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Blockchain Interview Questions

A list of top frequently asked **Blockchain Interview Questions** and answers are given below.

1) What is Blockchain?

A Blockchain is a constantly growing **ledger**(file) that keeps a permanent record of all the transactions that have taken place, in a secure, chronological, and immutable way. It can be used for the secure transfer of money, property, contracts, etc. without requiring a third-party intermediary like bank or government.

Blockchain is the backbone of the most famous cryptocurrency named Bitcoin. It is a peer to peer electronic cash system and a decentralized network which allows users to make transactions directly without the involvement of third-party to manage the exchange of funds.

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2) What is the difference between Bitcoin blockchain and Ethereum blockchain?

We can see the basic differences between Bitcoin blockchain and Ethereum blockchain in the below table.

Points	Bitcoin Blockchain	Ethereum Blockchain
Founder	Satoshi Nakamoto	Vitalik Buterin
Release Date	9 Jan 2008	30 July 2015
Release Method	Genesis Block Mined	Presale
Usage	Digital Currency	Smart Contracts
Cryptocurrency	Used	Bitcoin Ether
Algorithm	SHA-256	Ethash
Blocks Time	10 minutes	12-14 seconds
Scalable	Not yet	Yes

3) What are the different types of Blockchains?

The different types of blockchains which introduce to the world are:
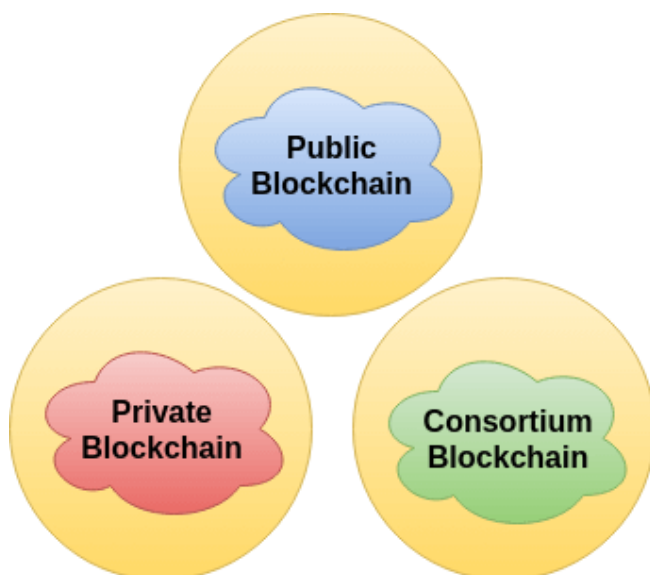
There are mainly three types of Blockchains introduced to the world.

1. Public Blockchain

A Public blockchain is a kind of blockchain which is "**for the people, by the people, and of the people**." There is no in-charge it means anyone can read, write, and audit the blockchain. It is an open-source, distributed, and decentralizes public ledger so anyone can review anything on a public blockchain. They are considered to be **Permissionless blockchain**.

2. Private Blockchain

A Private blockchain is a private property of an individual or an organization. It is controlled by a single organization that determines who can read it, submit the transaction to it, and who can participate in the consensus process. They are considered to be **permissioned blockchain**.

3. Consortium Blockchain or Federated Blockchain

In this blockchain, the consensus process is controlled by a pre-selected group, i.e., group of companies or representative individuals. These pre-selected group is coming together and making decisions for the best benefit of the whole network. Such groups are also called consortiums or a federation that's why the name consortium or federated blockchain.

4) Where is a blockchain stored?

The blockchain can be either stored as a flat file or as a database.

5) What are the types of records that are present in the blockchain database?

There are two types of records in a blockchain database.

1. Transactional Records

2. Block Records

Both the records can easily be accessed and can integrate with each other without following any complex algorithm.

6) List the key features of blockchain?

