

Hyperledger

Hyperledger is an open source blockchain platform which performs as a protocol for business-to-business and business-to-customer transactions. Hyperledger supports modular, plug and play consensus. The reasons of Hyperledger's modularity are saving computation cycles, scaling efficiency, and above all, responding to the variety of enterprise use case requirements by providing a secure, robust model for identity, auditability, and privacy.

Hyperledger is designed to be user friendly, highly functional, and robust for those who want to build their blockchain software on its core code. Some of the main capabilities and use cases of Hyperledger are financial asset depository, corporate action, supply chain, master data management, sharing economy and internet of things. All of these various applications may need totally different cryptographic algorithms, consensus algorithms, and database storage. Thus, the most important requirement of Hyperledger is modular structure. Private transactions and confidential contracts, identity and auditability, interoperability, and portability are other features which are important for Hyperledger to provide.

Hyperledger architecture consists of four logical categories. First category is identity services which manages identities of entities, participants and ledger objects. Second is policy services for managing access control, privacy, consortium rules and consensus rules. Blockchain services are the third category which are used for managing the distributed ledger through a peer-to-peer communication protocol. Finally, smart contract services are decentralized transactional programs running on the validating nodes. Each of these categories can act as a module. Hyperledger's modules have clear, well defined APIs to use Hyperledger algorithms in a plug-and-play manner.

In order to evaluate characteristics of blockchain systems such as Hyperledger, an evaluation framework has been introduced which is called BLOCKBENCH. This evaluation framework is used for analyzing private blockchains. BLOCKBENCH performs both in component and overall scale, and measures performance in terms of throughput, latency, scalability and fault-tolerance. The results of analyzing Ethereum, Parity and Hyperledger as the most mature blockchain platforms show that blockchain systems' performance is limited. Although, the results expose that Hyperledger consistently outperforms the other two systems across the most benchmarks, it fails to scale beyond 16 nodes. Finally, it is obvious in the results that consensus protocols in Ethereum and Hyperledger are responsible for the performance gap at the application layer.