

This document has below sections:

1. Technical Overview of the implementation
2. Explanation of Business use cases implemented
3. Details of Steps of business use cases
4. Execution commands and screen-shots
5. Negative Test Cases (Validation scenarios demonstrated)
6. Shutting down the network
7. Additional checks

**Note:** Execution of the business use cases are completely automated, hence you do not need to execute any commands manually. The commands are provided just for demonstrating what's being executed.

If you need to execute any additional use cases, the procedure explained in the 'additional checks' section.

### **Technical Overview:**

To make the project implementation more realistic, in addition to the project requirements I considered below additional points:

1. Enabled TLS security across the network.
2. Enabled Certification Authorities for registrar and users organizations.
3. etcDraft is the recommended consensus algorithm and mandatory in 2.2 onwards. Considering this, I too used etcDraft (configured set of 3 orderers).
4. Used couch database for all the nodes to support complex queries.
5. Automated execution of all the business use cases. (Explained later in the document).
6. Wrote additional chaincode in GoLang. (However not sure about the execution environment during evaluation at upGrad hence disabled/commented out the corresponding commands in the scripts)
7. Adjusted the delay timings to compensate if the network speed is bit slow and computing capacity is bit lower.
8. Using 'latest' for fabric images is risky, as it keeps pulling latest images, and the changes may be incompatible with our application. Hence to avoid this, I used explicit version (1.4.9) of fabric libraries
9. As a good coding practise, and as suggested in the recorded sessions, implemented state and statelist abstractions/interface style.
10. Used inheritance and implemented common functions such as viewUser, viewProperty in the parent, so as to avoid code duplication
11. Verification step added after each transaction request, and verified with expected and actual values.

```
Actual Value for upgradCoins: "1900"  
Expected Value for upgradCoins: "1900"
```

This and similar can be seen in each screen shot of verification step.

12. Custom channel name used: **property-registration-channel**

13. Names of the chaincode containers spawned is started with 'cc-' (shortform for chaincode) instead of 'dev-'

Considering above additional points I covered, the provided scripts were not enough, hence I re-wrote ALL the scripts to generate the Hyperledger fabric network, installation and instantiation of chaincode, and to execute the business scenarios.

Below are the commands supported:

Script to use to build the network and run the commands: **pankaj-network.sh**

Various options supported:

1) **./pankaj-network.sh up -i 1.4.9 -l node -c property-registration-channel -f docker-compose-e2e.yaml -t 120 -d 5 -a -o etcdraft -s couchdb**

This executes the end to end scenario. Internally it generates crypto material, chaincode artifacts if does not exist, then, creates and starts the network, installs and instantiate the chiancode, and at last run the business use cases.

2) **./pankaj-network.sh generate -c property-registration-channel -o etcdraft**

Used to generate the crypto material and channel artifacts.

3) **./pankaj-network.sh network -i 1.4.9 -l node -c property-registration-channel -f docker-compose-e2e.yaml -t 120 -d 5 -a -o etcdraft -s couchdb**

Used to build and start the network.

4) **./pankaj-network.sh install -i 1.4.9 -l node -c property-registration-channel -t 120 -d 5**

Install and instantiate chiancode.

5) **./pankaj-network.sh tests -i 1.4.9 -l node -c property-registration-channel -t 120 -d 5**

Executes all the business scenarios needed to verify and evaluate the functionality. So no need to connect to each of the peer nodes and execute the commands.

6) **./pankaj-network.sh down -i 1.4.9 -l node -c property-registration-channel -f docker-compose-e2e.yaml -t 120 -d 5**

Used to bring down and clean-up the network.

### **Business Use case Overview:**

1. Created 2 users Pankaj and Aakash in the system.
2. Registered 1 property each of the above users.
3. Aakash's property is marked for sell.
4. Pankaj purchases Aakash's property.
5. At the end, Pankaj owns both the properties.
6. Aakash receives the price money and the same gets deducted from Pankaj's account.

### **Business Use Cases: Step by step covered as part of this document:**

1. Created new user registration request for user: Pankaj Mahadik, Aadhar: 8844 4455 6677
2. Verified the User registration request is created correctly.
3. Created new user registration request for user: Aakash Bansal, Aadhar: 1122 3344 5566
4. Verified the User registration request is created correctly.
5. Verified 2 user registration requests present in the system.
6. Approving User Registration Request for user: Pankaj Mahadik and 8844 4455 6677
7. Verify User object for Pankaj Mahadik and 8844 4455 6677 created successfully.
8. Approving User Registration Request for user: Aakash Bansal and 1122 3344 5566
9. Verify User object for Aakash Bansal and 1122 3344 5566 created successfully.
10. Verify 2 users are present in the system.
11. Create Property Registration request for PropertyId: 1, user: Pankaj Mahadik and 8844 4455 6677
12. Verify the property registration request created correctly for PropertyId: 1
13. Approve Property registration request for PropertyId: 1
14. Verify the property object created correctly for PropertyId: 1
15. Create Property Registration request for PropertyId: 2, user: Aakash Bansal and 1122 3344 5566
16. Verify the property registration request created correctly for PropertyId: 2
17. Approve Property registration request for PropertyId: 2
18. Verify the property object created correctly for PropertyId: 2
19. Verify the system has 2 properties and belong to Pankaj and Aakash one each.
20. Recharge Account with upg100 for user: Pankaj Mahadik and 8844 4455 6677
21. Verify account balance is 100 for user: Pankaj Mahadik and 8844 4455 6677
22. Recharge Account with upg500 for user: Pankaj Mahadik and 8844 4455 6677
23. Now Verify account balance is 600 (100 + 500) for user: Pankaj Mahadik and 8844 4455 6677
24. Recharge Account with upg1000 for user: Pankaj Mahadik and 8844 4455 6677

25. Now Verify account balance is 1600 (600 + 1000) for user: Pankaj Mahadik and 8844 4455 6677
26. Recharge Account with upg100 for user: Aakash Bansal and 1122 3344 5566
27. Verify account balance is 100 for user: Aakash Bansal and 1122 3344 5566
28. Recharge Account with upg1000 for user: Aakash Bansal and 1122 3344 5566
29. Now Verify account balance is 1100 (100 + 1000) for user: Aakash Bansal and 1122 3344 5566
30. updateProperty for Sale for propertyId: 2, user: Aakash Bansal and 1122 3344 5566
31. verify status is onSale for property propertyId: 2
32. Invoke purchaseProperty for propertyId: 2, buyer: Pankaj Mahadik and 8844 4455 6677
33. Verify status of property is re-set to 'registered' for property: 2
34. Verify Owner of property reflects Pankaj Mahadik for property: 2
35. Verify Seller receives the amount of 800 as price for property: 2. Aakash's balance = 1900 (1100 + 800)
36. Verify Buyer spend the amount of 800 as price for property: 2. Pankaj's balance = 800 (1600 - 800)
37. Verify both the Properties owned by 'Pankaj Mahadik'

### **Start the network, Install Instantiate chaincode, run business use cases:**

I am elaborating the 'up' option, as it will internally generates crypto material, chaincode artifacts, creates and starts the network, installs and instantiate the chiancode, run the business use cases.

You just need to execute with 'up' option, and observe the console. The relevant screen shots are pasted below to verify.

**\*\*\* All commands need to be executed from property-registration/network folder. \*\*\***

**The commands are long and getting spanned across multiple lines in the word document. Please copy them in notepad to remove new line. Please refer to the corresponding screenshot to see actual command.**

Assumption: docker service is up and running, and docker is configured such that docker commands run without sudo.

```
./pankaj-network.sh up -i 1.4.9 -l node -c property-registration-channel -f docker-compose-e2e.yaml -t 120 -d 5 -a -o etcdraft -s couchdb
```

Note: The commands shown at each screen-shot below get generated and executed as part of script execution. Those are mentioned here just to track. The evaluator do NOT need to execute any command explicitly.

#### Known Issues:

Downloading of fabric images may take longer to download at first time, hence if the execution fails with indication of timeout, please bring whole network down with command:

```
./pankaj-network.sh down -i 1.4.9 -l node -c property-registration-channel -f docker-compose-e2e.yaml -t 120 -d 5
```

and then continue with the command:

```
./pankaj-network.sh up -i 1.4.9 -l node -c property-registration-channel -f docker-compose-e2e.yaml -t 120 -d 5 -a -o etcdraft -s couchdb
```

### **Network Creation:**

1. You will see screen similar to below when the execution starts.

```
Property Registration --Pankaj Mahadik
/usr/pankaj/property-registration/network>./pankaj-network.sh up -i 1.4.9 -l node -c property-registration-channel -f docker-compose-e2e.yaml -t 120 -d 5 -a -o etcdraft -s couchdb
=====
Property Registration Network
Advanced Certification Programme in Blockchain
conducted by IIIT Bangalore and upGrad
Assignment on Hyperledger Fabric - v1.4.9
Project by - Pankaj Mahadik
=====
PANKAJ MAHADEK
=====
Building fabric network and installing chaincodes for channel 'property-registration-channel' with CLI timeout of '120' seconds and CLI delay of '5' seconds and using database 'couchdb'
Continue? [Y/n] y
proceeding ...
=====
STARTED
=====
starting with: Building fabric network and installing chaincodes
LOCAL_VERSION=1.4.9
DOCKER_IMAGE_VERSION=1.4.9
```

2. Next it will generate the crypto material and channel artifacts.

3. Next, the network will be created and the nodes will be started:

4. Next, the channel is created:

```

Channel name : property-registration-channel
-----
Creating channel...
-----
+ peer channel create -o orderer.property-registration-network.com:7050 -c property-registration-channel -f ./channel-artifacts/channel.tx --tls true --cafile /opt/gopath/src/github.com/hyperledger/fabric/peer/crypto/ordererOrganizations/orderer.property-registration-network.com/msp/tlscacerts/tlsca.property-registration-network.com-cert.pem
res0
+ set +x
-----
```

## 5. Next, all peers will join the channel:

```
-----  
Having all peers join the channel...  
-----  
+ peer channel join -b property-registration-channel.block  
+ res=0  
+ set +x  
2022-04-30 10:22:20.622 UTC [channelCmd] InitCmdFactory -> INFO 001 Endorser and orderer connections initialized  
2022-04-30 10:22:32.033 UTC [channelCmd] executeJoin -> INFO 002 Successfully submitted proposal to join channel  
===== peer0.registrar joined channel 'property-registration-channel' =====  
-----  
+ peer channel join -b property-registration-channel.block  
+ res=0  
+ set +x  
2022-04-30 10:22:39.010 UTC [channelCmd] InitCmdFactory -> INFO 001 Endorser and orderer connections initialized  
2022-04-30 10:22:46.891 UTC [channelCmd] executeJoin -> INFO 002 Successfully submitted proposal to join channel  
===== peer1.registrar joined channel 'property-registration-channel' =====  
-----  
+ peer channel join -b property-registration-channel.block  
+ res=0  
+ set +x  
2022-04-30 10:22:52.985 UTC [channelCmd] InitCmdFactory -> INFO 001 Endorser and orderer connections initialized  
2022-04-30 10:22:59.118 UTC [channelCmd] executeJoin -> INFO 002 Successfully submitted proposal to join channel  
===== peer0.users joined channel 'property-registration-channel' =====  
-----  
+ peer channel join -b property-registration-channel.block  
+ res=0  
+ set +x  
2022-04-30 10:23:05.911 UTC [channelCmd] InitCmdFactory -> INFO 001 Endorser and orderer connections initialized  
2022-04-30 10:23:14.456 UTC [channelCmd] executeJoin -> INFO 002 Successfully submitted proposal to join channel  
===== peer1.users joined channel 'property-registration-channel' =====  
-----  
+ peer channel join -b property-registration-channel.block  
+ res=0  
+ set +x  
2022-04-30 10:23:20.754 UTC [channelCmd] InitCmdFactory -> INFO 001 Endorser and orderer connections initialized  
2022-04-30 10:23:25.654 UTC [channelCmd] executeJoin -> INFO 002 Successfully submitted proposal to join channel  
===== peer2.users joined channel 'property-registration-channel' =====
```

## 6. Next, update anchor for registrar and users organization:

```
-----  
Updating anchor peers for registrar...  
-----  
+ peer channel update -o orderer.property-registration-network.com:7050 -c property-registration-channel -f ./channel-artifacts/registrarMSPanchors.tx --tls true --cafile /opt/gopath/src/github.com/hyperledger/fabric/peer/crypto/ordererOrganizations/property-registration-network.com/orderers/orderer.property-registration-network.com/msp/tlscacerts/tlsca.property-registration-network.com-cert.pem  
+ res=0  
2022-04-30 10:23:32.372 UTC [channelCmd] InitCmdFactory -> INFO 001 Endorser and orderer connections initialized  
2022-04-30 10:23:33.411 UTC [channelCmd] executeUpdate -> INFO 002 Successfully submitted channel update  
===== Anchor peers updated for org 'registrar' on channel 'property-registration-channel' =====  
-----  
Updating anchor peers for users...  
-----  
+ peer channel update -o orderer.property-registration-network.com:7050 -c property-registration-channel -f ./channel-artifacts/usersMSPanchors.tx --tls true --cafile /opt/gopath/src/github.com/hyperledger/fabric/peer/crypto/ordererOrganizations/property-registration-network.com/orderers/orderer.property-registration-network.com/msp/tlscacerts/tlsca.property-registration-network.com-cert.pem  
+ res=0  
2022-04-30 10:23:38.978 UTC [channelCmd] InitCmdFactory -> INFO 001 Endorser and orderer connections initialized  
2022-04-30 10:23:39.019 UTC [channelCmd] executeUpdate -> INFO 002 Successfully submitted channel update  
===== Anchor peers updated for org 'usersMSP' on channel 'property-registration-channel' =====  
-----  
==== All GOOD, pankaj_property_registration_network created successfully...! =====
```

