What is blockchain Technology

Blockchain is a system for recording data in a way that makes system changes, hacking, and cheating difficult or impossible.

A blockchain is a digital ledger of transactions replicated and distributed across the entire network of computer systems on the blockchain.
Distributed ledger technology refers to a decentralized database that is managed by several users. Every new transaction that happens on the blockchain is copied to each participant's ledger, and each block in the chain is made up of numerous transactions. Distributed ledger technology refers to a decentralized database that is managed by several users.
A hash, an immutable cryptographic signature, is used to record transactions on a blockchain.

It means that if one block in one chain had changed, it would be immediately apparent that it had been tampered with. If hackers wanted to corrupt a blockchain system, they would have to change every block in the chain across all of the distributed versions of the blockchain. Blockchains such as Bitcoin and Ethereum are constantly and continually growing as blocks are added to the chain, which significantly adds to the security of the ledger.

Types of blockchain

There are four main types of blockchain networks:

1. public blockchains
2. private blockchains
3. consortium blockchains
4. hybrid blockchains

Each of these systems has advantages, disadvantages, and perfect applications.

1.Public blockchains

How it works

The first blockchain technology is the public blockchain. It is where cryptocurrencies like Bitcoin originated and helped popularize distributed ledger technology (DLT). It eliminates the drawbacks of centralization, such as decreased security and transparency. DLT distributes data throughout a peer-to-peer network rather than storing it in a single location. Because of its decentralized nature, some form of authentication must be used. This method, sometimes referred to as a "consensus algorithm," enables blockchain users to agree on the current state of the ledger. Two popular consensus techniques are proof of work (PoW) and proof of stake (PoS).

Anybody with an internet connection may join up to a blockchain platform to become an authorized node since public blockchain is open and permissionless. This individual can perform

mining operations—the complex computations required to verify transactions and add them to the ledger—and has access to both recent and historical data. In the network, no legitimate record or transaction can be altered, and because the source code is often open source, anybody may check the transactions, look for errors, and suggest fixes.

Advantages of Public blockchain

1. Public blockchains are fully independent of the organizations that created them, so even if that company is no longer around, the public blockchain will continue to function as long as computers are still linked to it.

2. Public blockchains are transparent networks. Public blockchains are generally safe as long as their users adhere strictly to security regulations and procedures.

Disadvantages of Public blockchain

1. The network may be sluggish, and businesses cannot impose access or use restrictions. Hackers may unilaterally change a public blockchain network if they control 51% or more of its computer power.

2. Public blockchains also struggle with scalability. When more nodes join the network, it becomes slower.

3. Secured public blockchains' main drawback is the high energy use needed to maintain them. A consensus method that makes members compete to verify the data and gain compensation for allowing the network to utilize its processing power is the concern. Not all blockchain networks employ an energy-intensive validation procedure, and as a result, not all of them consume a lot of electricity.

4. Another issue is the lack of complete anonymity and privacy. With public blockchains, the transaction amounts and associated addresses are visible to everyone. If the address of the owner is made known, the user's anonymity is compromised.

5. Public blockchains can attract users with motives that might not be sincere. The majority of public blockchains are made for cryptocurrencies, which are a top target for thieves and hackers due to their high value.

Uses cases

1. The mining and exchange of cryptocurrencies like Bitcoin is the most typical use case for public blockchains. It may also be used to electronically notarize affidavits and public documents of property ownership in order to create a permanent record with an auditable chain of custody.

2. For organizations that are based on openness and trust, like social support groups or non-governmental organizations, this kind of blockchain is appropriate. Private enterprises will probably wish to stay away due to the network's open nature.

2. **Private blockchain**

How it works

A private blockchain is a blockchain network that operates in a regulated environment, such as a closed network, or that is governed by a single institution. Although it functions similarly to a public blockchain network in terms of peer-to-peer connections and decentralization, this particular blockchain is substantially more limited in scope. Private blockchains are often run on a limited network inside a firm or organization rather than allowing anybody to join and contribute processing power. These are also referred to as "business blockchains" or "permissioned blockchains."

Advantages of Private blockchain

1. The governing body regulates accessibility, security, authorizations, and permission levels. For instance, the creation of a private blockchain network enables a company to manage which nodes are permitted to see, add, or alter data. Moreover, it can limit outsiders' access to certain information. Private blockchains are similar to an intranet, but public blockchains are more similar to the internet.

2. Due to their size constraints, private blockchains may process transactions far more quickly than public blockchains.

Disadvantages of a Private blockchain

1. Given that decentralization is the fundamental tenet of blockchain, one of the drawbacks of private blockchains is the contentious assertion that they are not actual blockchains. As centralized nodes decide what is valid, it is also more challenging to fully create confidence in the information. Less security may also result from the small node count. The consensus process may be jeopardized if a few nodes act erratically.

2. Moreover, the source code from private blockchains is frequently closed-source and proprietary. It cannot be independently audited or verified by users, which may result in poor security. With a private blockchain, there is no anonymity either.

