BLOCKCHAINS

ARCHITECTURE, DESIGN AND USE CASES

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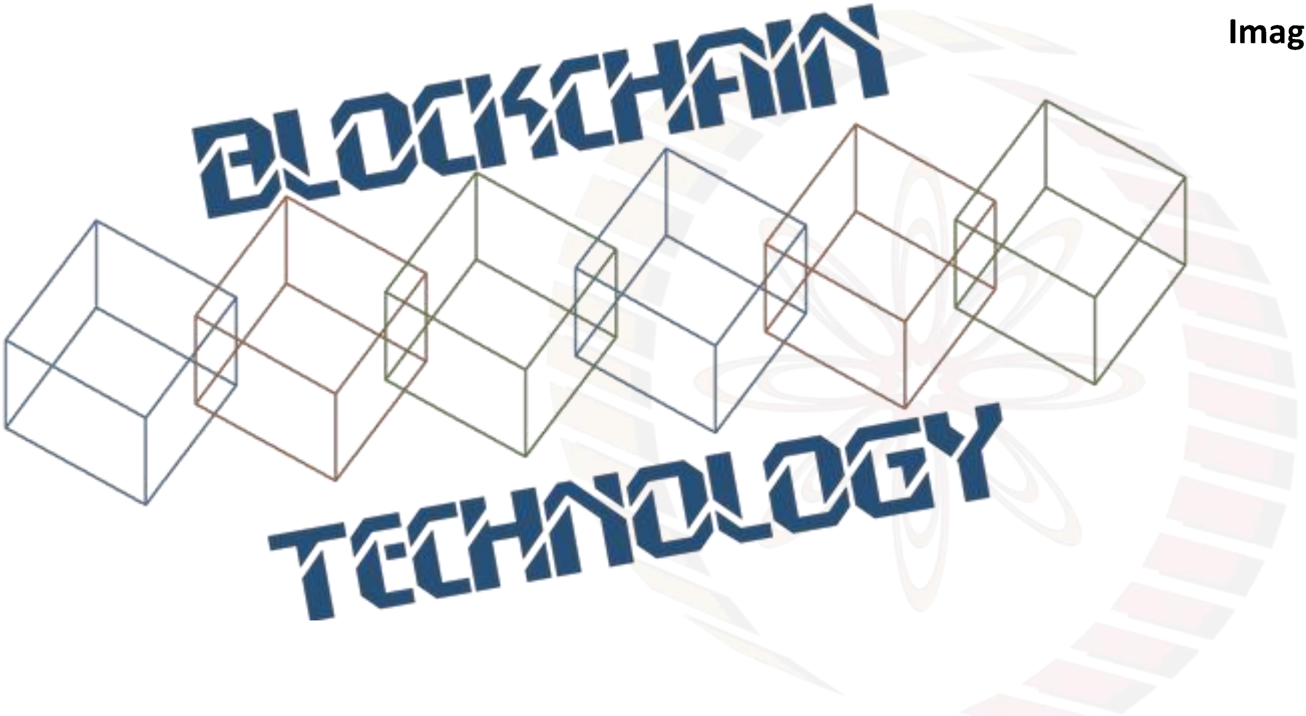
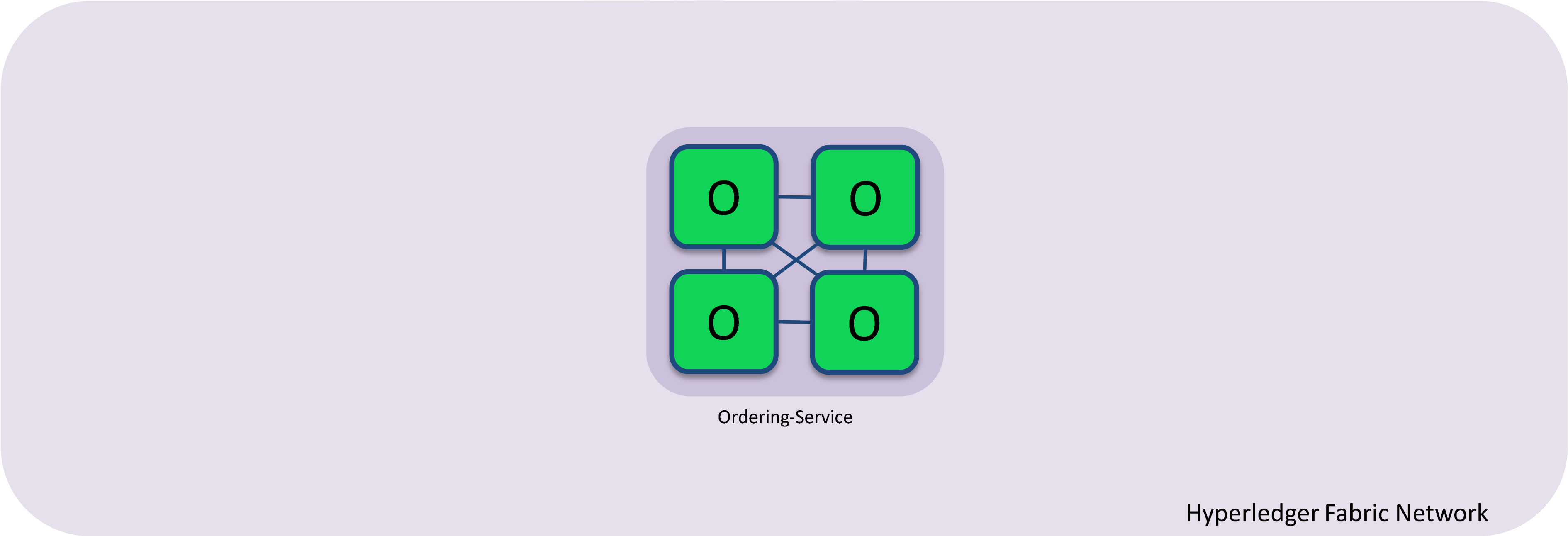
Image courtesy: http://beetfusion.com/



