Hyperledger Fabric (2)

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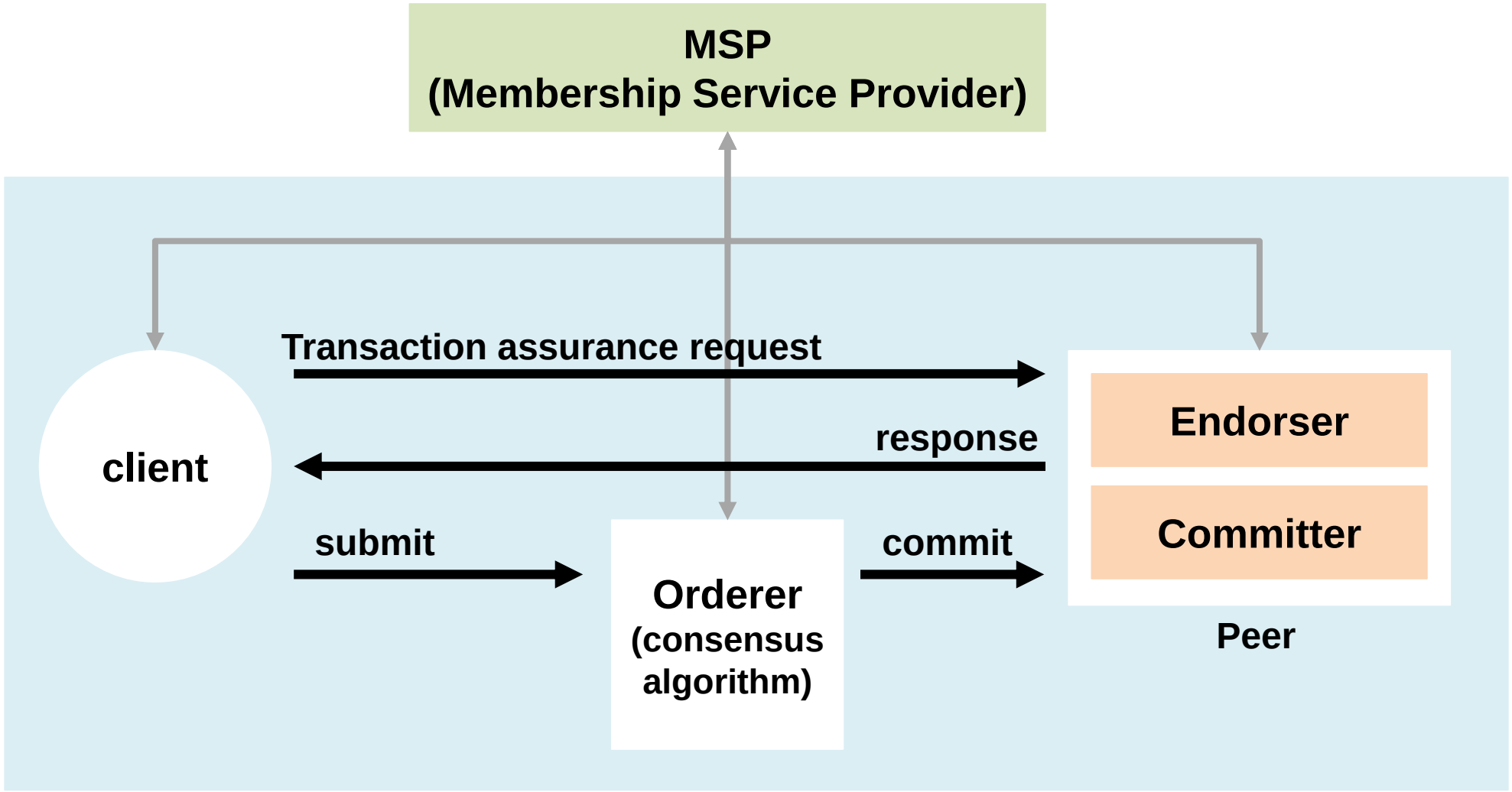
Components of Hyperledger Fabric (1/2)

- **Assets**
  - Value exchanged over the network
  - (Key-value)
- **Chaincode**
  - Business logic
  - Enforce the rules for reading or altering key-value pairs
  - System chaincode
- **Ledger**
  - Tamper-resistant record of all state transitions
- **Channel**
  - One ledger per channel
  - It can be shared across the entire network or it can be privatized

Components of Hyperledger Fabric (2/2)

- **Transaction**
  - Deploy transaction
  - Invoke transaction
- **Nodes**
  - Client node
  - Peer node
    - Committing peer
    - Endorsing peer
  - Ordering Service node (Orderer)
- **vKVS (versioned Key Value Store)**
- **MSP (Membership Service Provider)**

