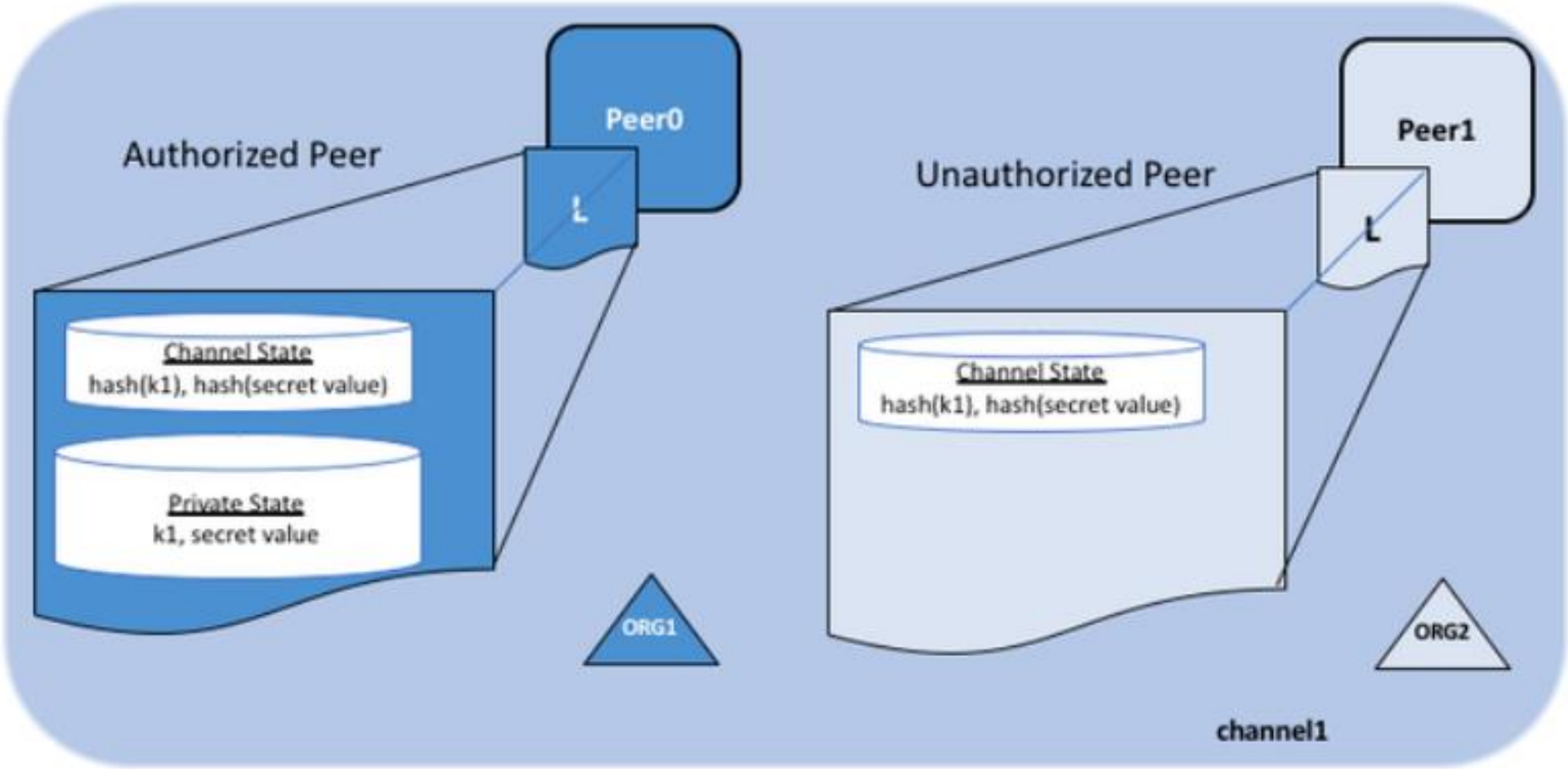
Private Data

- 같은 채널의 다른 조직으로부터 데이터를 보호(비공개)
- 별도의 채널을 생성할 경우 추가적인 관리 비용 발생
  - 체인코드 버전
  - 합의
  - MSP