HYPERLEDGER FABRIC NETWORK SETUP

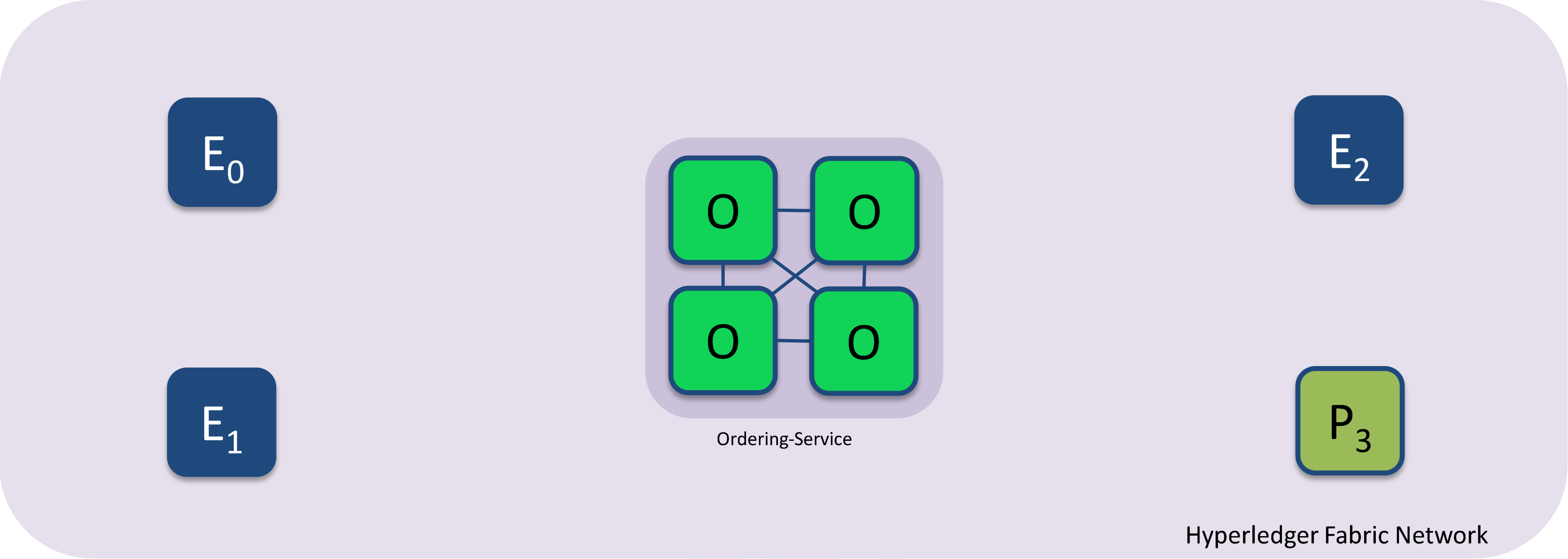
Step 1/6: Configure & Start Ordering Service



