

BLOCKCHAIN FOR DETECTING COUNTERFEIT DRUGS

Case-Study Functionality Testing Document

Capstone Project: Drug-Counterfeit Case Study

Application: Pharmaceutical Supply Chain

Submission to: UpGrad

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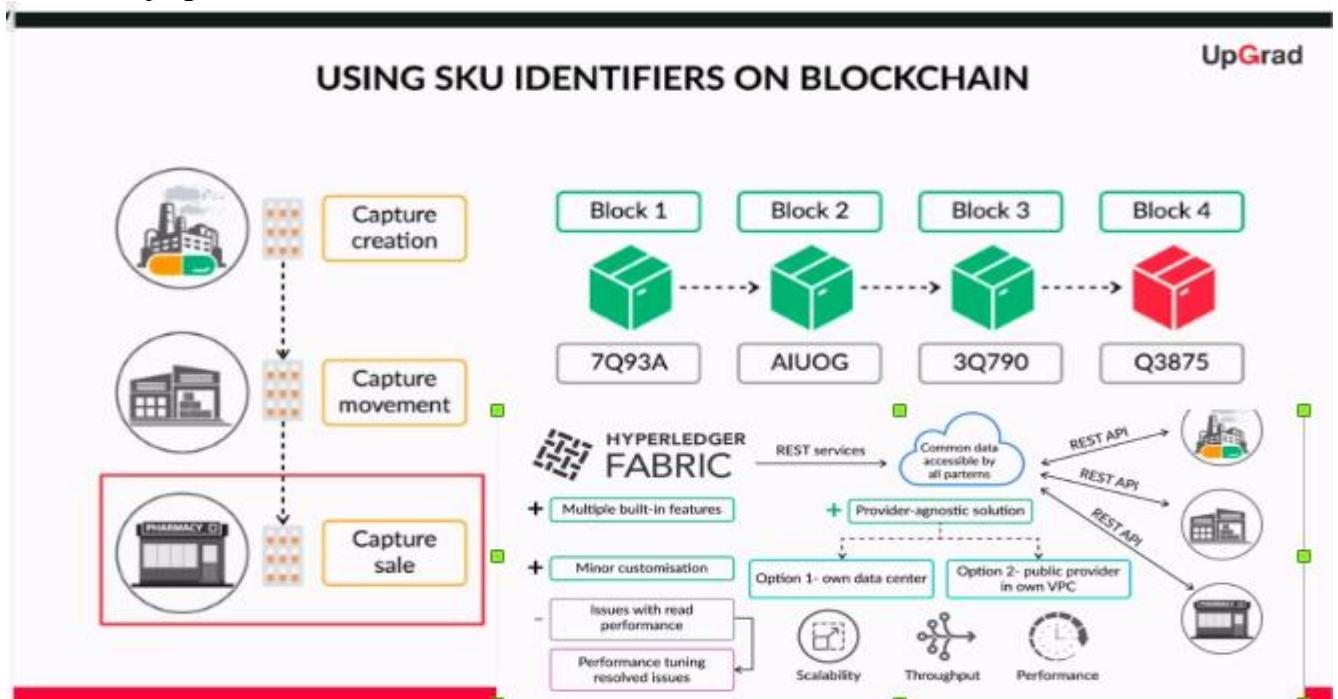
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Introduction:

The Case-Study brings three major possible ways of drug-counterfeit like, a factory manufacturing counterfeit drugs under a different name, through contract manufacturing and reintroducing expired drugs into the market. This problem can be addressed by a sustainable solution where it provides a technology for drug serialisation, a technology for marking products, a scalable system and an instantly integrable software. There comes the Blockchain technology using Hyperledger architecture that provides a promising solution by recording the data at each step in a secure way right from manufacturer to the end consumer.

SKU- Stock Keeping Units



The source for the specifications of detailed Drug-counterfeit use-case is provided in the course content of module 8 (capstone project).

TechStack:

TechStack	
Blockchain Framework	Hyperledger Fabric
Virtualisation Tool	Oracle VM Virtual Box – Ubuntu Environment
Programmed In	Node.js
Imagefile(provided by UpGrad)	blockchain-node-upgrad-001disk.vmdk (It has all hyperledger-fabric binaries installed with all prerequisites on ubuntu18.04 OS)
Tool	Docker Compose (for defining and running multi-container Docker applications)
OtherTools/Application/library	Cryptogen, configtxgen/Postman/Express etc
Text Editor	Atom

SupplyChain Architecture:

