

INTRODUCTION TO BLOCKCHAIN TECHNOLOGY



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WHY BLOCKCHAIN?

- Double-spending
- Trust
- Fraud
- Central authority

Centralized Network



Decentralized Network



What is Blockchain?

A digital ledger where blocks of transactions are securely linked.



Core Elements of Blockchain

- Block – Data holder
- Hashing – Security (SHA-256)
- Chain – Link of trust
- Distributed Ledger – Shared copy for everyone.



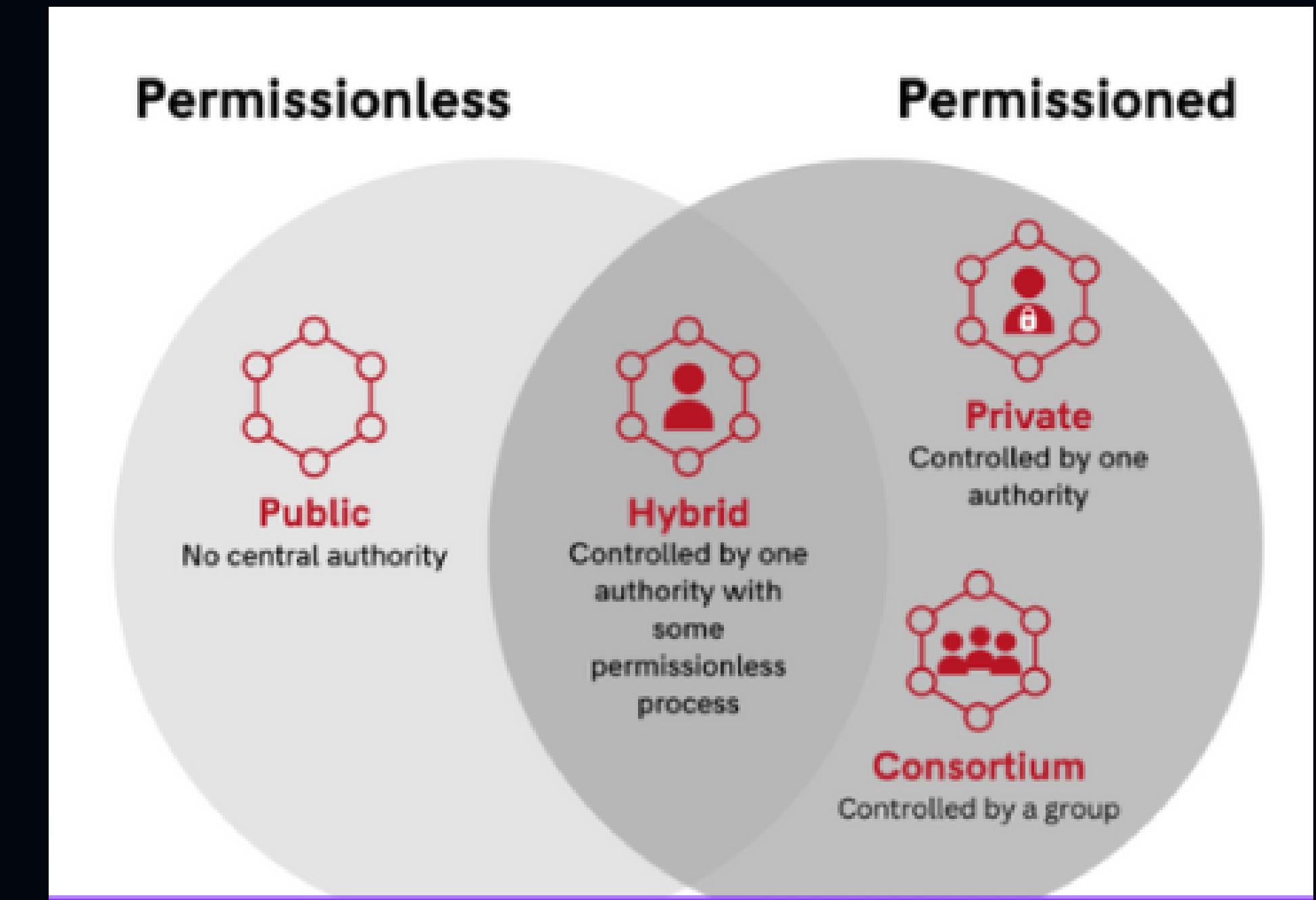
Cryptography in Blockchain

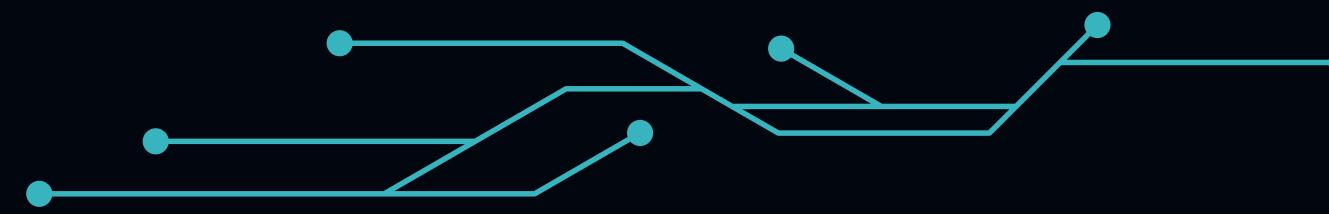
- Hash Functions (SHA-256) for security,
- Digital Signatures to prove who made a transaction
- Public and Private Keys to ensure only the owner can access their funds



TYPES OF BLOCKCHAIN

- Public
- Private
- Consortium
- Hybrid.





CONSENSUS MECHANISMS:

- It is the rules or methods used in blockchain networks to make sure that all participants (nodes) agree on the same version of the ledger (blockchain), even though the system is decentralized and no central authority exists.

