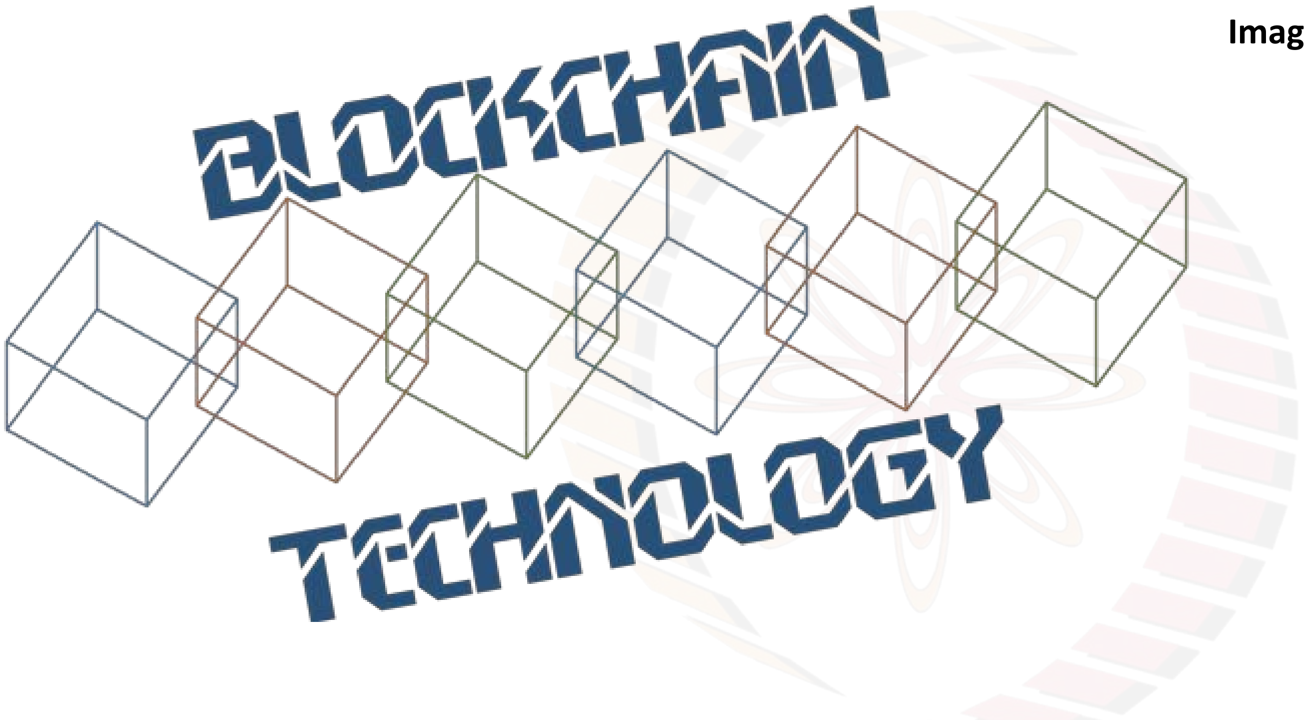
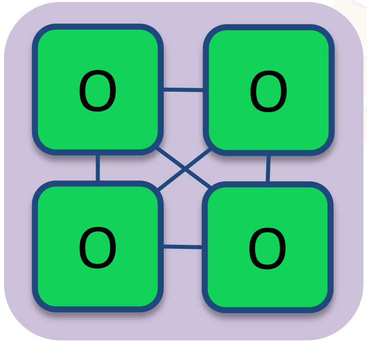


Image courtesy: http://beetfusion.com/

# HYPERLEDGER FABRIC DETAILS

# Ordering Service

The ordering service packages transactions into blocks to be delivered to peers. Communication with the service is via channels.