SUPPLY CHAIN ARCHITECTURE



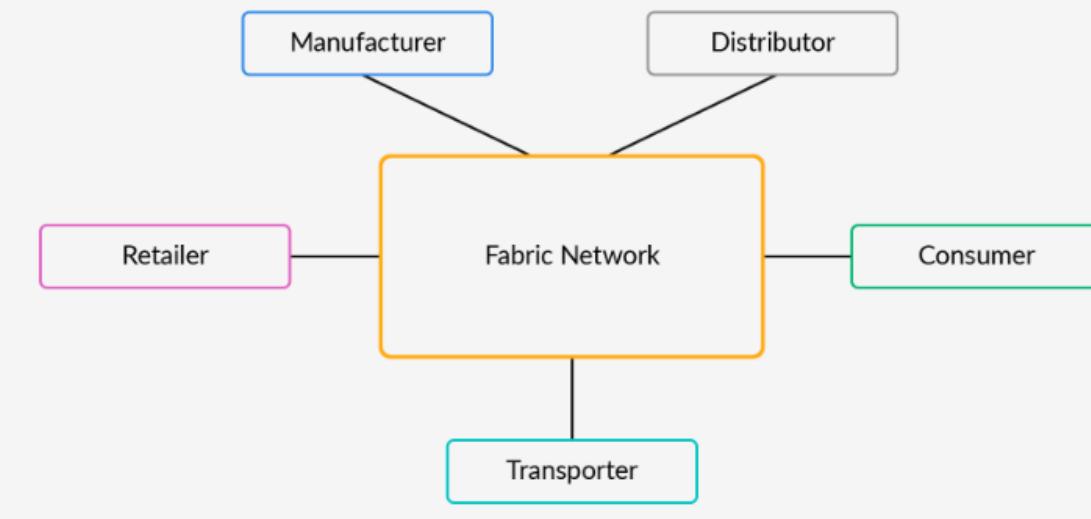
The Capstone project is divided into four segments namely

1. FabricNetwork Setup
2. Chaincode Development – Invoking the functions
3. Node Application Development
4. Send HTTP requests on Rest-api endpoints using Postman application & make a collection file

Segment1: FabricNetwork Setup

Network Architecture

NETWORK ARCHITECTURE



Network Properties

Network Properties	
Network Name	pharma-network
Organisations - Peers	Manufacturer- 2 peers, Distributor- 2 peers, Retailer- 2 peers, Consumer- 2 peers, Transporter- 2 peers (i.e peer0 & peer1)
Channel Name	pharmachannel
Chaincode Name	pharmanet
Orderer Type	Solo
Chaincode Installation	On all peers
Anchor Peers	Peer0 of each Organisation
User	Admin (created one more user i.e user1 besides default Admin user)

Note 1: The network is run in dev-mode by uncommenting the –peer-chaincodedev = true in docker-compose-peer.yaml file

Prerequisites for fabric Network Setup

1. Check the folders having Read-write-Execute permissions , if not change the permissions of the folders. Ref : <https://www.linux.com/training-tutorials/how-manage-file-and-folder-permissions-linux/>
2. Add the path of the binaries to the .bashrc file
3. Add the bin folder of the pharma-net to the .bashrc file
4. open the terminal, type the command `sudo nano /root/.bashrc` (This will open the /root/.bashrc file on the terminal.)
5. Add the following at the end of this file: `export PATH = ~/workspace/pharma-net/network/bin:$PATH`
6. save the file using Ctrl+X

Bootstrap the Network

1. Open a new tab in the terminal . Type the command `cd ~/workspace/pharma-net/network/`
2. Before starting the network make sure that there are no containers running
3. Check the status by using the command `docker ps -a`
4. If any containers are up, remove the containers using `./fabricNetwork.sh down` or `docker-compose -f docker-compose.yml down --volumes --remove-orphan`
5. Remove the exited containers using `docker rm $(docker ps -a -f status=exited -q)`
6. Start the network using `./fabricNetwork.sh up`

Command Title	Command Name	Expected Outcomes
Bootstrap the Network	<code>./fabricNetwork.sh up</code>	<ul style="list-style-type: none"> 1. generates crypro materials 2. creates channel artifacts 3. creates docker containers 4. creates a channel 5. makes peers join the channel 6. defines the anchor peer0 for each organisation

Below is the screenshot of generation of crypro materials (i.e generating certificates and genesis block) and channel artifacts

The image shows two terminal sessions running on an Oracle VM VirtualBox machine. Both sessions are titled "test-blockchain [Running] - Oracle VM VirtualBox".

Terminal 1 (Thu 16:59):

```
upgrad@upgrad-VirtualBox:~/workspace/pharma-net/network$ docker ps -a
CONTAINER ID        IMAGE               COMMAND             CREATED            STATUS              PORTS               NAMES
upgrad@upgrad-VirtualBox:~/workspace/pharma-net/network$ ./fabricNetwork.sh up
Starting for channel 'pharmacchannel' with CLI timeout of '15' seconds and CLI delay of '5' seconds and chaincode version '1.1'
Continue? [Y/n] y
proceeding ...
LOCAL_VERSION=1.4.3
DOCKER_IMAGE_VERSION=1.4.3
=====
WARNING =====
Local Fabric binaries and docker images are
out of sync. This may cause problems.
=====
/home/upgrad/workspace/pharma-net/network/bin/cryptogen
#####
##### Generate certificates using cryptogen tool #####
#####
cryptogen generate config=./crypto-config.yaml
manufacturer.pharma-network.com
distributor.pharma-network.com
retailer.pharma-network.com
transporter.pharma-network.com
consumer.pharma-network.com
+ res=0
+ set +x

/home/upgrad/workspace/pharma-net/network/bin/configtxgen
#####
##### Generating Orderer Genesis block #####
#####
+ configtxgen -profile OrdererGenesis -channelID upgrad-sys-channel -outputBlock ./channel-artifacts/genesis.block
2020-04-15 01:24:12.086 IST [common.tools.configtxgen] main -> INFO 001 Loading configuration
#####
##### Generating anchor peer update for distributorMSP #####
#####
+ configtxgen -profile pharmacchannel -outputAnchorPeersUpdate ./channel-artifacts/distributorMSPanchors.tx -channelID pharmacchannel -asOrg
Org distributorMSP
2020-04-27 17:24:38.318 IST [common.tools.configtxgen] main -> INFO 001 Loading configuration
2020-04-27 17:24:38.373 IST [common.tools.configtxgen.localconfig] Load -> INFO 002 Loaded configuration: /home/upgrad/workspace/pharma
-net/network/configtx.yaml
2020-04-27 17:24:38.411 IST [common.tools.configtxgen.localconfig] completeInitialization -> INFO 003 orderer type: solo
2020-04-27 17:24:38.412 IST [common.tools.configtxgen.localconfig] LoadTopLevel -> INFO 004 Loaded configuration: /home/upgrad/workspace
/pharma-net/network/configtx.yaml
2020-04-27 17:24:38.412 IST [common.tools.configtxgen] doOutputAnchorPeersUpdate -> INFO 005 Generating anchor peer update
2020-04-27 17:24:38.412 IST [common.tools.configtxgen] doOutputAnchorPeersUpdate -> INFO 006 Writing anchor peer update
+ res=0
+ set +x
```