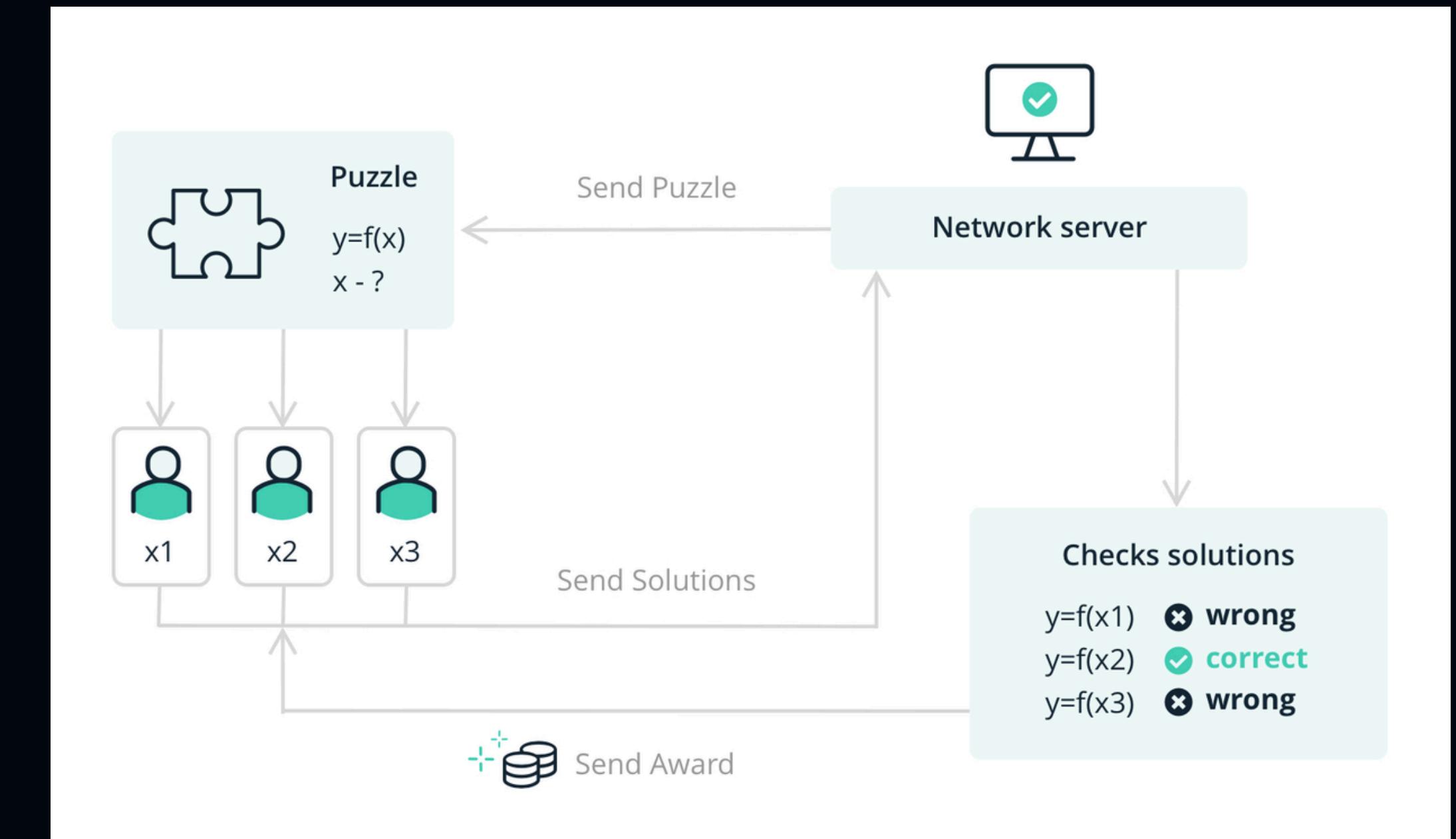
BENEFITS

- Ensure trust between unknown participants.
- Validate and add new transactions/blocks.
- Protect against fraud, double-spending, and attacks.

