e-ISSN: 2582-5208
International Research Journal of Modernization in Engineering Technology and Science
(Peer-Reviewed, Open Access, Fully Refereed International Journal)
Volume:04/Issue:05/May-2022 Impact Factor- 6.752 www.irjmets.com

BLOCKCHAIN EMERGING TECHNOLOGY

Nihal Tonpe[*1], Jayesh Bachher[*2], Rohit Mane[*3], Sanket Udanshiv[*4], Abhishek Hanumant Patil[*5], Prof. Sanket Pawar[*6]

[*1,2,3,4,5]Student, Department Of Computer Engineering, Bharati Vidyapeeth's College Of Engineering Lavale, Pune, Maharashtra, India.

[*6]Guide, Department Of Computer Engineering, Bharati Vidyapeeth's College Of Engineering Lavale, Pune, Maharashtra, India.

ABSTRACT

The path to the future network is pointing to the data-driven paradigm to better meet the explosive growth of mobile services as well as the growing heterogeneity of mobile devices, many of which generate and use a large amount and variety of data. These routes are also hampered by significant challenges in terms of security, privacy, service provision and network management. Blockchain, the technology of creating distributed accounts that provides unalterable logs of transactions recorded in distributed networks, has recently emerged as the basic technology of cryptocurrency and is revolutionizing data storage and processing in computer network systems.For future data-driven networks (DDNs), blockchain is considered a promising solution for enabling secure storage, sharing and analysis of data, protection of privacy for users, strong, reliable network control and decentralized routing and resource management.

Keywords: Blockchain, Databbases, Banking System, Cryptography, Bitcoin, Blockchain Based System.

I. INTRODUCTION

A blockchain is a type of database because it is a digital laser that stores information in data structures called blocks. A traditional database, on the other hand, is a data structure used to store information. Data storage first started as a flat-file hierarchical system that provided digital storage for collecting simple information. Over time, Data storage incorporated and took advantage of a relational model that allowed more complex ways to collect information related data from multiple Data storage. Data storage can be modified, managed, updated and controlled by a user named administrator. This is where main authority comes in. The database always has an administrator who has complete control over it. The administrator can create, delete, modify and change any records stored in the database. Administrators can also administer Data storage such as performance optimization and molding the database to more manageable levels. A large database usually lowers the performance index, so administrators run optimization methods to improve the performance of the database.

The database is also recursive, which means that if you want to repeat a task on the record and modify or delete it and you have the right to do so, you can do it. Often, administrators remove old records from a database that are already backed up or are considered obsolete and useless information.

Blockchain works differently when traditional Data storage are centralized. Blockchain stores data in uniformly sized of memory. To provide cryptographic security, each block contains hashed information or the hash code from the previous block. Unlike Data storage, these additional security features included in blockchain make them extremely difficult to hack and tamper with.. Hashing uses the SHA-256 system which is primarily a one-way hash function. The hashed information is the data and digital signatures from the previous block and the hash of the previous blocks that go back to the first block or to the genesis block in the blockchain. That information is driven by a hash function that points to the address of the next block. PS: Remember linked lists? Blocks in a blockchain are connected in the same manner as nodes are connected in a linked list.

II. DATABASE SYSTEM

1. Introduction to Data storage -

A traditional database is a data structure used to store information. Data is usually stored electronically in a computer system. Data storage have evolved into a flat file hierarchy that gives us some simple information on how to collect and store information. Later, Data storage began to use relational models which helped us to

e-ISSN: 2582-5208
International Research Journal of Modernization in Engineering Technology and Science
(Peer-Reviewed, Open Access, Fully Refereed International Journal)
Volume:04/Issue:05/May-2022 Impact Factor- 6.752 www.irjmets.com

create more complex ways of aggregating data by building relationships between information in multiple Data storage. The data stored in the database can be managed using DBMS.

2. Table

A table is a collection of related data which is held within a database. Tables are creat from pillars and rows. Columns are used to describe the data fields and rows define a record stored in a database.