Architecture of Hyperledger Fabric (1/5)

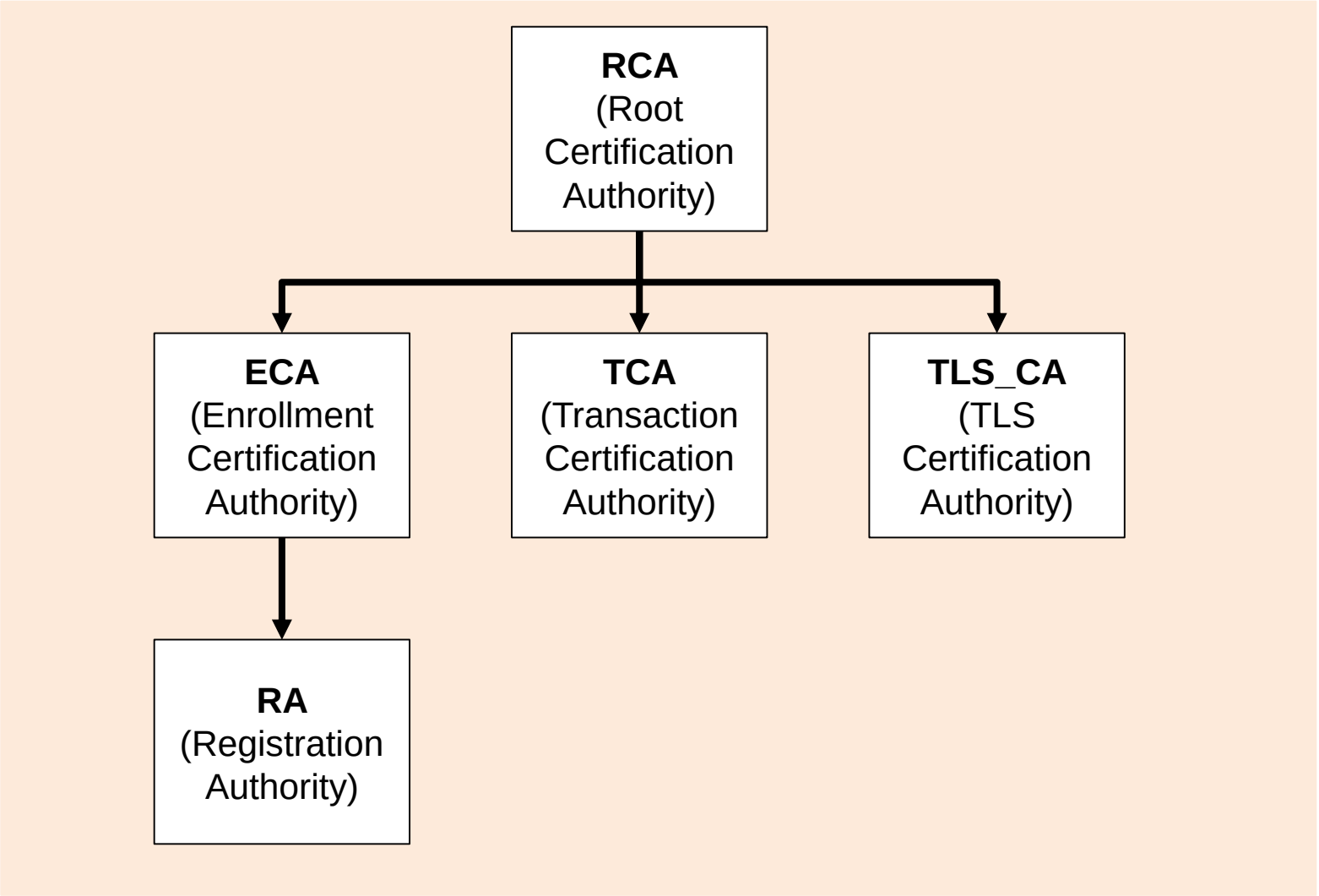


Architecture of Hyperledger Fabric (2/5)

- **World state**
  - Store status change information of blockchain changed according to transaction execution result
  - versioned Key Value Store (vKVS)
    - **Key**: the name of the information used by the chaincode
    - **Value**: information corresponding to Key
    - **Version**: the number of a particular key-value pair
  - Each time the value is updated, a new version is assigned to distinguish the state of the existing key-value pair

Architecture of Hyperledger Fabric (3/5)