The essential properties of a blockchain are:

1. Decentralized Systems

2. Distributed ledger

3. Safer & Secure Ecosystem

4. Fast

5. Low Transaction Fees

6. Fault-Tolerant

7. Minting

7) How does Blockchain differ from relational databases?

The blockchain differs from the relational database in the following ways.

Points	Blockchain	Relational Database
Unit of data	Block	Table
Failure	None	Can happen

| Centralized Control	No	Yes
Modification in data	Not Possible	Possible
Single Point of Failure	Does not exist	Exists

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8) Name some popular platforms for developing blockchain applications.

Some of the popular platforms for developing blockchain are:

1. Ethereum

2. Hyperledger Sawtooth

3. Quorum

4. Ripple

5. R3 Corda

6. Qtum

7. IOTA

8. EOS

9) What do you mean by blocks in the blockchain technology?

A Blockchain consists of a list of records(some or all of the recent transaction). Such records are stored in blocks. Each time a block gets completed, a new block is generated. The block linked with other blocks constitutes a chain of blocks called Blockchain. Each block, after added into the blockchain, will be stored as a permanent database. We cannot delete or reverse any block from the blockchain.
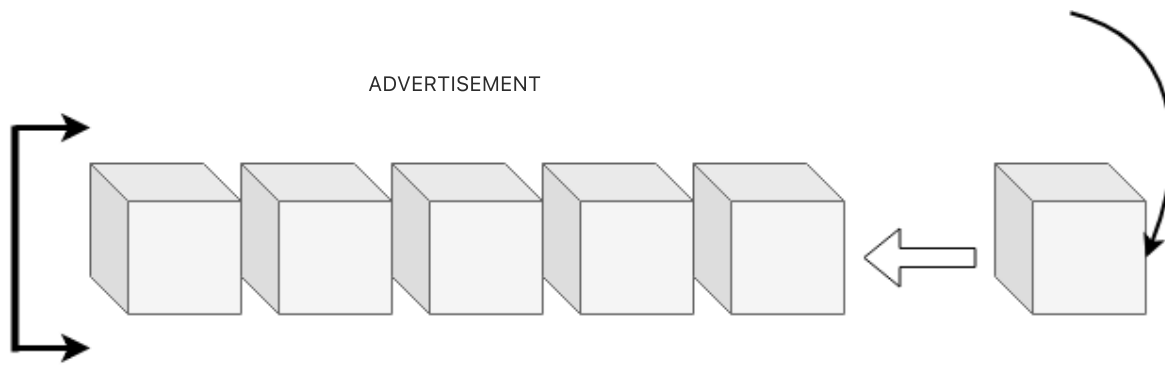
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10) Every block of Blockchain consist of what elements?

Every block must include these three things:

1. A hash pointer to the previous block

2. Timestamp

3. List of transactions

11) How does a block is recognized in the Blockchain approach?

Each block in the blockchain consists of a hash value. The hash value acts as a link to the block which is before it, transaction data and in fact a stamp of time.

Blockchain

Block:	#	1
Nonce:		11316
Data:		
Prev:		0000000000000000000000000000000000000006
Hash:		000015783b764259d382017d91a36d206d0606

Mine

Block:	#	2
Nonce:		35230
Data:		
Prev:		000015783b764259d382017d91a36d206d0606
Hash:		000012fa9b916eb9078f8d98a7864e697ae83e

Mine

12) How can blocks be identified?

Blocks can be identified by their block height and block header hash.

13) Can you modify the data in a block?

No, it's not possible to modify the data in a block. In case any modification is required, you would have to erase the information from all other associated blocks too.

14) Can you remove a complete block from a network?

Yes, it is possible to remove a complete block from a network. There are times when only a specific portion of this online ledger is to be considered. There are default options and filters that can help us do this without making a lot of efforts.

15) What type of records can be kept in the Blockchain? Is there any restriction on the same?

No, it is not possible to give restriction for keeping records in the blockchain approach. We can put any type of data on a blockchain such as Bank records, health records, images, Facebook messages, etc.