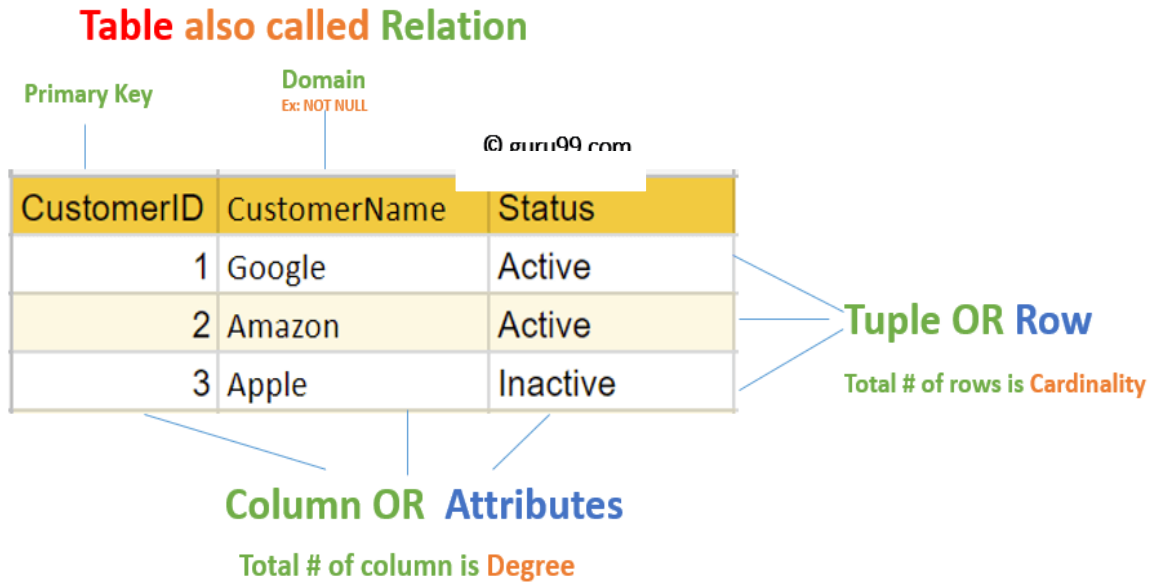

Figure 1: Table.

Source: https://mkkumawat.medium.com/data-models-in-database-management-system-2be740bce8b8

3. Characteristics of a Database

- A database can be modified, managed and controlled.
- Every database always has a user that functions as a administrator, this user has complete control of the database.
- Administrator can create, delete, modify and change any record stored in a database.
- Administrators can also perform administration operations such as optimizing performance and managing database size.
- Data storage can have many other roles for controlling and operating data.
- A database is recursive, you can modify, update or delete a particular record.

4. Database Topology

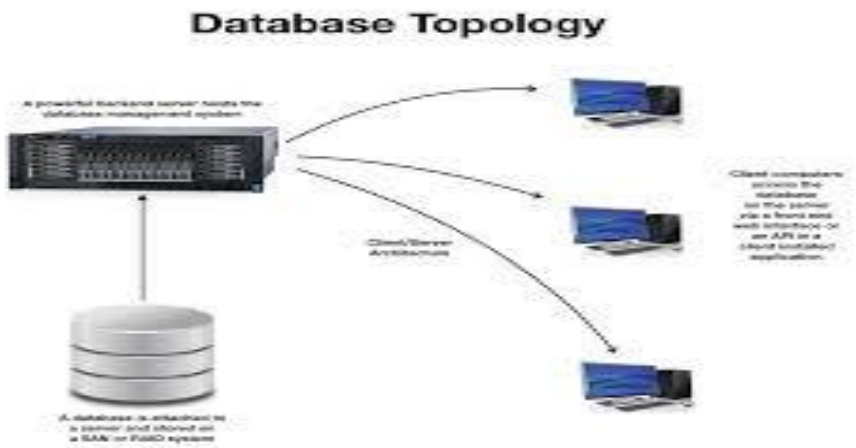

Figure 2: Datadase Topology.

e-ISSN: 2582-5208
International Research Journal of Modernization in Engineering Technology and Science
(Peer-Reviewed, Open Access, Fully Refereed International Journal)
Volume:04/Issue:05/May-2022 Impact Factor- 6.752 www.irjmets.com

Source:https://hackernoon.com/databases-and-blockchains-the-difference-is-in-their-purpose-and-design-56ba6335778b

III. BLOCKCHAIN

1. What precisely is Blockchain?

The blockchain is general terms is defined in following manner:

A. A technology that permits transactions to be recorded permanently.

B. A technology that cryptographically secure the system and chains data in consecutive order.

C. A technology that errase middle and establiesh trust through the algorithm. Blockchain was first introduced on board for Bitcoin in 2009 by unidentified user his named is Satoshi Nakamoto. Currently, blockchain is used my multiple organizations to tackle their problems and provide a better solution.