Private Data Collection

1. The actual private data
2. A hash of that data

Private Data

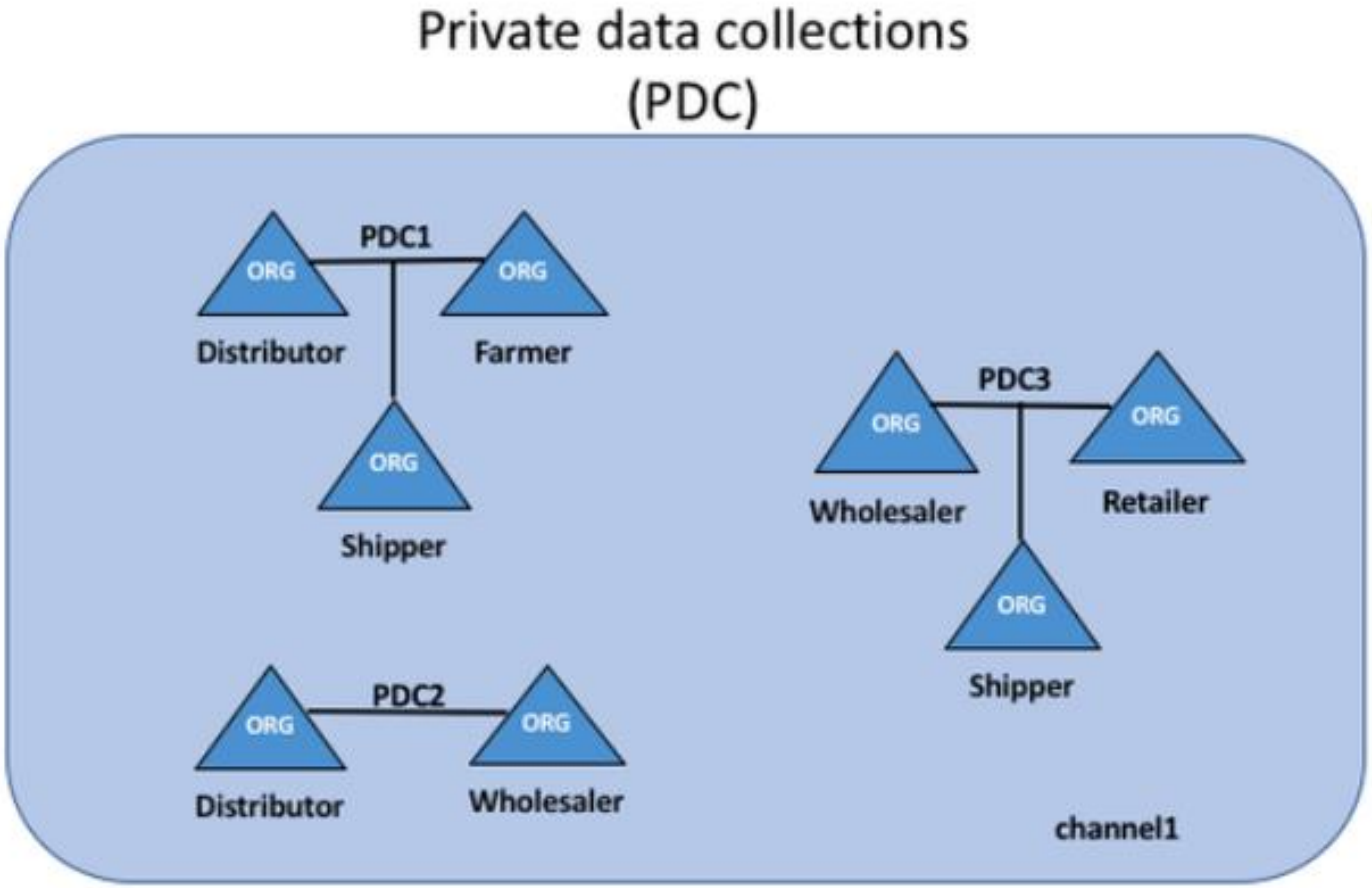


- 채널의 모든 멤버에게 트랜잭션의 비밀로 유지 되어야 할 때 ➔ Channel
- 모든 조직들 간에 트랜잭션이 공유되어야 하지만, 해당 조직의 하위 집합만 트랜잭션의 일부에 액세스 할 때 ➔ Collection (***Peer-to-peer, Don't use Orderer***)