Some of the common types of records which can be kept in the blockchain are:

1. Records of medical transactions

2. Transaction processing

3. Identity management

4. Events related to organizations,

5. Management activities

6. Documentation

16) Which cryptographic algorithm is used in Blockchain?

Blockchain uses SHA-256 Hashing algorithm. The National Security Agency (NSA) in the USA develop SHA-256 Hashing algorithm.

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17) In what order are the blocks linked in the blockchain?

Blockchain always links each block in backward order. In other words, blockchain links each block with its previous block.

18) What are the benefits of blockchain?

Some of the important benefits of blockchain are:
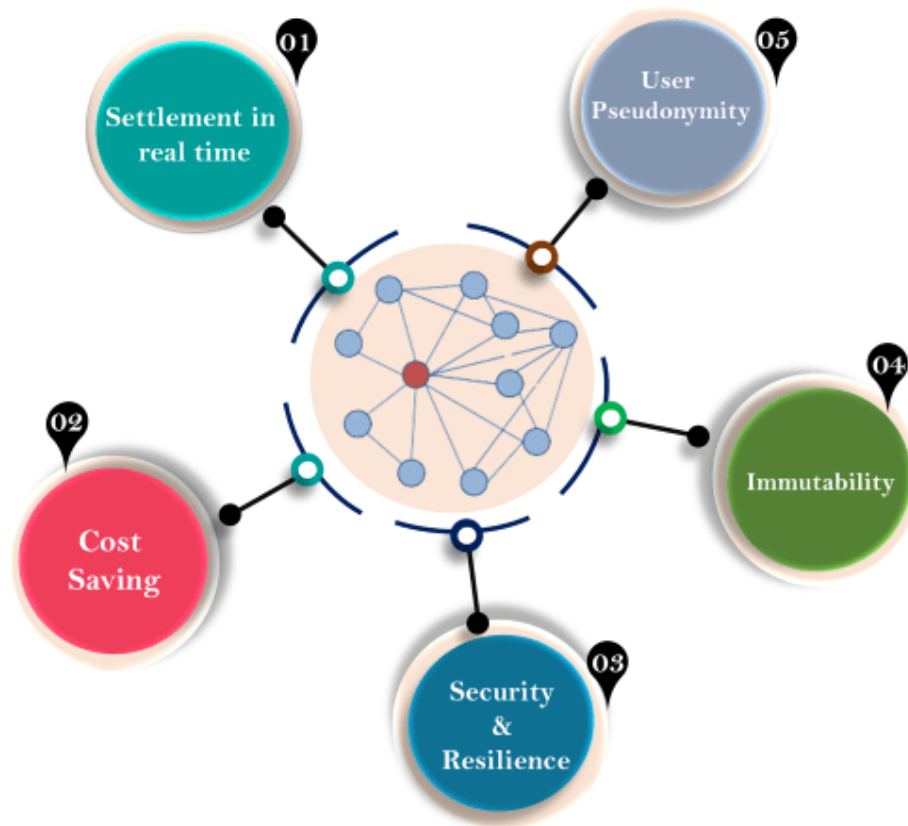
Settlement in real-time: In the financial industry, blockchain can allowing the quicker settlement of trades. It does not take a lengthy process for verification, settlement, and clearance because a single version of agreed-upon data is available between all stack holders.

Cost-saving: Blockchain allows peer-to-peer transactions to be completed without the need for a third party such as a bank which reduced overhead costs for exchanging assets.

Security and Resilience: Blockchain uses very advanced cryptography to make sure that the information which is going to lock inside the blockchain is secure against hacking attacks and fraud. It uses Distributed Ledger Technology where each party holds a copy of the original chain, so the system remains operative, even the large number of other nodes fall.

Immutability: A blockchain register transactions in chronological order, which mean every transaction happens after the previous one. The chronological order certifies the unalterability of all operations in the blockchain. It means when a new block is added to the chain of ledgers, it cannot be removed or modified.