## Installation and Instantiation of chaincode:

Next is, install the chaincodes on peer0.registrar, peer1.registrar and peer0.users node, and instantiate on peer0.registrar node.

```
-----  
channel name : property-registration-channel  
-----  
Installing chaincodes on peer0.registrar  
-----  
+ peer chaincode install -n regnet -v 1.0 -l node -p /opt/gopath/src/github.com/chaincode/node  
+ res=0  
+ set +x  
2022-04-30 10:23:48.770 UTC [chaincodeCmd] checkChaincodeConfigParams -> INFO 001 Using default escc  
2022-04-30 10:23:48.770 UTC [chaincodeCmd] checkChaincodeConfigParams -> INFO 001 Using default vsccc  
2022-04-30 10:24:02.110 UTC [chaincodeCmd] install -> INFO 003 Installed remotely response:<status:200 payload:"OK" >  
===== Chaincode is installed on peer0.registrar =====  
-----  
Installing chaincodes on peer1.registrar  
-----  
+ peer chaincode install -n regnet -v 1.0 -l node -p /opt/gopath/src/github.com/chaincode/node  
+ res=0  
+ set +x  
2022-04-30 10:24:02.598 UTC [chaincodeCmd] checkChaincodeConfigParams -> INFO 001 Using default escc  
2022-04-30 10:24:02.598 UTC [chaincodeCmd] checkChaincodeConfigParams -> INFO 001 Using default vsccc  
2022-04-30 10:24:06.723 UTC [chaincodeCmd] install -> INFO 003 Installed remotely response:<status:200 payload:"OK" >  
===== Chaincode is installed on peer1.registrar =====  
-----  
Installing chaincodes on peer0.users  
-----  
+ peer chaincode install -n regnet -v 1.0 -l node -p /opt/gopath/src/github.com/chaincode/node  
+ res=0  
+ set +x  
2022-04-30 10:24:09.169 UTC [chaincodeCmd] checkChaincodeConfigParams -> INFO 001 Using default escc  
2022-04-30 10:24:09.169 UTC [chaincodeCmd] checkChaincodeConfigParams -> INFO 001 Using default vsccc  
2022-04-30 10:24:09.920 UTC [chaincodeCmd] install -> INFO 003 Installed remotely response:<status:200 payload:"OK" >  
===== Chaincode is installed on peer0.users =====  
-----  
Instantiating 'regnet' chaincode on peer0.registrar  
-----  
+ peer chaincode instantiate -o orderer.property-registration-network.com:7050 --tls true --cafile /opt/gopath/src/github.com/hyperledger/fabric/peer/crypto/ordererOrganizations/property-registration-network.com/orderers/orderer.property-registration-network.com/msp/tlscacerts/tlsca.property-registration-network.com-cert.pem -C property-registration-channel -n regnet -l node -v 1.0 -c '{"Args":["org.property-registration-network.regnet.registrar:instantiate"]}' -p 'OR ('  
+ res=0  
+ set +x  
2022-04-30 10:24:10.404 UTC [chaincodeCmd] checkChaincodeConfigParams -> INFO 001 Using default escc  
2022-04-30 10:24:10.404 UTC [chaincodeCmd] checkChaincodeConfigParams -> INFO 001 Using default vsccc  
===== Chaincode is instantiated on peer0.registrar on channel 'property-registration-channel' =====  
-----  
==== All GOOD, pankaj_property_registration_network installation and instantiation completed =====
```

## Business Use Cases:

- Created new user registration request for user: Pankaj Mahadik, Aadhar: 8844 4455 6677

```
peer chaincode invoke -o orderer.property-registration-network.com:7050 --tls true --cafile /opt/gopath/src/github.com/hyperledger/fabric/peer/crypto/ordererOrganizations/property-registration-network.com/orderers/orderer.property-registration-network.com/msp/tlscacerts/tlsca.property-registration-network.com-cert.pem -C property-registration-channel -n regnet --peerAddresses peer0.users.property-registration-network.com:9051 --tlsRootCertFiles /opt/gopath/src/github.com/hyperledger/fabric/peer/crypto/peerOrganizations/users.property-registration-network.com/peers/peer0.users.property-registration-network.com/tls/ca.crt -c '{"Args":["org.property-registration-network.regnet.users:requestNewUser","Pankaj Mahadik","8844 4455 6677","mahadikpankaj@gmail.com","9890787870"]}'
```

```
executing Use Cases

Invoking requestNewUser for user: Pankaj Mahadik and 8844 4455 6677 - (executing on peer0.users)

{"Args":["org.property-registration-network.regnet.users:requestNewUser","Pankaj Mahadik","8844 4455 6677","mahadikpankaj@gmail.com","9890787870"]}

peer chaincode invoke -o orderer.property-registration-network.com:7050 --tls true --cafile /opt/gopath/src/github.com/hyperledger/fabric/peer/crypto/ordererOrganizations/property-registration-network.com/orderers/orderer.property-registration-network.com-msp/tlscacerts/tlsca.property-registration-network.com-cert.pem -C property-registration-channel -n regnet --peerAddresses peer0.users.property-registration-network.com:9051 --tlsRootCertFiles /opt/gopath/src/github.com/hyperledger/fabric/peer/crypto/peerOrganizations/users.property-registration-network.com/peers/peer0.users.property-registration-network.com/tls/ca.crt -c '{"Args":["org.property-registration-network.regnet.users:requestNewUser","Pankaj Mahadik","8844 4455 6677","mahadikpankaj@gmail.com","9890787870"]}' +-----+-----+
2022-04-30T10:31:46.831 UTC [chaincodeCmd] chaincodeInvokeOrQuery +> INFO 001 Chaincode invoke successful. result: status:200 payload:"{\\"class\":\"org.property-registration-network.regnet.models.request\",\\\"key\":\"PANKAJMAHADIK-88444456677\",\\\"name\":\"Pankaj Mahadik\",\\\"aadharNumber\":\"884444556677\",\\\"email\":\"mahadikpankaj@gmail.com\",\\\"phone\":\"9890787870\",\\\"createdAt\":\"2022-04-30T10:31:46.808Z\",\\\"requestType\":\"user\"}" +-----+-----+
===== Invoke transaction successful on peer0.users on channel 'property-registration-channel' =====
```

- Verified the User registration request is created correctly.

```
peer chaincode query -C property-registration-channel -n regnet -c '{"Args":["org.property-registration-network.regnet.users:getUserRegistrationRequest","Pankaj Mahadik","8844 4455 6677"]}'
```

```
Querying Request object for user: Pankaj Mahadik and 8844 4455 6677 - (executing on peer0.users)

Attempting to Query peer0.users on channel 'property-registration-channel'... =====
+-----+-----+
Actual Value For email: "mahadikpankaj@gmail.com"
Expected Value For email: "mahadikpankaj@gmail.com"
+-----+-----+
[{"aadharNumber": "884444556677", "class": "org.property-registration-network.regnet.models.request", "createdAt": "2022-04-30T10:31:46.808Z", "currentState": null, "email": "mahadikpankaj@gmail.com", "key": "PANKAJMAHADIK-884444556677", "name": "Pankaj Mahadik", "phone": "9890787870", "requestType": "user"}]
===== query successful() on peer0.users on channel 'property-registration-channel' =====
```

- Created new user registration request for user: Aakash Bansal, Aadhar: 1122 3344 5566

```
peer chaincode invoke -o orderer.property-registration-network.com:7050 --tls true --cafile /opt/gopath/src/github.com/hyperledger/fabric/peer/crypto/ordererOrganizations/property-registration-network.com/orderers/orderer.property-registration-network.com/msp/tlscacerts/tlsca.property-registration-network.com-cert.pem -C property-registration-channel -n regnet --peerAddresses peer0.users.property-registration-network.com:9051 --tlsRootCertFiles /opt/gopath/src/github.com/hyperledger/fabric/peer/crypto/peerOrganizations/users.property-registration-network.com/peers/peer0.users.property-registration-network.com/tls/ca.crt -c '{"Args":["org.property-registration-network.regnet.users:requestNewUser","Aakash Bansal","1122 3344 5566","aakashbansal@gmail.com","8523698741"]}'
```

```
Invoking requestNewUser for user: Aakash Bansal and 1122 3344 5566 - (executing on peer0.users)

{"Args":["org.property-registration-network.regnet.users:requestNewUser","Aakash Bansal","1122 3344 5566","aakashbansal@gmail.com","8523698741"]}

peer chaincode invoke -o orderer.property-registration-network.com:7050 --tls true --cafile /opt/gopath/src/github.com/hyperledger/fabric/peer/crypto/ordererOrganizations/property-registration-network.com/orderers/orderer.property-registration-network.com-msp/tlscacerts/tlsca.property-registration-network.com-cert.pem -C property-registration-channel -n regnet --peerAddresses peer0.users.property-registration-network.com:9051 --tlsRootCertFiles /opt/gopath/src/github.com/hyperledger/fabric/peer/crypto/peerOrganizations/users.property-registration-network.com/peers/peer0.users.property-registration-network.com/tls/ca.crt -c '{"Args":["org.property-registration-network.regnet.users:requestNewUser","Aakash Bansal","1122 3344 5566","aakashbansal@gmail.com","8523698741"]}' +-----+-----+
2022-04-30T10:32:04.983 UTC [chaincodeCmd] chaincodeInvokeOrQuery +> INFO 001 Chaincode invoke successful. result: status:200 payload:"{\\"class\":\"org.property-registration-network.regnet.models.request\",\\\"key\":\"AAKASHBANSAL-112233445566\",\\\"name\":\"Aakash Bansal\",\\\"aadharNumber\":\"112233445566\",\\\"email\":\"aakashbansal@gmail.com\",\\\"phone\":\"8523698741\",\\\"requestType\":\"user\"}" +-----+-----+
===== Invoke transaction successful on peer0.users on channel 'property-registration-channel' =====
```

- Verified the User registration request is created correctly.

```
peer chaincode query -C property-registration-channel -n regnet -c '{"Args":["org.property-registration-network.regnet.users:getUserRegistrationRequest","Aakash Bansal","1122 3344 5566"]}'
```

```
Querying Request object for user: Aakash Bansal and 1122 3344 5566 - (executing on peer0.users)

Attempting to Query peer0.users on channel 'property-registration-channel'... =====
+-----+-----+
Actual Value For email: "aakashbansal@gmail.com"
Expected Value For email: "aakashbansal@gmail.com"
+-----+-----+
[{"aadharNumber": "112233445566", "class": "org.property-registration-network.regnet.models.request", "createdAt": "2022-04-30T10:32:04.969Z", "currentState": null, "email": "aakashbansal@gmail.com", "key": "AAKASHBANSAL-112233445566", "name": "Aakash Bansal", "phone": "8523698741", "requestType": "user"}]
===== query successful() on peer0.users on channel 'property-registration-channel' =====
```

- Verified 2 user registration requests present in the system. (executing on peer0.registrar)

```
peer chaincode query -C property-registration-channel -n regnet -c '{"Args":["org.property-registration-network.regnet.users:getAllUserRegistrationRequests"]}'
```

```
-----  
Querying all User Registration Requests - (executing on peer0.registrar)  
-----  
Attempting to Query peer0.registrar ... 0.5 secs  
+-----  
peer chaincode query -C org.property-registration-network.regnet.users:getAllUserRegistrationRequests  
peer chaincode query -C org.property-registration-network.regnet -n regnet -c {"Args":["org.property-registration-network.regnet.users:getAllUserRegistrationRequests"]}'  
res=0  
set +x  
{"\\"aadharNumber\"\":\"112233445566\", \"class\": \"org.property-registration-network.regnet.models.request\", \"createdAt\": \"2022-04-30T10:32:04.969Z\", \"currentState\":null, \"email\":\"akashbansal@gmail.com\", \"key\": \"AAKASHBANSAL-112233445566\", \"name\": \"Aakash Bansal\", \"phone\": \"9852368780\", \"requestedAt\": \"2022-04-30T10:31:46.808Z\", \"aadharNumber\": \"88444455677\", \"class\": \"org.property-registration-network.regnet.models.request\", \"createdAt\": \"2022-04-30T10:31:46.808Z\", \"currentState\":null, \"email\": \"akashbansal@gmail.com\", \"key\": \"AAKASHBANSAL-112233445566\", \"name\": \"Pankaj Mahadik\", \"phone\": \"9859076780\", \"requestedAt\": \"2022-04-30T10:31:46.808Z\"}  
-----  
Query successful on peer0.registrar on channel 'property-registration-channel'
```