Ordering-Service

Different configuration options for the ordering service include:

– SOLO

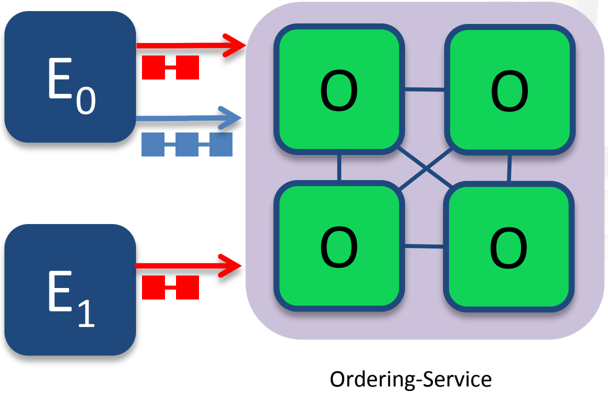
- Single node for development

– Kafka : Crash fault tolerant consensus

- 3 nodes minimum
- Odd number of nodes recommended

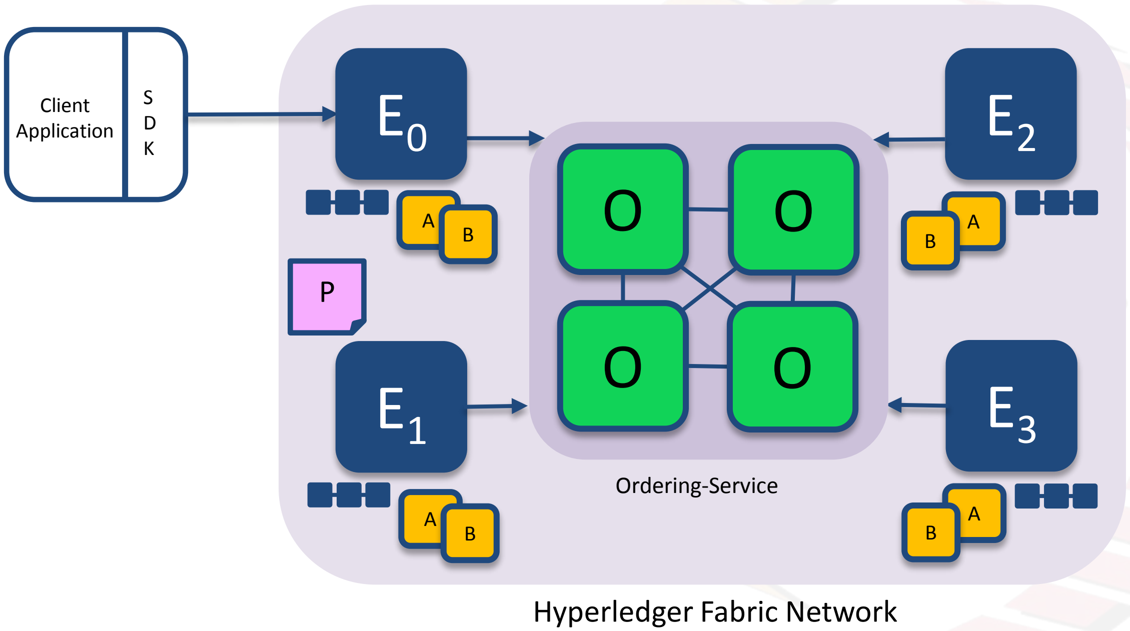
# Channels

Channels provide privacy between different ledgers



- Ledgers exist in the scope of a channel
  - Channels can be shared across an entire network of peers
  - Channels can be permissioned for a specific set of participants
- Chaincode is installed on peers to access the worldstate
- Chaincode is instantiated on specific
- Peers can participate in multiple channels
- Concurrent execution for performance and scalability