- **Membership Service Provider (MSP) (1)**



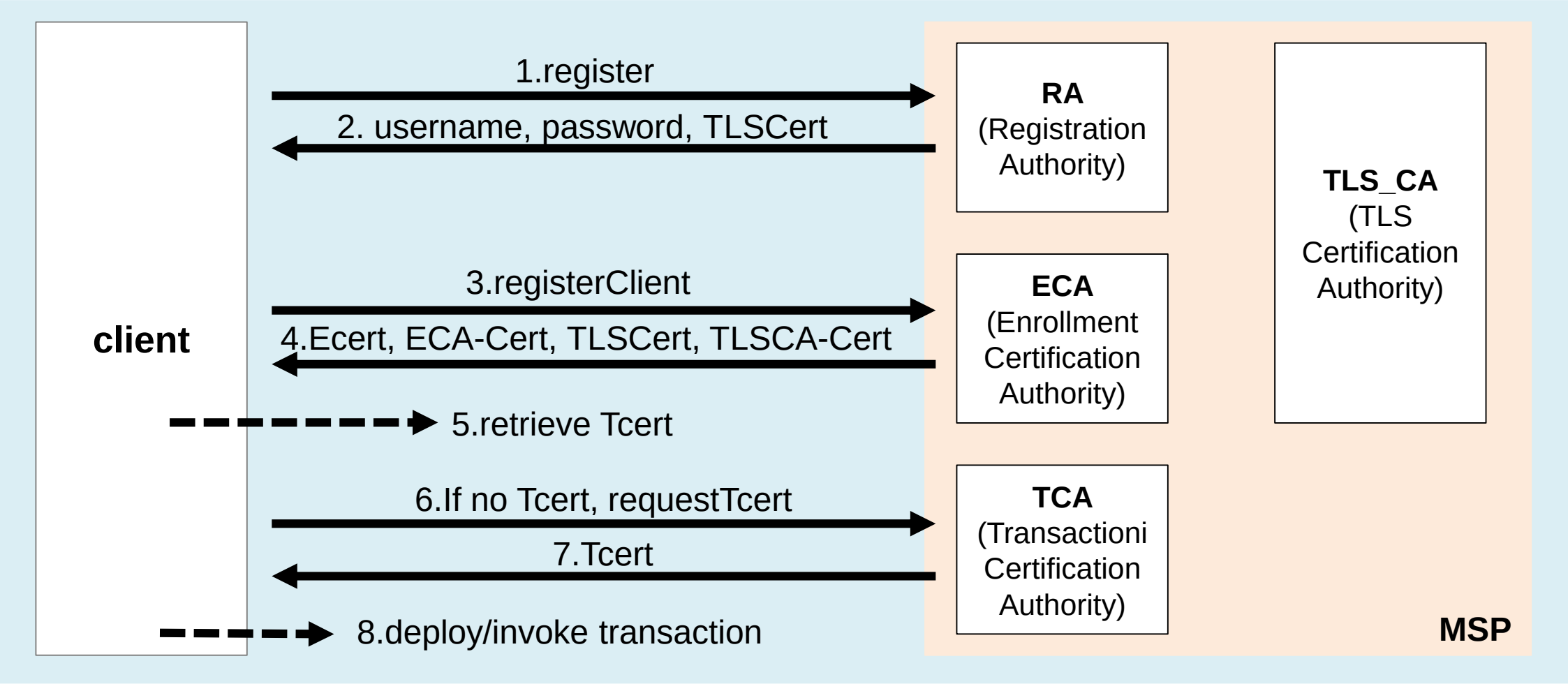
Architecture of Hyperledger Fabric (4/5)

Membership Service Provider (MSP) (2)

- ECA (Enrollment CA)
  - Issuance of ECert (Enrollment Certificate)
  - Generate public key – private key
  - Delegate identification process to RA
- TCA (Transaction CA)
  - Issuance of TCert (Transaction Certificate)
  - Ensure transaction non-connectivity
- TLS_CA
  - Issuing certificates that can be used by the TLS protocol

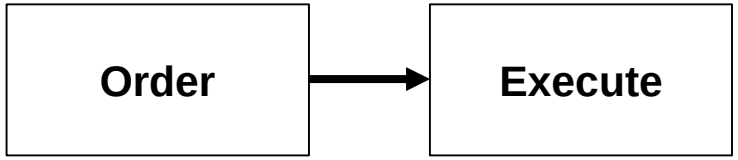
Architecture of Hyperledger Fabric (5/5)

- **Membership Service Provider (MSP) (3)**
  - **Provision of Membership services to users and clients**