Terminal 2 (Thu 17:02):

```
upgrad@upgrad-VirtualBox:~/workspace/pharma-net/network
#####
##### Generating anchor peer update for retailerMSP #####
#####
+ configtxgen -profile pharmacchannel -outputAnchorPeersUpdate ./channel-artifacts/retailerMSPanchors.tx -channelID pharmacchannel -asOrg
Org retailerMSP
2020-04-15 01:24:13.164 IST [common.tools.configtxgen] main -> INFO 001 Loading configuration
2020-04-15 01:24:13.217 IST [common.tools.configtxgen.localconfig] Load -> INFO 002 Loaded configuration: /home/upgrad/workspace/pharma
-net/network/configtx.yaml
2020-04-15 01:24:13.286 IST [common.tools.configtxgen.localconfig] completeInitialization -> INFO 003 orderer type: solo
2020-04-15 01:24:13.297 IST [common.tools.configtxgen.localconfig] LoadTopLevel -> INFO 004 Loaded configuration: /home/upgrad/workspace
/pharma-net/network/configtx.yaml
2020-04-15 01:24:13.298 IST [common.tools.configtxgen] doOutputAnchorPeersUpdate -> INFO 005 Generating anchor peer update
2020-04-15 01:24:13.298 IST [common.tools.configtxgen] doOutputAnchorPeersUpdate -> INFO 006 Writing anchor peer update
+ res=0
+ set +x

#####
##### Generating anchor peer update for transporterMSP #####
#####
+ configtxgen -profile pharmacchannel -outputAnchorPeersUpdate ./channel-artifacts/transporterMSPanchors.tx -channelID pharmacchannel -asOrg
Org transporterMSP
2020-04-15 01:24:13.420 IST [common.tools.configtxgen] main -> INFO 001 Loading configuration
2020-04-15 01:24:13.466 IST [common.tools.configtxgen.localconfig] Load -> INFO 002 Loaded configuration: /home/upgrad/workspace/pharma
-net/network/configtx.yaml
2020-04-15 01:24:13.540 IST [common.tools.configtxgen.localconfig] completeInitialization -> INFO 003 orderer type: solo
2020-04-15 01:24:13.547 IST [common.tools.configtxgen.localconfig] LoadTopLevel -> INFO 004 Loaded configuration: /home/upgrad/workspace
/pharma-net/network/configtx.yaml
2020-04-15 01:24:13.547 IST [common.tools.configtxgen] doOutputAnchorPeersUpdate -> INFO 005 Generating anchor peer update
2020-04-15 01:24:13.548 IST [common.tools.configtxgen] doOutputAnchorPeersUpdate -> INFO 006 Writing anchor peer update
+ res=0
+ set +x
```

```

test-blockchain [Running] - Oracle VM VirtualBox
File Machine View Input Devices Help
Activities Terminal Thu 17:04
upgrad@upgrad-VirtualBox: ~/workspace/pharma-net/network

#####
##### Generating anchor peer update for consumerMSP #####
#####
+ configtxgen -profile pharmachannel -outputAnchorPeersUpdate ./channel-artifacts/consumerMSPanchors.tx -channelID pharmachannel -asOrg consumerMSP
2020-04-15 01:24:13.682 IST [common.tools.configtxgen] main -> INFO 001 Loading configuration
2020-04-15 01:24:13.748 IST [common.tools.configtxgen.localconfig] Load -> INFO 002 Loaded configuration: /home/upgrad/workspace/pharma-net/network/configtx.yaml
2020-04-15 01:24:13.800 IST [common.tools.configtxgen.localconfig] completeInitialization -> INFO 003 orderer type: solo
2020-04-15 01:24:13.808 IST [common.tools.configtxgen.localconfig] LoadTopLevel -> INFO 004 Loaded configuration: /home/upgrad/workspace/pharma-net/network/configtx.yaml
2020-04-15 01:24:13.808 IST [common.tools.configtxgen] doOutputAnchorPeersUpdate -> INFO 005 Generating anchor peer update
2020-04-15 01:24:13.808 IST [common.tools.configtxgen] doOutputAnchorPeersUpdate -> INFO 006 Writing anchor peer update
+ res=0
+ set +x

Creating network "network_pharma" with the default driver
Creating volume "network_orderer.pharma-network.com" with default driver
Creating volume "network_peer0.manufacturer.pharma-network.com" with default driver
Creating volume "network_peer1.manufacturer.pharma-network.com" with default driver
Creating volume "network_peer0.distributor.pharma-network.com" with default driver
Creating volume "network_peer1.distributor.pharma-network.com" with default driver
Creating volume "network_peer0.retailer.pharma-network.com" with default driver
Creating volume "network_peer1.retailer.pharma-network.com" with default driver
Creating volume "network_peer0.transporter.pharma-network.com" with default driver
Creating volume "network_peer1.transporter.pharma-network.com" with default driver
Creating volume "network_peer0.consumer.pharma-network.com" with default driver
Creating volume "network_peer1.consumer.pharma-network.com" with default driver
Creating peer0.manufacturer.pharma-network.com ...
Creating peer1.manufacturer.pharma-network.com ...
Creating orderer.pharma-network.com ...