2. Current Banking System

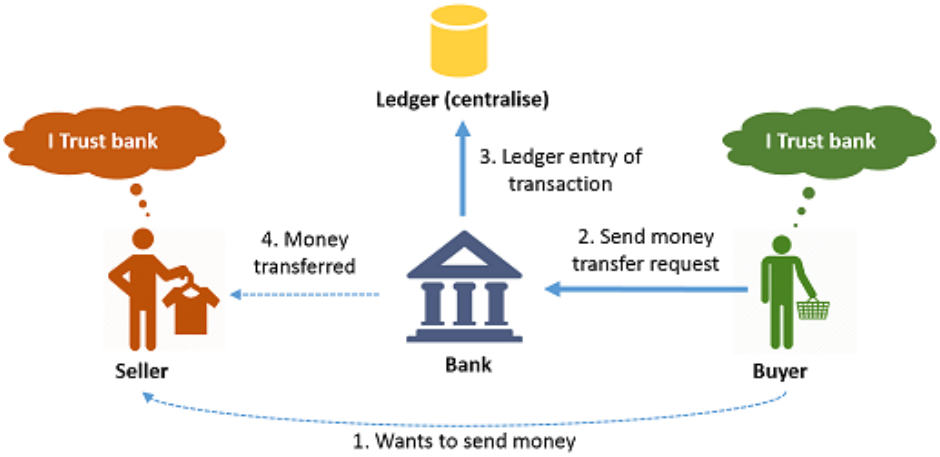

Figure 3: current banking system.

Source: http://pianoroll.it/Adapter/bank-transfer-blockchain-7181.php

3. Problems with current system

a) Account Hacking
b) Internet Frauds
c) High Transaction Costs
d) High Transaction Time due to intermediaries
e) Dependency on Banks

4. Blockchain Banking System

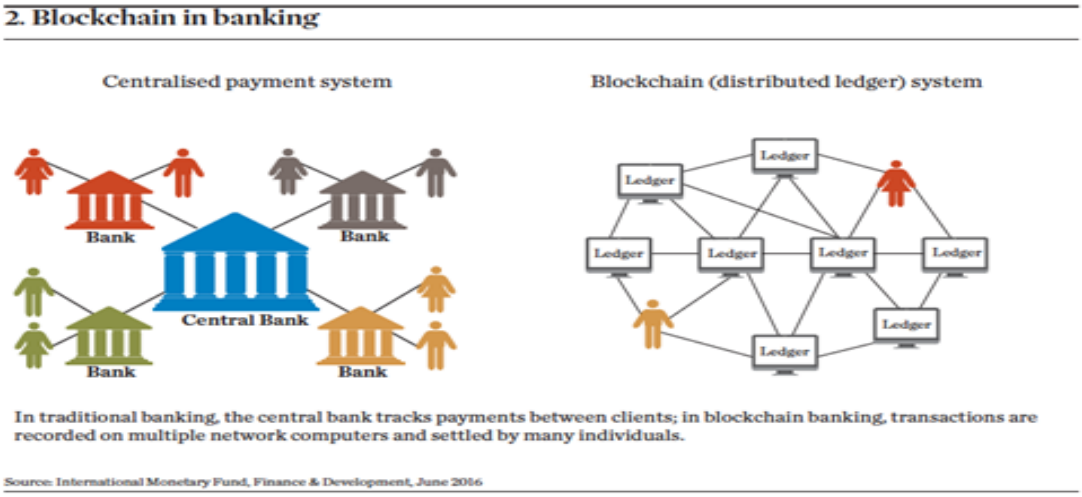

Figure 4: blockchain banking system.

e-ISSN: 2582-5208
International Research Journal of Modernization in Engineering Technology and Science
(Peer-Reviewed, Open Access, Fully Refereed International Journal)
Volume:04/Issue:05/May-2022 Impact Factor- 6.752 www.irjmets.com

Source: https://www.ipe.com/securities-services-blockchain-a-beginners-guide/10014058.article

5. How Blockchain solves the current problem?

- Security through Cryptography
- Availability through multiple machines
- Low transaction costs
- Remove of central parties and intermediaries