## 6. Approving User Registration Request for user: Pankaj Mahadik and 8844 4455 6677 - (executing on peer0.registrar)

```
peer chaincode invoke -o orderer.property-registration-network.com:7050 --tls true --cafile /opt/gopath/src/github.com/hyperledger/fabric/peer/crypto/ordererOrganizations/property-registration-network.com/orderers/orderer.property-registration-network.com/msp/tlscacerts/tlsca.property-registration-network.com-cert.pem -C property-registration-channel -n regnet --peerAddresses peer0.registrar.property-registration-network.com:7051 --tlsRootCertFiles /opt/gopath/src/github.com/hyperledger/fabric/peerOrganizations/registrar.property-registration-network.com/tls/ca.crt -c '{"Args":["org.property-registration-network.regnet.registrar:approveNewUser","Pankaj Mahadik","8844 4455 6677"]}'
```

```
-----  
Approving User Registration Request for user: Pankaj Mahadik and 8844 4455 6677 - (executing on peer0.registrar)  
-----  
+ peer chaincode invoke -o orderer.property-registration-network.com:7050 --tls true --cafile /opt/gopath/src/github.com/hyperledger/Fabric/peer/crypto/ordererOrganizations/property-registration-network.com/orderers/orderer.property-regis  
tration-network.com/msp/tlscacerts/tlsca.property-registration-network.com-cert.pem -C property-registration-channel -n regnet --peerAddresses peer0.registrar.property-registration-network.com:7051 --tlsRootCertFiles /opt/gopath/src/git  
hub.com/hyperledger/fabric/peerOrganizations/registrar.property-registration-network.com/tls/ca.crt -c {"Args":["org.property-registration-network.regnet.registrar:approveNewUser","Pankaj Mahadik","8844 4455 6677"]}'  
res=0  
set +x  
[2022-04-30T10:32:04.969Z] [chaincodeInvokeEntry] > INFO 001 Chaincode invoke successful, result: status:200 payload:[{"class": "org.property-registration-network.regnet.models.user", "key": "PANKAJMAHADIK-8844445566", "aadharNumber": "88444455677", "email": "mahadikpankaj@gmail.com", "name": "Pankaj Mahadik", "phone": "9859076780", "requestedAt": "2022-04-30T10:31:46.808Z", "approvedAt": "2022-04-30T10:32:34.039Z", "upgradeCoins": "0"}]  
-----  
Invoke transaction successful on peer0.registrar on channel 'property-registration-channel'
```

## 7. Verify User object for Pankaj Mahadik and 8844 4455 6677 created successfully - (executing on peer1.registrar)

```
peer chaincode query -C property-registration-channel -n regnet -c '{"Args":["org.property-registration-network.regnet.users:viewUser","Pankaj Mahadik","8844 4455 6677"]}'
```

```
-----  
query the User object to verify is created for user: Pankaj Mahadik and 8844 4455 6677 - (executing on peer1.registrar)  
-----  
+-----  
peer chaincode query -C org.property-registration-network.regnet.users:viewUser -n regnet -c {"Args":["org.property-registration-network.regnet.users:viewUser","Pankaj Mahadik","8844 4455 6677"]}'  
Attempting to Query peer1.registrar ... 0 secs  
res=0  
set +x  
Actual Value for email: "mahadikpankaj@gmail.com"  
Expected Value for email: "mahadikpankaj@gmail.com"  
Class: "org.property-registration-network.regnet.models.user" Key: "PANKAJMAHADIK-8844445566", currentState: null, aadharNumber: "88444455677", approvedAt: "2022-04-30T10:32:34.039Z", email: "mahadikpankaj@gmail.com", name: "Pankaj Mahadik", phone: "9859076780", requestedAt: "2022-04-30T10:31:46.808Z", upgradeCoins: "0"  
-----  
Query successful on peer1.registrar on channel 'property-registration-channel'
```

## 8. Approving User Registration Request for user: Aakash Bansal and 1122 3344 5566 - (executing on peer1.registrar)

```
peer chaincode invoke -o orderer.property-registration-network.com:7050 --tls true --cafile /opt/gopath/src/github.com/hyperledger/fabric/peer/crypto/ordererOrganizations/property-registration-network.com/orderers/orderer.property-registration-network.com/msp/tlscacerts/tlsca.property-registration-network.com-cert.pem -C property-registration-channel -n regnet --peerAddresses peer1.registrar.property-registration-network.com:8051 --tlsRootCertFiles /opt/gopath/src/github.com/hyperledger/fabric/peerOrganizations/registrar.property-registration-network.com/tls/ca.crt -c {"Args":["org.property-registration-network.regnet.registrar:approveNewUser","Aakash Bansal","1122 3344 5566"]}'
```

```
-----  
Approving User Registration Request for user: Aakash Bansal and 1122 3344 5566 - (executing on peer1.registrar)  
-----  
+-----  
peer chaincode invoke -o orderer.property-registration-network.com:7050 --tls true --cafile /opt/gopath/src/github.com/hyperledger/Fabric/peer/crypto/ordererOrganizations/property-registration-network.com/orderers/orderer.property-regis  
tration-network.com/msp/tlscacerts/tlsca.property-registration-network.com-cert.pem -C property-registration-channel -n regnet --peerAddresses peer1.registrar.property-registration-network.com:8051 --tlsRootCertFiles /opt/gopath/src/git  
hub.com/hyperledger/fabric/peerOrganizations/registrar.property-registration-network.com/tls/ca.crt -c {"Args":["org.property-registration-network.regnet.registrar:approveNewUser","Aakash Bansal","1122 3344 5566"]}'  
res=0  
set +x  
[2022-04-30T10:32:04.969Z] [chaincodeInvokeEntry] > INFO 001 Chaincode invoke successful, result: status:200 payload:[{"class": "org.property-registration-network.regnet.models.user", "key": "AAKASHBANSAL-112233445566", "aadharNumber": "112233445566", "email": "akashbansal@gmail.com", "name": "Aakash Bansal", "phone": "9852368745", "requestedAt": "2022-04-30T10:32:04.969Z", "approvedAt": "2022-04-30T10:35:42.725Z", "upgradeCoins": "0"}]  
-----  
Invoke transaction successful on Peer1.registrar on channel 'property-registration-channel'
```

## 9. Verify User object for Aakash Bansal and 1122 3344 5566 created successfully. - (executing on peer0.registrar)

```
peer chaincode query -C property-registration-channel -n regnet -c '{"Args":["org.property-registration-network.regnet.users:viewUser","Aakash Bansal","1122 3344 5566"]}'
```

```

Query the user object to verify is created for user: Aakash Bansal and 1122 3344 5566 - (executing on peer0.registrar)

Attempting to Query peer0.registrar on channel 'property-registration-channel'... =====
+ C_PARAMETER["Args":["org.property-registration-network.regnet.users:viewUser","Aakash Bansal","1122 3344 5566"]]
+ peer chaincode query -C property-registration-channel -n regnet -c '{"Args":["org.property-registration-network.regnet.users:viewUser","Aakash Bansal","1122 3344 5566"]}'
+ res0
+ set +x
Actual Value for email: "akashbansal@gmail.com"
Specified Value for email: "akashbansal@gmail.com"
"Class": "org.property-registration-network.regnet.models.user", "key": "AAKASHBANSAL-112233445566", "currentState": null, "aadharNumber": "112233445566", "approvedAt": "2022-04-30T10:35:42.725Z", "email": "akashbansal@gmail.com", "name": "Aakash Bansal", "phone": "8523698741", "requestedAt": "2022-04-30T10:32:04.969Z", "upgradeCoins": "0"} =====
Query successful on peer0.registrar on channel 'property-registration-channel'

```

## 10. Verify that two users are present in the system - (executing on peer0.users)

```

peer chaincode query -C property-registration-channel -n regnet -c '{"Args":["org.property-registration-network.regnet.users:getAllUsers"]}' 

```

```

Query all Users in the system - (executing on peer0.users)

Attempting to Query peer0.users on channel 'property-registration-channel'... =====
+ C_PARAMETER["Args":["org.property-registration-network.regnet.users:getAllUsers"]]
+ peer chaincode query -C property-registration-channel -n regnet -c '{"Args":["org.property-registration-network.regnet.users:getAllUsers"]}'
+ res0
+ set +x
Actual Value for user: {"id": "112233445566", "approvedAt": "2022-04-30T10:35:42.725Z", "class": "org.property-registration-network.regnet.models.user", "currentState": null, "email": "akashbansal@gmail.com", "key": "AAKASHBANSAL-112233445566", "name": "Aakash Bansal", "phone": "8523698741", "requestedAt": "2022-04-30T10:32:04.969Z", "upgradeCoins": "0", "aadharNumber": "88444556677", "approvedAt": "2022-04-30T10:32:34.039Z", "class": "org.property-registration-network.regnet.models.user", "currentState": null, "email": "mahadikpanka@gmail.com", "key": "PANKAJMAHADIK-88444556677", "name": "Pankaj Mahadik", "phone": "9890787870", "requestedAt": "2022-04-30T10:31:46.808Z", "upgradeCoins": "0"} =====
Query successful on peer0.users on channel 'property-registration-channel'

```

## 11. Create Property Registration request for PropertyId: 1, user: Pankaj Mahadik and 8844 4455 6677 - (executing on peer0.users)

```

peer chaincode invoke -o orderer.property-registration-network.com:7050 --tls true --cafile /opt/gopath/src/github.com/hyperledger/fabric/peer/crypto/ordererOrganizations/property-registration-network.com/orderers/orderer.property-registration-network.com/msp/tlscacerts/tlsca.property-registration-network.com-cert.pem -C property-registration-channel -n regnet --peerAddresses peer0.users.property-registration-network.com:9051 --tlsRootCertFiles /opt/gopath/src/github.com/hyperledger/fabric/peer/crypto/peerOrganizations/users.property-registration-network.com/peers/peer0.users.property-registration-network.com/tls/ca.crt -c '{"Args":["org.property-registration-network.regnet.users:propertyRegistrationRequest","Pankaj Mahadik","8844 4455 6677","1","1000"]}' 

```

```

Create Property Registration request for PropertId: 1, user: Pankaj Mahadik and 8844 4455 6677 - (executing on peer0.users)

{"Args": ["org.property-registration-network.regnet.users:propertyRegistrationRequest", "Pankaj Mahadik", "8844 4455 6677", "1", "1000"]}
+ peer chaincode invoke -o orderer.property-registration-network.com:7050 --tls true --cafile /opt/gopath/src/github.com/hyperledger/fabric/peer/crypto/ordererOrganizations/property-registration-network.com/orderers/orderer.property-registration-network.com/msp/tlscacerts/tlsca.property-registration-network.com-cert.pem --peerAddresses peer0.users.property-registration-network.com:9051 --tlsRootCertFiles /opt/gopath/src/github.com/hyperledger/fabric/peer/crypto/peerOrganizations/users.property-registration-network.com/peers/peer0.users.property-registration-network.com/tls/ca.crt -c '{"Args": ["org.property-registration-network.regnet.users:propertyRegistrationRequest", "Pankaj Mahadik", "8844 4455 6677", "1", "1000"]}' 
+ res0
+ set +x
null \Invoke transaction successful on peer0.users on channel 'property-registration-channel'

```

## 12. Verify the property registration request created correctly for PropertyId: 1 - (executing on peer0.registrar)

```

peer chaincode query -C property-registration-channel -n regnet -c '{"Args":["org.property-registration-network.regnet.users:getPropertyRegistrationRequest","1"]}' 

```

```

Verify the property registration request created correctly for PropertId: 1 - (executing on peer0.registrar)

Attempting to Query peer0.registrar on channel 'property-registration-channel'... =====
+ C_PARAMETER["Args":["org.property-registration-network.regnet.users:getPropertyRegistrationRequest","1"]]
+ peer chaincode query -C property-registration-channel -n regnet -c '{"Args":["org.property-registration-network.regnet.users:getPropertyRegistrationRequest","1"]}'
+ res0
+ set +x
Actual Value for owner: "PANKAJMAHADIK-88444556677"
Specified Value for owner: "PANKAJMAHADIK-88444556677"
"Class": "org.property-registration-network.regnet.models.request", "requestType": "property", "status": "registered" =====
Query successful on peer0.registrar on channel 'property-registration-channel'

```

## 13. Approve Property registration request for PropertyId: 1 - (executing on peer0.registrar)

```

peer chaincode invoke -o orderer.property-registration-network.com:7050 --tls true --cafile /opt/gopath/src/github.com/hyperledger/fabric/peer/crypto/ordererOrganizations/property-registration-network.com/orderers/orderer.property-registration-network.com/msp/tlscacerts/tlsca.property-registration-network.com-cert.pem -C property-registration-channel -n regnet --peerAddresses peer0.registrar.property-registration-network.com:7051 --tlsRootCertFiles /opt/gopath/src/github.com/hyperledger/fabric/peer/crypto/peerOrganizations/registrar.property-registration-network.com/peers/peer0.registrar.property-registration-network.com/tls/ca.crt -c '{"Args":["org.property-registration-network.regnet.registrar:approvePropertyRegistration","1"]}' 

```

```

Approve Property registration request for PropertyId: 1 - (executing on peer0.registrar)
=====
["Args":["org.property-registration-network.regnet.registrar:approvePropertyRegistration","1"]]

peer chaincode invoke -o orderer.property-registration-network.com:7050 --tls true --cafile /opt/gopath/src/github.com/hyperledger/fabric/peer/crypto/ordererOrganizations/property-registration-network.com/orderers/orderer.property-registr
hub.com/hyperledger/fabric/peer/crypto/peerOrganizations/regnet.property-registration-network.com/peers/peer0.registrar.property-registration-network.com/tls/ca.crt -c '{"Args":["org.property-registration-network.regnet.registrar:app
rovePropertyRegistration","1"]}' 
+ set +x
+ curl -X POST -H "Content-Type: application/json" --data-binary $reqData http://$peer0RegistrarUrl/api/v1/chaincodeInvoke
null+M+10+36+43+64+10+ [chainedcodeCall] chaincodeInvokeSuccessfull+M+001+001+Chaincode invoke successful. result: status:200 payload:{"class": "org.property-registration-network.regnet.models.property", "key": "1", "currentState": "null", "propertyId": "1", "owner": "PANKAJMAHADIK-88444556677", "price": "1000", "status": "registered", "requestedAt": "2022-04-30T10:36:05.726Z", "approvedAt": "2022-04-30T10:36:26.467Z"}+
===== Invoke transaction successful on peer0.registrar on channel 'property-registration-channel'