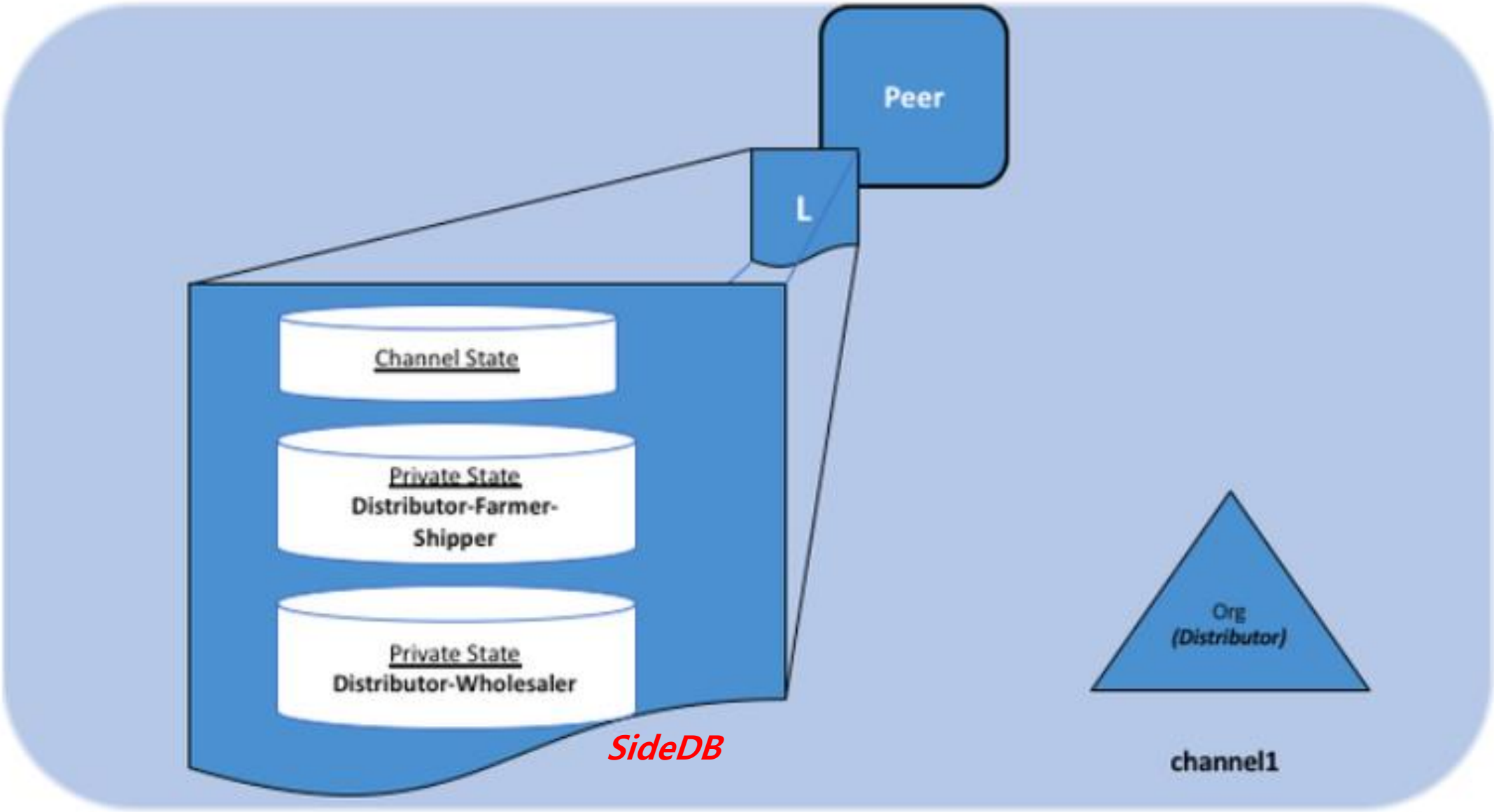
Private Data

- **A Farmer** selling his goods abroad
- **A Distributor** moving goods abroad
- **A Shipper** moving goods between parties
- **A Wholesaler** purchasing goods from distributors
- **A Retailer** purchasing goods from shippers and wholesalers

1.PDC1: **Distributor**, **Farmer** and **Shipper**
2.PDC2: **Distributor** and **Wholesaler**
3.PDC3: **Wholesaler**, **Retailer** and **Shipper**



Private Data



Private Data

1. **Build a collection definition JSON file**
2. Read and Write private data using chaincode APIs
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6. Query the private data as an unauthorized peer
7. Purge Private Data
8. Using indexes with private data

- name
- policy
- requiredPeerCount
- maxPeerCount
- blockToLive

```
// collections_config.json

[
  {
        "name": "collectionMarbles",
        "policy": "OR('Org1MSP.member', 'Org2MSP.member')",
        "requiredPeerCount": 0,
        "maxPeerCount": 3,
        "blockToLive":1000000
  },

  {
        "name": "collectionMarblePrivateDetails",
        "policy": "OR('Org1MSP.member')",
        "requiredPeerCount": 0,
        "maxPeerCount": 3,
        "blockToLive":3
  }
]
```

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```
// Peers in Org1 and Org2 will have this private data in a side database
type marble struct {
  ObjectType string `json:"docType"`
  Name       string `json:"name"`
  Color      string `json:"color"`
  Size       int    `json:"size"`
  Owner      string `json:"owner"`
}

