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Blockchain Tutorial

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Blockchain Tutorial

A lot of interest has been shown in blockchain technology. It's known as financial transactions, computer futures, and cryptocurrency. Go through this blockchain tutorial, which explains both fundamental and advanced blockchain concepts.

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Introduction to Blockchain

Blockchain is an approach to data storage that makes it hard or impossible for outsiders to change, breach, or control the system.

Blockchain technology is a framework that uses many databases, referred to as the "chain," connected via peer-to-peer nodes, to store public transactional records or blocks. This type of storage is commonly known as a "digital ledger."

How is blockchain technology operational?

Blockchain is widely used in applications such as Bitcoin. A cryptocurrency called Bitcoin is utilized for online asset exchanges.

Bitcoin allows two parties to conduct transactions over the Internet without relying on third parties using cryptographic verification. A digital signature

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secures each transaction.

Frequent Terminologies in Blockchain Technology

Decentralization: The blockchain's data is not stored on a central server or system. The information is dispersed among millions of globally connected computers via the blockchain.

Due to its public verifiability and presence on all nodes, this technology permits the notarization of data.

Nodes: A node is a computer connected to the blockchain network.

- Node uses the client to establish a connection with the blockchain.
- On the blockchain, the client assists with transaction propagation and validation.
- A node on the blockchain updates itself with the most recent block of data when a computer connects to the blockchain and downloads a copy of the blockchain data into the system.
- Miners refer to the connected node that assists in the transaction execution process in exchange for a reward.

Why Blockchain?

Blockchain technology is applicable in a variety of contexts. The primary application of blockchains is as a distributed ledger for money.

A wide range of business applications, including banking, finance, government, healthcare, insurance, media and entertainment, retail, etc., demonstrate its immense promise.

The following five characteristics of blockchain contribute to trust:

- **Distributed:** Every incoming transaction is shared and updated in the distributed ledger.

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- **Secure:** Due to cryptography and permissions, blockchain cannot be accessible to unauthorized parties.
- **Transparent:** Every blockchain node has access to all transaction data and a copy of the blockchain itself.
- **Consensus-based:** Consensus algorithms are used to accomplish all pertinent networks that concur with the members involving a transaction.
- **Flexible:** The platform allows for the writing of smart contracts that are carried out in response to predetermined criteria.

Benefits of Blockchain

Blockchain technology provides the following advantages for its users:

- **Time-saving:** The process is quicker and less expensive.
- **Cost-saving:** There is no requirement for independent confirmation. There are fewer middlemen.
- **Increased security:** Since blockchain data is shared among millions of participants, it is impenetrable to tampering. The system is secure from fraud and cybercrime.
- **Collaboration:** It eliminates the need for third-party negotiation and enables direct communication between all parties.
- **Reliability:** Every interested party's identity is verified and certified via blockchain. By doing so, duplicate records are eliminated, lowering rates and speeding up transactions.

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Applications of Blockchain

Blockchain is used widely in the following sectors:

- Banking Companies to safeguard and enhance the banking experience.

- The accounting industry could more easily monitor private information and lower fraud
- Airlines will protect private information.
- various industries to communicate directly with customers, guaranteeing advantages

Popular companies utilizing blockchain technology are:

- Barclays
- Visa
- Unilever
- Walmart
- DHL
- Pfizer
- The government of Dubai
- Google
- Microsoft
- Amazon, etc

Types of Blockchain

There are four types of blockchains available. They are

- Public Blockchain.
- Private Blockchain.
- Hybrid Blockchain.
- Consortium Blockchain.

Public Blockchain

Public blockchains are fully capable of decentralization. Anyone with a computer and internet connection can join the network; there are no limitations.

Features:

- Open source and not owned by anyone.
- Every computer connected to the network has a copy of every other node
- Records or transactions can be verified.

Benefits:

- Trustable
- Secure
- Decentralized
- Anonymous Nature.

Limitations:

- Slow processing
- Energy consumption
- Less acceptance

Examples: bitcoin and ethereum.

Use Case: Financial Systems.

Private Blockchain

They are not as decentralized but more secure than the others, as only certain nodes are allowed to participate in the process.

Features:

- Less transparent.
- Only certain authorized users can access them.
- Function within exclusive networks.
- Few individuals are permitted to take part in a network within a business.

Benefits:

- High speed
- Scalable
- Increased privacy
- More balanced

Limitations:

- More vulnerable
- Centralized
- Few nodes.

Examples: Hyperledger and Corda

Use Cases: Asset Management, Internal Auditing,

and Voting.

Hybrid Blockchain

It is the hybrid content of a public and private blockchain, where certain parts are made visible as a public blockchain and others are controlled via a particular organization.

Features:

- Combination benefits of public and private blockchains
- Permissionless and permission-based.
- Smart contracts allow users to access data.
- Transactions can't be changed as it is a principal entity.

Benefits:

- Hybrid Ecosystem
- Transactions are cost-effective
- Highly customizable
- Flexible operations

Limitations:

- Less efficiency in maintenance
- Less transparency
- Closed ecosystem

Examples: XRP tokens and the Ripple network.