```

Below is the screenshot of creation of Docker Containers

CONTAINER ID	IMAGE	NAMES	COMMAND	CREATED	STATUS	PORTS
f66cf7526f93	hyperledger/fabric-tools:latest	cli	"bin/bash"	4 seconds ago	Up Less than a second	
532166b37076	hyperledger/fabric-peer:latest	peer1.retailer.pharma-network.com	"peer node start --p..."	3 minutes ago	Up About a minute	0.0.0.0:12
3c2cec6125de	hyperledger/fabric-peer:latest	peer1.consumer.pharma-network.com	"peer node start --p..."	3 minutes ago	Up About a minute	0.0.0.0:16
051->16051/tcp	hyperledger/fabric-peer:latest	peer0.manufacturer.pharma-network.com	"peer node start --p..."	3 minutes ago	Up About a minute	0.0.0.0:70
51->7051/tcp, 0.0.0.0:7053->7053/tcp	hyperledger/fabric-peer:latest	peer0.retailer.pharma-network.com	"sh -c 'fabric-ca-se..."	3 minutes ago	Up About a minute	7054/tcp,
0.0.0.0:13054->13054/tcp	hyperledger/fabric-peer:latest	peer0.transporter.pharma-network.com	"sh -c 'fabric-ca-se..."	3 minutes ago	Up About a minute	7054/tcp,
95e1b6585aac	hyperledger/fabric-peer:latest	peer0.consumer.pharma-network.com	"peer node start --p..."	3 minutes ago	Up About a minute	0.0.0.0:11
051->1051/tcp, 0.0.0.0:11053->11053/tcp	hyperledger/fabric-peer:latest	peer0.transporter.pharma-network.com	"peer node start --p..."	3 minutes ago	Up About a minute	0.0.0.0:13
051->13051/tcp, 0.0.0.0:13053->13053/tcp	hyperledger/fabric-peer:latest	peer0.distributor.pharma-network.com	"sh -c 'fabric-ca-se..."	3 minutes ago	Up About a minute	0.0.0.0:90
03ce24561806	hyperledger/fabric-cacenv:latest	chaincode	"bin/bash -c 'sleep..."	3 minutes ago	Up About a minute	
b218d44af981	hyperledger/fabric-ca:latest		"sh -c 'fabric-ca-se..."	3 minutes ago	Up About a minute	0.0.0.0:70
54->7054/tcp	hyperledger/fabric-ca:latest	ca.manufacturer.pharma-network.com	"sh -c 'fabric-ca-se..."	3 minutes ago	Up About a minute	7054/tcp,
1968628a3274	hyperledger/fabric-ca:latest	ca.distributor.pharma-network.com	"sh -c 'fabric-ca-se..."	3 minutes ago	Up About a minute	7054/tcp,
0.0.0.0:9054->9054/tcp	hyperledger/fabric-ca:latest	ca.retailer.pharma-network.com	"sh -c 'fabric-ca-se..."	3 minutes ago	Up About a minute	7054/tcp,
ad564cffb26a	hyperledger/fabric-ca:latest	ca.consumer.pharma-network.com	"sh -c 'fabric-ca-se..."	3 minutes ago	Up About a minute	7054/tcp,
0.0.0.0:11054->11054/tcp	hyperledger/fabric-peer:latest	peer1.transporter.pharma-network.com	"peer node start --p..."	3 minutes ago	Up About a minute	0.0.0.0:14
c98fdbcb41dc	hyperledger/fabric-peer:latest	peer1.consumer.pharma-network.com	"peer node start --p..."	3 minutes ago	Up About a minute	0.0.0.0:15
0a571850080e	hyperledger/fabric-peer:latest	peer1.distributor.pharma-network.com	"peer node start --p..."	3 minutes ago	Up About a minute	0.0.0.0:90
051->14051/tcp, 0.0.0.0:14053->14053/tcp	hyperledger/fabric-peer:latest	peer0.transporter.pharma-network.com	"peer node start --p..."	3 minutes ago	Up About a minute	0.0.0.0:15
1d25431c29c4	hyperledger/fabric-peer:latest	peer0.consumer.pharma-network.com	"peer node start --p..."	3 minutes ago	Up About a minute	0.0.0.0:16
051->15051/tcp, 0.0.0.0:15053->15053/tcp	hyperledger/fabric-peer:latest	peer0.distributor.pharma-network.com	"peer node start --p..."	3 minutes ago	Up About a minute	0.0.0.0:90

