Hyperledger Fabric Chaincode

Chaincode Introduction

Chaincode is used to handle the business logic of the Hyperledger Blockchain network.

These are like smart contracts written in Ethereum and have some functionality of interacting with Blockchain network.

Only chaincode can read or manipulate data of Blockchain network like membership details, role and certificates of the peers.

It must be installed on every single peer of a channel or an organization.

There can be multiple chaincode and they can have different endorsement policies incorporated with each chaincode.

Technical Overview

Chaincode can be written in GO, Java and Node language for now and Hyperledger will soon provide support for more languages.

Chaincode runs in a secured Docker container isolated from the endorsing peer process.

Chaincode initializes and manages ledger state through transactions submitted by applications.

Chaincode must be installed and instantiated on all peers of the network.

A chaincode can be invoked to update or query the ledger in a proposal transaction. Given the appropriate permission, a chaincode may invoke another chaincode, either in the same channel or in different channels, to access its state.

What does Chaincode look like?

Chaincode is an isolated program that maintains its own private state on the ledger.

Each chaincode implements an Init method and an Invoke method.

- Init is used for setting up the chain code.
- Invoke is used to call the functions from the chaincode.

Both the methods described above accept a `ChaincodeStubInterface` parameter, which carries a client for interacting with the ledger and for querying other chaincodes.

The `ChaincodeStubInterface` also has a list of arguments passed to the chaincode, which allows the chaincode to implement different behaviors as per the different function calls.

Chaincode Lifecycle

- The entities must agree on a chaincode before it can be used.
- Entities must be able to review the chaincode and sign it to prevent tampering.
- Chaincode is passed around using the package format called `ChaincodeDeploymentSpec`, which includes the source code, the policies for instantiating the chaincode, and the list of entities that have agreed and signed on the chaincode.
- Properly endorsed chaincode can be installed and instantiated on Peers in the network.
- Peer uses Docker to run a container with the chaincode inside.
- Peer is responsible for managing the chaincode container's lifecycle and networking.

There's a special kind of chaincode called System chaincode which runs as part of the Peer process, not in a separate container. It's used to implement low-level ledger features like the endorser system, query system, and validation system.