User Pseudonymity: It is a state where the user has a consistent identifier which is not the real name of the user. The real identities are only available to administrators. It allows users to communicate with others in a generally anonymous way. It helps to maintain user privacy and enables free transactions without any security worries. In the blockchain, your pseudonym is the address to which you receive Bitcoin. Every transaction which involves that address is stored permanently in the blockchain. If your address is linked to your identity, every transaction will be linked to you. It is always good to every time use a new address for each transaction to avoid the transactions being linked to a common owner.

19) What are the Merkle trees? What is its importance in blockchain?

Merkle tree is a fundamental part of blockchain technology. It is a mathematical **data structure** composed of hashes of different blocks of data, and which serves as a summary of all the transactions in a block. It also allows for efficient and secure verification of content in a large body of data. It also helps to verify the consistency and content of the data. Both Bitcoin and Ethereum use Merkle Trees structure. Merkle Tree is also known as **Hash Tree**.
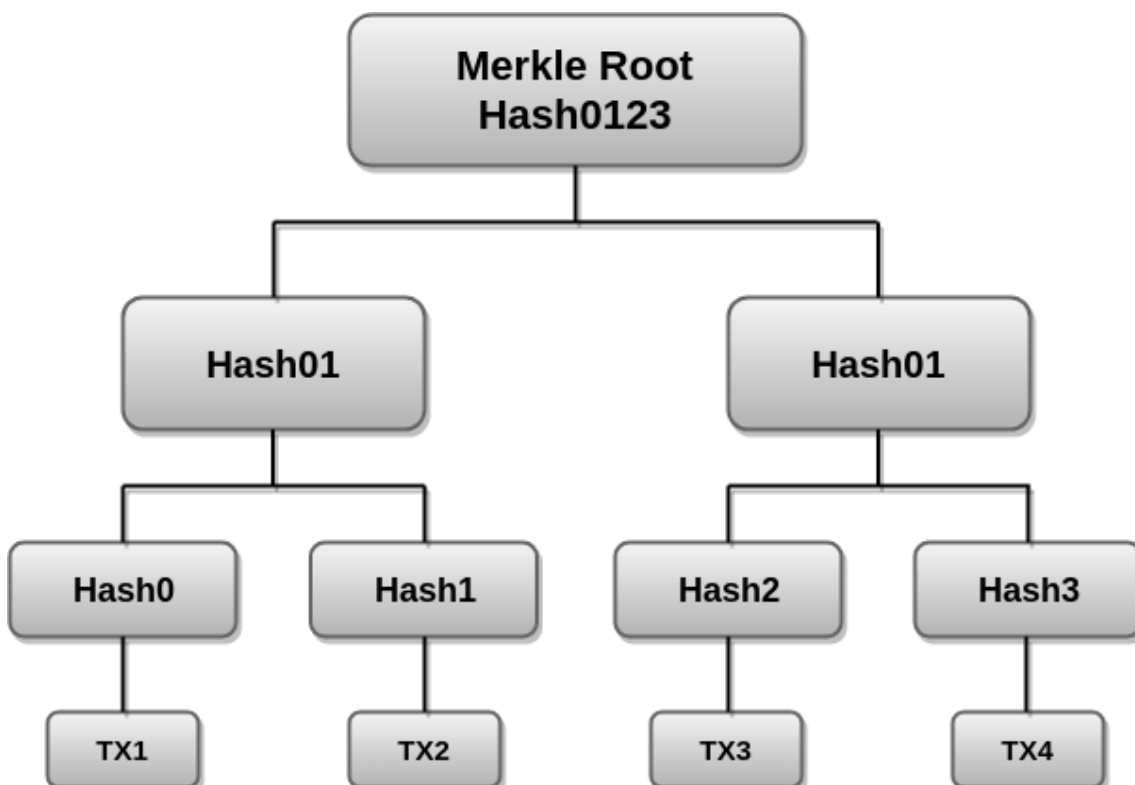
The Merkle tree plays a vital role in blockchain technology. If someone needs to verify the existence of a specific transaction in a block, then there is no need to download the entire block to verify the transaction in a block. He can only download the chain of block headers. It allows downloading a collection of a branch of the tree which contains this transaction is enough. We check the hashes which are relevant to your transactions. If these hashes check out is correct, then we know that this particular transaction exists in this block.

