

Background Theories of Blockchain

* Chain of Block:

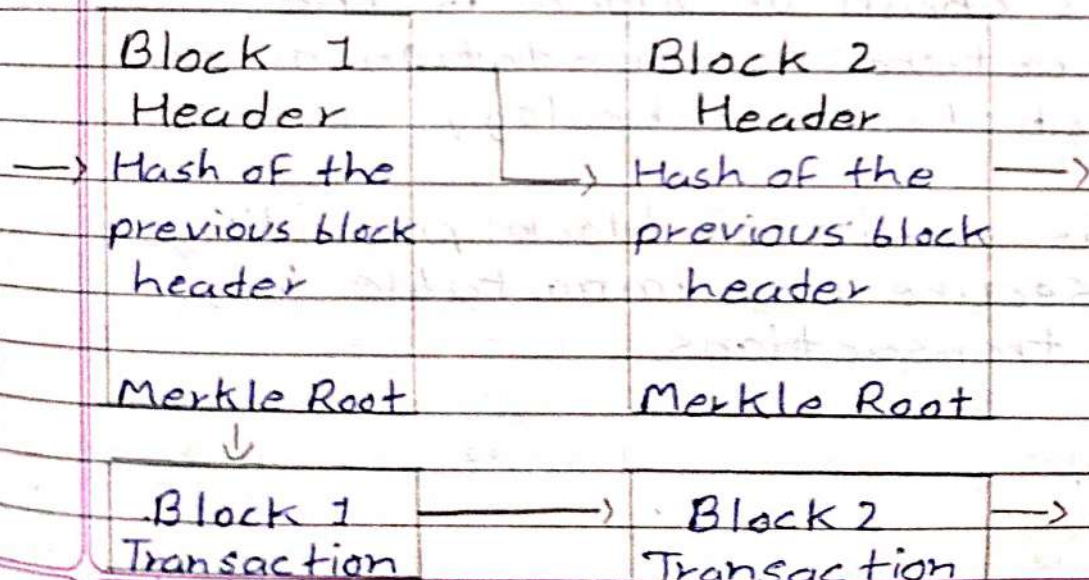
⇒ In a Blockchain, Data is stored in a series of blocks.

Each block contains a list of transaction, timestamp and a reference of a the previous block.

The blocks are linked together in a linear sequence like forming a chain.

There are Two Components in Block.

- 1) Block Header
- 2) Block Body



1 Block Header: Contains metadata about the block.

- Previous Block Hash: A reference to the hash of the previous block in the chain.

- Timestamp: The time when block was created.

- Merkle Root: The root hash of the merkle tree.

2 Block Body: Contains the list of transaction include in the block.

This chain of blocks ensures the integrity and security of the data.

This chain of block is the structure or foundation of the blockchain technology.

This chain of block providing a secure and immutable ledger of transactions.

* Merkle Tree:

=> Merkle Tree is also known as hash tree which are the fundamental component of blockchain technology.

This tree enable efficient and secure verification of large data structure.

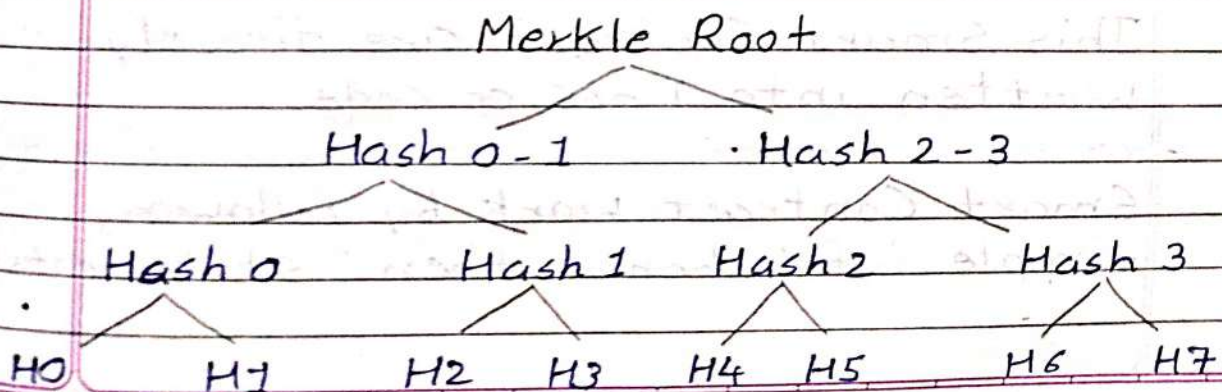
Merkle Tree is helps to solve problems in large decentralized network.

This Tree enable decentralized blockchain to share data, verify them and make them trustworthy.

-> Structure of Merkle Tree:

- Each leaf node contains the hash of a data block.

- Each non-leaf node contains the hash of its child nodes.



→ Benefits:

1. Validate the integrity of data
2. Storage Efficiency - Required small disk space
3. Handling Large volumes of transaction
4. Data Confidentiality
5. Enhance Security of data

* Smart Contract:

⇒ A Smart Contract is a self-executing contract which includes terms and condition.

A Smart Contract is a agreement between buyer and seller.

This Smart Contract are directly written into lines of code.

Smart Contract work by following simple "if/when-then" statements

that are written into code on a blockchain.

A network of computers executes the action when predetermined conditions have been met and verified.

This action could include releasing funds to the appropriate parties.

That means the transaction cannot be changed and only parties who have been granted permission.

Smart Contract includes all the terms and conditions which have to follow between buyer and seller.

→ Benefits:

- 1 Trust and Transparency Condition
- 2 Accuracy
- 3 Security
- 4 Saving time between buyer and seller.

-> Application :

- 1 Financial Services
- 2 Supply Chain Management
- 3 Healthcare
- 4 Real Estate
- 5 Voting System

* Actors in Blockchain:

=> Actors play crucial roles in the functioning and maintenances of a blockchain network.

Each actor contributes to different aspects of the system for security, reliability, decentralization and usability.

This are the actor which involves in Blockchain.

- 1 Blockchain Architect: Designs and structures the blockchain system.

- 2 Regulator : Ensures the blockchain system complies with legal and regulatory requirements.
- 3 Blockchain User : Participants who interact with the blockchain to perform transaction.
- 4 Membership Services : Manages identities and access control in network.
- 5 Traditional Data Sources : External system that provides data input in blockchain.
- 6 Traditional Processing Platforms : Legacy system that interact with blockchain for data processing.
- 7 Blockchain Network Operator : Manages and maintains the infrastructure of blockchain.
- 8 Blockchain Developer : Develops smart contracts and decentralized application.

* Difference Between Centralized and decentralized network, or Distributed network.

Centralized Network

Distributed Network.

- | | | |
|---|---|--|
| 1 | Control is centralized, only single server control. | Control is distributed, multiple server control. |
| 2 | Requires time for accessing the system. | Requires less time for accessing the system. |
| 3 | Only one database in the system. | multiple database in the system. |
| 4 | System provides Data Consistency. | System can be provides Data Inconsistency. |
| 5 | Easier to maintain and update easier. | More complex to update and maintain. |
| 6 | Costly to scale | Can be cost-effective |
| 7 | Easier to implement and manage. | Complex to manage and implement. |