SNS COLLEGE OF ENGINEERING

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DEPARTMENT OF COMPUTER SCIENCE AND TECHNOLOGY

COURSE NAME: 19CS622-Blockchain Technology

III YEAR /VI SEMESTER

Unit 4- HYPERLEDGER

Hyperledger Framework

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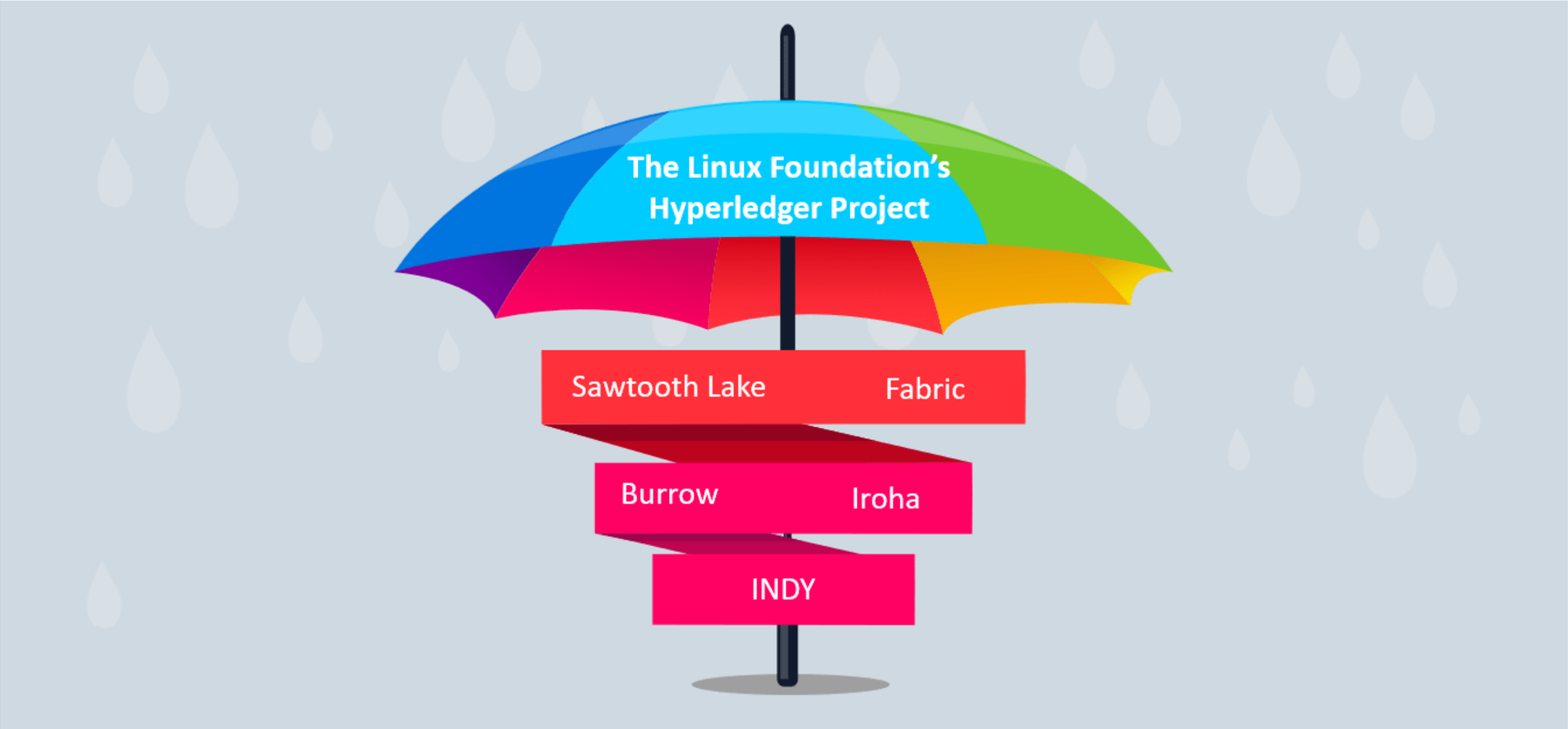
HYPERLEDGER

Hyperledger is an umbrella of open source projects and tools which is managed by Linux foundation which started in December 2015.