IV. DATABASE VS BLOCKCHAIN

1. Typical Database Architecture

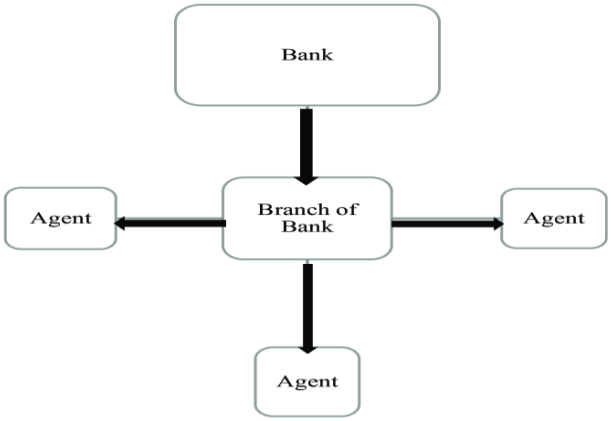

Figure 5: Typical bank architecture.

Source: https://www.researchgate.net/figure/Agent-banking-model-in-Bangladesh_fig1_343551688

2. Typical A Blockchain Architecture

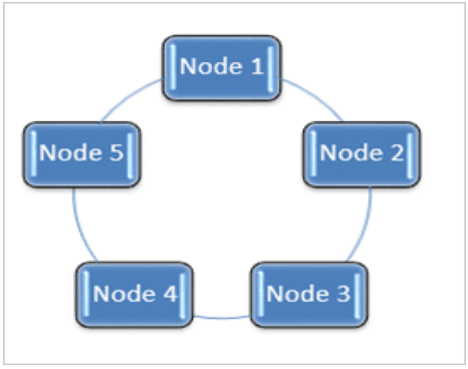

Figure 6: Typical blockchain architecture.

Source: https://www.softwaretestinghelp.com/computer-networking-basics/

3. Problems with Database

[1] Single Point of failure
[2] Administrator Privileges
[3] Security issues
[4] No Transparency

4. Advantages of Blockchain

- Decentralization
- Immutability
- Transparency
- Security
- Removal of Intermediaries

e-ISSN: 2582-5208
International Research Journal of Modernization in Engineering Technology and Science
(Peer-Reviewed, Open Access, Fully Refereed International Journal)
Volume:04/Issue:05/May-2022 Impact Factor- 6.752 www.irjmets.com

5. Difference between Blockchain and Database

Characteristic	Blockchain	Database
Authority	Decentralized	Centralized
Architecture	Distributed	Client-Server Architecture
Data Handling	Only Read and Write	CRUD operations
Integrity	Nobody can change	Alterations are allowed
Transparency	Built In	Not Transparent
Trust	Algorithms	Owner of the Database

V. HOW BLOCKCHAIN WORKS?

- Let's imagine that five people in one room decided to make their currency. They need to know the flow of the funds. They appointed one person to track the flow of funds For our example Bill is tracking the flow of funds

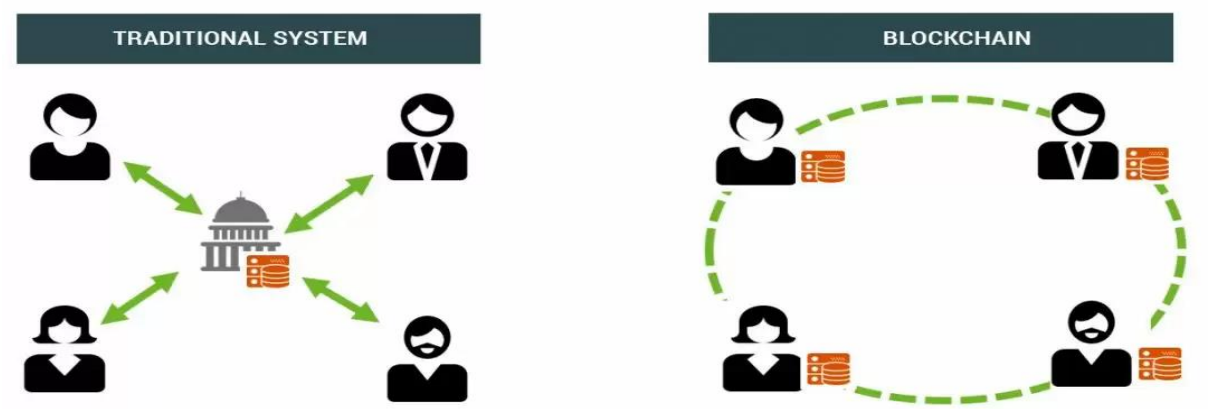

Figure 7: Typical blockchain architecture.