Below are the screenshots of Creating Channel and Peers joining the Channel

```
Setting Up Hyperledger Fabric Network

Channel name : pharmachannel
Creating channel...
+ peer channel create -o orderer.pharma-network.com:7050 -c pharmachannel -f ./channel-artifacts/channel.tx
+ res=0
+ set +x
2020-04-27 11:55:50.363 UTC [channelCmd] InitCmdFactory -> INFO 001 Endorser and orderer connections initialized
2020-04-27 11:55:50.682 UTC [cli.common] readBlock -> INFO 002 Received block: 0
===== Channel 'pharmachannel' created =====

Having all peers join the channel...
+ peer channel join -b pharmachannel.block
+ res=0
+ set +x
2020-04-27 11:55:50.911 UTC [channelCmd] InitCmdFactory -> INFO 001 Endorser and orderer connections initialized
2020-04-27 11:55:51.095 UTC [channelCmd] executeJoin -> INFO 002 Successfully submitted proposal to join channel
===== peer0.manufacturer.pharma-network.com joined channel 'pharmachannel' =====

+ peer channel join -b pharmachannel.block
+ res=0
+ set +x
2020-04-27 11:55:56.251 UTC [channelCmd] InitCmdFactory -> INFO 001 Endorser and orderer connections initialized
2020-04-27 11:55:56.365 UTC [channelCmd] executeJoin -> INFO 002 Successfully submitted proposal to join channel
===== peer1.manufacturer.pharma-network.com joined channel 'pharmachannel' =====

+ peer channel join -b pharmachannel.block
+ res=0
+ set +x
2020-04-27 11:56:22.602 UTC [channelCmd] InitCmdFactory -> INFO 001 Endorser and orderer connections initialized
2020-04-27 11:56:22.713 UTC [channelCmd] executeJoin -> INFO 002 Successfully submitted proposal to join channel
===== peer0.consumer.pharma-network.com joined channel 'pharmachannel' =====

+ peer channel join -b pharmachannel.block
+ res=0
+ set +x
2020-04-27 11:56:27.886 UTC [channelCmd] InitCmdFactory -> INFO 001 Endorser and orderer connections initialized
2020-04-27 11:56:28.000 UTC [channelCmd] executeJoin -> INFO 002 Successfully submitted proposal to join channel
===== peer1.consumer.pharma-network.com joined channel 'pharmachannel' =====

+ peer channel join -b pharmachannel.block
+ res=0
+ set +x
2020-04-27 11:56:33.148 UTC [channelCmd] InitCmdFactory -> INFO 001 Endorser and orderer connections initialized
2020-04-27 11:56:33.255 UTC [channelCmd] executeJoin -> INFO 002 Successfully submitted proposal to join channel
===== peer0.transporter.pharma-network.com joined channel 'pharmachannel' =====

+ peer channel join -b pharmachannel.block
+ res=0
+ set +x
2020-04-27 11:56:38.381 UTC [channelCmd] InitCmdFactory -> INFO 001 Endorser and orderer connections initialized
2020-04-27 11:56:38.479 UTC [channelCmd] executeJoin -> INFO 002 Successfully submitted proposal to join channel
===== peer1.transporter.pharma-network.com joined channel 'pharmachannel' =====

+ peer channel join -b pharmachannel.block
+ res=0
+ set +x
2020-04-27 11:56:01.566 UTC [channelCmd] InitCmdFactory -> INFO 001 Endorser and orderer connections initialized
2020-04-27 11:56:01.664 UTC [channelCmd] executeJoin -> INFO 002 Successfully submitted proposal to join channel
===== peer0.distributor.pharma-network.com joined channel 'pharmachannel' =====

+ peer channel join -b pharmachannel.block
+ res=0
+ set +x
2020-04-27 11:56:06.848 UTC [channelCmd] InitCmdFactory -> INFO 001 Endorser and orderer connections initialized
2020-04-27 11:56:06.940 UTC [channelCmd] executeJoin -> INFO 002 Successfully submitted proposal to join channel
===== peer1.distributor.pharma-network.com joined channel 'pharmachannel' =====

+ peer channel join -b pharmachannel.block
+ res=0
+ set +x
2020-04-27 11:56:12.146 UTC [channelCmd] InitCmdFactory -> INFO 001 Endorser and orderer connections initialized
2020-04-27 11:56:12.234 UTC [channelCmd] executeJoin -> INFO 002 Successfully submitted proposal to join channel
===== peer0.retailer.pharma-network.com joined channel 'pharmachannel' =====

+ peer channel join -b pharmachannel.block
+ res=0
+ set +x
2020-04-27 11:56:17.357 UTC [channelCmd] InitCmdFactory -> INFO 001 Endorser and orderer connections initialized
2020-04-27 11:56:17.453 UTC [channelCmd] executeJoin -> INFO 002 Successfully submitted proposal to join channel
===== peer1.retailer.pharma-network.com joined channel 'pharmachannel' =====
```