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20) What is Double Spending? Is it possible to double spend in a Blockchain system?

Double spending means spending the same money multiple times. In a physical currency, the double-spending problem can never arise. But in digital cash-like bitcoin, the double-spending problem can arise. Hence, in Bitcoin transactions, there is a possibility of being copied and rebroadcasted. It makes it possible that the same bitcoin could be spent twice by its owner. One of the primary aims of Blockchain technology is to eliminate this approach up to the possible extent.

Blockchain prevents the double-spending problem by implementing a confirmation mechanism from multiple parties before the actual transaction added to the ledger.

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21) What is a ledger? Name the common type of ledgers that can be considered by users in Blockchain?

A ledger is a file that is constantly growing. It keeps a permanent record of all the transactions that have taken place between two parties on the blockchain network.

There are **three** common types of a ledger that can be considered by users in the blockchain:

1. Centralized Network

2. Decentralized Network

3. Distributed Network

22) Why is Blockchain a trusted approach?

Blockchain is a trusted approach due to the following reasons:

1. It is easily compatible with other business applications due to its open-source nature.

2. It is safe, hacking proof and encrypted.

3. There is no central authority to control it.

4. All participants agreed to how a transaction inserted into the blockchain.

5. The transaction is immutable means once the transaction inserted into the blockchain, we cannot change it.

23) What is mean by DAO?

The DAO stands for Decentralized Autonomous Organization. It is an organization that is both autonomous and decentralized. It is represented by rules encoded as a computer program that is transparent, controlled by shareholders, and not influenced by the central government.

A DAO can be seen as the most complex form of a smart contract. A smart contract is a computer program that autonomously exists on the Internet, but at the same time, it needs people to perform a task that it can't do by itself.

A DAO's financial transaction record and program rules are maintained on a blockchain. Since DAO runs on a blockchain, and it's running on a distributed network, you can have multiple combinations of different parties exchanging value and reaching agreements. It means that, to a Decentralized Autonomous Organization, it doesn't matter if you are a human being or you're a robot. You can actually have devices communicating with devices, or devices communicating with people, or people communicating with people. To DAO, it makes no difference because as long as it's programmed into the collection of smart contracts, the whole thing can run automatically and immutable.

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24) What do you mean by Coinbase transaction?

A Coinbase transaction is the **first transaction** in a block. It is a **unique type** of bitcoin transaction that can be created by a miner. The miners use it to collect the block reward for their work and any other transaction fees collected by the miner are also sent in this transaction.

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25) What is the difference between blockchain and database?

The important differences between the blockchain and database are:
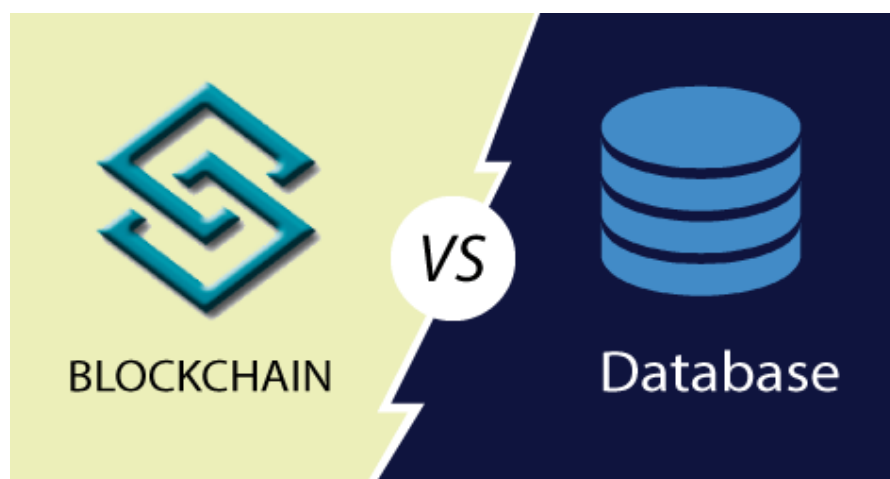
SN	Blockchain	Database
1.	Blockchain is Decentralized. Here, no one is an administrator means everyone is an in-charge.	The database is centralized. It has administrators who control all the data.
2.	Everyone has rights to read and write.	Only authorized people can read and write.
3.	Peer-to-peer architecture.	Client-server architecture.
4.	Here, only Append operation is allowed.	CRUD(Create, Read, Update, Delete) mechanism is possible.
5.	Historical data of digital records.	No records of ownership.