Source: https://www.intelipost.com.br/en/blockchain-en/

- Now, to forge transactions, Bill would need to change all the notebooks.
- Sometime after, the group realized that there were too many transaction records and that he couldn't keep the diary like this forever. After reaching 10,000 transactions, they converted them to a one-page spreadsheet. Andy checked that all transactions are right.
- The group spread his spreadsheet diary over 10,000 computers located globally.
- These computers are says vertex. Each time a new transaction occurs it has to be authenticated by nodes.
- Once each node checks the transaction there is a kind of electronic opinion, because some nodes may think the transaction is valid and others think it is a fraud.
- Now, if the bill changes an entry, all other computers will have the original entries. They will not allow fraudulent records.

VI. BLOCKCHAIN CRYPTOGRAPHY

1. Introduction to Cryptography

Cryptography is an important aspect when we deal with network security. 'Crypto' called secrets or hide

e-ISSN: 2582-5208
International Research Journal of Modernization in Engineering Technology and Science
(Peer-Reviewed, Open Access, Fully Refereed International Journal)
Volume:04/Issue:05/May-2022 Impact Factor- 6.752 www.irjmets.com

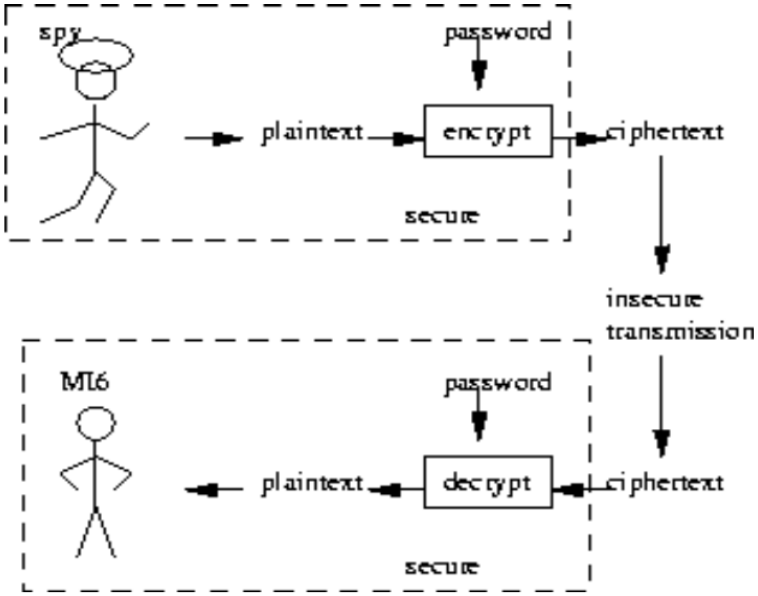

Figure 8: Cryptography.

Source: https://www.cl.cam.ac.uk/~jac22/books/mm/book/node332.html

2. Types of Cryptography

- Symmetric aka Private Key Cryptography
- Asymmetric aka Public Key Cryptography

3. Symmetric Cryptography

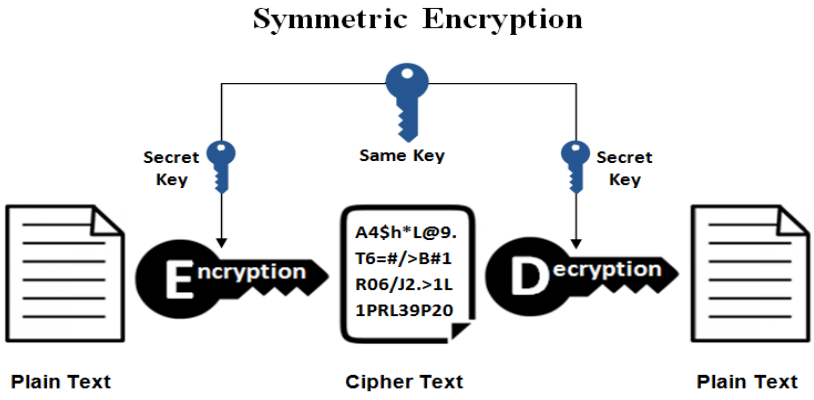

Figure 9: symmetric Cryptography.