Below are the screenshots of updating the anchor peers, after successful anchor peers updatation and END will be echoed

```
Having all peer0 update the channel...
Updating anchor peers for manufacturer...
+ peer channel update -o orderer.pharma-network.com:7050 -c pharmachannel -f ./channel-artifacts/manufacturerMSPanchors.tx
+ res=0
+ set +x
2020-04-27 11:56:43.657 UTC [channelCmd] InitCmdFactory -> INFO 001 Endorser and orderer connections initialized
2020-04-27 11:56:43.705 UTC [channelCmd] update -> INFO 002 Successfully submitted channel update
===== Anchor peers updated for org 'manufacturerMSP' on channel 'pharmachannel' =====

Updating anchor peers for distributor...
+ peer channel update -o orderer.pharma-network.com:7050 -c pharmachannel -f ./channel-artifacts/distributorMSPanchors.tx
+ res=0
+ set +x
2020-04-27 11:56:48.846 UTC [channelCmd] InitCmdFactory -> INFO 001 Endorser and orderer connections initialized
2020-04-27 11:56:48.913 UTC [channelCmd] update -> INFO 002 Successfully submitted channel update
===== Anchor peers updated for org 'distributorMSP' on channel 'pharmachannel' =====

Updating anchor peers for retailer...
+ peer channel update -o orderer.pharma-network.com:7050 -c pharmachannel -f ./channel-artifacts/retailerMSPanchors.tx
+ res=0
+ set +x
2020-04-27 11:56:54.038 UTC [channelCmd] InitCmdFactory -> INFO 001 Endorser and orderer connections initialized
2020-04-27 11:56:54.083 UTC [channelCmd] update -> INFO 002 Successfully submitted channel update
===== Anchor peers updated for org 'retailerMSP' on channel 'pharmachannel' =====

Updating anchor peers for consumer...
+ peer channel update -o orderer.pharma-network.com:7050 -c pharmachannel -f ./channel-artifacts/consumerMSPanchors.tx
+ res=0
+ set +x
2020-04-27 11:56:59.203 UTC [channelCmd] InitCmdFactory -> INFO 001 Endorser and orderer connections initialized
2020-04-27 11:56:59.259 UTC [channelCmd] update -> INFO 002 Successfully submitted channel update
===== Anchor peers updated for org 'consumerMSP' on channel 'pharmachannel' =====

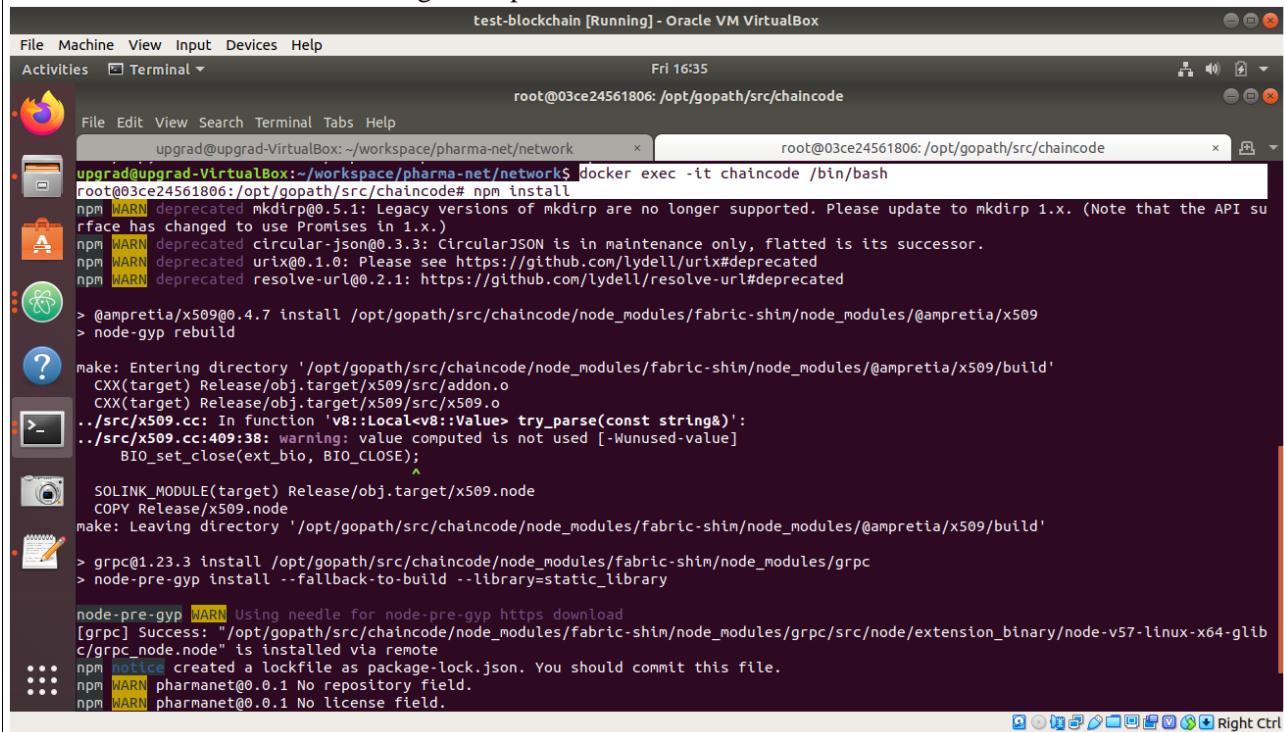
Updating anchor peers for transporter...
+ peer channel update -o orderer.pharma-network.com:7050 -c pharmachannel -f ./channel-artifacts/transporterMSPanchors.tx
+ res=0
+ set +x
2020-04-27 11:57:04.427 UTC [channelCmd] InitCmdFactory -> INFO 001 Endorser and orderer connections initialized
2020-04-27 11:57:04.501 UTC [channelCmd] update -> INFO 002 Successfully submitted channel update
===== Anchor peers updated for org 'transporterMSP' on channel 'pharmachannel' =====

===== All GOOD, Hyperledger Fabric Pharma Network Is Now Up and Running! =====
```

