



# Building on Blockchain with AWS

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MCA 2nd SEMESTER

# Introduction to Blockchain

Blockchain is a **Digital Ledger** system that stores data in blocks. These blocks are connected to each other like a chain. Once a transaction is recorded, it **cannot be changed** (immutable), and everyone in the network can see it (transparent).

## Decentralization

Operates on a network of computers, reducing single points of failure. No central authority. Everyone (called “nodes”) keeps a copy of the records.

## Immutability

Once data is added, it **can't be changed** due to cryptographic security.

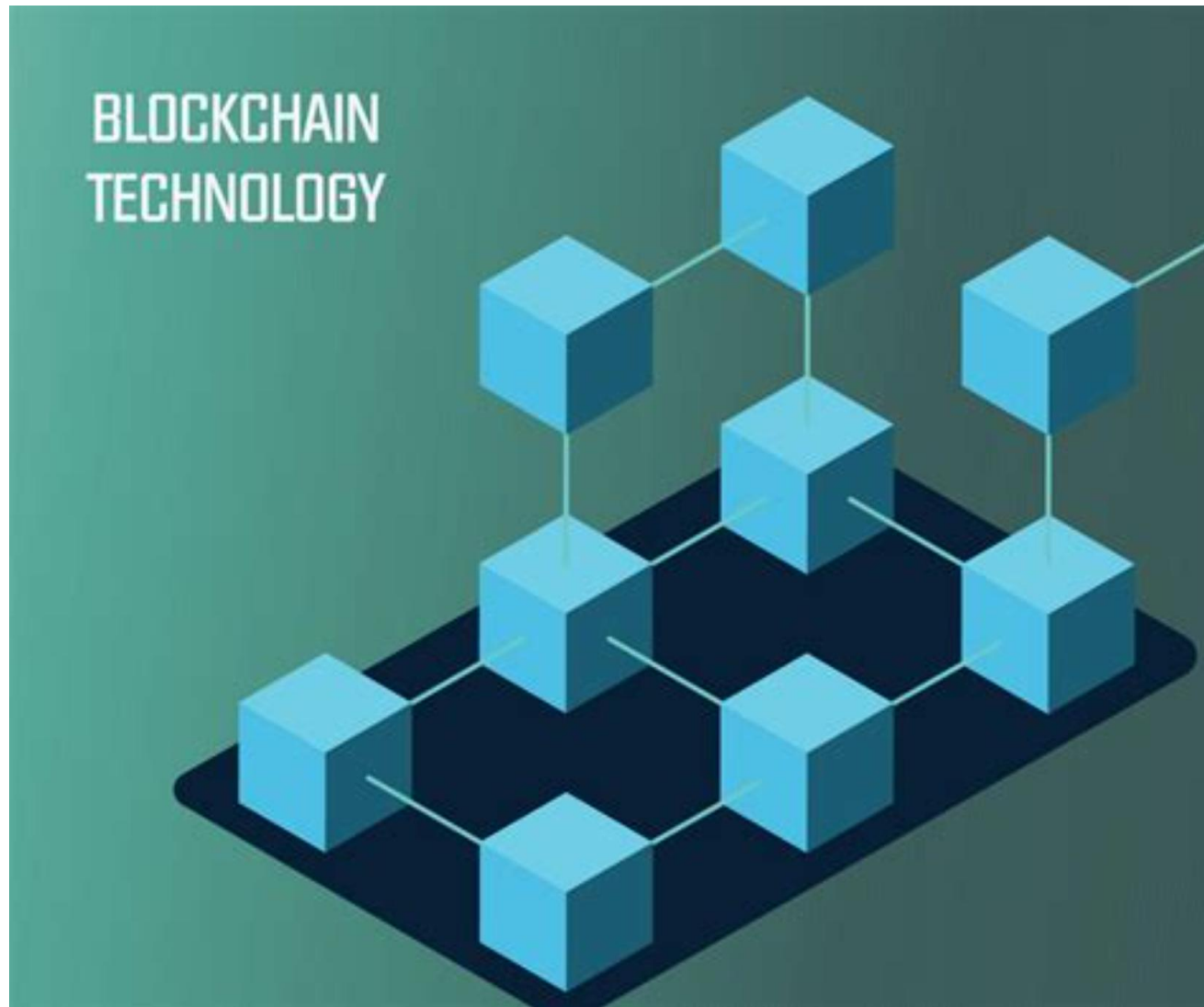
## Transparency

Everyone involved can view the entire ledger.