Source: https://www.ssl2buy.com/wiki/symmetric-vs-asymmetric-encryption-what-are-differences

4. Asymmetric Cryptography

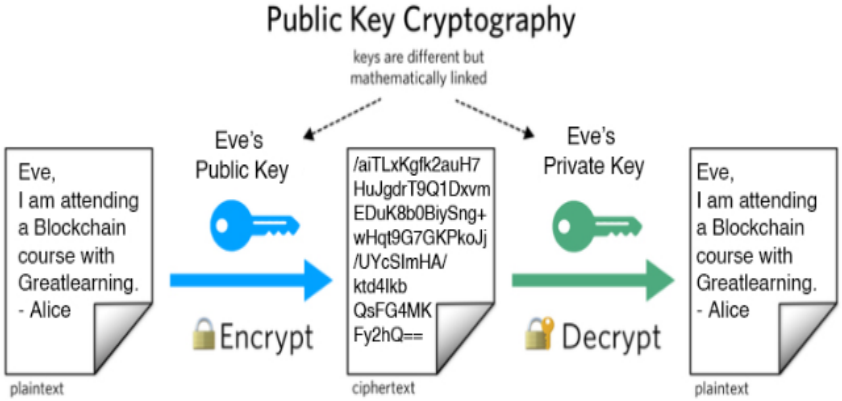

Figure 10: asymmetric Cryptography.

e-ISSN: 2582-5208
International Research Journal of Modernization in Engineering Technology and Science
(Peer-Reviewed, Open Access, Fully Refereed International Journal)
Volume:04/Issue:05/May-2022 Impact Factor- 6.752 www.irjmets.com

Source: https://www.twilio.com/blog/what-is-public-key-cryptography

5. Hashing

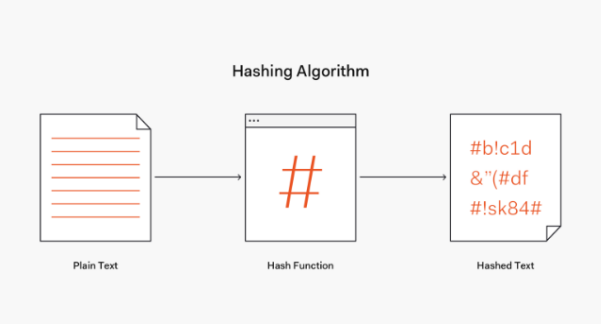

Figure 11: Hashing.

Source: https://computersciencewiki.org/index.php/Hashing

6. Merkle Trees

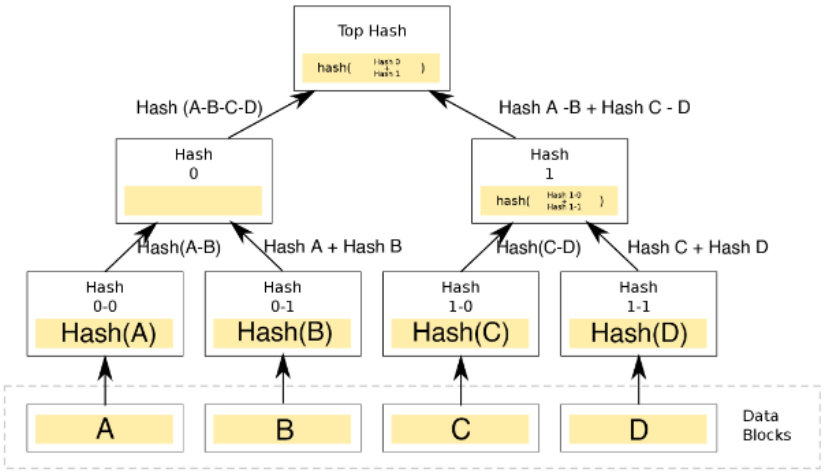

Figure 12: Merkle Tree.

source: https://en.wikipedia.org/wiki/Merkle_tree

VII. MECANISM OF BLOCKCHAIN TRANSACTION

1. How a Blockchain Transaction Works?

Step 1: The user creates a transaction in an attempt to send currency or data from their wallet to someone else.