6.	Blockchains are fully confidential.	Databases are not fully confidential.
7.	Blockchain is slow because it depends on the hash rate.	The database is fast because fewer people administer it.
8.	Blockchain is permissionless.	The database is permissioned.

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26) What is Cryptocurrency?

Cryptocurrency is a digital asset(currencies) which can be used to exchange value between parties. It uses strong cryptography to secure and verify the financial transactions as well as control the creation of new units of that currency. As we know, it is a digital currency, so it doesn't exist physically. Some popular cryptocurrencies are Bitcoin, Litecoin, Z-Cash, Monero, Dash, etc.

We know that the government prints the government currencies like fiat currency such as Dollar, Rupees, Yen or Yuan itself. It means there is a centralized institution exists which can create thousands or millions or billions more of that currency. Unlike government currencies like bitcoin, these type of currencies is created by the same mathematical formulas that make the cryptocurrency work. Thus, cryptocurrencies use decentralized control, which works through distributed ledger technology that serves as a public financial transaction database.

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27) What are the limitations of blockchain?

The major limitations of blockchain are:

Lack of Technical Talent

Today, there are a lot of developers available who can do a lot of different things in every field. But in the blockchain technology, there are not so many developers available who have specialized expertise in blockchain technology. Hence, the lack of developers is a hindrance to developing anything on the blockchain.

Network Size

Blockchains require a vast network of users. Therefore it is not much resistant to the wrong action as well as it responds to attacks and grows stronger. The blockchain is a robust network with a widely distributed grid of nodes, which makes it more difficult to reap the full benefit.

Security Flaw

Bitcoin and other blockchains are associated with one considerable security flaw known as a "51% attack." This security flaw refers to a situation when a group of "miners" takes control of more than half of the blockchain network's computing power. If the miners somehow acquire sufficient computational power, then there is no centralized authority to prevent them from influencing the entire Bitcoin network. It means the attacker can block new transactions from taking place or being confirmed. They are also able to reverse the transactions that have already validated during that same period. Due to this, they could spend coins twice.

For this reason, Bitcoin mining pools are closely monitored by the community who ensure that no one gains such network influence.

Speed and cost of transactions

The first few years of the existence of blockchain, transactions cost are "nearly free." But as the network grows, it will NOT be the most cost-effective option of transferring money due to rising transaction costs in the network. From the end of 2016, it processes only seven transactions per second, and each transaction costs around 0.20$.

Consensus Mechanism

In the blockchain, we know that a block can be created in every 10 minutes. It is because every transaction made must ensure that every block in the blockchain network must reach a common consensus. Depending on the network size and the number of blocks or nodes involved in a blockchain, the back-and-forth communications involved to attain a consensus can consume a considerable amount of time and resources.

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28) What is a 51% attack?

The 51% attack on a blockchain network refers to a miner or a group of miners who are trying to control more than 50% of a network's mining power, computing power or hash rate. In this attack, the attacker can block new transactions from taking place or being confirmed. They are also able to reverse transactions that have already confirmed while they were in control of the network, leading to a double-spending problem.