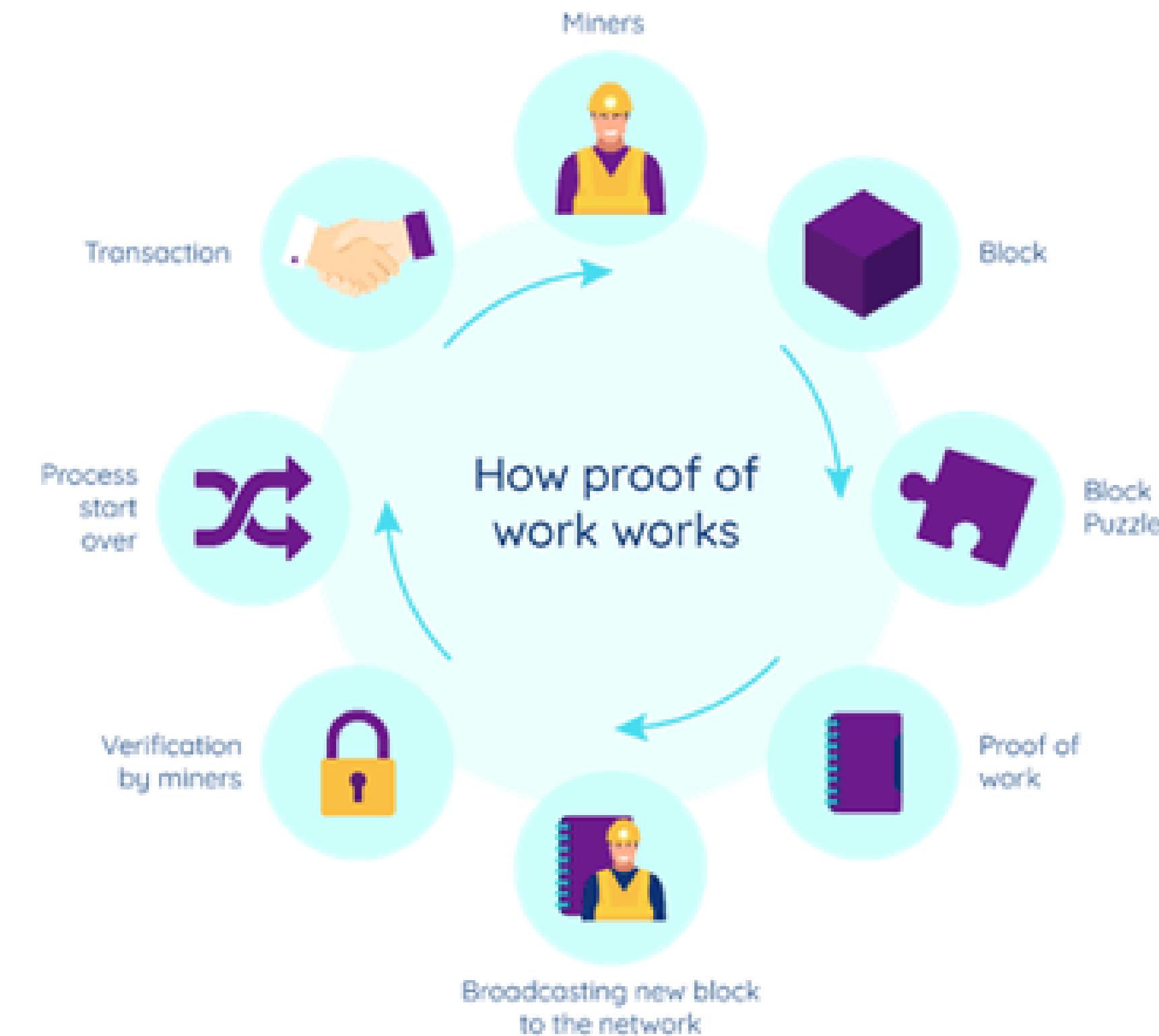


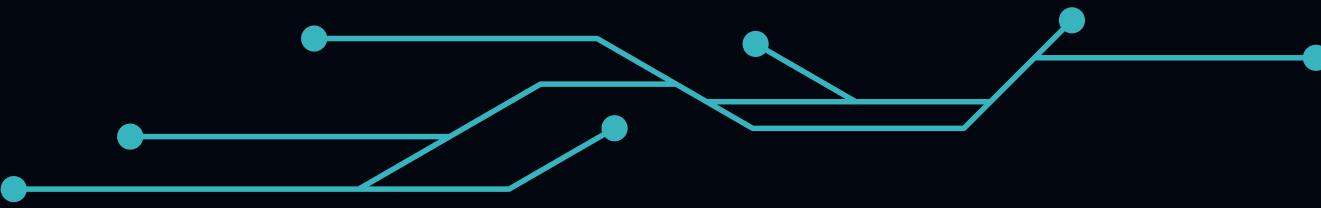
PROOF OF WORK:

Proof of Work (PoW) is a cryptographic consensus mechanism that requires participants (miners) to solve complex mathematical puzzles, or "mining," in order to validate transactions and add new blocks of data to the blockchain.



PROOF OF WORK





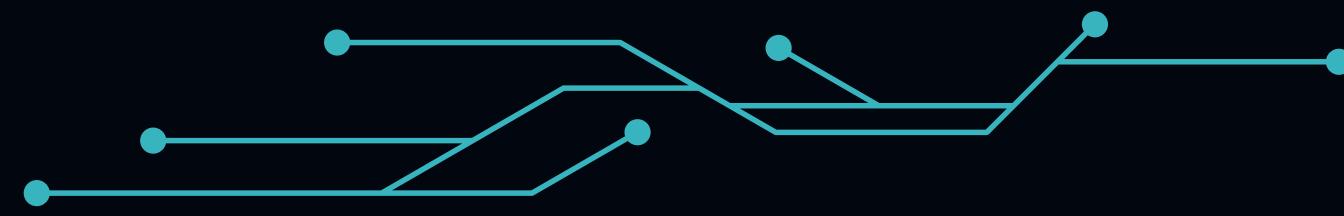
Blockchain Platforms:

- A blockchain platform is like an “operating system for blockchain applications”— provide a base for cryptocurrency, smart contracts, and decentralized apps (DApps).