Step 2:This transaction is placed in a 'pool of unconfirmed transactions'. This pool is a collection of uncertified transactions that miners are waiting to process.

Step 3: The miners on the blockchain select transactions from these bridges and make them 'blocks'. A block is a collection of transactions with some additional metadata. Each miner builds his own block. Many miners can do the same in their block.

Step 4: Once the block is created, the miners create the block signature. This trademark is made by finds the answer a complex calculation eqution. Mathematical problems are different in each block depending on the transaction.

Step 5:The miner who first finds the target signature for his block, transmits the block and the signature to all other miners.

Step 6: Other miners verify the signature if it is valid, other miners will confirm its validity and agree that the block can be added to the blockchain. This procedure is also says concurrence .

e-ISSN: 2582-5208
International Research Journal of Modernization in Engineering Technology and Science
(Peer-Reviewed, Open Access, Fully Refereed International Journal)
Volume:04/Issue:05/May-2022 Impact Factor- 6.752 www.irjmets.com

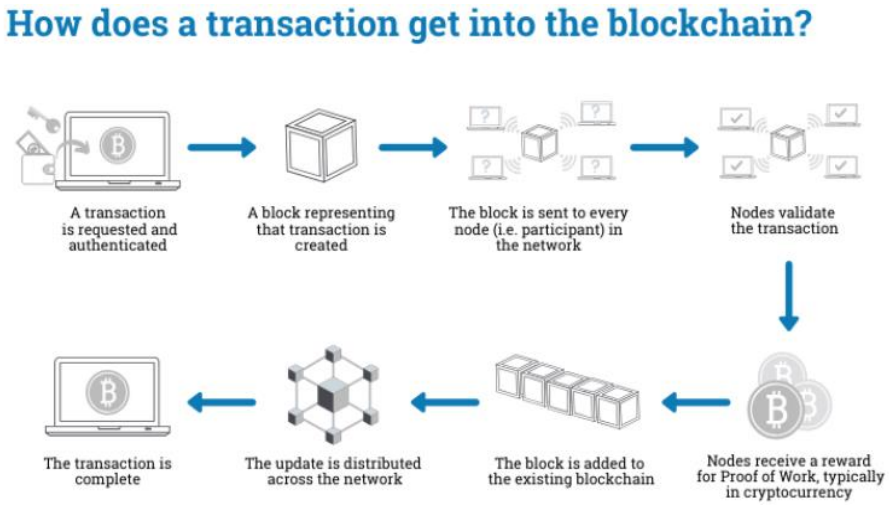

Figure 13: how does a transaction get into the blockchain.

Source:https://www.euromoney.com/learning/blockchain-explained/how-transactions-get-into-the-blockchain

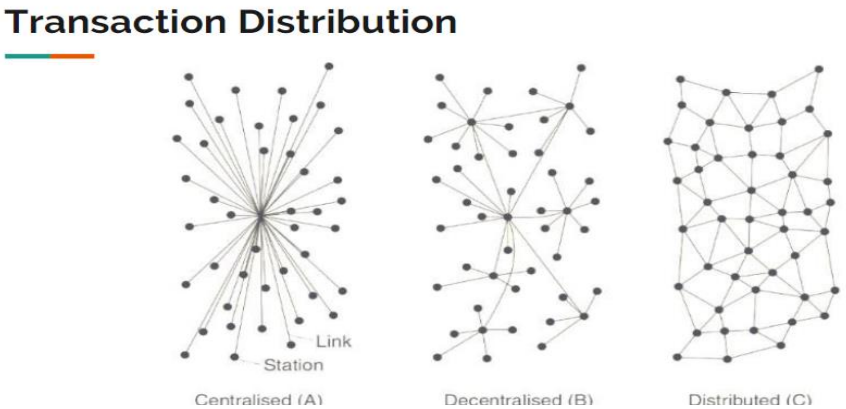

Figure 14: transaction Distribution.

Source: https://personalpages.manchester.ac.uk/staff/m.dodge/cybergeography/atlas/historical.html

VIII. BLOCKCHAIN ECOSYSTEM

1. Blockchain Projects

The blockchain ecosystem is currently underway with some large projects and many more under the pipeline. Some of the major projects on the blockchain are:

- **Bitcoin** - This project introduced the world to Blockchain.
- **Ethereum** - The project comes with the concept of a smart contract where the two parties follow certain rules and build trust. This free the world to more decentralized applications.
- **Neo**- This project positioned itself as the "Chinese Ethereum" but it bought the Python as the main language for the creation of Applications.
- **Hyperledger Fabric** - This is an enterprise graded project which can be easily programmed as per the enterprise needs. This is a modular project which supports multiple consensus algorithms.