Installing dependencies:

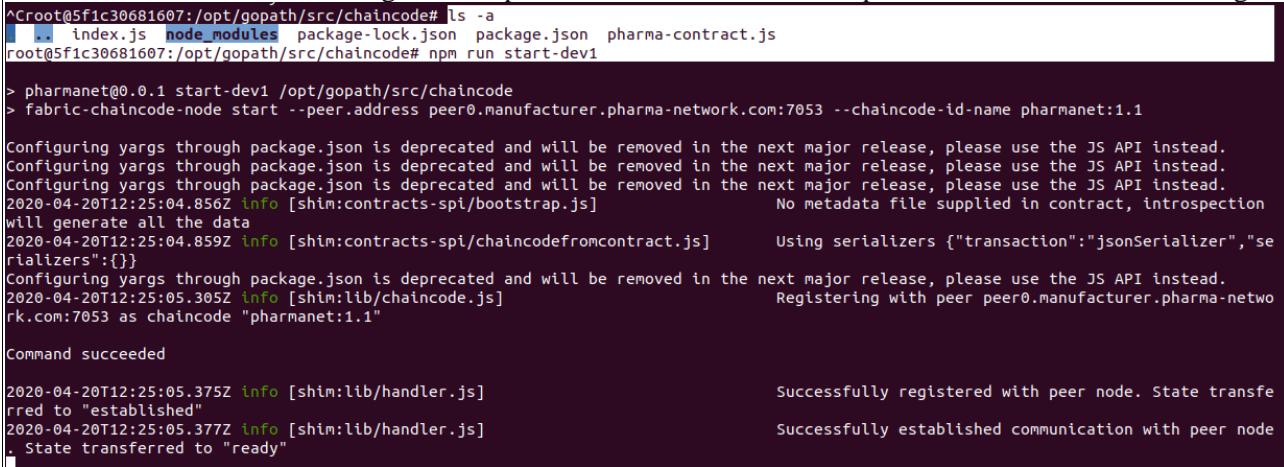
1. Ensure that all the dependencies mentioned in the package.json file are available as node_modules inside the chaincode folder. To generate node_modules, open a new tab in the terminal
2. SSH into chaincode container using command `docker exec -it chaincode /bin/bash`
3. Install the dependencies using `npm install`
4. Type the command “ls” to list the files present in chaincode folder
5. Run the node script using `npm run start-dev1`
6. After the command succeeded a message “state transferred to Ready” will be prompted

Below is the screenshot of installing the dependencies



```
test-blockchain [Running] - Oracle VM VirtualBox
File Machine View Input Devices Help
Activities Terminal Fri 16:35
root@03ce24561806:/opt/gopath/src/chaincode
File Edit View Search Terminal Tabs Help
upgrad@upgrad-VirtualBox:~/workspace/pharma-net/network$ docker exec -it chaincode /bin/bash
root@03ce24561806:/opt/gopath/src/chaincode# npm install
npm WARN deprecated mkdirp@0.5.1: Legacy versions of mkdirp are no longer supported. Please update to mkdirp 1.x. (Note that the API surface has changed to use Promises in 1.x.)
npm WARN deprecated circular-json@0.3.3: CircularJSON is in maintenance only, flattened is its successor.
npm WARN deprecated urix@0.1.0: Please see https://github.com/lydell/urix#deprecated
npm WARN deprecated resolve-url@0.2.1: https://github.com/lydell/resolve-url#deprecated
> @ampretia/x509@0.4.7 install /opt/gopath/src/chaincode/node_modules/fabric-shim/node_modules/@ampretia/x509
> node-gyp rebuild
make: Entering directory '/opt/gopath/src/chaincode/node_modules/fabric-shim/node_modules/@ampretia/x509/build'
  CXX(target) Release/obj.target/x509/src/addon.o
  CXX(target) Release/obj.target/x509/src/x509.o
  ./src/x509.cc: In function 'v8::Local<v8::Value> try_parse(const string&)':
  ./src/x509.cc:409:38: warning: value computed is not used [-Wunused-value]
    BIO_set_close(ext_bio, BIO_CLOSE);
  ^
  SOLINK_MODULE(target) Release/obj.target/x509.node
  COPY Release/x509.node
make: Leaving directory '/opt/gopath/src/chaincode/node_modules/fabric-shim/node_modules/@ampretia/x509/build'
> grpc@1.23.3 install /opt/gopath/src/chaincode/node_modules/fabric-shim/node_modules/grpc
> node-pre-gyp install --fallback-to-build --library=static_library
node-pre-gyp WARN Using needle for node-pre-gyp https download
[grpc] Success: "/opt/gopath/src/chaincode/node_modules/fabric-shim/node_modules/grpc/src/node/extension_binary/node-v57-linux-x64-glib
c/grpc_node.node" is installed via remote
npm notice created a lockfile as package-lock.json. You should commit this file.
npm WARN pharmanet@0.0.1 No repository field.
npm WARN pharmanet@0.0.1 No license field.
```