// Only peers in Org1 will have this private data in a side database
type marblePrivateDetails struct {
  ObjectType string `json:"docType"`
  Name       string `json:"name"`
  Price      int    `json:"price"`
}
```

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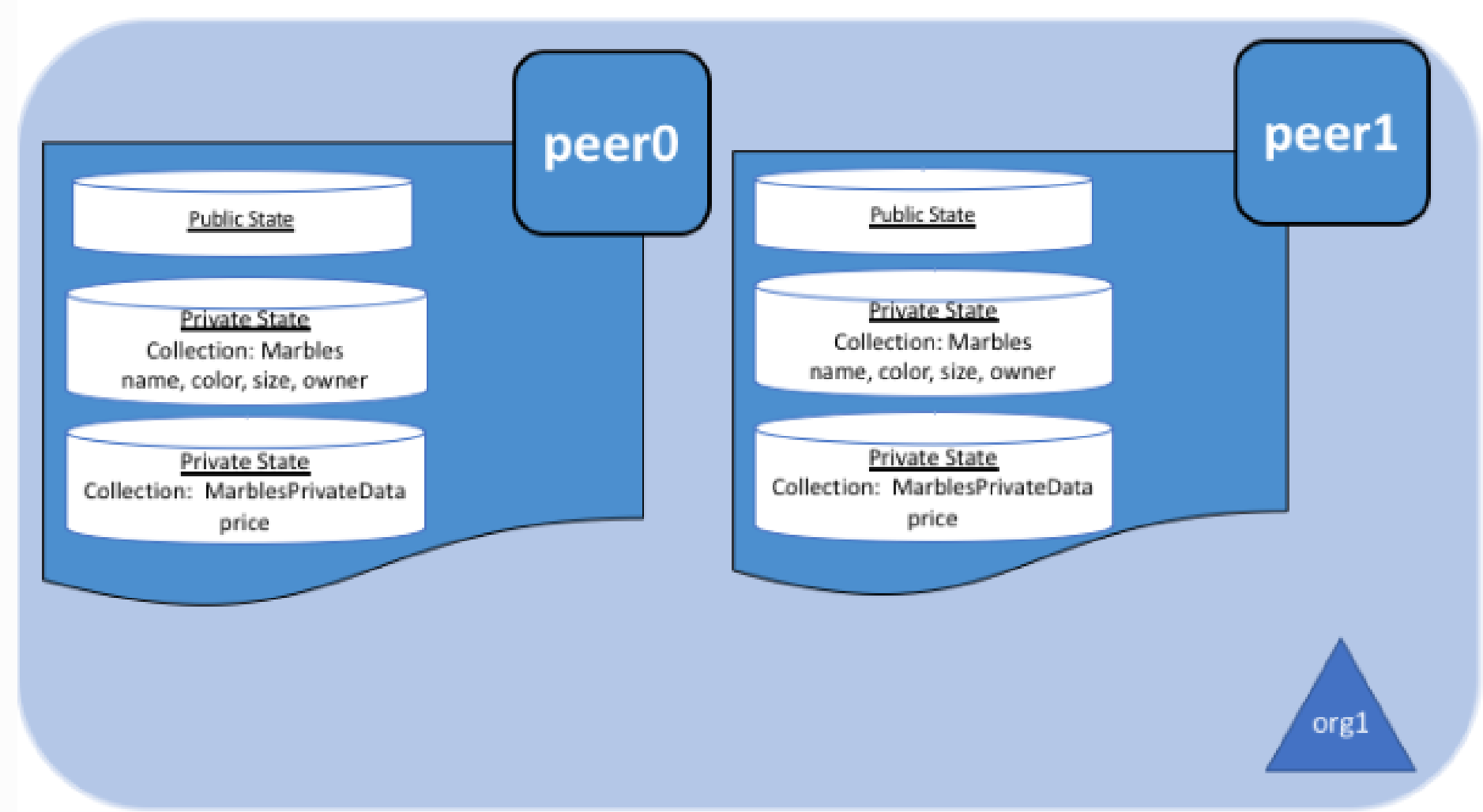

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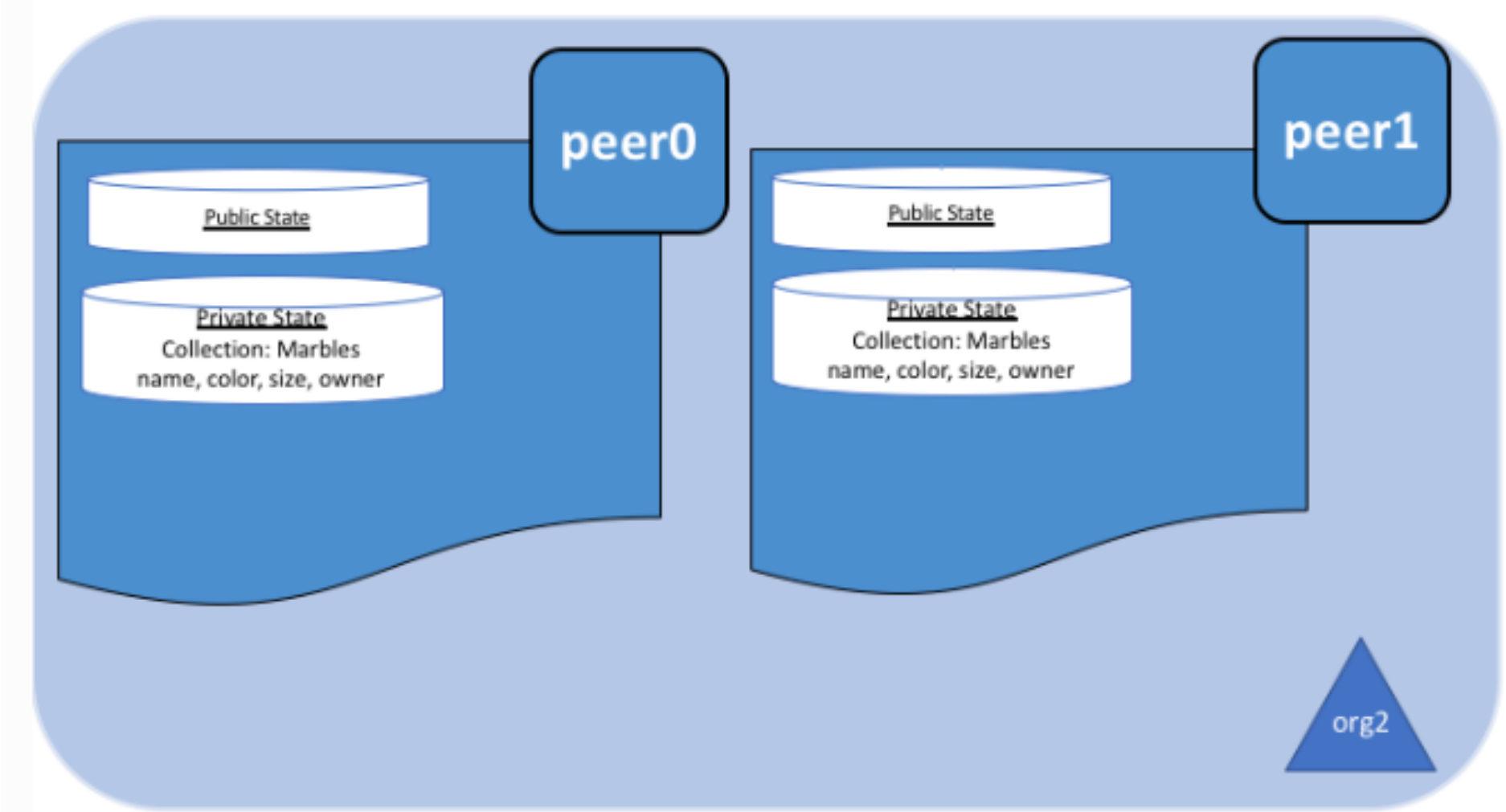

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Reading collection data

- GetPrivateData(): private data 쿼리
  - collection name
  - the data key

collections_config.json

- collectionMarbles
  - Org1, Org2의 멤버가 SideDB에 접속
- collectionMarblesPrivateDetails
  - Org1의 구성원만 SideDB에 접속

- readMarble: name, color, size and owner
- readMatrblePrivateDetails: price

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Writing private data

- collectionMarbles: name, color, size and owmer
- collectionMarblePrivateDetails: price