2. Blockchain Users

- Blockchain users are ordinary people like you and me who use blockchain or cryptocurrency to achieve certain results. They may also be investors who buy cryptocurrencies to sell at a later date.
- To build a blockchain user base there must be some utility related to problem solving in technology or cryptocurrency.

e-ISSN: 2582-5208
International Research Journal of Modernization in Engineering Technology and Science
(Peer-Reviewed, Open Access, Fully Refereed International Journal)
Volume:04/Issue:05/May-2022 Impact Factor- 6.752 www.irjmets.com

3. For Example:

a) Bitcoin serves the major utility of payment for goods and services. Currently there are over 50,000 merchants registered with Bitcoin including - Microsoft, PayPal and Subway.

b) Bitcoin was the first mover in Blockchain and it's high utility as payment system made sure that a large part of its ecosystem is based upon users.

4. Blockchain Exchanges

a) Each blockchain project has a strong ecosystem at work and always includes decentralized exchange. These are developed by a blockchain team or other developer community.

b) Typical exchanges are designed to find cheaper exchange rates between any two cryptocurrencies, making token / cryptocurrency trading more affordable.

c) The exchanges used for trading can be integrated with the hardware wallet or users can create their own wallet on the exchange website.

5. Blockchain Verfiers/Miners

[1] In order for blockchain to operate and maintain its integrity, it needs a large network of independent nodes around the world.. In a private blockchain, the central organization has authority over each node in the network. In the case of public blockchain, on the other hand, anyone can set up their computer to act as a node. The administer of these computers are called miners.

[2] Since the integrity of a blockchain is directly related to the number of individual nodes on the network, some incentives for mining are also required. Different blockchains use different mining systems but most of them have some types: ○ An incentive system A consent algorithm

6. Blockchain Applications

In addition to exchanges, platforms and users, another important aspect of the blockchain ecosystem is applications created for industry, developer and community specific propose . There are various examples of applications being created on blockchain, some of the major applications are:

- **CryptPad**- A decentralized document creation application.
- **Humaniq**- A fintech startup which joints unbanked user with worldwide economy.
- **Augur**- A peer to peer oracle and prediction market place.
- **Filament**- creating the Internet Of Thing systems over the Blockchain.

IX. CONCLUSION

By using Bitcoin as a case study in this short dissertation, you became familiar with many concepts of blockchain. Bitcoin is the first successful implementation of the blockchain. Today, the world has found applications of blockchain technology in many industries, where trust is required without the involvement of a centralized authority. So welcome to the world of blockchain.

X. REFERENCES

[1] [1].An Overview of Blockchain Technology: Architecture, Consensus, and Future Trends Zibin Zheng; Shaoan Xie; Hongning Dai; Xiangping Chen; Huaimin Wang

[2] https://ieeexplore.ieee.org/abstract/document/8029379

[3] https://intellipaat.com/blog/tutorial/blockchain-tutorial/blockchain-vs-database/#:~:text=A%20blockchain%20is%20kind%20of,structure%20used%20for%20storing%20information

[4] https://www.coursehero.com/file/113828521/01-Database-Systemspdf/

[5] https://www.coursehero.com/file/113828521/01-Database-Systemspdf/

[6] https://mehta2155-34505.medium.com/blockchain-technology-f8f075b0656b

[7] https://www.coursehero.com/file/113828067/02-Blockchainpdf/

[8] https://www.sciencedirect.com/topics/computer-science/symmetric-cryptography#:~:text=Symmetric%20cryptography%2C%20known%20also%20as,and%20to%20decrypt%20the%20data.

[9] https://www.techtarget.com/searchsecurity/definition/asymmetric-cryptography

[10] https://www.coursehero.com/tutors-problems/Information-Security/27894856-Please-explain-how-the-symmetric-encryption-and-asymmetric-encryption/

[11] simplilearn.com/tutorials/blockchain-tutorial/merkle-tree-in-blockchain#what_is_a_merkle_tree