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29) What is encryption? What is its role in Blockchain?

We know that the security of data is always matters. Encryption is a process of converting information or data into a code to prevent unauthorized access. It helps organizations to keep their data secure(i.e., prevent unauthorized access). In this technique, the data is encoded or changed

into an unreadable format up to some extent before it is sent out of a network by the sender. The only receiver can understand how to decode the same.

In Blockchain technology, this approach is very useful because it makes the overall security and authenticity of blocks and help to keep them secure.

30) What is the difference between Proof-of-work and Proof-of-stake?

The main differences between the Proof of Work and Proof of Stake are:

Proof of Work

Proof of Work(PoW) algorithm is used to confirm the transaction and creates a new block to the chain. In this algorithm, miners compete against each other to complete the transaction on the network. The process of competing against each other is called mining. It defines an expensive computer calculation. In this, a reward is given to the first miner who solves each blocks problem.

Proof of Stake

In the case of PoS algorithm, a set of nodes decide to stake their own cryptocurrencies for the transaction validation. They are called 'stakers.' In proof of stake, the creator of a new block is chosen in a deterministic way, depending on its wealth, also defined as stake. It does not give any block reward, so miners take the transaction fees only. Proof-of-Stake can be several thousand times more cost-effective as compared to proof of work.

31) How does the security of a block works?

A blockchain is a chain of blocks that contain records of transactions. Block is the most secure part of a blockchain. The record of a blockchain is protected through a cryptographic hash algorithm. Each block is connected with all other blocks before and after it through a distinctive hash pointer which adds more security to the block. If the value within a block is modified, the hash value will also change. This hash is a security identifier which provides a reasonable level of security to the whole blockchain.

Ambitious hackers also need to know the hash key of the previous block to make changes to the block information. For those ambitious hackers, blockchains are decentralized and distributed across peer-to-peer networks that are continuously updated and keep syncing. Since these records are not contained in a central location, so blockchains don't have a single point of failure and cannot be changed from a single computer.

32) What is the difference between public and private key?

The private key is used to encrypt or lock a message or transaction which is sent on the blockchain network. The sender can send a message using the public key of the receiver. On the other hand, the receiver can decrypt the message or the transaction using his private key. By using the private and public key, the communication or transaction is kept safe and tamper-proof.

33) Name the platforms that are actively developing Blockchain applications?

Blockchain technology was first used for financial transactions. But nowadays, its scope is increasing and applies in a variety of industries like e-commerce, data management, energy, gaming, e-governance, and many more. There are several commercial and open-source platforms available to provide the framework for creating applications that support a blockchain. Hyperledger and Ethereum are actively improving the blockchain ecosystem by creating advanced cross-industry blockchain technologies.

Hyperledger is an open-source collaboration that provides tools and techniques for developing an enterprise-grade blockchain solution. While Ethereum is an open-source and leading platform designed for developers, organizations, and business to build and deploy blockchain applications.

34) How does bitcoin use blockchain?

A transaction is a transfer of value between Bitcoin wallets that gets included in the blockchain. Bitcoin wallets keep a secret piece of data called a private key. The private key is used to sign transactions and provide mathematical proof that they have come from the owner of the wallet.

35) What is Consensus algorithm?

The consensus algorithm is the method of gaining consensus on a change of data over the system or distributed network. Consensus algorithms are heavily used in blockchains as they enable the network of unknown nodes to reach consensus on the data that is being stored or shared through the blockchain.

36) What are the types of consensus algorithms?

There are many types of consensus algorithms or techniques available. The most popular consensus algorithm is:

- Proof-of-Work(PoW)

- Proof-of-Stake(PoS)

- Delegated Proof-of-Stake(DPoS)

- Proof-of-Authority(PoA)

- Proof-of-Elapsed Time(PoET)

- Byzantine Fault Tolerance

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