```

#### 14. Verify the property object created correctly for PropertyId: 1 - (executing on peer0.users)

```

peer chaincode query -C property-registration-channel -n regnet -c '{"Args":["org.property-registration-network.regnet.users:viewProperty","1"]}'

```

```

Verify the property object created correctly for PropertyId: 1 - (executing on peer0.users)
=====
["Args":["org.property-registration-network.regnet.users:viewProperty","1"]]

Querying on peer0.users on channel 'property-registration-channel'...
=====
+C.PARAMETERS='{"Args":["org.property-registration-network.regnet.users:viewProperty","1"]}' 
+ peer chaincode query -C property-registration-channel -n regnet -c '{"Args":["org.property-registration-network.regnet.users:viewProperty","1"]}' 
+ res0=$?
+ res0=0
+ set +x
Actual Value for owner: "PANKAJMAHADIK-88444556677"
Expected Value for owner: "PANKAJMAHADIK-88444556677"
{"class": "org.property-registration-network.regnet.models.property", "key": "1", "currentState": "null", "approvedAt": "2022-04-30T10:36:26.467Z", "owner": "PANKAJMAHADIK-88444556677", "price": "1000", "propertyId": "1", "requestedAt": "2022-04-30T10:36:05.726Z", "status": "registered", "approvedAt": "2022-04-30T10:36:26.467Z"}+
===== Query successful on peer0.users on channel 'property-registration-channel'

```

#### 15. Create Property Registration request for PropertyId: 2, user: Aakash Bansal and 1122 3344 5566 - (executing on peer0.users)

```

peer chaincode invoke -o orderer.property-registration-network.com:7050 --tls true --cafile /opt/gopath/src/github.com/hyperledger/fabric/peer/crypto/ordererOrganizations/property-registration-network.com/orderers/orderer.property-registr
hub.com/hyperledger/fabric/peer/crypto/peerOrganizations/users.property-registration-network.com/msp/tlscacerts/tlsca.property-registration-network.com-cert.pem -C property-registration-channel -n regnet --peerAddresses peer0.users.property-registration-network.com:9051 --tlsRootCertFiles /opt/gopath/src/github.com/hyperledger/fabric/peer/crypto/peerOrganizations/users.property-registr
ation-network.com/peers/peer0.users.property-registration-network.com/tls/ca.crt -c '{"Args":["org.property-registration-network.regnet.users:propertyRegistrationRequest", "Aakash Bansal", "1122 3344 5566", "2", "800"]}' 

```

```

Create Property Registration request for PropertyId: 2, user: Aakash Bansal and 1122 3344 5566 - (executing on peer0.users)
=====
["Args":["org.property-registration-network.regnet.users:propertyRegistrationRequest", "Aakash Bansal", "1122 3344 5566", "2", "800"]]

peer chaincode invoke -o orderer.property-registration-network.com:7050 --tls true --cafile /opt/gopath/src/github.com/hyperledger/fabric/peer/crypto/ordererOrganizations/property-registration-network.com/orderers/orderer.property-registr
hub.com/hyperledger/fabric/peer/crypto/peerOrganizations/users.property-registration-network.com/msp/tlscacerts/tlsca.property-registration-network.com-cert.pem -C property-registration-channel -n regnet --peerAddresses peer0.users.property-registration-network.com:9051 --tlsRootCertFiles /opt/gopath/src/github.com/hyperledger/fabric/peer/crypto/peerOrganizations/users.property-registr
ation-network.com/peers/peer0.users.property-registration-network.com/tls/ca.crt -c '{"Args":["org.property-registration-network.regnet.users:propertyRegistrationRequest", "Aakash Bansal", "1122 3344 5566", "2", "800"]}' 
+ set +x
Actual Value for owner: "AAKASHBANSAL-112233445566"
Expected Value for owner: "AAKASHBANSAL-112233445566"
{"class": "org.property-registration-network.regnet.models.request", "createdat": "2022-04-30T10:36:43.818Z", "currentState": "null", "key": "2", "owner": "AAKASHBANSAL-112233445566", "price": "800", "propertyId": "2", "requestType": "property", "status": "registered"}+
===== Invoke transaction successful on peer0.users on channel 'property-registration-channel'

```

#### 16. Verify the property registration request created correctly for PropertyId: 2 - (executing on peer1.registrar)

```

peer chaincode query -C property-registration-channel -n regnet -c '{"Args":["org.property-registration-network.regnet.users:getPropertyRegistrationRequest","2"]}' 

```

```

Verify the property registration request created correctly for PropertyId: 2 - (executing on peer1.registrar)
=====
["Args":["org.property-registration-network.regnet.users:getPropertyRegistrationRequest","2"]]

Querying on peer1.registrar on channel 'property-registration-channel'...
=====
+C.PARAMETERS='{"Args":["org.property-registration-network.regnet.users:getPropertyRegistrationRequest","2"]}' 
+ peer chaincode query -C property-registration-channel -n regnet -c '{"Args":["org.property-registration-network.regnet.users:getPropertyRegistrationRequest","2"]}' 
+ res0=$?
+ res0=0
+ set +x
Actual Value for owner: "AAKASHBANSAL-112233445566"
Expected Value for owner: "AAKASHBANSAL-112233445566"
{"class": "org.property-registration-network.regnet.models.request", "createdat": "2022-04-30T10:36:43.818Z", "currentState": "null", "key": "2", "owner": "AAKASHBANSAL-112233445566", "price": "800", "propertyId": "2", "requestType": "property", "status": "registered"}+
===== Query successful on peer1.registrar on channel 'property-registration-channel'

```

#### 17. Approve Property registration request for PropertyId: 2 - (executing on peer1.registrar)

```

peer chaincode invoke -o orderer.property-registration-network.com:7050 --tls true --cafile /opt/gopath/src/github.com/hyperledger/fabric/peer/crypto/ordererOrganizations/property-registration-network.com/orderers/orderer.property-registr
hub.com/hyperledger/fabric/peer/crypto/peerOrganizations/regnet.property-registration-network.com/msp/tlscacerts/tlsca.property-registration-network.com-cert.pem -C property-registration-channel -n regnet --peerAddresses peer1.registrar.property-registration-network.com:8051 --tlsRootCertFiles /opt/gopath/src/github.com/hyperledger/fabric/peer/crypto/peerOrganizations/regnet.property-registration-network.com/peers/peer1.registrar.property-registration-network.com/tls/ca.crt -c '{"Args":["org.property-registration-network.regnet.registrar:approvePropertyRegistration","2"]}' 

```

```

Approve Property registration request for PropertyId: 2 - (executing on peer1.registrar)
=====
["Args":["org.property-registration-network.regnet.registrar:approvePropertyRegistration","2"]]

peer chaincode invoke -o orderer.property-registration-network.com:7050 --tls true --cafile /opt/gopath/src/github.com/hyperledger/fabric/peer/crypto/ordererOrganizations/property-registration-network.com/orderers/orderer.property-registr
hub.com/hyperledger/fabric/peer/crypto/peerOrganizations/regnet.property-registration-network.com/msp/tlscacerts/tlsca.property-registration-network.com-cert.pem -C property-registration-channel -n regnet --peerAddresses peer1.registrar.property-registration-network.com:8051 --tlsRootCertFiles /opt/gopath/src/github.com/hyperledger/fabric/peer/crypto/peerOrganizations/regnet.property-registration-network.com/peers/peer1.registrar.property-registration-network.com/tls/ca.crt -c '{"Args":["org.property-registration-network.regnet.registrar:app
rovePropertyRegistration","2"]}' 
+ set +x
+ curl -X POST -H "Content-Type: application/json" --data-binary $reqData http://$peer1RegistarUrl/api/v1/chaincodeInvoke
null+M+10+36+43+64+10+ [chainedcodeCall] chaincodeInvokeSuccessfull+M+001+001+Chaincode invoke successful. result: status:200 payload:{"class": "org.property-registration-network.regnet.models.property", "key": "2", "currentState": "null", "propertyId": "2", "owner": "AAKASHBANSAL-112233445566", "price": "800", "status": "registered", "requestedAt": "2022-04-30T10:36:43.818Z", "approvedAt": "2022-04-30T10:36:59.953Z"}+
===== Invoke transaction successful on peer1.registrar on channel 'property-registration-channel'

```

18. Verify the property object created correctly for PropertyId: 2 - (executing on peer0.users)

```
peer chaincode query -C property-registration-channel -n regnet -c '{"Args":["org.property-registration-network.regnet.users:viewProperty","2"]}'
```

```
Verify the property object created correctly for PropertyId: 2 - (executing on peer0.users)
=====
Attempting to Query peer0.users on channel 'property-registration-channel'...
=====
+ C_PARAMETER={"Args":["org.property-registration-network.regnet.users:viewProperty","2"]}
+ peer chaincode query -C property-registration-channel -n regnet -c '{"Args":["org.property-registration-network.regnet.users:viewProperty","2"]}'
+ res=$?
+ set +x
+ echo $res
0
+ echo "Actual Value for owner: `AAKASHBANSAL-112233445566`"
+ echo "Expected Value for owner: `AAKASHBANSAL-112233445566`"
"{"class":"org.property-registration-network.models.property","key":"2","currentState":null,"approvedAt":"2022-04-30T10:36:59.953Z","owner":"AAKASHBANSAL-112233445566","price":800,"propertyId":"2","requestedAt":"2022-04-30T10:36:43.818Z"}"
+ echo "Query successful on peer0.users on channel 'property-registration-channel'"

=====
```

19. Verify the system has 2 properties and belong to Pankaj and Aakash one each. - (executing on peer0.users)

```
peer chaincode query -C property-registration-channel -n regnet -c '{"Args":["org.property-registration-network.regnet.users:getAllProperties"]}'
```

```
Query all Properties - (executing on peer0.users)
=====
Attempting to Query peer0.users on channel 'property-registration-channel'...
=====
+ C_PARAMETER={"Args":["org.property-registration-network.regnet.users:getAllProperties"]}
+ peer chaincode query -C property-registration-channel -n regnet -c '{"Args":["org.property-registration-network.regnet.users:getAllProperties"]}'
+ res=$?
+ set +x
[{"id":1,"owner": "AAKASHBANSAL-112233445566","currentState":null,"approvedAt": "2022-04-30T10:36:26.467Z","status": "registered","class": "org.property-registration-network.models.property","key": "1","owner": "AAKASHBANSAL-112233445566","price": 800,"propertyId": "1","requestedAt": "2022-04-30T10:36:59.953Z"}, {"id":2,"owner": "PANKAJMAHADIK-884444556677","currentState":null,"approvedAt": "2022-04-30T10:36:43.818Z","status": "registered","class": "org.property-registration-network.models.property","key": "2","owner": "PANKAJMAHADIK-884444556677","price": 1000,"propertyId": "2"}]
+ echo "Query successful on peer0.users on channel 'property-registration-channel'"

=====
```

20. Recharge Account with upg100 for user: Pankaj Mahadik and 8844 4455 6677 - (executing on peer0.users)

```
peer chaincode invoke -o orderer.property-registration-network.com:7050 --tls true --cafile /opt/gopath/src/github.com/hyperledger/fabric/peer/crypto/ordererOrganizations/property-registration-network.com/orderers/orderer.property-registration-network.com/msp/tlscacerts/tlsca.property-registration-network.com-cert.pem -C property-registration-channel -n regnet --peerAddresses peer0.users.property-registration-network.com:9051 --tlsRootCertFiles /opt/gopath/src/github.com/hyperledger/fabric/peer/crypto/peerOrganizations/users.property-registration-network.com/peers/peer0.users.property-registration-network.com/tls/ca.crt -c '{"Args":["org.property-registration-network.regnet.users:rechargeAccount","Pankaj Mahadik","8844 4455 6677","upg100"]}'
```

```
{"Args":["org.property-registration-network.regnet.users:rechargeAccount","Pankaj Mahadik","8844 4455 6677","upg100"]}
```

```
{}
```

```
+ set +x
+ peer chaincode invoke -o orderer.property-registration-network.com:7050 --tls true --cafile /opt/gopath/src/github.com/hyperledger/Fabric/peer/crypto/ordererOrganizations/property-registration-network.com/orderers/orderer.property-registration-network.com/msp/tlscacerts/tlsca.property-registration-network.com-cert.pem -C property-registration-channel -n regnet --peerAddresses peer0.users.property-registration-network.com:9051 --tlsRootCertFiles /opt/gopath/src/github.com/hyperledger/fabric/peer/crypto/peerOrganizations/users.property-registration-network.com/peers/peer0.users.property-registration-network.com/tls/ca.crt -c '{"Args":["org.property-registration-network.regnet.users:rechargeAccount","Pankaj Mahadik","8844 4455 6677","upg100"]}'
```

```
{"Args":["org.property-registration-network.regnet.users:rechargeAccount","Pankaj Mahadik","8844 4455 6677","upg100"]}
```

```
{}
```

21. Verify account balance is 100 for user: Pankaj Mahadik and 8844 4455 6677 - (executing on peer0.registrar)

```
peer chaincode query -C property-registration-channel -n regnet -c '{"Args":["org.property-registration-network.regnet.users:viewUser","Pankaj Mahadik","8844 4455 6677"]}'
```

```
Verify balance amount of 100 for user: Pankaj Mahadik and 8844 4455 6677 - (executing on peer0.registrar)
=====
Attempting to Query peer0.registrar on channel 'property-registration-channel'...
=====
+ C_PARAMETER={"Args":["org.property-registration-network.regnet.users:viewUser","Pankaj Mahadik","8844 4455 6677"]}
+ peer chaincode query -C property-registration-channel -n regnet -c '{"Args":["org.property-registration-network.regnet.users:viewUser","Pankaj Mahadik","8844 4455 6677"]}'
+ res=$?
+ set +x
+ echo $res
0
+ echo "Actual Value for upgradcoins: `100`"
+ echo "Expected Value for upgradcoins: `100`"
"{"class":"org.property-registration-network.models.user","key": "PANKAJMAHADIK-884444556677","aadharNumber": "884444556677","approvedAt": "2022-04-30T10:32:34.039Z","email": "mahadikpankaj@gmail.com","name": "Pankaj Mahadik","phone": "9890787870","requestedAt": "2022-04-30T10:31:46.808Z"}"
+ echo "Query successful on peer0.registrar on channel 'property-registration-channel'"

=====
```