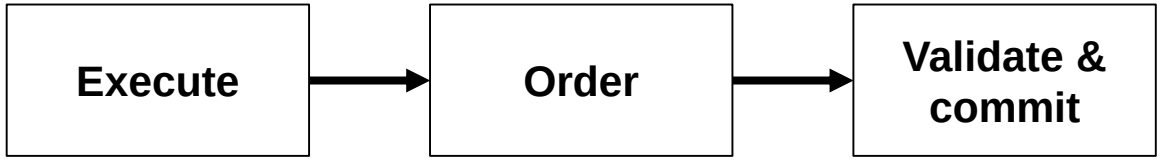
Transaction Flow of Hyperledger Fabric (1/2)

- existing smart-contract: **order-execute**



  - Order: validates and orders transactions then propagates them to all peer nodes
  - Execute: each peer then executes the transaction sequentially
  - Must be deterministic

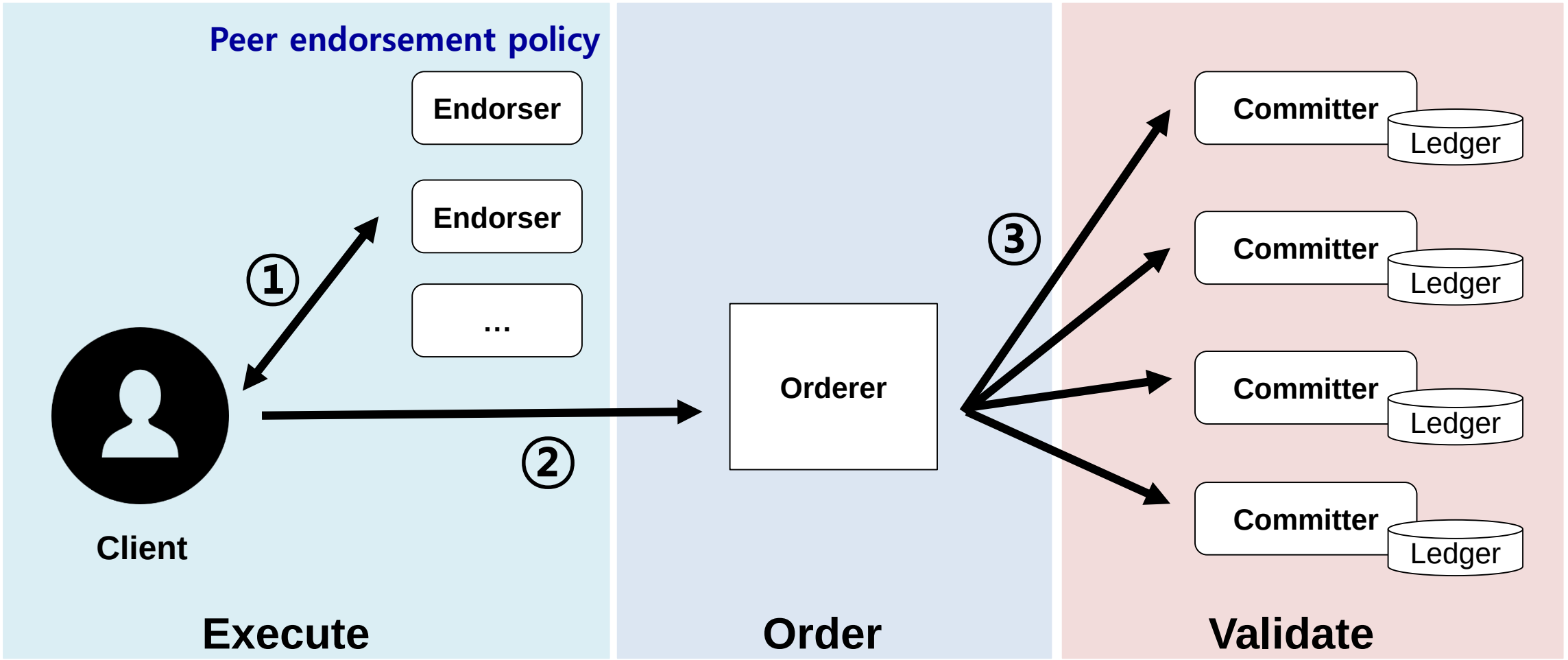
- **Hyperledger Fabric: Execute-order-validate**



  - Execute: execute a transaction and check its correctness
  - Order: order transactions via a (pluggable) consensus protocol
  - Validate: validate transactions before committing them to the ledger

Transaction Flow of Hyperledger Fabric (2/2)

- **Execute-order-validate**



Summary

- Components of Hyperledger Fabric
- Architecture of Hyperledger Fabric
- Transaction flow

References

- https://www.youtube.com/watch?v=kMktpqo0FH8
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- https://Hyperledger-Fabric.readthedocs.io/en/release-1.0/arch-deep-dive.html