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Blockchains : An Emergent Technology

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ABSTRACT: Blockchain is the hot topic around the world. Blockchain is fully decentralized, distributed, open, ledger in digital format, which maintain a record of all the transactions which happened in P2P network. All these records are stored in decentralized manner which are interconnected. And privacy is the major issue in the technology. Blockchain is the technology that gains our trust and provides us the transparency in the work. Now a day's importance of Blockchain technology has been growing since the idea of bitcoin was developed in 2009. The aim is that, Blockchain provide us security, transparency and data integrity without any third person. In the blockchain, most of the research work is done in cryptocurrency i.e. bitcoin and very few work done in applications like smart contract.The paper is emphasizing on different kinds of bolockchains, applications, different types of cryptocurrencies.

KEYWORDS: Blockchain, cryptocurrency, public and private blockchain, smart contract, Ledger.

I. INTRODUCTION

Blockchain is the technology that developed first for bitcoin cryptocurrency. The concepts of bitcoin and blockchain were first proposed in 2009 by Satoshi Nakamoto. Blockchains provides grave disruption to the conventional business processes since the applications and transactions, which needed centralized architectures or trusted third parties to verify them, can now operate in a decentralized way with the same level of certainty[1].

This is a digital transaction ledger, maintain by the multiple nodes that are not trusting on third party. Each and every transaction file manage by specific software platforms that give us the permission for data to be transmitted, processed, stored, represented in human understandable form When we create a bitcoin, each block contains a header , timestamp , transaction data and link which is connected to the prior block.

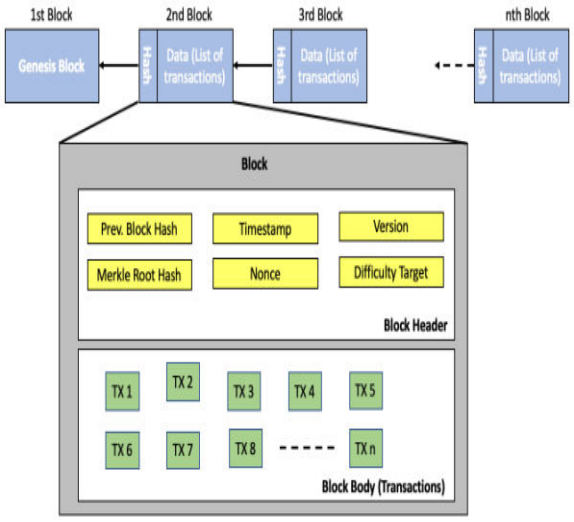

Figure 1: Architectural diagram of a blockchain

A hash gets generated for each and every block, dependent on its contents of that block (shown in Fig. 1). Henceforth, any changes of a given block would outcome in a change in the hashes of all sequential blocks. Each and every transaction is spread through the network of nodes running the blockchain protocol, and needs to be authenticated by all participants. The main benefit of a blockchain is its transparency and agreement among all the participants[2].

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II. LITERATURE REVIEW

Basically, block is nothing but the one kind of folder in which we can store our data or transactions. This block is almost impossible to hack. A block shows the current andpast information. Each time a block is completed it becomes part of the past block and gives way to new block in the blockchain. The finalized block is a permanent record of the blockchain transactions and it is recorded in the current one. In this way entire system works in a cycle and always data gets permanently stored.

Each and every data written on a blockchain is secured by single cryptographic key. When a new block is added in the chain, from the previous block, including its key is put up to create the key of second record. This interaction creates dependency.

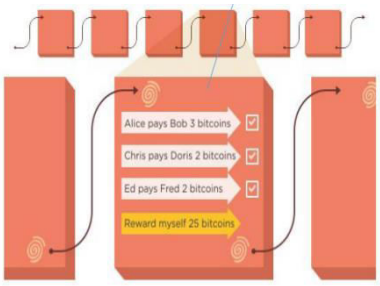

Fig. 2 : Schematic diagram of Blockchain Technology

a. Why blockchains?