```
// ==== Create marble object and marshal to JSON ====
objectType := "marble"
marble := &marble{objectType, marbleName, color, size, owner}
marbleJSONasBytes, err := json.Marshal(marble)
if err != nil {
        return shim.Error(err.Error())
}

// === Save marble to state ===
err = stub.PutPrivateData("collectionMarbles", marbleName, marbleJSONasBytes)
if err != nil {
        return shim.Error(err.Error())
}

// ==== Save marble private details ====
objectType = "marblePrivateDetails"
marblePrivateDetails := &marblePrivateDetails{objectType, marbleName, price}
marblePrivateDetailsBytes, err := json.Marshal(marblePrivateDetails)
if err != nil {
        return shim.Error(err.Error())
}
err = stub.PutPrivateData("collectionMarblePrivateDetails", marbleName, marblePrivateDetailsBytes)
if err != nil {
        return shim.Error(err.Error())
}
```

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```
cd fabric-samples/first-network
./byfn.sh down

./byfn.sh up -c mychannel -s couchdb
```

- peer0.org1.example.com
- peer1.org1.example.com
- peer0.org2.example.com
- peer1.org2.example.com

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```
docker exec -it cli bash
```

- ***peer0.org1.example.com***

```
peer chaincode install -n marblesp -v 1.0 -p github.com/chaincode/marbles02_private/go/
```

```
install -> INFO 003 Installed remotely response:<status:200 payload:"OK" >
```

- ***peer1.org1.example.com***

```
export CORE_PEER_ADDRESS=peer1.org1.example.com:7051
peer chaincode install -n marblesp -v 1.0 -p github.com/chaincode/marbles02_private/go/
```

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- ***Org2 전환***

```
export CORE_PEER_LOCALMSPID=Org2MSP
export
PEER0_ORG2_CA=/opt/gopath/src/github.com/hyperledger/fabric/peer/crypto/peerOrganizat
ions/org2.example.com/peers/peer0.org2.example.com/tls/ca.crt
export CORE_PEER_TLS_ROOTCERT_FILE=$PEER0_ORG2_CA
export
CORE_PEER_MSPCONFIGPATH=/opt/gopath/src/github.com/hyperledger/fabric/peer/crypto/pee
rOrganizations/org2.example.com/users/Admin@org2.example.com/msp
```

- ***peer0.org2.example.com***

```
export CORE_PEER_ADDRESS=peer0.org2.example.com:7051
peer chaincode install -n marblesp -v 1.0 -p github.com/chaincode/marbles02_private/go/
```

- ***peer1.org2.example.com***

```
export CORE_PEER_ADDRESS=peer1.org2.example.com:7051
peer chaincode install -n marblesp -v 1.0 -p github.com/chaincode/marbles02_private/go/
```

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- ***Instantiate***

```
export
ORDERER_CA=/opt/gopath/src/github.com/hyperledger/fabric/peer/crypto/ordererOr
ganizations/example.com/orderers/orderer.example.com/msp/tlscacerts/tlsca.exam
ple.com-cert.pem

peer chaincode instantiate -o orderer.example.com:7050 --tls --cafile
$ORDERER_CA -C mychannel -n marblesp -v 1.0 -c '{"Args":["init"]}' -P
"OR('Org1MSP.member','Org2MSP.member')" --collections-config
$GOPATH/src/github.com/chaincode/marbles02_private/collections_config.json
```

```
[chaincodeCmd] checkChaincodeCmdParams -> INFO 001 Using default escc
[chaincodeCmd] checkChaincodeCmdParams -> INFO 002 Using default vscc
```

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```
export CORE_PEER_ADDRESS=peer0.org1.example.com:7051
export CORE_PEER_LOCALMSPID=Org1MSP
export CORE_PEER_TLS_ROOTCERT_FILE=/opt/gopath/src/github.com/hyperledger/\
    fabric/peer/crypto/peerOrganizations/org1.example.com/peers/peer0.org1.example.com/tls/ca.crt
export CORE_PEER_MSPCONFIGPATH=/opt/gopath/src/github.com/hyperledger/\
    fabric/peer/crypto/peerOrganizations/org1.example.com/users/Admin@org1.example.com/msp
export PEER0_ORG1_CA=/opt/gopath/src/github.com/hyperledger/\
    fabric/peer/crypto/peerOrganizations/org1.example.com/peers/peer0.org1.example.com/tls/ca.crt
```

```
peer chaincode invoke -o orderer.example.com:7050 --tls –cafile \
    /opt/gopath/src/github.com/hyperledger/fabric/peer/crypto/\
    ordererOrganizations/example.com/orderers/orderer.example.com/\
    msp/tlscacerts/tlsca.example.com-cert.pem -C mychannel -n marblesp \
    -c '{"Args":["initMarble","marble1","blue","35","tom","99"]}'
```

```
[chaincodeCmd] chaincodeInvokeOrQuery->INFO 001 Chaincode invoke successful. result: status:200
```

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```
// ============================================
// readMarble - read a marble from chaincode state
// ============================================

func (t *SimpleChaincode) readMarble(stub shim.ChaincodeStubInterface, args []string) pb.Response {
    var name, jsonResp string
    var err error
    if len(args) != 1 {
        return shim.Error("Incorrect number of arguments. Expecting name of the marble to query")
    }

    name = args[0]
    valAsbytes, err := stub.GetPrivateData("collectionMarbles", name) //get the marble from chaincode state

    if err != nil {
        jsonResp = "{₩"Error₩":₩"Failed to get state for " + name + "₩"}"
        return shim.Error(jsonResp)
    } else if valAsbytes == nil {
        jsonResp = "{₩"Error₩":₩"Marble does not exist: " + name + "₩"}"
        return shim.Error(jsonResp)
    }