## Security

Uses **encryption** (cryptography) to protect data.

# Graphic Diagram of Blockchain



- **Blocks:** Units containing transactions, timestamps, and cryptographic hashes.
- **Chain:** These blocks are linked one after another.
- **Nodes:** Computers validating and recording transactions.
- **Transaction:** Actions or exchanges recorded on the blockchain.
- **Consensus Mechanism:** Process for nodes to agree on blockchain state (e.g., PoW, PoS).

# Understanding Core Blockchain Concepts

Let's dive deeper into some fundamental concepts that power blockchain technology.

## 1. Smart Contracts

A **Smart Contract** is a program or code stored on the blockchain that runs **automatically** when specific conditions are met.

✔ Think of it as: "If this happens, then do that"

### Real-Life Contract:

You hire a painter. You pay only **after** the painting is done.

### Smart Contract:

You create a smart contract that says:

"If painting is done and uploaded, then release ₹1000 to painter automatically."

Once the painting is verified, the money is transferred automatically—no middleman needed!

Automatic

Runs on its own.

No Middleman

No need for lawyers, banks, or companies.

Transparent

Everyone can see the rules.

Immutable

Can't be changed once uploaded.

# Understanding Core Blockchain Concepts

## 2. Cryptography

Cryptography is a way of **protecting data** so that only the **right person** can read it or verify its authenticity.

✅ Think of it like **locking information** in a box and only the person with the correct **key** can open it.

### Used for in Blockchain:

- **Hashing:** Converts data into a **fixed-size code** (like a fingerprint). If you change even one letter, the hash will completely change.
- **Digital Signatures:** Like your digital fingerprint to **prove identity**.
- **Encryption:** Keeps the data **secret** from unauthorized users.

**Example:** If your message is "Hello", cryptography might convert it to something like:

2cf24dba5fb0a... (Hash)

No one can reverse it back to "Hello" without the original, ensuring data integrity.



# Understanding Core Blockchain Concepts

## 3. Proof of Work (PoW)

It's a **method** used by blockchains (like Bitcoin) to decide **who gets to add the next block**. Computers must solve a **very hard puzzle**; the first one to solve it gets the reward and adds the block.

✅ Imagine 100 students solving a Rubik's Cube. The one who solves it first gets ₹100 and writes on the class whiteboard.

### Why is it used?

- To make sure **only one person** adds the block.
- To prevent **cheating or hacking**.
- To make it **costly and difficult** to attack the network.

### Drawbacks:

- **Wastes electricity** due to intense computation.
- Can be relatively **slow** in processing transactions.
- **Needs expensive hardware** to participate effectively.

# Introduction to Amazon Managed Blockchain (AMB)

AMB simplifies creating and managing scalable blockchain networks using popular frameworks like Ethereum and Hyperledger Fabric.



## Supports Frameworks

Compatible with Hyperledger Fabric, Ethereum, Polygon, and Bitcoin.



## Fully Managed

AWS handles network creation, maintenance, and scaling.



## Scalability

Easily scales to accommodate growing transaction volumes.



## Secure & Reliable

Built on AWS infrastructure with access control and encryption.

# How Amazon Managed Blockchain Works

## Network Creation

Users create or join networks, selecting frameworks and configuring settings.

## Smart Contracts

Deploy and manage smart contracts to automate processes.

## Node Management

AMB handles node creation, management, and scaling.

## Monitoring & Analytics

Utilize AWS CloudWatch for performance and system health.



# Working with AWS Managed Blockchain

Explore how to interact with AMB, choose the right offering, and leverage AWS resources for your blockchain solutions.

## Access Multi-Blockchain Data with AMB Query

AMB Query is a tool/API that allows your app to **read data** from different blockchain networks.

## Choose Your AMB Offering

### Serverless Offering

- **Fully automatic**, no need to manage servers.
- Good for **beginners and light workloads**.
- Just use the service and AWS handles everything.

### Dedicated Offering

- Gives more **Control and Performance**.
- You can configure resources, which is good for **High-traffic or Business-Critical Apps**.
- You are responsible for some management tasks.