# Single Channel Network

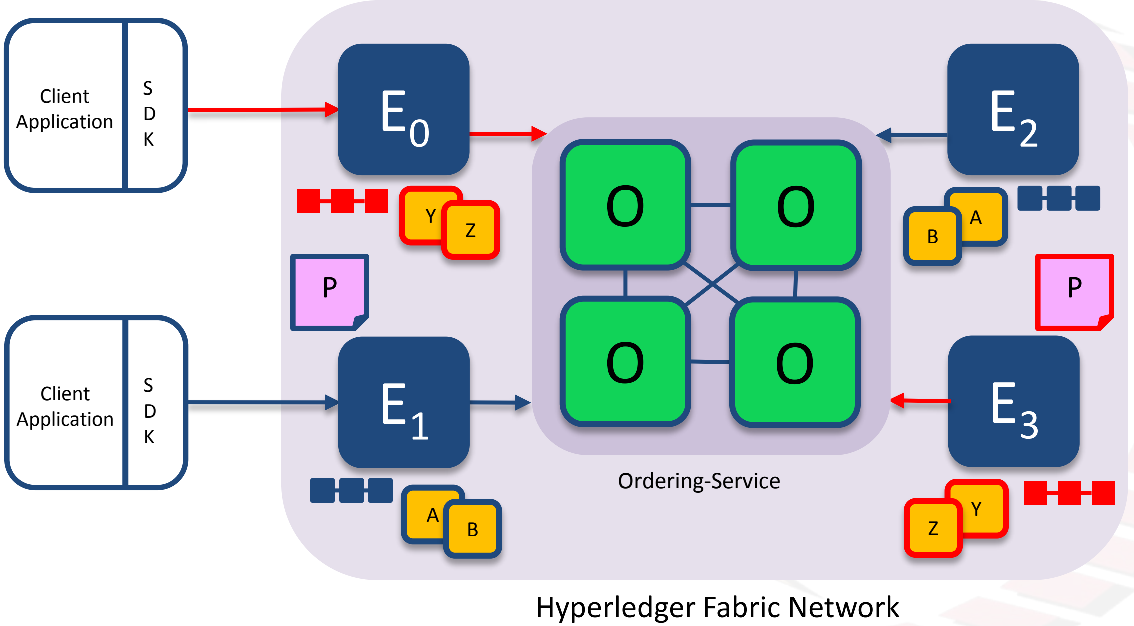


- All peers connect to the same system channel (blue).
- All peers have the same chaincode and maintain the same ledger
- Endorsement by peers $E_0$, $E_1$, $E_2$ and $E_3$

Key:

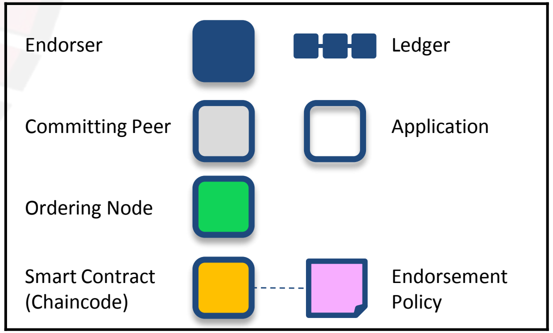
| | | | |
|---|---|---|---|
| Endorser | ■ | ■■■ | Ledger |
| Committing Peer | □ | □ | Application |
| Ordering Node | 🟩 | | |
| Smart Contract (Chaincode) | 🟨 | ▨ | Endorsement Policy |