    return shim.Success(valAsbytes)
}
```

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```
// ============================================
// readMarblePrivateDetails - read a marble private details from chaincode state
// ============================================

func (t *SimpleChaincode) readMarblePrivateDetails(stub shim.ChaincodeStubInterface, args []string)
pb.Response {
    var name, jsonResp string
    var err error

    if len(args) != 1 {
        return shim.Error("Incorrect number of arguments. Expecting name of the marble to query")
    }

    name = args[0]
    valAsbytes, err := stub.GetPrivateData("collectionMarblePrivateDetails", name) //get the marble private
details from chaincode state

    if err != nil {
        jsonResp = "{₩"Error₩":₩"Failed to get private details for " + name + ": " + err.Error() + "₩"}"
        return shim.Error(jsonResp)
    } else if valAsbytes == nil {
        jsonResp = "{₩"Error₩":₩"Marble private details does not exist: " + name + "₩"}"
        return shim.Error(jsonResp)
    }
    return shim.Success(valAsbytes)
}
```

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- *Org1 → marble1의 이름, 색상, 크기 및 소유자 private data*

```
peer chaincode query -C mychannel -n marblesp -c '{"Args":["readMarble","marble1"]}'
```

```
{"color":"blue","docType":"marble","name":"marble1","owner":"tom","size":35}
```

- *Org1 → marble1의 가격 private data*

```
peer chaincode query -C mychannel -n marblesp -c  '{"Args":["readMarblePrivateDetails","marble1"]}'
```

```
{"docType":"marblePrivateDetails","name":"marble1","price":99}
```

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- ***Switch to a peer in Org2***

```
export CORE_PEER_ADDRESS=peer0.org2.example.com:7051
export CORE_PEER_LOCALMSPID=Org2MSP
export PEER0_ORG2_CA=/opt/gopath/src/github.com/hyperledger/₩
                     fabric/peer/crypto/peerOrganizations/org2.example.com/₩
                     peers/peer0.org2.example.com/tls/ca.crt
export CORE_PEER_TLS_ROOTCERT_FILE=$PEER0_ORG2_CA
export CORE_PEER_MSPCONFIGPATH=/opt/gopath/src/github.com/hyperledger/₩
                     fabric/peer/crypto/peerOrganizations/org2.example.com/₩
                     users/Admin@org2.example.com/msp
```

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- ***Query private data Org2 is authorized to***

```
peer chaincode query -C mychannel -n marblesp -c '{"Args":["readMarble","marble1"]}'
```

```
{"docType":"marble","name":"marble1","color":"blue","size":35,"owner":"tom"}
```

- ***Query private data Org2 is not authorized to***

```
peer chaincode query -C mychannel -n marblesp -c \
                                    '{"Args":["readMarblePrivateDetails","marble1"]}'
```

```
{"Error":"Failed to get private details for marble1: GET_STATE failed:
transaction ID: b04adebbf165ddc90b4ab897171e1daa7d360079ac18e65fa15d84ddfebfae90:
Private data matching public hash version is not available. Public hash
version = &version.Height{BlockNum:0x6, TxNum:0x0}, Private data version =
(*version.Height)(nil)"}
```

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- ***수명을 가지는 Private data***

```
// collections_config.json

[
  {
        "name": "collectionMarbles",
        "policy": "OR('Org1MSP.member', 'Org2MSP.member')",
        "requiredPeerCount": 0,
        "maxPeerCount": 3,
        "blockToLive":1000000
  },

  {
        "name": "collectionMarblePrivateDetails",
        "policy": "OR('Org1MSP.member')",
        "requiredPeerCount": 0,
        "maxPeerCount": 3,
        "blockToLive":3
  }
]
```

3블럭까지만 저장

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- ***Switch to a peer in Org1***

```
export CORE_PEER_ADDRESS=peer0.org1.example.com:7051
export CORE_PEER_LOCALMSPID=Org1MSP
export PEER0_ORG2_CA=/opt/gopath/src/github.com/hyperledger/₩
                     fabric/peer/crypto/peerOrganizations/org1.example.com/₩
                     peers/peer0.org1.example.com/tls/ca.crt
export CORE_PEER_TLS_ROOTCERT_FILE=$PEER0_ORG2_CA
export CORE_PEER_MSPCONFIGPATH=/opt/gopath/src/github.com/hyperledger/₩
                     fabric/peer/crypto/peerOrganizations/org1.example.com/₩
                     users/Admin@org1.example.com/msp
```

- ***Private data logs***

```
docker logs peer0.org1.example.com 2>&1 | grep -i -a -E 'private|pvt|privdata'
```

```
[pvtdatastorage] func1 → INFO 023 Purger started: Purging expired private data till block number [0]
[pvtdatastorage] func1 → INFO 024 Purger finished
[kvledger] CommitWithPvtData → INFO 022 Channel [mychannel]: Committed block [0] with 1 transaction(s)
[kvledger] CommitWithPvtData → INFO 02e Channel [mychannel]: Committed block [1] with 1 transaction(s)
[kvledger] CommitWithPvtData → INFO 030 Channel [mychannel]: Committed block [2] with 1 transaction(s)
[kvledger] CommitWithPvtData → INFO 036 Channel [mychannel]: Committed block [3] with 1 transaction(s)
[kvledger] CommitWithPvtData → INFO 03e Channel [mychannel]: Committed block [4] with 1 transaction(s)
```

