SNS COLLEGE OF ENGINEERING

Kurumbapalayam (Po), Coimbatore – 641 107

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19SB603- PUBLIC LEDGERS

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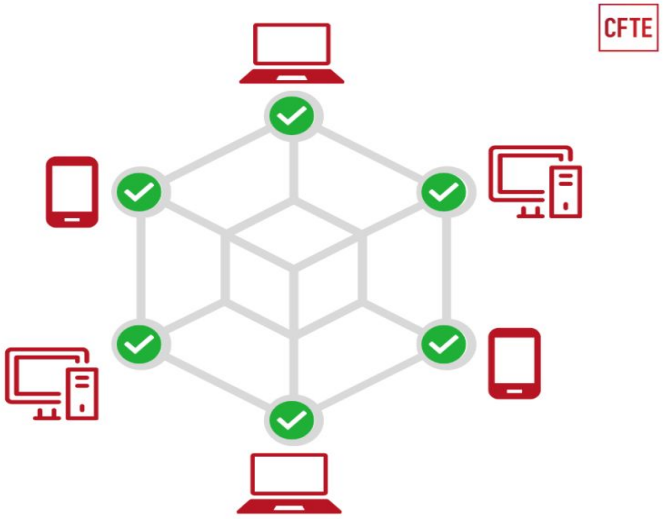
PUBLIC LEDGERS

A **public ledger** is a decentralized and transparent digital record where transactions are openly accessible to all participants. It operates on a distributed network, ensuring that no single entity controls the data. Transactions are verified through consensus mechanisms like Proof of Work (PoW) or Proof of Stake (PoS). Once recorded, data is immutable and cannot be altered or deleted.

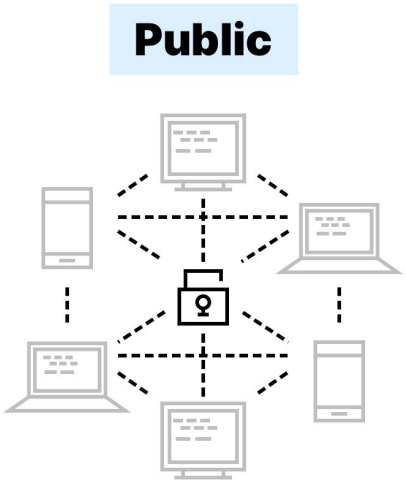
Examples: Bitcoin and Ethereum blockchains function as public ledgers.

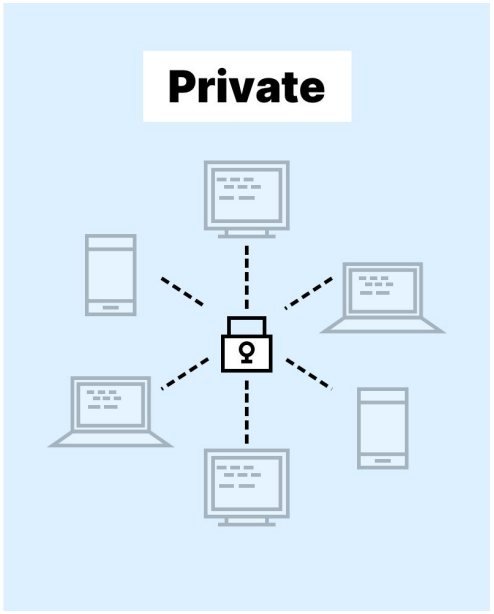


How Public Ledgers Work in Blockchain

1. Transaction Initiation
2. Broadcasting to the Network
3. Verification and Consensus
4. Adding to the Blockchain
5. Transparency and Security

Example: Bitcoin's Public Ledger





Consensus Mechanisms in Public Ledgers

Proof of Work (PoW) – Miners solve complex puzzles to validate transactions (e.g., Bitcoin).
Proof of Stake (PoS) – Validators stake coins to confirm transactions (e.g., Ethereum 2.0).
Delegated PoS (DPoS) – Users vote for trusted validators (e.g., EOS).
Proof of Authority (PoA) – Transactions validated by approved entities (e.g., VeChain).
Practical Byzantine Fault Tolerance (PBFT) – Nodes reach agreement through voting (e.g., Hyperledger).

Advantages of Public Ledgers

✅ **Advantages:**

- **Transparency** – All transactions are publicly accessible.
- **Decentralization** – No single authority controls the ledger.
- **Security** – Cryptographic encryption ensures data integrity.
- **Immutability** – Once recorded, data cannot be altered.
- **Trustless System** – No need for intermediaries.

CHALLENGES

⚠️ **Challenges:**

- **Scalability Issues** – High transaction volume can cause delays.
- **Energy Consumption** – PoW-based blockchains require significant power.
- **Privacy Concerns** – Transactions are visible to everyone.
- **Regulatory Uncertainty** – Governments may impose restrictions.
- **51% Attack Risk** – If one entity controls most mining power, they can manipulate transactions.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