An Ordering Service is configured and started for the network:

```
$ docker-compose [-f orderer.yml] ...
```

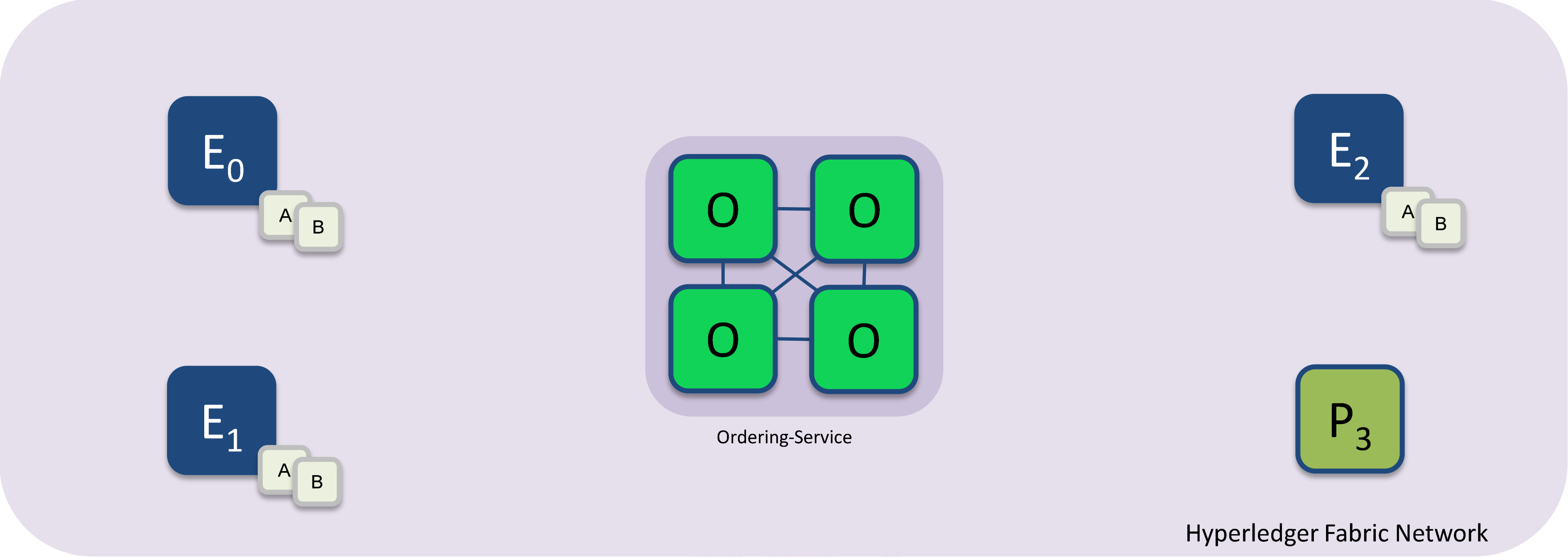
Step 2/6: Configure and Start Peer Nodes



A peer is configured and started for each Endorser or Committer in the network:

$ peer node start ...