Blockchain can helps us in various ways :

- **Trust :** Nobody with in blockchian network has the rights to change ,modify or delete the data or records. Even if, someone tries to do, it will not accepted by other stakeholders.
- **Autonomy :**There is no single owner of this blockchain network, but everyone can participate in it for creating the solution.
- **Security :**Blockchain uses cryptographic hash to ensure security. All the information on the blockchain is hashed with cryptography i.e. key is used to secure the data or transaction. All the participants which are involved in blockchain base network will use the public key for transaction and private key for the data access.
- **Transparency :** Everything is transparent and Everything is visible to all the participant from beginning to end. It decreases the chance for any kind of alteration in the data because nothing is hidden.
- **Intermediator :**This Blockchain application removes the intermediaries. For eg. Vehicle registration, license issuing.
- **Less Time :** The transaction that take place using blockchain technology take very few time for its execution.

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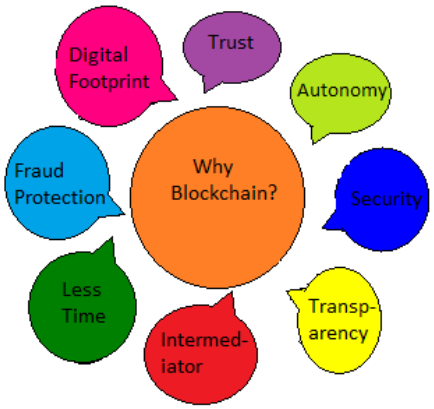

Fig. 3 :Blockchain is the Technology of the Future

- **Fraud Protection :** Due to great transparency of transactions in blockchain, any kind of scam can be easily recognized.
- **Digital Footprint :** Footprint means that, it will keep a track of all the digital assets and can be trace back to the first block. It will be actually very helpful in healthcare and banking sector.
- **Types of Ledger :** Ledger is a digital file that tracks all bitcoin transaction. It is one kind of database where confirmed transactions are recorded. There are three types of ledgers.

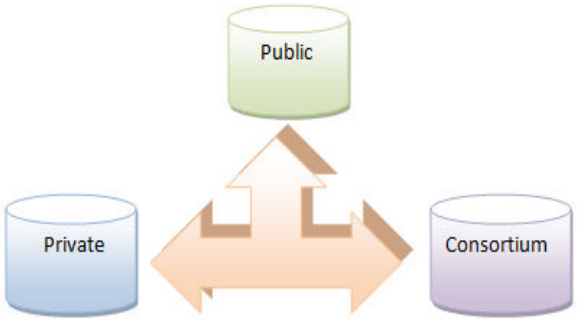

Fig. 4 : Types of Ledger

- **Public Ledger :** Public ledger is an record keeping system. In the public ledger anyone can participate as a user, miners, developer because it is an open source. It is organizes into a long chain of blocks of information. It is stored on the personal computers or electronic devices of the individuals who use the blockchain.
- **Private Ledger :** Private blockchain that keep individuals personal information like contact number, bank detail, transaction details and many more to join private ledger or private blockchain.
- **Consortium Ledger :** This type of ledger provides semi private access to the users. Therefore, consortium ledgers are governed by a group of organizations and not by a single entity.

III. WORKING MODEL OF BLOCKCHAIN

A transaction is requested by a person. A block that represents that transaction is being created and is sent to everyone in the network. The transaction is validated with the help of some consensus algorithms and some rewards are given for the proof of Work. Then successfully block is added into the existing blockchain. Now this update is distributed across the network. Now this updated chain is also available with others in the network. Fig. 4 shows the various steps which is carried out in blockchain.

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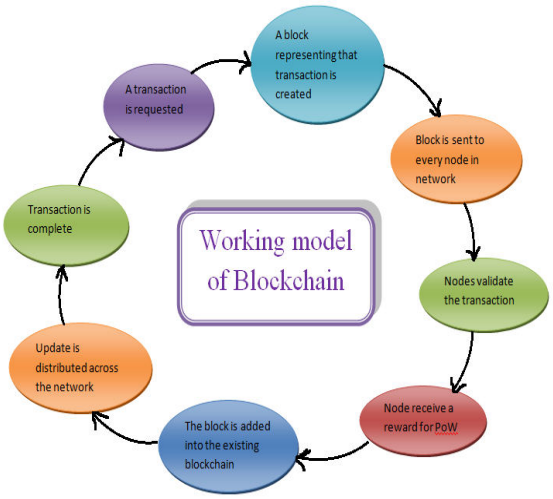

Fig. 5 : Transaction in blockchain

IV. APPLICATIONS OF BLOCKCHAIN

Blockchain technology has various real time applications. These applications are ranging from cyber security, government, identity and healthcare. It also changes the future by bringing us to autonomous objects from the Inter o Things. The various applications are shown in Fig. 6.