Use Cases: healthcare industry, financial industry, real estate industry, and government sectors.

Consortium Blockchain

It is an innovative strategy that meets the needs of the company. In addition to initiating or receiving transactions, this blockchain verifies the transaction.

Features:

- Federated blockchain

- Innovative solution for solving industry needs.
- Some will be public and some will be private.
- More than one company can manage.

Benefits:

- High-speed verification
- Decentralization at every level.
- Any member can access the blocks.
- Flexible for decision-making.

Limitations:

- All members should approve a transaction.
- Chances of less transparency
- Chances of vulnerability.

Examples: Multichain and Tendermint.

Use Cases: high-level businesses, banks, and payment processing sectors.

Blockchain Interview Questions and Answers

Implementation of Blockchain in Java

Several blockchain frameworks, including Hyperledger Fabric, Ethereum, and Corda, employ Java.

The steps below must be followed to use Hyperledger Fabric to create a blockchain in Java:

Step 1: Create a development environment: You must create a development environment with the Hyperledger Fabric SDK for Java and all other dependencies.

Step 2: Describe the network: It is necessary to provide the network topology, which includes the nodes, channels, and smart contracts.

Step 3: Create the smart contracts: To create the smart contracts, Java must be used. A smart

contract is a piece of business logic that runs on the blockchain and controls transactions.

Step 4: Develop the application: The software that interfaces with the blockchain network needs to be developed. For this, you may utilize the Hyperledger Fabric SDK for Java.

Step 5: Test and deploy: Before being made available on the blockchain network, the application must be assessed.

Significant Features of Hyperledger Fabric

Some of the hyper ledger fabric's features are,

- **Modular Architecture:** Adaptable and Customizable
- **Permissioned Blockchain:** Only authorized users can participate.
- **Smart Contracts:** self-executing agreements that could automate business processes.
- **Performance and Scalability:** Handle 1000s of transactions per second.
- **Enterprise-Grade Security:** Identity management, encryption, and access control.

The Linux Foundation is in charge of maintaining Hyperledger Fabric, an open-source blockchain platform.

Blockchain Developer Salary

Smart Contracts in Blockchain Technology

Smart contracts function by having a predefined set of conditions that, when met, trigger the contract's automatic fulfillment of its obligations.

Due to automation, there is a reduction in the time and costs associated with traditional contract administration as middlemen such as banks, brokers, or attorneys are not required.

- The conditions of a seller-buyer contract are directly encoded into code in smart contracts, which are self-executing contracts.
- American computer scientist Nick Szabo devised the virtual currency known as “Bit Gold” in 1998.
- According to him, automated transaction procedures that carry out contract requirements are known as smart contracts.
- It makes the transactions clear, traceable, and irreversible.

Benefits of Smart Contracts

The benefits of smart contracts in blockchain are as follows:

Accuracy, Speed, and Efficiency: It is immediately executed. It is digital and automated. Quick error-correcting features are there.

Trust and Transparency: There is no third-party engagement and there are encrypted transaction logs.

High Security: As blockchain transaction records are encrypted, hackers can't easily access them.

Savings: It gets rid of the necessity for middlemen in transactional processes.

How do smart contracts work?

The steps involved in the smart contracts are as follows:

Step 1: Developers and business teams work together to specify their requirements.

Step 2: Simple events include things like a utility meter reading threshold, a shipment receipt, and payment authorization.

Step 3: More complex logic may be used to encode the value of a financial item that is a derivative.

Step 4: The developers then use a platform for creating smart contracts to generate and test the logic. It will then go through testing.

Step 5: An internal specialist or a business specializes in assessing security.

Step 6: After the contract has been approved, it is then implemented on an active blockchain.

Step 7: After it is deployed, the smart contract is set up to receive event updates

Step 8: The smart contract goes into action as soon as it receives the required set of events from one or more oracles.

Smart Contract Limitations

- Smart contracts are **unable to obtain information about “real-world” events** since they are unable to send HTTP inquiries. This is intentional.
- The consensus process, which is essential to security and decentralization, might be **compromised by using outside data**.

Use Cases of Smart Contracts

- Simple to complex business processes
- Simple economic transactions involve smart access management.
- Industries such as banking, insurance, e-governance, telecommunications, energy, music industries, education, and so on.

Blockchain Training

Future Scope of Blockchain Technology

The blockchain is changing our understanding of transparency and security. Here are the future predictions that can be transformed using blockchain technology:

- Interoperability and cross-chain solutions.
- DeFi (Decentralized Finance) Evolution.
- NFT (Non-Fungible Token) Evolution.
- Sustainability and green blockchain growth.
- Integration with IoT (Internet of Things).
- Privacy-enhancing technologies like Monero.
- Government adoption.
- Supply chain transparency.
- DAOs (Decentralized Anonymous Organizations).
- Blockchain Interoperability Protocols.

Conclusion

Blockchain transforms legacy systems into digital age systems. We hope this blockchain tutorial helps you understand the fundamental concepts. Hone your skills by enrolling in our [blockchain training in Chennai](#).

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