Use cases

Private blockchains are the best option when a blockchain has to be cryptographically secure but the governing entity doesn't want the data to be accessible to the general public due to their speed.

3. Hybrid blockchain

How it works.

Organizations occasionally employ hybrid blockchain, a form of blockchain technology that includes components of both private and public blockchains, to get the best of both worlds. It enables businesses to set up both a private, permission-based system and a public, permission-less system, giving them control over which data is made available to the public and who has access to it.

With a hybrid blockchain, transactions and data are typically private but may be authenticated as necessary, for example by granting access via a smart contract. Although kept inside the network, confidential information may still be verified. A private corporation may own the hybrid blockchain, but it cannot alter transactions.

An individual who joins a hybrid blockchain has complete access to the network. Until they do a transaction, other users cannot learn the identity of the user. The opposite person is then made aware of their identity.

Advantages of hybrid blockchain

1. One of the main advantages of a hybrid blockchain is that outside hackers cannot launch a 51 percent attack on the network since it runs in a closed environment. Moreover, it safeguards privacy while allowing for third-party communication. It offers speedy and affordable transactions and has more scalability than a public blockchain network.

Disadvantages of hybrid blockchain

1. This kind of blockchain can have information hidden, thus it isn't totally transparent. Users have little motivation to participate in or contribute to the network, and updating might be challenging.

Use cases.

1. One of the many fascinating applications of hybrid blockchain technology is real estate. A hybrid blockchain can be used by businesses to run systems privately while displaying some information, like listings, to the general public. Both highly regulated areas like the financial sector and the retail sector may benefit from the use of hybrid blockchain to streamline processes.

2. Medical records may be stored on a hybrid blockchain. Users can use a smart contract to access personal data, but arbitrary third parties cannot view the information. It might

be used by governments to safely communicate information with other organizations while storing citizen data privately.

4. Consortium blockchain

How it works

The consortium blockchain, also known as a federated blockchain, consists of both private and public blockchain characteristics. Yet, it differs in that a decentralized network is used in collaboration by several organizational members. The risks related to having a single party control the network on a private blockchain are eliminated by a consortium blockchain, which effectively acts as a private blockchain with restricted access to a certain group.

In a consortium blockchain, preset nodes control the consensus procedures. The transaction initiation, reception, and validation are handled by a validator node. Transactions can be sent or received by member nodes.

Advantages of Consortium blockchain

1. A consortium blockchain is often more dependable, scalable, and efficient than a public blockchain network. Access controls are possible, exactly like with private and hybrid blockchains.

Disadvantages of Consortium blockchain

1. Compared to public blockchains, consortium blockchains are less transparent. The network's operation may be hampered by the blockchain's own rules if a member node is breached, making it still vulnerable to compromise.

Use cases.

1. Applications for this kind of blockchain include banking and payments. Which nodes will validate the transactions? They might be chosen by a consortium made up of many banks. Organizations that want to track food as well as research organizations can develop a similar model. Supply chains, especially those involving food and medicine, might greatly benefit from it.

Five important blockchain benefits

1.Enhanced security

The way that your sensitive and critical data is seen has the potential to be profoundly altered by blockchain technology. Blockchain creates a record that cannot be altered and is end-to-end encrypted, which lowers fraud and illegal activity. By employing permissions to restrict access

and anonymizing personal data, privacy concerns may also be solved on the blockchain. Information is stored over a network of computers rather than on a single server to prevent hackers from accessing it.

2.Greater transparency

Every business would have to manage a distinct database in the absence of blockchain. Blockchain uses a distributed ledger to ensure that data and transactions are recorded uniformly everywhere. All network members with permissioned access view the same information at the same time, giving full transparency. All transactions are immutable records that have been time and date stamped. This allows members to view the complete transaction history, virtually eliminating the potential for fraud.

3.Instant traceability

Blockchain creates an audit trail that documents the origins of an item at every point in its journey. This can provide proof in businesses where customers are worried about environmental or human rights concerns around a product, or in industries plagued by fraud and counterfeiting. Data concerning provenance may be immediately shared with customers via blockchain technology. Data on traceability can reveal weaknesses in any supply chain, such as those where items may be stored on a loading dock while being transported.

4.Increased efficiency and speed

Conventional paper-intensive procedures take a long time, are subject to human error, and frequently require third-party mediation. Transactions may be finished more quickly and effectively by streamlining these operations with blockchain. The blockchain may hold documentation and transaction information together, doing away with the necessity for paper exchange. Clearing and settlement may happen considerably more quickly because there is no need to reconcile several ledgers.

5.Automation

With "smart contracts," transactions may also be automated, boosting your productivity and accelerating the process even further. After pre-specified conditions are met, the next stage of a transaction or process will automatically get started. Smart contracts need fewer human interactions and depend less on third parties to verify that a contract's terms have been followed. A customer's insurance claim, for instance, may be settled and reimbursed promptly if the client submits the required supporting evidence.