This applications are categorized in various parts like digital currency, record keeping, Securities, Smart contracts. This digital currency application is used in E-commerce, global payments, remittance, P2P lending, Microfinance. Record keeping application is used in healthcare, title records, Ownership, Voting, Intellectual property. Security application is used in different sector like equity, private markets, crowd funding and derivatives. And smart contracts are used in digital rights, wagers and escrow.

Fig. 6 : Applications of Blockchain

At the primarily, the University of Nicosia used the blockchainto maintain the record of students, i.e. name , data, activities, achievement of the students [3,5,6]. Massachusetts Institute of Technology (MIT) has comeup with a learning machine technology grounded on blockchain technology and they have produced a wallet for their students holding the educational records of a student [3,5,7]. Holberton school is also applying blockchain technology to keep the educational information of students, i.e. learning behavior, their credential, and activities in class [4,5].

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Table 1.Comparison studies

	Existing issue in education		Features of Blockchain	Challenges and issue to blockchain implementation
	[5]	[6]		
Physical	Y	N	Y	Y
Digital	Y	N	Y	Y
financial	N	Y	Y	Y

Table 2: Different types of blockchain networks.

Item	Public	Private	Federated
Access	Read / write for anyone	Read / write for single organization	Read / write for multiple selected organizations
Speed	Slower	Faster	Faster
Efficiency	Low	High	High
Security	Proof of work, Proof of stake and other consensus mechanism	Pre-approved participants and voting / multi-party consensus	Pre-approved participants and voting / multi-party consensus
Immutability	Nearly impossible to tamper	Could be tampered	Could be tampered
Consensus	Permissionless and anonymous	Permissioned and known identities	Permissioned and known identities
Network	Decentralized	Partially Decentralized	Partially Decentralized
Asset	Native asset	Any asset	Any asset

V. CRYPTOCURRENCY TO BLOCKCHAIN

Many other cryptocurrency is coming to have existence. cryptocurrency is also called as ALTCOINS. They are built on their own blockchain.

Fig. 6 : Types of cryptocurrency

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Bitcoins are the first cryptocurrency and biggest of all. It provides decentralize peer to peer system to transfer the money from one person to another. Bitcoin solved the double-spending problem. Etherium supports smart contract. Etherium is decentralized computer network that allows to developers to develop or build the applications on its blockchain. Ripple is payment protocol which runs on permissioned blockchain. It supports instant and cheap transactions. Ripple has been mostly adopted by financial institutions. Bitcoin cash is a product of hardfork to the original bitcoin. The new currency is having bigger block sizes. It increases 1 MB to 8 MB. Litcoin is mostly similar to the bitcoin technical framework. It aim to served as a transaction cryptocurrency featuring lower block times and lower fees than bitcoins. Dash is created by Litcoinhardfork. This cryptocurrency allows for standard transaction in addition to instant and private transfer.

VI. ANALYSIS

This paper describe about safety of blockchain technology. From this paper we can understand that the possibility of threats in public blockchain. These threats disturbs transactions of public blockchain too. This technology may suffer from different types of attacks in this technology. There are three types of blockchain networks i.e. public, private and consortium.
The above table shows the comparison of different types of blockchian network. Blockchain technology is latest technology. This supports for development of many applications.

VII.CONCLUSION

Blockchain is a amazing technology with multidimensional benefits. If we it used along with the IoT, we can establish a translucent supply chain of food, reduce food scam and build consumer faith.

Blockchain is demanding topic in recent year, it will supports for development of many applications. This technology supportgreater security during transaction. This technology is capable to address bitcoin transaction, Smart contract, ethereum and distributed ledger are some applications of blockchain, Bitcoin is one of the popular and widely used application of blockchain, which is faster as well as cheaper. This provides the good security for sensitive information.

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