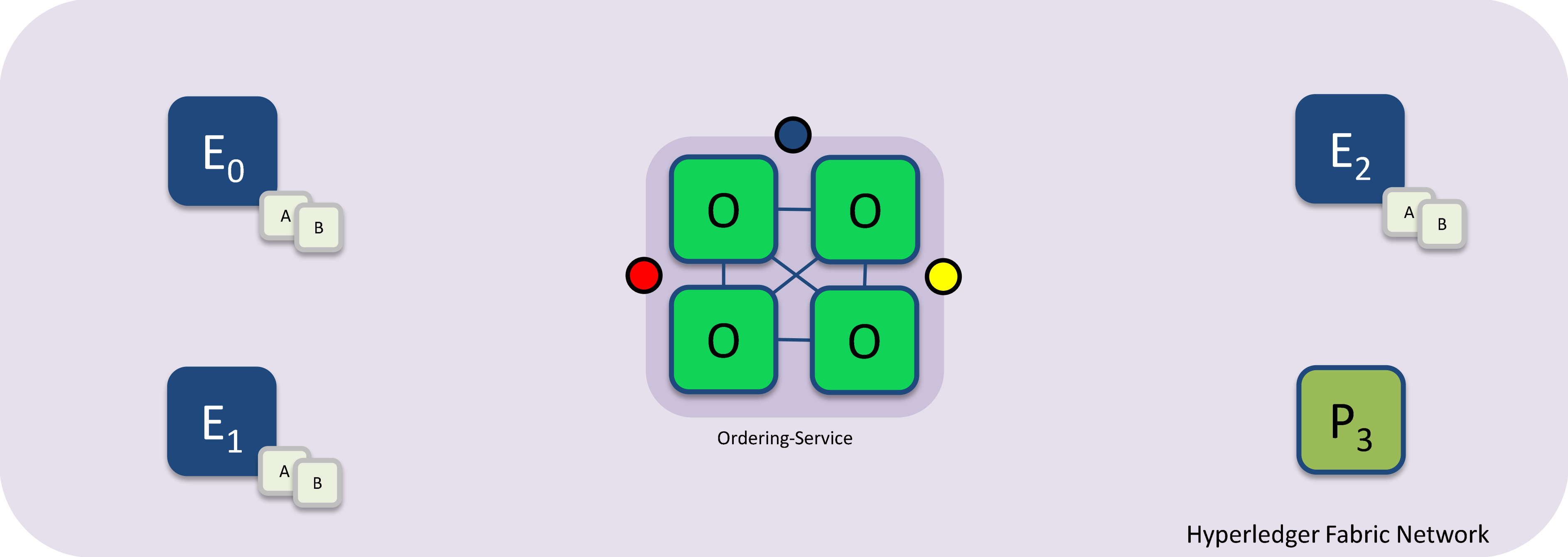
Step 3/6: Install Chaincode



Chaincode is installed onto each Endorsing Peer that needs to execute it:

$ peer chaincode install ...

