Task -3

Aspect	Ethereum	Hyperledger fabric	IBM Food Trust
Blockchain Name	Ethereum	Hyperledger Fabric	IBM Food trust
Type (Public/Private/ Consortium)	Public	permissioned	Consortium
Consensus Mechanism Used	Proof of Stake	Raft& Kafka -based approaches , BFT(Byzantine Fault Tolerance)	Quorum Consensus Mechanism
Permission Model (Open/Permissi oned)	Open and Permissionless	Permissioned	Permissioned
Speed / Throughput (TPS if available)	15-30 TPS	Can scale to 20000 TPS	Not available
Smart Contract Support (Y/N + Language)	Yes , Solidity	Chaincode support using various languages like : Go , Java etc	Yes , GoLang
Token Support (Native or not)	Yes (Both native & non native)	Both fungible and non fungible token support	No

	DeFi	Banking and Finance	Traceability and transparency in the food supply chain
Typical Use Case			
Notable Technical Feature (e.g., privacy, pluggable consensus)	Smart Contract , DApps	Chaincode Functionality , Modular Design	Data traceability , improved food safety

Comparison

Ethereum is a public, permissionless blockchain platform, meaning anyone can join and participate without needing explicit permission. Its core strength lies in its **smart contract capabilities**, enabling decentralized applications (dApps) for various use cases like DeFi, NFTs, and gaming. It utilizes the Ethereum Virtual Machine (EVM) to execute smart contracts, typically written in Solidity. While highly decentralized, its scalability has historically been a challenge, though it's addressed through ongoing upgrades (e.g., Proof-of-Stake, Layer 2 solutions).

Hyperledger Fabric is a permissioned blockchain framework designed for enterprise solutions. Unlike Ethereum, participants in a Hyperledger Fabric network must be known and authenticated. This allows for greater **privacy and confidentiality** through features like private channels, where specific transactions or data are only visible to authorized parties. It offers a **modular architecture** with pluggable consensus mechanisms (e.g., Raft, Kafka) and supports smart contracts (called "chaincode") in multiple programming languages, providing high transaction throughput and low latency, making it suitable for supply chain, finance, and healthcare.

IBM Food Trust is a specific application built on **Hyperledger Fabric**. It's a Software-as-a-Service (SaaS) solution tailored for the food supply chain. Its technical foundation leverages Fabric's strengths in **permissioned networks, data privacy, and traceability**. IBM Food Trust provides pre-built modules for tracing products, managing certificates, and sharing documents securely among supply chain participants (growers, processors, retailers, etc.). It emphasizes industry standards (like GS1 and EPCIS) to ensure data interoperability and aims to improve food safety, reduce waste, and enhance transparency from farm to table.

Based on the technical capabilities discussed:

1. A decentralized app (dApp): Ethereum

- **Justification:** Ethereum was specifically designed to be a platform for dApps, offering robust **smart contract functionality** (Solidity, EVM) that enables complex, self-executing logic without intermediaries. Also It is **public and permissionless in nature.**

2. A supply chain network among known partners: Hyperledger Fabric

- **Justification:** Hyperledger Fabric is ideal for this scenario due to its **permissioned nature**. In a supply chain with known partners, controlling who can access and record data is crucial for privacy, confidentiality, and regulatory compliance. Fabric's **private channels** allow for control over data visibility, ensuring that sensitive information is only shared with authorized parties. Its **modular architecture** and support for various programming languages for chaincode (smart contracts) offers flexibility .

3. An inter-bank financial application: Hyperledger Fabric

- **Justification:** Similar to supply chain networks, inter-bank financial applications demand high levels of **privacy, security, and regulatory compliance**. Hyperledger Fabric's **permissioned environment** ensures that only authorized financial institutions can participate in the network, maintaining the necessary trust and control. Its ability to handle **high transaction volumes** and provide **transaction finality** quickly is critical for financial settlements.