22. Recharge Account with upg500 for user: Pankaj Mahadik and 8844 4455 6677 - (executing on peer0.users)

```
peer chaincode invoke -o orderer.property-registration-network.com:7050 --tls true --cafile /opt/gopath/src/github.com/hyperledger/fabric/peer/crypto/ordererOrganizations/property-registration-network.com/orderers/orderer.property-registration-network.com/msp/tlscacerts/tlsca.property-registration-network.com-cert.pem -C property-registration-channel -n regnet --peerAddresses peer0.users.property-registration-network.com:9051 --tlsRootCertFiles /opt/gopath/src/github.com/hyperledger/fabric/peer/crypto/peerOrganizations/users.property-
```

```
registration-network.com/peers/peer0.users.property-registration-network.com/tls/ca.crt -c '{"Args": ["org.property-registration-network.regnet.users:rechargeAccount", "Pankaj Mahadik", "8844 4455 6677", "upg500"]}'
```

```
Invoke rechargeAccount of upg500 for user: Pankaj Mahadik and 8844 4455 6677 - (executing on peer0.users)

{"Args": ["org.property-registration-network.regnet.users:rechargeAccount", "Pankaj Mahadik", "8844 4455 6677", "upg500"]}

peer chaincode invoke -o orderer.property-registration-network.com:7050 --tls true --cafile /opt/gopath/src/github.com/hyperledger/fabric/peer/crypto/ordererOrganizations/property-registration-network.com/orderers/orderer.property-registration-network.com/msp/tlscacerts/tlsca.property-registration-network.com-cert.pem -C property-registration-channel -n regnet --peerAddresses peer0.users.property-registration-network.com:9051 --tlsRootCertFiles /opt/gopath/src/github.com/hyperledger/fabric/peer/crypto/peerOrganizations/users.property-registration-network.com/peers/peer0.users.property-registration-network.com/tls/ca.crt -c {"Args": ["org.property-registration-network.regnet.users:rechargeAccount", "Pankaj Mahadik", "8844 4455 6677", "upg500"]}

+ set +x
2022-04-30 10:37:43.739 UTC [chaincodeInvoke] chaincodeInvokeQuery -> INFO 001 Chaincode invoke successful, result: status:200 payload:{"class":"org.property-registration-network.regnet.models.user","key":"PANKAJMAHADIK-884444556677","currentState":null,"aadharNumber":"884444556677","approvedAt":"2022-04-30T10:32:34.039Z","email":"mahadikpankaj@gmail.com","name":"(Pankaj) Mahadik","phone":"9890787870","requestedAt":"2022-04-30T10:31:46.808Z","upgradCoins":600}
2022-04-30 10:37:43.739 UTC [chaincodeInvoke] chaincodeInvokeQuery -> INFO 001 Chaincode invoke successful, result: status:200 payload:{"class":"org.property-registration-network.regnet.models.user","key":"PANKAJMAHADIK-884444556677","currentState":null,"aadharNumber":"884444556677","approvedAt":"2022-04-30T10:32:34.039Z","email":"mahadikpankaj@gmail.com","name":"(Pankaj) Mahadik","phone":"9890787870","requestedAt":"2022-04-30T10:31:46.808Z","upgradCoins":600}
===== Invoke transaction successful on peer0.users on channel 'property-registration-channel' =====
```

23. Now Verify account balance is 600 (100 + 500) for user: Pankaj Mahadik and 8844 4455 6677 - (executing on peer1.registrar)

```
peer chaincode query -C property-registration-channel -n regnet -c '{"Args": ["org.property-registration-network.regnet.users:viewUser", "Pankaj Mahadik", "8844 4455 6677"]}'
```

```
Verify balance amount of 600 for user: Pankaj Mahadik and 8844 4455 6677 - (executing on peer1.registrar)

Attempting to Query peer1.registrar ... 5 secs
2022-04-30 10:37:43.739 UTC [chaincodeInvoke] chaincodeInvokeQuery -> INFO 001 Chaincode invoke successful, result: status:200 payload:{"class":"org.property-registration-network.regnet.models.user","key":"PANKAJMAHADIK-884444556677","currentState":null,"aadharNumber":"884444556677","approvedAt":"2022-04-30T10:32:34.039Z","email":"mahadikpankaj@gmail.com","name":"(Pankaj) Mahadik","phone":"9890787870","requestedAt":"2022-04-30T10:31:46.808Z","upgradCoins":600}
2022-04-30 10:37:43.739 UTC [chaincodeInvoke] chaincodeInvokeQuery -> INFO 001 Chaincode invoke successful, result: status:200 payload:{"class":"org.property-registration-network.regnet.models.user","key":"PANKAJMAHADIK-884444556677","currentState":null,"aadharNumber":"884444556677","approvedAt":"2022-04-30T10:32:34.039Z","email":"mahadikpankaj@gmail.com","name":"(Pankaj) Mahadik","phone":"9890787870","requestedAt":"2022-04-30T10:31:46.808Z","upgradCoins":600}
===== Query successful on peer1.registrar on channel 'property-registration-channel' =====
```

24. Recharge Account with upg1000 for user: Pankaj Mahadik and 8844 4455 6677 - (executing on peer0.users)

```
peer chaincode invoke -o orderer.property-registration-network.com:7050 --tls true --cafile /opt/gopath/src/github.com/hyperledger/fabric/peer/crypto/ordererOrganizations/property-registration-network.com/orderers/orderer.property-registration-network.com/msp/tlscacerts/tlsca.property-registration-network.com-cert.pem -C property-registration-channel -n regnet --peerAddresses peer0.users.property-registration-network.com:9051 --tlsRootCertFiles /opt/gopath/src/github.com/hyperledger/fabric/peer/crypto/peerOrganizations/users.property-registration-network.com/peers/peer0.users.property-registration-network.com/tls/ca.crt -c {"Args": ["org.property-registration-network.regnet.users:rechargeAccount", "Pankaj Mahadik", "8844 4455 6677", "upg1000"]}
{"Args": ["org.property-registration-network.regnet.users:rechargeAccount", "Pankaj Mahadik", "8844 4455 6677", "upg1000"]}
```

```
Invoke rechargeAccount of upg1000 for user: Pankaj Mahadik and 8844 4455 6677 - (executing on peer0.users)

peer chaincode invoke -o orderer.property-registration-network.com:7050 --tls true --cafile /opt/gopath/src/github.com/hyperledger/fabric/peer/crypto/ordererOrganizations/property-registration-network.com/orderers/orderer.property-registration-network.com/msp/tlscacerts/tlsca.property-registration-network.com-cert.pem -C property-registration-channel -n regnet --peerAddresses peer0.users.property-registration-network.com:9051 --tlsRootCertFiles /opt/gopath/src/github.com/hyperledger/fabric/peer/crypto/peerOrganizations/users.property-registration-network.com/peers/peer0.users.property-registration-network.com/tls/ca.crt -c {"Args": ["org.property-registration-network.regnet.users:rechargeAccount", "Pankaj Mahadik", "8844 4455 6677", "upg1000"]}
+ set +x
2022-04-30 10:37:56.775 UTC [chaincodeInvoke] chaincodeInvokeQuery -> INFO 001 Chaincode invoke successful, result: status:200 payload:{"class":"org.property-registration-network.regnet.models.user","key":"PANKAJMAHADIK-884444556677","currentState":null,"aadharNumber":"884444556677","approvedAt":"2022-04-30T10:32:34.039Z","email":"mahadikpankaj@gmail.com","name":"(Pankaj) Mahadik","phone":"9890787870","requestedAt":"2022-04-30T10:31:46.808Z","upgradCoins":600}
2022-04-30 10:37:56.775 UTC [chaincodeInvoke] chaincodeInvokeQuery -> INFO 001 Chaincode invoke successful, result: status:200 payload:{"class":"org.property-registration-network.regnet.models.user","key":"PANKAJMAHADIK-884444556677","currentState":null,"aadharNumber":"884444556677","approvedAt":"2022-04-30T10:32:34.039Z","email":"mahadikpankaj@gmail.com","name":"(Pankaj) Mahadik","phone":"9890787870","requestedAt":"2022-04-30T10:31:46.808Z","upgradCoins":600}
===== Invoke transaction successful on peer0.users on channel 'property-registration-channel' =====
```

25. Now Verify account balance is 1600 (600 + 1000) for user: Pankaj Mahadik and 8844 4455 6677 - (executing on peer0.users)

```
peer chaincode query -C property-registration-channel -n regnet -c '{"Args": ["org.property-registration-network.regnet.users:viewUser", "Pankaj Mahadik", "8844 4455 6677"]}'
```

```
Verify balance amount of 1600 for user: Pankaj Mahadik and 8844 4455 6677 - (executing on peer0.users)

Attempting to Query peer0.users ... 5 secs
2022-04-30 10:37:56.775 UTC [chaincodeInvoke] chaincodeInvokeQuery -> INFO 001 Chaincode invoke successful, result: status:200 payload:{"class":"org.property-registration-network.regnet.models.user","key":"PANKAJMAHADIK-884444556677","currentState":null,"aadharNumber":"884444556677","approvedAt":"2022-04-30T10:32:34.039Z","email":"mahadikpankaj@gmail.com","name":"(Pankaj) Mahadik","phone":"9890787870","requestedAt":"2022-04-30T10:31:46.808Z","upgradCoins":600}
2022-04-30 10:37:56.775 UTC [chaincodeInvoke] chaincodeInvokeQuery -> INFO 001 Chaincode invoke successful, result: status:200 payload:{"class":"org.property-registration-network.regnet.models.user","key":"PANKAJMAHADIK-884444556677","currentState":null,"aadharNumber":"884444556677","approvedAt":"2022-04-30T10:32:34.039Z","email":"mahadikpankaj@gmail.com","name":"(Pankaj) Mahadik","phone":"9890787870","requestedAt":"2022-04-30T10:31:46.808Z","upgradCoins":600}
===== Query successful on peer0.users on channel 'property-registration-channel' =====
```

26. Recharge Account with upg100 for user: Aakash Bansal and 1122 3344 5566 - (executing on peer0.users)

```
peer chaincode invoke -o orderer.property-registration-network.com:7050 --tls true --cafile /opt/gopath/src/github.com/hyperledger/fabric/peer/crypto/ordererOrganizations/property-registration-network.com/orderers/orderer.property-registration-network.com/msp/tlscacerts/tlsca.property-registration-network.com-cert.pem -C property-registration-channel -n regnet --peerAddresses peer0.users.property-registration-network.com:9051 --tlsRootCertFiles /opt/gopath/src/github.com/hyperledger/fabric/peer/crypto/peerOrganizations/users.property-registration-network.com/peers/peer0.users.property-registration-network.com/tls/ca.crt -c {"Args": ["org.property-registration-network.regnet.users:rechargeAccount", "Aakash Bansal", "1122 3344 5566", "upg100"]}
{"Args": ["org.property-registration-network.regnet.users:rechargeAccount", "Aakash Bansal", "1122 3344 5566", "upg100"]}
```

```
registration-network.com/peers/peer0.users.property-registration-network.com/tls/ca.crt -c '{"Args":["org.property-registration-network.reqnet.users:rechargeAccount","Aakash Bansal","1122 3344 5566","upq100"]}'
```

```

Invoke rechargeAccount of up100 for user: Akash Bansal and 1122 3344 5566 - (executing on peer0.users)

["Args": ["orderer.property-registration-network-regent-users-rechargeAccount", "Akash Bansal", "1122 3344 5566", "up100"], "peer chaincode invoke -o orderer.property-registration-network.com:7050 --tls true --cafile /opt/gopath/src/github.com/hyperledger/fabric/peer/crypto/ordererOrganizations/property-registration-network.com/orderers/orderer.property-registration-network.com/msp/tlscacerts/tlsca.property-registration-network.com-cert.pem -C property-registration-channel -n regnet -p --peerAddresses peer0.users.property-registration-network.com:9051 -c tlscacert -s /opt/gopath/src/github.com/hyperledger/fabric/peer/crypto/peerOrganizations/users.property-registration-network.com/peers/peer0.users.property-registration-network.com/tls/ca.crt -c <["org": "org.property-registration-network", "regnet": "rechargeAccount", "up100"]], "res": "exit", "err": "exit status 0", "status": 200, "payload": "{\"class\":\"org.property-registration-network.regnet.models.user\", \"key\":\"AAKASHBANSAL112233445566\", \"value\":\"100\", \"uprAddrs\": \"\", \"uprAuthNumber\": \"\", \"uprApprovalDate\": \"2024-04-30T10:35:47Z\", \"email\": \"akashbansal@gmail.com\", \"name\": \"Akash Bansal\", \"phone\": \"852369641\", \"requestDate\": \"2024-04-30T10:32:04.968Z\"}"]
Invoke transaction successful on peer0.users on channel 'property-registration-channel'