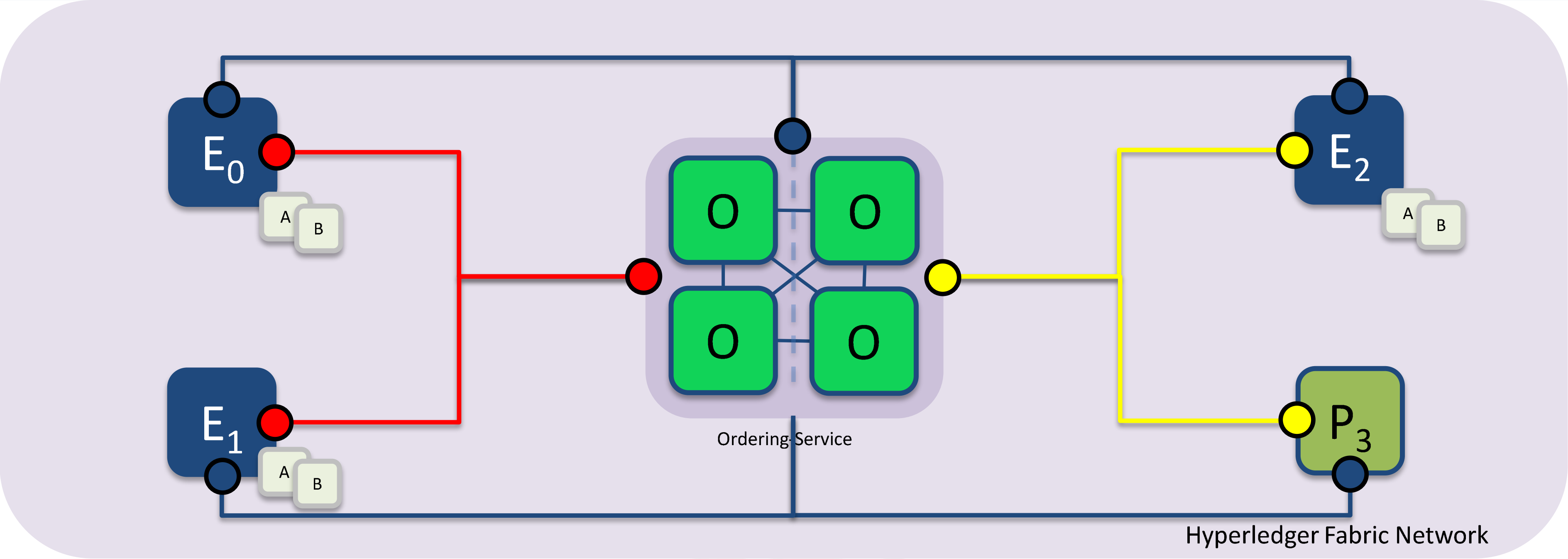
Step 4/6: Create Channels



Channels are created on the ordering service:

```
$ peer channel create –o [orderer] ...
```

Join Channels

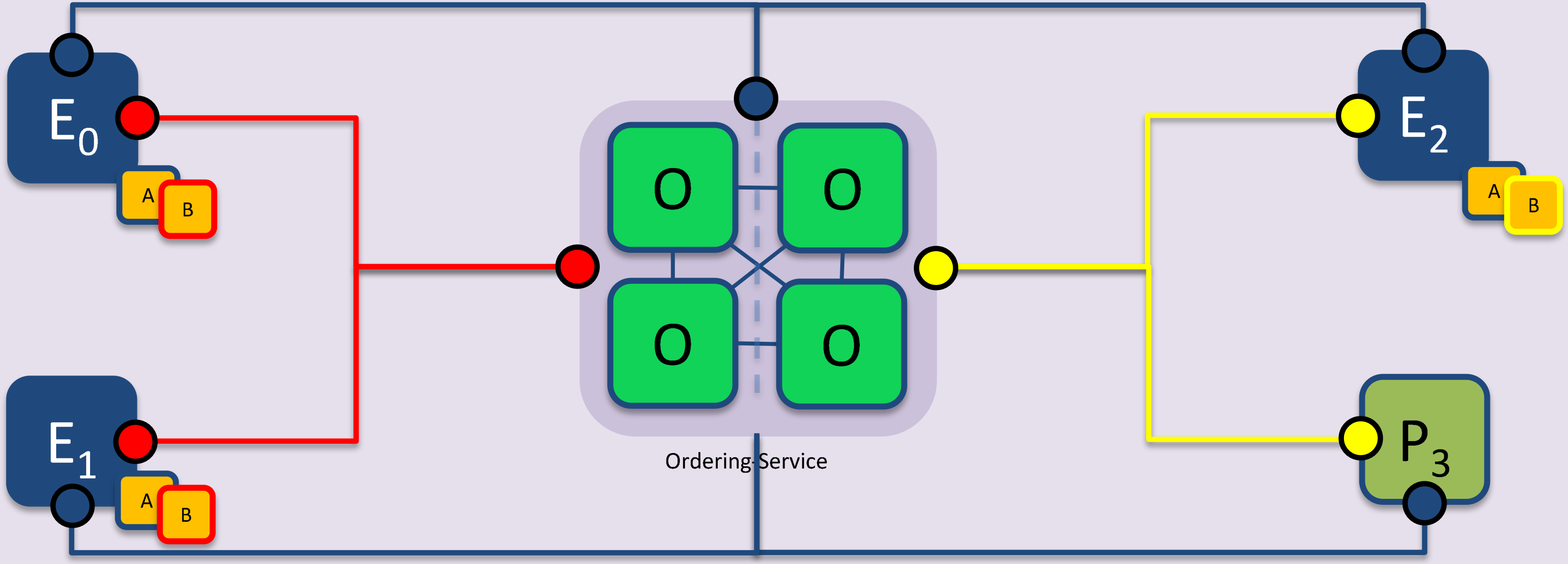


Peers that are permissioned can then join the channels they want to transact on:

$ peer channel join ...