Architecture

1. Consensus Layer:

- Creates an agreement on the ordering and confirms the accuracy of the transaction database that comprises a block.
- The communication layer is used by the consensus layer to communicate with the client and other network peers.
- Confirms that all transactions in a proposed block are correct according to approval and consensus policies.
- Interfaces with the smart-contract layer and relies on it to validate the accuracy of an ordered transaction database in a block.

Architecture

2. Smart Contract Layer:

The smart contract layer verifies each transaction by guaranteeing that it adheres to the transaction's policy and contract and invalid transactions are denied and may be removed from consideration for inclusion in a block.

Smart contracts are classified into two types:

installed smart contracts- Before the network is launched, installed smart contracts implement business logic on the validators.

On-chain smart contracts– On-chain smart contracts implement business rules in the form of a transaction that is committed to the blockchain and then invoked by subsequent transactions. The code that describes the business logic forms part of the ledger with on-chain smart contracts.

Architecture

3. Communication Layer:

- Communication Layer is in charge of peer-to-peer message transfer between nodes in a shared ledger instance.
- The communication layer is used by the consensus layer to communicate with the client and other network peers.
- The algorithm must function exactly like a single node system, executing each transaction atomically one at a time.
- If communication does not fail, then each non-faulty node will finally get every submitted transaction.
- TLS is used for secure communication among nodes in the Fabric. TLS communication can employ both one-way (server only) and 2 different (server and client) authentication.

Architecture

4. Data Store Abstraction:

- Allows other modules to use alternative data stores.
- The actual private data is kept in a private database on authorized organizations' peer nodes and accessed via chaincode on these authorized peers;
- A hash of the secret data, which has been endorsed, sorted, and recorded to the ledgers of every peer on the channel.

Architecture

5. Crypto Abstraction:

- Allows for the substitution of alternative crypto techniques or modules without disrupting other modules.

- CPU and GPU mining is supported by Hyperledger Besu and can be enabled using command-line arguments.
- Ethminer with both the stratum+tcp and getwork schemes was utilized for GPU mining support testing.

Architecture

6. Identity Service:

- Allows for the formation of a trusted root during the configuration of a blockchain instance, the enrolment and registration of identities or systems entities during network operation, and the administration of changes such as drops, additions, and revocations.
- It also offers authentication and permission.

Architecture

7. Policy Service:

- Policy Services is in charge of policy management for the system's numerous policies, including the endorsement policy, consensus policy, and group management policy.
- It communicates with and is dependent on another module to enforce the different policies.
- Fabric policies reflect the process through which members agree to approve or reject changes to the network, a route, or a smart contract. Policies are agreed upon by channel members when the channel is first set up, but they can also be changed as the channel evolves.

Architecture

8. API:

- It enables clients and applications to interface with blockchains. there are three types of API used in hyperledger they are:

Admin API

- This class establishes a management link to a Hyperledger Composer runtime.

Common API

- The Common API comprises the APIs that are used to access information about the Business Network to which you are connected as well as to establish new assets, participants, transactions, and events. It also offers APIs for obtaining information about these resources.

Runtime API

- All transaction functions have access to the Runtime API.
- It provides API access to build and issue queries, emit events, retrieve all forms of registries, get the current participant, and get the serializer to produce resources from JavaScript objects. – execute HTTP REST calls.

Architecture

9. Interoperation:

- Allows separate blockchain instances to communicate with one another.
- Interoperability, supported by comprehensive data and transaction standards, is required to capitalize on this powerful technology.

References

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Thank You