```

27. Verify account balance is 100 for user: Aakash Bansal and 1122 3344 5566 - (executing on peer1.registrar)

```
peer chaincode query -C property-registration-channel -n regnet -c '{"Args":["org.property-registration-network.regnet.users:viewUser","Aakash Bansal","1122 3344 5566"]}'
```

```
Verify balance amount of 100 for user: Aakash Bansal and 1122 3344 5566 - (executing on peer1.registrar)
-----  
Attempting to query peer1.registrar for args  
+ C_PARAMETER['Args':["org.property-registration-network.regnet.users:viewUser","Aakash Bansal","1122 3344 5566"]]  
+ C_CHANNELCODE query < property-registration-channel -n regnet -c ["Args":["org.property-registration-network.regnet.users:viewUser","Aakash Bansal","1122 3344 5566"]]  
+ rest=0  
+ set=0  
Actual Value for upgradcoins: "100"  
Expected Value for upgradcoins: "100"  
-----  
[{"id": "org.property-registration-network.regnet.upgradecoins", "model": "upgradcoins", "currentState": null, "aadharNumber": "112233445566", "approvedAt": "2022-04-30T10:35:42.772Z", "email": "aakashbansal@gmail.com", "name": "Aakash  
Bansal", "phone": "8526878934"}]  
Query successful on peer1.registrar on channel property-registration-channel
```

28. Recharge Account with upg1000 for user: Aakash Bansal and 1122 3344 5566 - (executing on peer0.users)

```
peer chaincode invoke -o orderer.property-registration-network.com:7050 --tls true --cafile /opt/gopath/src/github.com/hyperledger/fabric/peer/crypto/ordererOrganizations/property-registration-network.com/orderers/orderer.property-registration-network.com/msp/tlscacerts/tlsca.property-registration-network.com-cert.pem -C property-registration-channel -n regnet --peerAddresses peer0.users.property-registration-network.com:9051 --tlsRootCertFiles /opt/gopath/src/github.com/hyperledger/fabric/peer/crypto/peerOrganizations/users.property-registration-network.com/peers/peer0.users.property-registration-network.com/tls/ca.crt -c '{"Args":["org.property-registration-network.regnet.users:rechargeAccount","Akash Bansal","1122 3344 5566","upg1000"]}'
```

29. Now Verify account balance is 1100 (100 + 1000) for user: Aakash Bansal and 1122 3344 5566 - (executing on peer0.users)

```
peer chaincode query -C property-registration-channel -n regnet -c '{"Args":["org.property-registration-network.regnet.users:viewUser","Aakash Bansal","1122 3344 5566"]}'
```

```

Verify balance amount of 1100 for user: Akash Bansal and 1122 3344 5566 - (executing on peer0.users)
=====
+ start-ing to query on channel 'property-registration-channel'... =====
+ C_PARAMETER="{'Args':["org.property.registration-network.regnet.users:viewUser","Akash Bansal","1122 3344 5566"]}"
+ peer chaincode query -C 'property-registration-channel' -n regnet -c '{"Args':[{"Args":['org.property.registration-network.regnet.users:viewUser','Akash Bansal','1122 3344 5566']}'
+ set +x
+ echo "Current value for upor:aducino: "1100"
+ echo "Current value for upor:aducino: "1100"
+ class="org.property.registration-network.Regnet_models.User" key="AASKASHBANSAL-112233445566",currentState=null,aadharNumber="112233445566",approvedAt="2022-04-30T10:35:42.725Z",email="akashbansal@gmail.com",name="Akash Bansal"
+ upor=682365
+ echo "Query successful on peer0.users on channel 'property-registration-channel'" =====

```

30. updateProperty for Sale for propertyId: 2, user: Aakash Bansal and 1122 3344 5566 - (executing on peer0.users)

```
peer chaincode invoke -o orderer.property-registration-network.com:7050 --tls true --cafile /opt/gopath/src/github.com/hyperledger/fabric/peer/crypto/ordererOrganizations/property-registration-network.com/orderers/orderer.property-registration-network.com/msp/tlscacerts/tlsca.property-registration-network.com-cert.pem -C property-registration-channel -n regnet --peerAddresses peer0.users.property-registration-network.com:9051 --tlsRootCertFiles /opt/gopath/src/github.com/hyperledger/fabric/peer/crypto/peerOrganizations/users.property-registration-network.com/peers/peer0.users.property-registration-network.com/tls/ca.crt -c '{"Args":["org.property-registration-network.regnet.users:updateProperty","Aakash Bansal","1122 3344 5566","2","onSale"]}'
```

```

updateProperty For Sale for propertyId: 2, user: Aakash Bansal and 1122 3344 5566 - (executing on peer0.users)

["Args":["org.property-registration-network.regnet.users:updateProperty","Aakash Bansal","1122 3344 5566","2","onSale"]]

peer chaincode invoke -o orderer.property-registration-network.com:7050 --tls true --cafile /opt/gopath/src/github.com/hyperledger/fabric/peer/crypto/ordererOrganizations/property-registration-network.com/orderers/orderer.property-regnet.property-regnet.ca/tlsca.property-registration-network.com-cert.pem -C property-registration-channel -n regnet --peerAddresses peer0.users.property-registration-network.com:9051 --tlsRootCertFiles /opt/gopath/src/github.com/hyperledger/Fabric-peer/crypto/peers/property-registration-network.com/tls/ca.crt -c '{"Args":["org.property-registration-network.regnet.users:updateProperty","Aakash Bansal","1122 3344 5566","2","onSale"]}' 

set +x
+ curl -X POST -H "Content-Type: application/json" --data-binary '{"id":1,"method": "invoke","args": {"method": "updateProperty", "params": ["Aakash Bansal", "1122 3344 5566", "2", "onSale"]}}' http://127.0.0.1:7050/chaincode invoke successful result: status:200 payload:{"\> class": "\> org.property-registration-network.regnet.models.property", "\> key": "\> 2", "\> currentState": "onSale", "\> approvedAt": "2022-04-30T10:36:59.953Z", "\> owner": "AAKASHBANSAL-112233445566", "\> price": "800", "\> propertyId": "2", "\> requestedAt": "2022-04-30T10:36:43.818Z", "\> status": "onSale"} Invoke transaction successful on peer0.users on channel 'property-registration-channel' =====

```

### 31. verify status is onSale for property propertyId: 2 - (executing on peer0.users)

```

peer chaincode query -C property-registration-channel -n regnet -c '{"Args":["org.property-registration-network.regnet.users:viewProperty","2"]}' 

```

```

verify status is onSale for property propertyId: 2 - (executing on peer0.users)

Attempting to Query peer0.users on channel 'property-registration-channel' ... =====
+ C_PARAMETERs['Args']=["org.property-registration-network.regnet.users:viewProperty","2"]
+ peer chaincode query -C property-registration-channel -n regnet -c '{"Args":["org.property-registration-network.regnet.users:viewProperty","2"]}' 
+ Res0
+ set +x
Actual Value for status: "onSale"
Expected Value for status: "onSale"
+ class="org.property-registration-network.regnet.models.property", "key": "2", "currentState": null, "approvedAt": "2022-04-30T10:36:59.953Z", "owner": "AAKASHBANSAL-112233445566", "price": "800", "propertyId": "2", "requestedAt": "2022-04-30T10:36:43.818Z", "status": "onSale"
Query successful on peer0.users on channel 'property-registration-channel' =====

```

### 32. Invoke purchaseProperty for propertyId: 2, buyer: Pankaj Mahadik and 8844 4455 6677 - (executing on peer0.users)

```

peer chaincode invoke -o orderer.property-registration-network.com:7050 --tls true --cafile /opt/gopath/src/github.com/hyperledger/fabric/peer/crypto/ordererOrganizations/property-registration-network.com/orderers/orderer.property-regnet.property-regnet.ca/tlsca.property-registration-network.com-cert.pem -C property-registration-channel -n regnet --peerAddresses peer0.users.property-registration-network.com:9051 --tlsRootCertFiles /opt/gopath/src/github.com/hyperledger/Fabric-peer/crypto/peers/property-registration-network.com/tls/ca.crt -c '{"Args":["org.property-registration-network.regnet.users:purchaseProperty","Pankaj Mahadik","8844 4455 6677","2"]}' 

```

```

invoke purchaseProperty for propertyId: 2, buyer: Pankaj Mahadik and 8844 4455 6677 - (executing on peer0.users)

["Args":["org.property-registration-network.regnet.users:purchaseProperty","Pankaj Mahadik","8844 4455 6677","2"]]

peer chaincode invoke -o orderer.property-registration-network.com:7050 --tls true --cafile /opt/gopath/src/github.com/hyperledger/fabric/peer/crypto/ordererOrganizations/property-registration-network.com/orderers/orderer.property-regnet.property-regnet.ca/tlsca.property-registration-network.com-cert.pem -C property-registration-channel -n regnet --peerAddresses peer0.users.property-registration-network.com:9051 --tlsRootCertFiles /opt/gopath/src/github.com/hyperledger/Fabric-peer/crypto/peers/property-registration-network.com/tls/ca.crt -c '{"Args":["org.property-registration-network.regnet.users:purchaseProperty","Pankaj Mahadik","8844 4455 6677","2"]}' 

set +x
+ curl -X POST -H "Content-Type: application/json" --data-binary '{"id":1,"method": "invoke","args": {"method": "purchaseProperty", "params": ["Pankaj Mahadik", "8844 4455 6677", "2"]}}' http://127.0.0.1:7050/chaincode invoke successful result: status:200 payload:{"\> class": "\> org.property-registration-network.regnet.models.property", "\> key": "\> 2", "\> currentState": "onApproved", "\> approvedAt": "2022-04-30T10:36:59.953Z", "\> owner": "\> PANKAJMAHADIK-884444556677", "\> price": "800", "\> propertyId": "\> 2", "\> requestedAt": "2022-04-30T10:36:43.818Z", "\> status": "registered"} Invoke transaction successful on peer0.users on channel 'property-registration-channel' =====

```

### 33. Verify status of property is re-set to 'registered' for property: 2 - (executing on peer0.registrar)

```

peer chaincode query -C property-registration-channel -n regnet -c '{"Args":["org.property-registration-network.regnet.users:viewProperty","2"]}' 

```

```

Verify status of property is re-set to 'registered' for property: 2 - (executing on peer0.registrar)

Attempting to Query peer0.registrar on channel 'property-registration-channel' ... =====
+ C_PARAMETERs['Args']=["org.property-registration-network.regnet.users:viewProperty","2"]
+ peer chaincode query -C property-registration-channel -n regnet -c '{"Args":["org.property-registration-network.regnet.users:viewProperty","2"]}' 
+ Res0
+ set +x
Actual Value for status: "registered"
Expected Value for status: "registered"
+ class="org.property-registration-network.regnet.models.property", "key": "2", "currentState": null, "approvedAt": "2022-04-30T10:36:59.953Z", "owner": "PANKAJMAHADIK-884444556677", "price": "800", "propertyId": "2", "requestedAt": "2022-04-30T10:36:43.818Z", "status": "registered"
Query successful on peer0.registrar on channel 'property-registration-channel' =====

```

### 34. Verify Owner of property reflects Pankaj Mahadik for property: 2 - (executing on peer1.registrar)

```

peer chaincode query -C property-registration-channel -n regnet -c '{"Args":["org.property-registration-network.regnet.users:viewProperty","2"]}' 

```

```

Verify owner of property reflects Pankaj Mahadik for property: 2 - (executing on peer1.registrar)

Attempting to Query peer1.registrar on channel 'property-registration-channel' ... =====
+ C_PARAMETERs['Args']=["org.property-registration-network.regnet.users:viewProperty","2"]
+ peer chaincode query -C property-registration-channel -n regnet -c '{"Args":["org.property-registration-network.regnet.users:viewProperty","2"]}' 
+ Res0
+ set +x
Actual Value for owner: "PANKAJMAHADIK-884444556677"
Expected Value for owner: "PANKAJMAHADIK-884444556677"
+ class="org.property-registration-network.regnet.models.property", "key": "2", "currentState": null, "approvedAt": "2022-04-30T10:36:59.953Z", "owner": "PANKAJMAHADIK-884444556677", "price": "800", "propertyId": "2", "requestedAt": "2022-04-30T10:36:43.818Z", "status": "registered"
Query successful on peer1.registrar on channel 'property-registration-channel' =====

```

### 35. Verify Seller receives the amount of 800 as price for property: 2. Total=1100+800=1900 - (executing on peer0.users)

```

peer chaincode query -C property-registration-channel -n regnet -c '{"Args":["org.property-registration-network.regnet.users:viewUser","Aakash Bansal","1122 3344 5566"]}' 

```

```

Verify Seller receives the amount of 800 as price for property: 2. Total=1100+800=1900 - (executing on peer0.users)

+ C_PARAMETERs '{"Args":["org.property-registration-network.regnet.users:viewUser","Akash Bansal","1122 3344 5566"]}'
peer chaincode query -C property-registration-channel -n regnet -c '{"Args":["org.property-registration-network.regnet.users:viewUser","Akash Bansal","1122 3344 5566"]}' 
Attempting to Query peer0.users ... sees
+ res=0
+ set x
Actual Value for upgradcoins: "1900"
Specified Value for upgradCoins: "1900"
"Class": "org.property-registration-network.regnet.models.user", "key": "AAKASHBANSAL-112233445566", "currentState": null, "aadharNumber": "112233445566", "approvedAt": "2022-04-30T10:35:42.725Z", "email": "akashbansal@gmail.com", "name": "Akash Bansal", "phone": "8523698741", "requestedAt": "2022-04-30T10:32:04.969Z", "upgradcoins": "1900"
===== Query successful on peer0.users on channel property-registration-channel =====

```

36. Verify Buyer spend the amount of 800 as price for property: 2. Total=1600-800=800 - (executing on peer0.users)

```

peer chaincode query -C property-registration-channel -n regnet -c '{"Args":["org.property-registration-network.regnet.users:viewUser","Pankaj Mahadik","8844 4455 6677"]}' 