# Multi-Channel Network



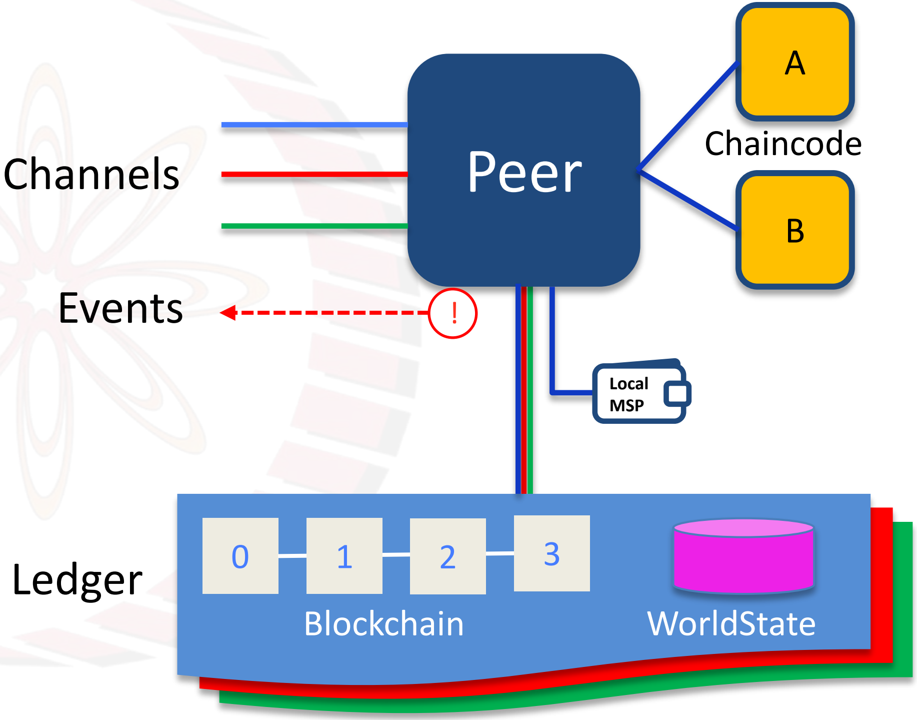
- Peers $E_0$ and $E_3$ connect to the red channel for chaincodes Y and Z
- Peers $E_1$ and $E_2$ connect to the blue channel for chaincodes A and B

Key:



# Fabric Peer

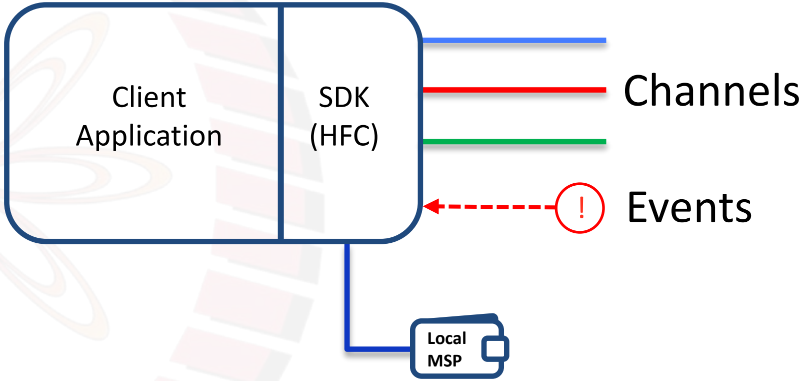
- Each peer:
  - Connects to one or more channels
  - Maintains one or more ledgers for each channel
  - Chaincodes are instantiated in separate docker containers
  - Chaincodes are shared across channels (no state is stored in chaincode container)
  - Local MSP (Membership Services Provider) provides crypto material
  - Emits events to the client application



# Client Application

- Each client application uses Fabric SDK to:
  - Connects over channels to one or more peers
  - Connects over channels to one or more orderer nodes
  - Receives events from peers
  - Local MSP provides client crypto material

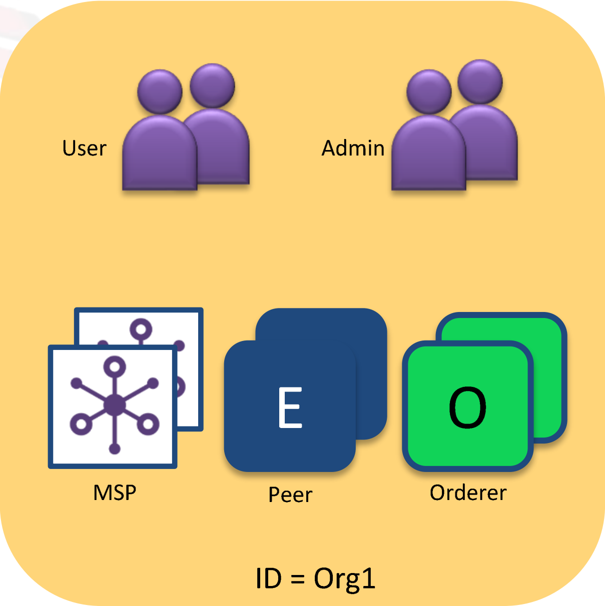
  - Client can be written in different languages (Node.js, Go, Java, Python?)