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- ***Peer Container → query for the marble1***

```
peer chaincode query -C mychannel -n marblesp \
        -c '{"Args":["readMarblePrivateDetails","marble1"]}'
{"docType":"marblePrivateDetails","name":"marble1","price":99}
```

- ***Create marble2***

```
peer chaincode invoke -o orderer.example.com:7050 --tls –cafile \
        /opt/gopath/src/github.com/hyperledger/fabric/peer/\
        crypto/ordererOrganizations/example.com/orderers/orderer.example.com/\
        msp/tlscacerts/tlsca.example.com-cert.pem -C mychannel -n marblesp \
        -c '{"Args":["initMarble","marble2","blue","35","tom","99"]}'
```

- ***Private data logs***

```
docker logs peer0.org1.example.com 2>&1 | grep -i -a -E 'private|pvt|privdata'
```

→ 블록 높이 1 증가

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- ***Peer Container → query for the marble1 again***

```
peer chaincode query -C mychannel -n marblesp \
        -c '{"Args":["readMarblePrivateDetails","marble1"]}'
{"docType":"marblePrivateDetails","name":"marble1","price":99}
```

- ***Transfer marble2 to "joe" ➔ 두번째 블록 추가***

```
peer chaincode invoke -o orderer.example.com:7050 --tls –cafile \
        /opt/gopath/src/github.com/hyperledger/fabric/peer/\
        crypto/ordererOrganizations/example.com/orderers/orderer.example.com/\
        msp/tlscacerts/tlsca.example.com-cert.pem -C mychannel -n marblesp \
        -c '{"Args":["transferMatble","marble2","joe"]}'
```

- ***Private data logs***

```
docker logs peer0.org1.example.com 2>&1 | grep -i -a -E 'private|pvt|privdata'
```

→ 블록 높이 1 증가

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- ***Peer Container → query for the marble1 again***

```
peer chaincode query -C mychannel -n marblesp \
        -c '{"Args":["readMarblePrivateDetails","marble1"]}'
{"docType":"marblePrivateDetails","name":"marble1","price":99}
```

- ***Transfer marble2 to "tom" → 세번째 블록 추가***

```
peer chaincode invoke -o orderer.example.com:7050 –tls –cafile \
        /opt/gopath/src/github.com/hyperledger/fabric/peer/\
        crypto/ordererOrganizations/example.com/orderers/orderer.example.com/\
        msp/tlscacerts/tlsca.example.com-cert.pem –C mychannel –n marblesp \
        -c '{"Args":["transferMatble","marble2", "tom"]}'
```

- ***Private data logs***

```
docker logs peer0.org1.example.com 2>&1 | grep -i -a -E 'private|pvt|privdata'
```

→ 블록 높이 1 증가

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- ***Peer Container → query for the marble1 again***

```
peer chaincode query -C mychannel -n marblesp \
        -c '{"Args":["readMarblePrivateDetails","marble1"]}'
{"docType":"marblePrivateDetails","name":"marble1","price":99}
```

- ***Transfer marble2 to "tom" → 네번째 블록 추가 → price private data 삭제***

```
peer chaincode invoke -o orderer.example.com:7050 –tls –cafile \
        /opt/gopath/src/github.com/hyperledger/fabric/peer/\
        crypto/ordererOrganizations/example.com/orderers/orderer.example.com/\
        msp/tlscacerts/tlsca.example.com-cert.pem –C mychannel –n marblesp \
        -c '{"Args":["transferMatble","marble2","jerry"]}'
```

- ***Private data logs***

```
docker logs peer0.org1.example.com 2>&1 | grep -i -a -E 'private|pvt|privdata'
```

→ 블록 높이 1 증가

Private Data

1. Build a collection definition JSON file
2. Read and Write private data using chaincode APIs
3. Install and instantiate chaincode with a collection
4. Store private data
5. Query the private data as an authorized peer
6. Query the private data as an unauthorized peer
7. **Purge Private Data**
8. Using indexes with private data

- ***Peer Container → query for the marble1 again***

```
peer chaincode query -C mychannel -n marblesp \
        -c '{"Args":["readMarblePrivateDetails","marble1"]}'
```

```
Error: endorsement failure during query. response: status:500
message:"{\"Error\":\"Marble private details does not exist: marble1\"}"
```