```

```

Verify Buyer spend the amount of 800 as price for property: 2. Total=1600-800=800 - (executing on peer0.users)

Attempting to Query peer0.users on channel property-registration-channel ... =====
+ C_PARAMETERs '{"Args":["org.property-registration-network.regnet.users:viewUser","Pankaj Mahadik","8844 4455 6677"]}'
peer chaincode query -C property-registration-channel -n regnet -c '{"Args":["org.property-registration-network.regnet.users:viewUser","Pankaj Mahadik","8844 4455 6677"]}' 
Attempting to Query peer0.users ... sees
+ res=0
+ set x
Actual Value for upgradcoins: "800"
Specified Value for upgradCoins: "800"
"Class": "org.property-registration-network.regnet.models.user", "key": "PANKAJMAHADIK-88444556677", "currentState": null, "aadharNumber": "88444556677", "approvedAt": "2022-04-30T10:32:34.039Z", "email": "mahadikpankaj@gmail.com", "name": "Pankaj Mahadik", "phone": "9876543210", "requestedAt": "2022-04-30T10:31:46.806Z", "upgradcoins": "800"
===== Query successful on peer0.users on channel property-registration-channel =====

```

37. Verify both the Properties owned by 'Pankaj Mahadik' - (executing on peer0.users)

```

peer chaincode query -C property-registration-channel -n regnet -c '{"Args":["org.property-registration-network.regnet.users:getAllProperties"]}' 
+ res=0

```

```

Verify both the Properties owned by 'Pankaj Mahadik' - (executing on peer0.users)

Attempting to Query peer0.users on channel property-registration-channel ... =====
+ C_PARAMETERs '{"Args":["org.property-registration-network.regnet.users:getAllProperties"]}'
peer chaincode query -C property-registration-channel -n regnet -c '{"Args":["org.property-registration-network.regnet.users:getAllProperties"]}' 
Attempting to Query peer0.users ... sees
+ res=0
+ set x
"["{\\"approvedAt\\": \"2022-04-30T10:36:46Z\", \"Class\\": \"org.property-registration-network.regnet.models.property\", \"currentState\\": null, \"key\\": \"PANKAJMAHADIK-88444556677\", \"owner\\": \"PANKAJMAHADIK-88444556677\", \"price\\": \"800\", \"propertyId\\": \"1\", \"requestedAt\\": \"2022-04-30T10:36:09.726Z\", \"status\\": \"registered\", \"registeredAt\\": \"2022-04-30T10:36:53.959Z\"}]"}
===== Query successful on peer0.users on channel property-registration-channel =====

```

38. Congratulations...! The property registration network tested successfully...!

```

Property Registration --Pankaj Mahadik
===== Congratulations...! pankaj_property_registration_network built and all use cases executed successfully =====
Completed: Building fabric network and installing chaincodes

```

### Negative Tests (Validation scenarios):

1. If request for new user registration tried to invoke on registrar node, then it fails as shown below:

```

peer chaincode invoke -o orderer.property-registration-network.com:7050 --tls true --cafile /opt/gopath/src/github.com/hyperledger/fabric/peer/crypto/ordererOrganizations/property-registration-network.com/orderers/orderer.property-registration-network.com/msp/tlscacerts/tlsca.property-registration-network.com-cert.pem -C property-registration-channel -n regnet --peerAddresses peer0.registrar.property-registration-network.com:7051 --tlsRootCertFiles /opt/gopath/src/github.com/hyperledger/fabric/peer/crypto/peerOrganizations/registrar.property-registration-network.com/peers/peer0.registrar.property-registration-network.com/tls/ca.crt -c '{"Args":["org.property-registration-network.regnet.users:requestNewUser","Upgrad User","1234 1234 1234","upgrad.user@gmail.com","1234567890"]}' 

```

```

Invoking requestNewUser for user: Upgrad User and 1234 1234 1234 - (executing on peer0.registrar)

["Args":["org.property-registration-network.regnet.users:requestNewUser","Upgrad User","1234 1234 1234","upgrad.user@gmail.com","1234567890"]]

peer chaincode invoke -o orderer.property-registration-network.com:7050 --tls true --cafile /opt/gopath/src/github.com/hyperledger/fabric/peer/crypto/ordererOrganizations/property-registration-network.com/orderers/orderer.property-registration-network.com/msp/tlscacerts/tlsca.property-registration-network.com-cert.pem -C property-registration-channel -n regnet --peerAddresses peer0.registrar.property-registration-network.com:7051 --tlsRootCertFiles /opt/gopath/src/github.com/hyperledger/fabric/peer/crypto/peerOrganizations/registrar.property-registration-network.com/peers/peer0.registrar.property-registration-network.com/tls/ca.crt -c '{"Args":["org.property-registration-network.regnet.users:requestNewUser","Upgrad User","1234 1234","upgrad.user@gmail.com","1234567890"]}' 
+ res=1
+ set x
ERROR !!!! Invoke requestNewUser failed !!!!!!
ERROR !!! Invoke execution on peer0.registrar failed !!!!!!
ERROR !!! FAILED to execute End-2-End Scenario =====

```

Error: "transaction returned with failure: Error: Stakeholder of type 'registrar' attempted to execute 'requestNewUser' operation, when only stakeholder of type 'users' is allowed to execute."

2. If property is not marked for sale, and tried to invoke purchaseProperty, then it throws appropriate error:

```
peer chaincode invoke -o orderer.property-registration-network.com:7050 --tls true --cafile /opt/gopath/src/github.com/hyperledger/fabric/peer/crypto/ordererOrganizations/property-registration-network.com/orderers/orderer.property-registration-network.com/msp/tlscacerts/tlsca.property-registration-network.com-cert.pem -C property-registration-channel -n regnet --peerAddresses peer0.users.property-registration-network.com:9051 --tlsRootCertFiles /opt/gopath/src/github.com/hyperledger/fabric/peer/crypto/peerOrganizations/users.property-registration-network.com/peers/peer0.users.property-registration-network.com/tls/ca.crt -c '{"Args":["org.property-registration-network.regnet.users:purchaseProperty","Aakash Bansal","1122 3344 5566","2"]}'
```

```
Invoke purchaseProperty for propertyId: 2, buyer: Aakash Bansal and 1122 3344 5566 - (executing on peer0.users)
["Args":["org.property-registration-network.regnet.users:purchaseProperty","Aakash Bansal","1122 3344 5566","2"]]
peer chaincode invoke -o orderer.property-registration-network.com:7050 --tls true --cafile /opt/gopath/src/github.com/hyperledger/fabric/peer/crypto/ordererOrganizations/property-registration-network.com/orderers/orderer.property-registration-network.com/msp/tlscacerts/tlsca.property-registration-network.com-peers/peer0.users.property-registration-network.com/tls/ca.crt -c ["Args":["org.property-registration-network.regnet.users:purchaseProperty","Aakash Bansal","1122 3344 5566","2"]]
====
set +x
Fromendorsement failure during invoke, response: status=500 message="transaction returned with failure: Error: Property having propertyId: 2 is not marked for Sale, the status is registered, and not onSale"
===== Invoke execution on peer0.users failed =====
ERROR !!! FAILED to execute End-2-End Scenario =====
```

**ERROR**

Error: "Property having propertyId: 2 is not marked for Sale, the status is registered, and not onSale"

3. If user is not owner of a property and tries to change the status, it fails with appropriate error.

```
peer chaincode invoke -o orderer.property-registration-network.com:7050 --tls true --cafile /opt/gopath/src/github.com/hyperledger/fabric/peer/crypto/ordererOrganizations/property-registration-network.com/orderers/orderer.property-registration-network.com/msp/tlscacerts/tlsca.property-registration-network.com-cert.pem -C property-registration-channel -n regnet --peerAddresses peer0.users.property-registration-network.com:9051 --tlsRootCertFiles /opt/gopath/src/github.com/hyperledger/fabric/peer/crypto/peerOrganizations/users.property-registration-network.com/peers/peer0.users.property-registration-network.com/tls/ca.crt -c '{"Args":["org.property-registration-network.regnet.users:updateProperty","Upgrad User","1234 1234 1234","1","onSale"]}'
```

```
Invoking requestNewUser for user: Upgrad User and 1234 1234 1234 - (executing on peer0.users)
["Args":["org.property-registration-network.regnet.users:updateProperty","Upgrad User","1234 1234 1234","1","onSale"]]
peer chaincode invoke -o orderer.property-registration-network.com:7050 --tls true --cafile /opt/gopath/src/github.com/hyperledger/fabric/peer/crypto/ordererOrganizations/property-registration-network.com/orderers/orderer.property-registration-network.com/msp/tlscacerts/tlsca.property-registration-network.com-peers/peer0.users.property-registration-network.com/tls/ca.crt -c ["Args":["org.property-registration-network.regnet.users:updateProperty","Upgrad User","1234 1234 1234","1","onSale"]]
====
Fromendorsement failure during invoke, response: status=500 message="transaction returned with failure: Error: Current user: UPGRADUSER-123412341234 and Property owner: PANKAJMAHADIK-884444556677 for propertyId 1 are different."
===== Invoke execution on peer0.users failed =====
ERROR !!! FAILED to execute End-2-End Scenario =====
```

**ERROR**

Error: "Current user: UPGRADUSER-123412341234 and Property owner: PANKAJMAHADIK-884444556677 for propertyId 1 are different."

4. If user tries to purchase a property, however user's account do not have equal or more than the price of a property, then it will fail with relevant error.

```
peer chaincode invoke -o orderer.property-registration-network.com:7050 --tls true --cafile /opt/gopath/src/github.com/hyperledger/fabric/peer/crypto/ordererOrganizations/property-registration-network.com/orderers/orderer.property-registration-network.com/msp/tlscacerts/tlsca.property-registration-network.com-cert.pem -C property-registration-channel -n regnet --peerAddresses peer0.users.property-registration-network.com:9051 --tlsRootCertFiles /opt/gopath/src/github.com/hyperledger/fabric/peer/crypto/peerOrganizations/users.property-registration-network.com/peers/peer0.users.property-registration-network.com/tls/ca.crt -c '{"Args":["org.property-registration-network.regnet.users:purchaseProperty","Upgrad User","1234 1234 1234","1"]}'
```

```
Invoke purchaseProperty for propertyId: 1, buyer: Upgrad User and 1234 1234 1234 - (executing on peer0.users)
["Args":["org.property-registration-network.regnet.users:purchaseProperty","Upgrad User","1234 1234 1234","1"]]
peer chaincode invoke -o orderer.property-registration-network.com:7050 --tls true --cafile /opt/gopath/src/github.com/hyperledger/fabric/peer/crypto/ordererOrganizations/property-registration-network.com/orderers/orderer.property-registration-network.com/msp/tlscacerts/tlsca.property-registration-network.com-peers/peer0.users.property-registration-network.com/tls/ca.crt -c ["Args":["org.property-registration-network.regnet.users:purchaseProperty","Upgrad User","1234 1234 1234","1"]]
====
set +x
Fromendorsement failure during invoke, response: status=500 message="transaction returned with failure: Error: Insufficient balance to purchase property: ID: 1 Price: 1000 Balance: 500 Buyer:Upgrad User-1234 1234 1234"
===== Invoke execution on peer0.users failed =====
ERROR !!! FAILED to execute End-2-End Scenario =====
```

**ERROR**

Error: " Insufficient balance to purchase property: ID: 1 Price: 1000 Balance: 500 Buyer:Upgrad User-1234 1234 1234"

5. If user tries to purchase a property which is already owned, corresponding error will be thrown.

```
peer chaincode invoke -o orderer.property-registration-network.com:7050 --tls true --cafile /opt/gopath/src/github.com/hyperledger/fabric/peer/crypto/ordererOrganizations/property-registration-network.com/orderers/orderer.property-registration-network.com/msp/tlscacerts/tlsca.property-registration-network.com-cert.pem -C property-registration-channel -n regnet --peerAddresses peer0.users.property-registration-network.com:9051 --tlsRootCertFiles /opt/gopath/src/github.com/hyperledger/fabric/peer/crypto/peerOrganizations/users.property-registration-network.com/peers/peer0.users.property-registration-network.com/tls/ca.crt -c '{"Args":["org.property-registration-network.regnet.users:purchaseProperty","Pankaj Mahadik","8844 4455 6677","1"]}'
```

```
Invoke purchaseProperty for propertyId: 1, buyer: Pankaj Mahadik and 8844 4455 6677 - (executing on peer0.users)
[{"Args":["org.property-registration-network.regnet.users:purchaseProperty","Pankaj Mahadik","8844 4455 6677","1"]}]
peer chaincode invoke -o orderer.property-registration-network.com:7050 --tls true --cafile /opt/gopath/src/github.com/hyperledger/fabric/peer/crypto/ordererOrganizations/property-registration-network.com/orderers/orderer.property-registration-network.com/msp/tlscacerts/tlsca.property-registration-network.com-cert.pem -C property-registration-channel -n regnet --peerAddresses peer0.users.property-registration-network.com:9051 --tlsRootCertFiles /opt/gopath/src/github.com/hyperledger/fabric/peer/crypto/peerOrganizations/users.property-registration-network.com/peers/peer0.users.property-registration-network.com/tls/ca.crt -c '{"Args":["org.property-registration-network.regnet.users:purchaseProperty","Pankaj Mahadik","8844 4455 6677","1"]}'"
+ set +x
Error: endorsement failure during invoke, response: status=500 message="transaction returned with failure: Error: Owner: PANKAJMAHADIK-884444556677 trying to buy own property: propertyId: 1."
===== Invoke execution on peer0.users failed =====
ERROR !!! FAILED to execute End-2-End Scenario =====
```



Error: "Owner: PANKAJMAHADIK-884444556677 trying to buy own property: propertyId: 1."

