in its starting stages, IOTA has more than 35 brand-name participants (with Microsoft being one) offering it feedback.

#### F. Copyright and royalty protection

In a world with growing internet access, copyright and ownership laws on music, legal activities and other content has grown cloudy. With blockchain, those copyright laws might be solved considerably for digital content downloads, ensuring the artist or creator of the content being purchased gets their fair share. The blockchain would also provide real-time and transparent royalty distribution of data to musicians, legal activities and content creators.

#### G. Digital voting

We can solve the voter fraud problem with blockchain technology. Blockchain can solve this problem, the ability to vote digitally, but it's transparent enough that any regulators would be able to see if something were changed on the network. It combines the ease of digital voting with the inalterable (i.e., unchanging nature) of blockchain to make member vote truly count.

#### H. Real estate, land, and auto title transfers

Blockchain can take paper out of the equation, since paper trails are often a source of confusion. If you're buying or selling land, a house, or a car, you will need to transfer or receive (seller or borrower) a title is enough. Instead of handling this on paper, blockchain can store titles on its network, allowing for a transparent view of this transfer, as well as presenting a clear picture of legal ownership title according to their legal description in the land ownerships.

#### I. Food safety

Tracking of food status is very important in our activities. Since blockchain data is not changeable, you did be able to trace the transport of food products from their origin to the supermarket. In food order also we can use this Blockchain Technology.

#### J. Unchangeable data backup

Blockchain may also be the perfect way to back up data. Even we can do cloud storage systems are designed to be a go-to source for data safekeeping, they're not immune to

hackers, or even infrastructure problems. By using blockchain as a backup source for cloud data centers -- or for any data, as Boeing is considering with GPS receivers on its planes -- could resolve this concern.

## VIII. CONCLUSION

In this paper Blockchain Technology has studied the in different areas and websites. In the future all the global needs will solved by Blockchain technology because it has most powerful algorithm i.e, PoW with a distributed ledger, and decentralization. So it is secured and transparent and data can't be altered in Blockchain Technology. We have studied basic ideas of Blockchain Technology, its working and architecture, How Blockchain supports the bitcoin, Proof of Work (PoW) for secured transactions.

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