

1) Answer 1: Comparison Table

Blockchain Name	Type	Consensus Mechanism Used	Permission Model	Speed / Throughput (TPS)	Smart Contract Support	Token Support	Typical Use Case	Notable Technical Feature
Ethereum	Public	Proof of Stake (PoS)	Open	30-40 TPS	Yes (Solidity, Vyper)	Native (ETH)	Decentralized finance (DeFi), decentralized apps (dApps), NFTs	Decentralized: Large global community of developers; Decentralized Finance (DeFi) ecosystem; Smart contract flexibility: Solidity and Vyper programming languages; NFT support
Hyperledger Fabric	Private	Practical Byzantine Fault Tolerance (PBFT)	Permissioned	3,000+ TPS	Yes (Chaincode - Go, Java, Node.js)	Not native	Supply chain management, healthcare, financial services	Modular Architecture: Hyperledger offers pluggable consensus, privacy-oriented, with support for different programming languages like Go and Java for smart contracts (Chaincode).
R3 Corda	Consortium	Notary-based Consensus	Permissioned	1,000+ TPS	Yes (Corda Smart Contracts)	Not native	Financial services, inter-bank transactions	Privacy-Focused: Only parties involved in a transaction have access to the data; Notary-based consensus for more controlled and private transactions; Highly scalable.

2) Answer 2 : Short Report

- i) **Ethereum (Public Blockchain):** Ethereum is the most widely adopted public blockchain platform. It was originally built to enable decentralized applications (dApps) and smart contracts, and it uses the Proof of Stake (PoS) consensus mechanism after the transition from Proof of Work (PoW) with Ethereum 2.0. Ethereum supports native tokens (ETH) for transactions and gas fees and allows developers to write smart contracts using Solidity and Vyper programming languages. Despite its vast adoption, Ethereum's transaction throughput is limited to about 30-40 transactions per second (TPS) due to the decentralization and security requirements of its PoS mechanism, which may lead to congestion in times of high demand (e.g., during the DeFi boom). However, Ethereum has a large, active community of developers, and its open-source nature has led to extensive innovation, particularly in DeFi and NFTs. It is also permissionless, meaning anyone can join the network, making it ideal for applications requiring decentralized control, like cryptocurrency trading platforms and NFTs.
- ii) **Hyperledger Fabric (Private Blockchain):** Hyperledger Fabric is a permissioned blockchain designed specifically for enterprise applications. It utilizes the Practical Byzantine Fault Tolerance (PBFT) consensus mechanism, ensuring high security and fast transaction processing in private, controlled environments. The platform supports smart contracts (known as chaincode), and developers can write chaincode in Go, Java, or Node.js. Hyperledger Fabric boasts a high transaction throughput (3,000+ TPS) due to its permissioned nature, as only authorized nodes are involved in the network. This makes it ideal for private, enterprise-level use cases like supply chain management, healthcare, and financial services, where confidentiality, transparency, and the ability to control participant access are critical. Notably, Hyperledger allows for modular architecture; companies can choose from different consensus protocols based on their needs, making it highly flexible. Fabric's privacy-focused nature enables controlled sharing of sensitive information, ensuring confidentiality for transactions.
- iii) **R3 Corda (Consortium Blockchain):** R3 Corda is a blockchain platform aimed at the financial services sector and follows a consortium model, where multiple trusted entities collaborate in the network. Corda uses a unique notary-based consensus mechanism, where a notary ensures that transactions are legitimate, thereby offering scalability and high throughput (1,000+ TPS). Corda's privacy model is one of its defining features — it ensures that only the parties involved in a transaction can view the details, unlike public blockchains that expose transaction data to everyone. It supports smart contracts (written in Kotlin or Java) and is designed for inter-bank transactions, trade finance, and insurance use cases, where privacy and control over transaction visibility are paramount. Corda is specifically built for industries that require high levels of confidentiality, making it ideal for applications like cross-border payments, financial settlements, and trade finance.

3) Answer 3: Platform Selection for Different Use Cases

- i) **Decentralized App (dApp):** For a decentralized app, Ethereum is the most suitable platform. Ethereum's public nature, coupled with its large developer community and extensive documentation, makes it the go-to blockchain for decentralized applications. Ethereum's robust ecosystem, including DeFi applications and NFT marketplaces, shows its effectiveness in creating decentralized, trustless environments. Additionally, Ethereum's support for smart contracts in Solidity makes it flexible and developer-friendly, making it the best choice for creating dApps that need open access and decentralized control.
- ii) **Supply Chain Network Among Known Partners:** For a supply chain network where participants are known and trusted, Hyperledger Fabric is the most appropriate choice. The platform's permissioned nature allows companies to control who can join the network, ensuring that sensitive supply chain data is only visible to authorized parties. With its modular architecture and high throughput (3,000+ TPS), Fabric provides flexibility for enterprises that require privacy and speed in a private business network. Moreover, the use of chaincode for smart contracts enables businesses to automate their processes while maintaining confidentiality and integrity in their transactions.

- iii)** Inter-Bank Financial Application: For an inter-bank financial application, R3 Corda would be the best fit due to its focus on privacy and scalability in the financial sector. Corda's notary-based consensus mechanism ensures that only relevant parties can access transaction details, which is crucial for financial institutions dealing with sensitive financial data. The platform's high transaction throughput (1,000+ TPS) and its ability to handle private transactions between trusted entities make it ideal for applications like cross-border payments, trade finance, and other inter-bank financial applications. Additionally, Corda's smart contract support, along with its specific focus on the financial industry, makes it a more tailored solution for financial applications than public blockchains like Ethereum.