6. If a user tries to purchase a property who is not in the system, corresponding error will be thrown.

```
peer chaincode invoke -o orderer.property-registration-network.com:7050 --tls true --cafile /opt/gopath/src/github.com/hyperledger/fabric/peer/crypto/ordererOrganizations/property-registration-network.com/orderers/orderer.property-registration-network.com/msp/tlscacerts/tlsca.property-registration-network.com-cert.pem -C property-registration-channel -n regnet --peerAddresses peer0.users.property-registration-network.com:9051 --tlsRootCertFiles /opt/gopath/src/github.com/hyperledger/fabric/peer/crypto/peerOrganizations/users.property-registration-network.com/peers/peer0.users.property-registration-network.com/tls/ca.crt -c '{"Args":["org.property-registration-network.regnet.users:purchaseProperty","Upgrad User1","1234 1234 1234","1"]}'
```

```
Invoke purchaseProperty for propertyId: 1, buyer: Upgrad User1 and 1234 1234 1234 - (executing on peer0.users)
[{"Args":["org.property-registration-network.regnet.users:purchaseProperty","Upgrad User1","1234 1234 1234","1"]}]
peer chaincode invoke -o orderer.property-registration-network.com:7050 --tls true --cafile /opt/gopath/src/github.com/hyperledger/fabric/peer/crypto/ordererOrganizations/property-registration-network.com/orderers/orderer.property-registration-network.com/msp/tlscacerts/tlsca.property-registration-network.com-cert.pem -C property-registration-channel -n regnet --peerAddresses peer0.users.property-registration-network.com:9051 --tlsRootCertFiles /opt/gopath/src/github.com/hyperledger/fabric/peer/crypto/peerOrganizations/users.property-registration-network.com/peers/peer0.users.property-registration-network.com/tls/ca.crt -c '{"Args":["org.property-registration-network.regnet.users:purchaseProperty","Upgrad User1","1234 1234 1234","1"]}'"
+ set +x
Error: endorsement failure during invoke, response: status=500 message="transaction returned with failure: Error: User does not exists for name: Upgrad User1 and Aadhar number: 1234 1234 1234."
===== Invoke execution on peer0.users failed =====
ERROR !!! FAILED to execute End-2-End Scenario =====
```



Error: "User does not exists for name: Upgrad User1 and Aadhar number: 1234 1234 1234."

7. If a property is not registered, and purchase request received for it, corresponding error will be thrown.

```
peer chaincode invoke -o orderer.property-registration-network.com:7050 --tls true --cafile /opt/gopath/src/github.com/hyperledger/fabric/peer/crypto/ordererOrganizations/property-registration-network.com/orderers/orderer.property-registration-network.com/msp/tlscacerts/tlsca.property-registration-network.com-cert.pem -C property-registration-channel -n regnet --peerAddresses peer0.users.property-registration-network.com:9051 --tlsRootCertFiles /opt/gopath/src/github.com/hyperledger/fabric/peer/crypto/peerOrganizations/users.property-registration-network.com/peers/peer0.users.property-registration-network.com/tls/ca.crt -c '{"Args":["org.property-registration-network.regnet.users:purchaseProperty","Pankaj Mahadik","8844 4455 6677","3"]}'
```

```
Invoke purchaseProperty for propertyId: 3, buyer: Pankaj Mahadik and 8844 4455 6677 - (executing on peer0.users)
[{"Args":["org.property-registration-network.regnet.users:purchaseProperty","Pankaj Mahadik","8844 4455 6677","3"]}]
peer chaincode invoke -o orderer.property-registration-network.com:7050 --tls true --cafile /opt/gopath/src/github.com/hyperledger/fabric/peer/crypto/ordererOrganizations/property-registration-network.com/orderers/orderer.property-registration-network.com/msp/tlscacerts/tlsca.property-registration-network.com-cert.pem -C property-registration-channel -n regnet --peerAddresses peer0.users.property-registration-network.com:9051 --tlsRootCertFiles /opt/gopath/src/github.com/hyperledger/fabric/peer/crypto/peerOrganizations/users.property-registration-network.com/peers/peer0.users.property-registration-network.com/tls/ca.crt -c '{"Args":["org.property-regnet.users:purchaseProperty","Pankaj Mahadik","8844 4455 6677","3"]}'"
+ set +x
Error: endorsement failure during invoke, response: status=500 message="transaction returned with failure: Error: Property does not exists for id: 3."
===== Invoke execution on peer0.users failed =====
ERROR !!! FAILED to execute End-2-End Scenario =====
```



Error: "Property does not exists for id: 3."

## **Shutting down the network:**

```
./pankaj-network.sh down -i 1.4.9 -l node -c property-registration-channel -f docker-compose-e2e.yaml -t 120 -d 5
```

#### **Additional checks:**

#### **Additional Checks.**

- Logs of complete end to end execution are provided and can be found in file: End\_to\_end\_Execution\_with\_test\_case\_execution\_logs.txt
  - Command below shows all the docker containers running.

**docker ps -a**

CONTAINER ID	IMAGE	COMMAND	CREATED	STATUS	PORTS
160f16c88d88	hyperledger/fabric-peer:amend4-1.4.9	"bin/sh -c '/usr...'	21 hours ago	Up 21 hours	
bac5509dabb	cc-peers0.users.property-registration-network.com:regnet-1.0-3ea406cfd6789ef4b7812d91fa96e15285fc3e700e131c600ebd263d64450d81	"bin/sh -c '/cd /usr...'	21 hours ago	Up 21 hours	
cddabaa1666b	cc-peers0.users.property-registration-network.com:regnet-1.0	"bin/sh -c '/cd /usr...'	21 hours ago	Up 21 hours	
cfcfe76b52	hyperledger/fabric-tools:amend4-1.4.9	"bin/bash"	21 hours ago	Up 21 hours	
6513f2dacea	hyperledger/fabric-peer:amend4-1.4.9	"peer node start"	21 hours ago	Up 21 hours	0.0.0.0:10051->10051
c35061g943	hyperledger/fabric-peer:amend4-1.4.9	"peer node start"	21 hours ago	Up 21 hours	0.0.0.0:8051->8051
e397fe305a5	hyperledger/fabric-peer:amend4-1.4.9	"peer node start"	21 hours ago	Up 21 hours	0.0.0.0:1051->1051
6447168786f	hyperledger/fabric-peer:amend4-1.4.9	"peer node start"	21 hours ago	Up 21 hours	0.0.0.0:7051->7051
f6df51403fc	hyperledger/fabric-peer:amend4-1.4.9	"peer node start"	21 hours ago	Up 21 hours	0.0.0.0:9051->9051
496cdf7f292	hyperledger/fabric-peer:amend4-1.4.9	"tiny -- /docker-ent..."	21 hours ago	Up 21 hours	4369/tcp, 9100/tcp,
0..0.0:5984->5984/tcp	couchdb-peer1.users.property-registration-network.com	"hyperledger/fabric-peer:amend4-1.4.9	21 hours ago	Up 21 hours	4369/tcp, 9100/tcp,
43d35552d31	hyperledger/fabric-peer:amend4-1.4.9	"tiny -- /docker-ent..."	21 hours ago	Up 21 hours	4369/tcp, 9100/tcp,
0..0.0:5984->5984/tcp	couchdb-peer2.users.property-registration-network.com	"hyperledger/fabric-peer:amend4-1.4.9	21 hours ago	Up 21 hours	4369/tcp, 9100/tcp,
1d72ec47beb	hyperledger/fabric-orderer:amend4-1.4.9	"orderer"	21 hours ago	Up 21 hours	0.0.0.0:9050->9050
53a5c64d3915	hyperledger/fabric-orderer:amend4-1.4.9	"orderer"	21 hours ago	Up 21 hours	0.0.0.0:8050->8050
6c8ca28475e	hyperledger/fabric-orderer:amend4-1.4.9	"orderer"	21 hours ago	Up 21 hours	0.0.0.0:7050->7050
7f0fd71dafa2	hyperledger/fabric-ca:amend4-1.4.9	"sh -c '/fabric-ca-se..."	21 hours ago	Up 21 hours	0.0.0.0:7054->7054
938813442bb	cc-replica0.fabric-peer:amend4-1.4.9	"tiny -- /docker-ent..."	21 hours ago	Up 21 hours	4369/tcp, 9100/tcp,
0..0.0:5984->5984/tcp	couchdb-peer0.users.property-registration-network.com	"hyperledger/fabric-peer:amend4-1.4.9	21 hours ago	Up 21 hours	4369/tcp, 9100/tcp,
0..0.0:5984->5984/tcp	couchdb-peer0.users.property-registration-network.com	"tiny -- /docker-ent..."	21 hours ago	Up 21 hours	4369/tcp, 9100/tcp,
0db169672c	hyperledger/fabric-ca:amend4-1.4.9	"sh -c '/fabric-ca-se..."	21 hours ago	Up 21 hours	0.0.0.0:8054->8054
948a02c2fecac	hyperledger/fabric-peer:amend4-1.4.9	"tiny -- /docker-ent..."	21 hours ago	Up 21 hours	4369/tcp, 9100/tcp,
0..0.0:5984->5984/tcp	couchdb-peer1.property-registration-network.com	"hyperledger/fabric-peer:amend4-1.4.9	21 hours ago	Up 21 hours	4369/tcp, 9100/tcp,

As seen in the screenshot, **there are total: 19 nodes (containers) running.**

## 2: CA nodes

5: Peer nodes (2 for registrar, 3 for users)

## 5: couch database nodes

### 3: Orderer nodes (etcdraft algorithm)

3: Chaincode nodes (as the chaincode installed on 3 nodes: first 3 in the screenshot)

1: CLI node.

### 3. Couch database:

Login to [http://localhost:5984/\\_utils](http://localhost:5984/_utils) with username: COUCH\_USER and password: COUCH\_PASS

Databases			
Name	Size	# of Docs	Actions
_replicator	3.8 KB	1	
_users	3.8 KB	1	
property-registration-channel_	16.7 KB	2	
property-registration-channel_lscc	0.6 KB	1	
property-registration.channel_regnet	9.4 KB	4	

If clicked on the `property-registration-channel_regnet`, it will show the records as below:

property-registratio...		Document ID	Options	{ } JSON	CSV	JSON	
All Documents		Table	Metadata	{ } JSON	Create Document		
Run A Query with Mango							
Permissions							
Changes							
Design Documents							
id							
<input type="checkbox"/>		Dorg.property-registration-network.regnet.lists.property1	Dorg.property-registration-network.regnet.lists.property1	{ "rev": "1-cf6171d326568a9ad126c8699113abc" }			
<input type="checkbox"/>		Dorg.property-registration-network.regnet.lists.property2	Dorg.property-registration-network.regnet.lists.property2	{ "rev": "3-a44afe4e4d722509458a686ef44a3eb" }			
<input type="checkbox"/>		Dorg.property-registration-network.regnet.lists.user@AKASHBANS...	Dorg.property-registration-network.regnet.lists.user@AKASHBANS...	{ "rev": "4-6bd0d03a7cf75d14af22a3daba27798" }			
<input type="checkbox"/>		Dorg.property-registration-network.regnet.lists.user@PANKAJMAHA...	Dorg.property-registration-network.regnet.lists.user@PANKAJMAHA...	{ "rev": "5-30b64cacc32abb10eab7d39ac74a8036" }			

The revision number in the last column can be seen, as it get increased each time a transaction invoked on the entity.

If clicked on the JSON tab, it shows the complete JSON of the record.

e.g. the record for property id: 2 is shown below that we used in business use case:

```
id "\u0000org.property-registration-network.regnet.lists.property\u2020"
{
  "id": "\u0000org.property-registration-network.regnet.lists.property\u0002\u0000",
  "key": "\u0000org.property-registration-network.regnet.lists.property\u0002\u0000",
  "value": {
    "rev": "3-a444fe4e4df22509458a588eef4a43eb"
  },
  "doc": {
    "_id": "\u0000org.property-registration-network.regnet.lists.property\u0002\u0000",
    "_rev": "3-a444fe4e4df22509458a588eef4a43eb",
    "approvedAt": "2022-04-30T10:36:59.953Z",
    "class": "org.property-registration-network.regnet.models.property",
    "currentState": null,
    "key": "2",
    "owner": "PANKAJMAHADIK-884444556677",
    "price": "800",
    "propertyId": "2",
    "requestedAt": "2022-04-30T10:36:43.818Z",
    "status": "registered",
    "~version": "\u0000CgMBEgA="
  }
}
```

#### 4. Additional Use Cases:

To execute the additional use cases, the usual approach of connecting to cli node and invoking commands can be followed using the command:

```
docker exec -it cli /bin/bash
```

However, as the TLS is enabled, the commands get too long and highly error prone if tried to edit manually, hence I suggest if one wish to execute additional use cases, he/she can edit the runTests.sh in the scripts folder and add additional tests referring to existing tests present there.

Hint about the runTests.sh:

The first argument to any function denotes the peer0 or peer1 or peer2.

The second argument to any function denotes the organization: registrar or users.

Rest of the arguments, if passed, used in the transaction flow.

Keeping this in mind, and knowing the business flow, the functions can be understood.

One can remove all functions from the file and add additional functions to the file runTests.sh and then execute below command:

```
./pankaj-network.sh tests -i 1.4.9 -l node -c property-registration-channel -t 120 -d 5
```

I verified multiple times that the whole end to end flow runs successfully.

Please feel free to call me on 9890787870 if faced any issues or need any further information.

Thank you for evaluating my assignment...!