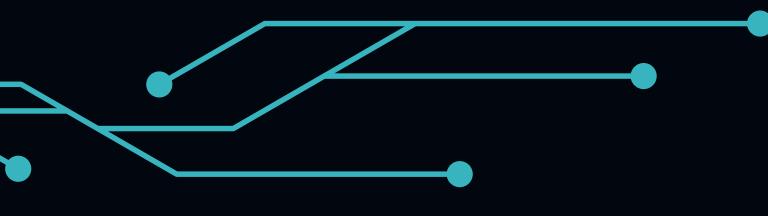
Example:

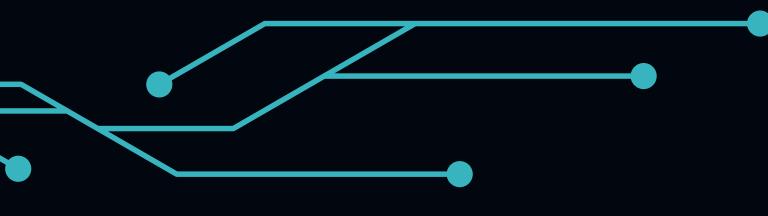
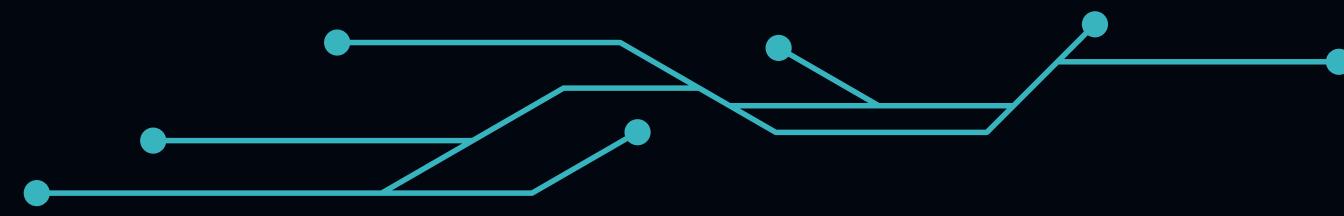
- Bitcoin (฿): First digital currency – used for peer-to-peer payments.
- Ethereum (diamond): Supports smart contracts and decentralized applications (DApps).
- Hyperledger (gear): Enterprise blockchain framework – for business and supply chain.
- Polygon (square): Scalable blockchain – Layer-2 solution to speed up Ethereum.



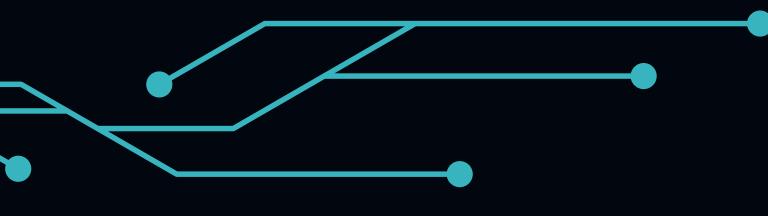
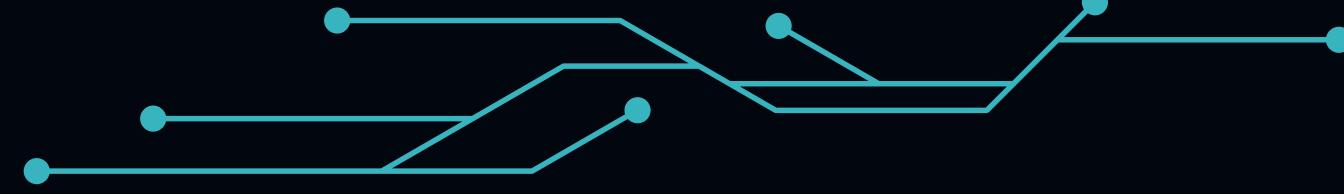


Applications of Blockchain

- Cryptocurrencies (Bitcoin, Ethereum) 💰 → Secure peer-to-peer digital payments.
 - Supply Chain Tracking 📦 → Transparency in goods movement from source to customer.
 - Healthcare Records 🏥 → Secure, tamper-proof storage of patient data.
 - Voting Systems 🗳️ → Transparent and fraud-resistant electronic voting.
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“Blockchain = Trust without intermediaries”



THANK YOU