# Organisations

Organisations define boundaries within a Fabric Blockchain Network

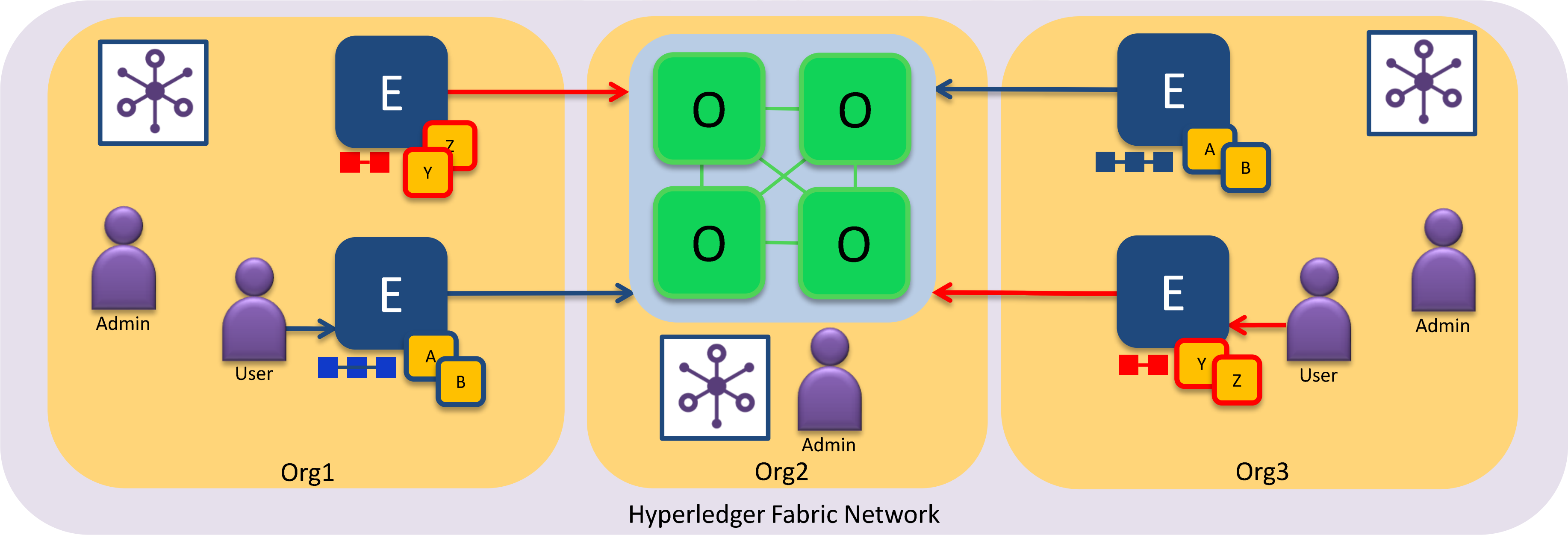
- Each organisation defines:
  - Membership Services Provider (MSP) for identities
  - Administrator(s)
  - Users
  - Peers
  - Orderers (optional)
- A network can include many organisations representing a consortium
- Each organisation has an ID



# Consortium Network

An example consortium network of 3 organisations

- Orgs 1 and 3 run peers
- Org 2 provides the ordering service only



E
Z
Y
Admin
User
E
A
B
Org1
O
O
O
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Org2
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User
Admin
Org3
Hyperledger Fabric Network