Step 6/6: Instantiate Chaincode in Channel

An Endorsement Policy is specified and once instantiated chaincode can process transactions.



Hyperledger Fabric Network

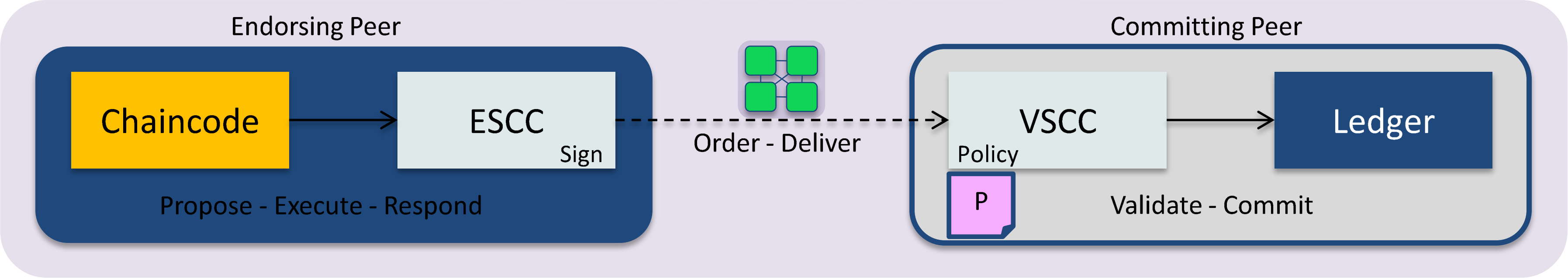
Peers finally instantiate the Chaincode on the channels they want to transact on:

$ peer chaincode instantiate … –P ‘policy’

Endorsement Policies

An endorsement policy describes the conditions by which a transaction can be endorsed. A transaction can only be considered valid if it has been endorsed according to its policy.

- Each chaincode is deployed with an Endorsement Policy
- **ESCC** (Endorsement System ChainCode) signs the proposal response on the endorsing peer
- **VSCC** (Validation System ChainCode) validates the endorsements



Endorsement Policy Syntax

```
$ peer chaincode instantiate
-C mychannel
-n mycc
-v 1.0
-p chaincode_example02
-c '{"Args":["init","a", "100", "b","200"]}'
-P "AND('Org1MSP.member')"
```

Instantiate the chaincode mycc on channel mychannel with the policy AND('Org1MSP.member')

Policy Syntax: EXPR(E[, E...])

Where EXPR is either AND or OR and E is either a principal or nested EXPR

Principal Syntax: MSP.ROLE

Supported roles are: member and admin

Where MSP is the MSP ID, and ROLE is either “member” or “admin”

N-out-of-K policy specification also possible (e.g., 3 out of 5 peers in the channel must endorse)

Endorsement Policy Examples

Examples of policies:

- Request 1 signature from all three principals
  - AND('Org1.member', 'Org2.member', 'Org3.member')
- Request 1 signature from either one of the two principals
  - OR('Org1.member', 'Org2.member')
- Request either one signature from a member of the Org1 MSP or (1 signature from a member of the Org2 MSP and 1 signature from a member of the Org3 MSP)
  - OR('Org1.member', AND('Org2.member', 'Org3.member'))

Hyperledger Fabric: Additional Information

- Project Home: https://www.hyperledger.org/projects/fabric

- Gerrit Repo: https://gerrit.hyperledger.org/r/#/admin/projects/fabric
- GitHub Mirror Repo: https://github.com/hyperledger/fabric

- Latest Docs: https://hyperledger-fabric.readthedocs.io/en/latest/

- Community Chat: https://chat.hyperledger.org/channel/fabric

- Project Wiki: https://wiki.hyperledger.org/projects/fabric

Fun Reading

- Build your first Fabric blockchain network: http://hyperledger-fabric.readthedocs.io/en/release-1.0/build_network.html
- IBM Blockchain 101: Quick start guide for developers: https://www.ibm.com/developerworks/cloud/library/cl-ibm-blockchain-101-quick-start-guide-for-developers-bluemix-trs/index.html

thank you!