

- **Public Blockchain:**

A public blockchain is a decentralized, open network where anyone can join, participate, and view transaction data. Examples include Bitcoin, Ethereum, and Solana. These blockchains are maintained by a global network of nodes that validate transactions through consensus mechanisms like Proof of Work (PoW) or Proof of Stake (PoS). Public blockchains are fully transparent—every transaction is recorded on a shared, immutable ledger accessible to anyone. This ensures trust without needing a central authority. Because of their openness, public blockchains are considered highly secure and censorship-resistant, but they can be slower and more energy-intensive compared to private blockchains. These networks play a vital role in powering cryptocurrencies, decentralized finance (DeFi), and Web3 applications.

- 1) **BITCOIN:**

Bitcoin is the first and most well-known cryptocurrency, created in 2009 by an unknown person or group using the pseudonym Satoshi Nakamoto. It operates on a decentralized public blockchain, allowing peer-to-peer transactions without intermediaries like banks. Bitcoin uses a Proof of Work (PoW) consensus mechanism, where miners solve complex puzzles to validate transactions and earn new bitcoins. With a limited supply of 21 million coins, Bitcoin is often viewed as "digital gold" and a hedge against inflation. It enables secure, transparent, and borderless transactions, making it a revolutionary form of money in the digital age.

**Private Blockchain:**

A private blockchain is a restricted, permissioned network where only selected participants can access, validate, or write data. Unlike public blockchains, which are open to anyone, private blockchains are controlled by a single organization or a consortium. Examples include Hyperledger Fabric and R3 Corda in private mode. These blockchains are used mainly in enterprise settings for applications requiring privacy, efficiency, and regulatory compliance.

**Hyperledger Fabric**, developed by the Linux Foundation, supports modular architecture and private channels, making it suitable for complex business processes. Private mode enhances privacy, performance, and control, making Hyperledger Fabric ideal for sectors like finance, supply chain, and healthcare, where data integrity and restricted access are essential.

**Consortium Blockchain:**

A consortium blockchain is a type of permissioned blockchain governed by a group of pre-selected organizations, rather than a single entity (as in private blockchains) or the general public (as in public blockchains). It combines features of both public and private blockchains, offering controlled access while maintaining some level of decentralization. Participants in a consortium blockchain share responsibilities for maintaining the network and validating transactions.

**R3 Corda**, designed specifically for the financial industry but now used across various sectors. Corda is not a traditional blockchain—it doesn't bundle data into blocks or broadcast transactions to all nodes. Instead, it enables direct, private communication between parties, making it highly efficient and privacy-focused. In a consortium setup, multiple banks or institutions can run a shared Corda network to execute smart contracts and share data securely.

**Consortium blockchains** provide enhanced privacy, better performance, and stronger governance than public networks, while avoiding the full centralization of private blockchains. They are ideal for collaborative environments like supply chains, insurance, healthcare, and banking, where multiple trusted parties need to transact and share data in a secure, coordinated way. This model promotes trust and efficiency while maintaining regulatory compliance and data control.

## 2.Create a comparison table or markdown sheet

Blockchain Name	Type	Consensus Mechanism	Permission Model	Speed / Throughput (TPS)	Token Support	Typical Use Case	Notable Technical Feature
Ethereum	Public	Proof of Stake (PoS)	Permissioned	~14 TPS (Layer1)	Yes (Solidity)   Vyper	DeFi, NFTs	Largest smart contract ecosystem
Hyperledger Fabric	Consortium	Pluggable Consensus	Permissioned	~3,000 TPS	No native token	Enterprise solutions, supply chain	Modular architecture, privacy features
Corda	Consortium	Notary-based Consensus	Permissioned	~600 TPS	No native token	Financial services, trade finance	Direct peer-to-peer transactions
Solana	Public	Proof of History (PoH) + PoS	Open	~65,000 TPS	Native (SOL)	High-speed DeFi, gaming	High throughput low fees
Polkadot	Public	Nominated Proof of Stake (NPoS)	Open	~1,000 TPS	Optimistic (ink!)	Interoperability, parachain	Cross-chain communication
Avalanche	Public	Avalanche Consensus	Open	~4,500 TPS	Native (AVAX)	DeFi, asset issuance	Subnets for custom blockchain networks
Binance Smart Chain	Public	Proof of Staked Authority (PoSA)	Open	~160 TPS	Native (BNB)	Low-cost. Issuance	Low-cost transactions

## 3)Write a Short Report (150–200 words):

Bitcoin, Ethereum, Solana, Hyperledger Fabric, and R3 Corda differ significantly in their technical design and intended use.

**Bitcoin** is highly secure and decentralized but lacks smart contract functionality and has low throughput (~7 TPS).

**Ethereum** supports smart contracts in Solidity and is ideal for decentralized apps (dApps), though its TPS is modest compared to newer platforms.

**Solana** excels in speed (50,000+ TPS), uses Proof of History for time optimization, and supports high-performance apps with low fees.

**Hyperledger Fabric** is a **private, permissioned** blockchain offering modular architecture, pluggable consensus, and private channels—ideal for trusted enterprise environments. It lacks a native token but supports smart contracts in Go, Java, and JavaScript.

**R3 Corda**, a **consortium-based platform**, is not a true blockchain but supports private, peer-to-peer smart contracts in Kotlin and Java, making it highly efficient for regulated financial sectors.

## Recommended Platforms

- **For a decentralized app: Solana**, due to its high throughput and low fees, making it ideal for real-time DeFi and gaming applications.
- **For a supply chain network among known partners: Hyperledger Fabric**, as its permissioned model ensures data privacy and scalability.
- **For an inter-bank financial application: Corda**, due to its efficient peer-to-peer design, reducing settlement times and enhancing security.

Each choice is based on the scalability, security, and consensus mechanism effectiveness, ensuring optimized performance for specific industries