Below is the screenshot of listing the files present in chaincode folder of pharma-net and result of running the node script



```
root@5f1c30681607:/opt/gopath/src/chaincode# ls -a
. .. index.js node_modules package-lock.json package.json pharma-contract.js
root@5f1c30681607:/opt/gopath/src/chaincode# npm run start-dev1

> pharmanet@0.0.1 start-dev1 /opt/gopath/src/chaincode
> fabric-chaincode-node start --peer.address peer0.manufacturer.pharma-network.com:7053 --chaincode-id-name pharmanet:1.1

Configuring yargs through package.json is deprecated and will be removed in the next major release, please use the JS API instead.
Configuring yargs through package.json is deprecated and will be removed in the next major release, please use the JS API instead.
Configuring yargs through package.json is deprecated and will be removed in the next major release, please use the JS API instead.
2020-04-20T12:25:04.856Z info [shim:contracts-spi/bootstrap.js]           No metadata file supplied in contract, introspection
will generate all the data
2020-04-20T12:25:04.859Z info [shim:contracts-spi/chaincodefromcontract.js]   Using serializers {"transaction": "jsonSerializer", "se
rializers": {}}
Configuring yargs through package.json is deprecated and will be removed in the next major release, please use the JS API instead.
2020-04-20T12:25:05.305Z info [shim:lib/chaincode.js]                         Registering with peer peer0.manufacturer.pharma-netwo
rk.com:7053 as chaincode "pharmanet:1.1"

Command succeeded
2020-04-20T12:25:05.375Z info [shim:lib/handler.js]                          Successfully registered with peer node. State transfe
rred to "established"
2020-04-20T12:25:05.377Z info [shim:lib/handler.js]                          Successfully established communication with peer node
State transferred to "ready"
```

Install and Instantiate the chaincode on the network

1. Open the new tab in the terminal and run the command `./fabricNetwork.sh install`
2. Chaincode is installed on all the peers of all organisations and instantiated on the peer0 of manufacturer

Below is the screenshot of the chaincode installation on peer0 & peer1 of all the five organisations

The screenshot shows two terminal windows side-by-side, both titled "test-blockchain [Running] - Oracle VM VirtualBox".
The top terminal window (Fri 16:46) shows the command being run: `upgrad@upgrad-VirtualBox:~/workspace/pharma-net/network$./fabricNetwork.sh install`. It outputs the following log:

```
Installing chaincode for channel 'pharmachannel' with CLI timeout of '15' seconds and CLI delay of '5' seconds and chaincode version '1.1'
Continue? [Y/n] y
proceeding ...
LOCAL_VERSION=1.4.2
DOCKER_IMAGE_VERSION=1.4.3
=====
WARNING =====
Local fabric binaries and docker images are
out of sync. This may cause problems.
=====
```

Then it shows the deployment of chaincode PHARMANET On Pharma Network:

```
Deploying Chaincode PHARMANET On Pharma Network
Channel name : pharmachannel
Installing chaincode on peer0.manufacturer.pharma-network.com ...
+ peer chaincode install -n pharmanet -v 1.1 -l node -p /opt/gopath/src/github.com/hyperledger/fabric/peer/chaincode/
+ res=0
+ set +x
2020-04-17 11:09:06.456 UTC [chaincodeCmd] checkChaincodeCmdParams -> INFO 001 Using default escc
2020-04-17 11:09:06.456 UTC [chaincodeCmd] checkChaincodeCmdParams -> INFO 002 Using default vscc
2020-04-17 11:09:16.228 UTC [chaincodeCmd] install -> INFO 003 Installed remotely response:<status:200 payload:"OK" >
=====
Chaincode is installed on peer0.manufacturer
=====
```

It then moves on to installing chaincode on peer1.manufacturer.pharma-network.com ...

The bottom terminal window (Fri 16:47) shows the continuation of the chaincode installation process, specifically for peer1.manufacturer.pharma-network.com. The log output is very similar to the top window, detailing the installation steps for each of the five organizations (distributor, retailer, consumer, and manufacturer) across their respective peer nodes (peer0 and peer1). The logs show the chaincode being installed and instantiated on each peer node, with success messages indicating the payload was "OK".

Below is the screenshot of successfull installation and instantiation of chaincode on the respective peers

```
Instantiating chaincode on channel using peer0.manufacturer.pharma-network.com ...
+ peer chaincode instantiate -o orderer.pharma-network.com:7050 -C pharmachannel -n pharanet -l node -v 1.1 -c '{"Args":["org.pharma-network.pharanet:instantiate"]}' -P 'OR ('\\'manufacturerMSP.member'\\',\\'distributorMSP.member'\\',\\'retailerMSP.member'\\',\\'transporterMSP.member'\\',\\'consumerMSP.member'\\')'
+ res=0
+ set +x
2020-04-27 12:03:30.553 UTC [chaincodeCmd] checkChaincodeCmdParams -> INFO 001 Using default escc
2020-04-27 12:03:30.553 UTC [chaincodeCmd] checkChaincodeCmdParams -> INFO 002 Using default vscc
===== Chaincode is instantiated on peer0.manufacturer on channel 'pharmachannel' =====

===== All GOOD, Chaincode PHARMANET Is Now Installed & Instantiated On Pharma Network =====
```

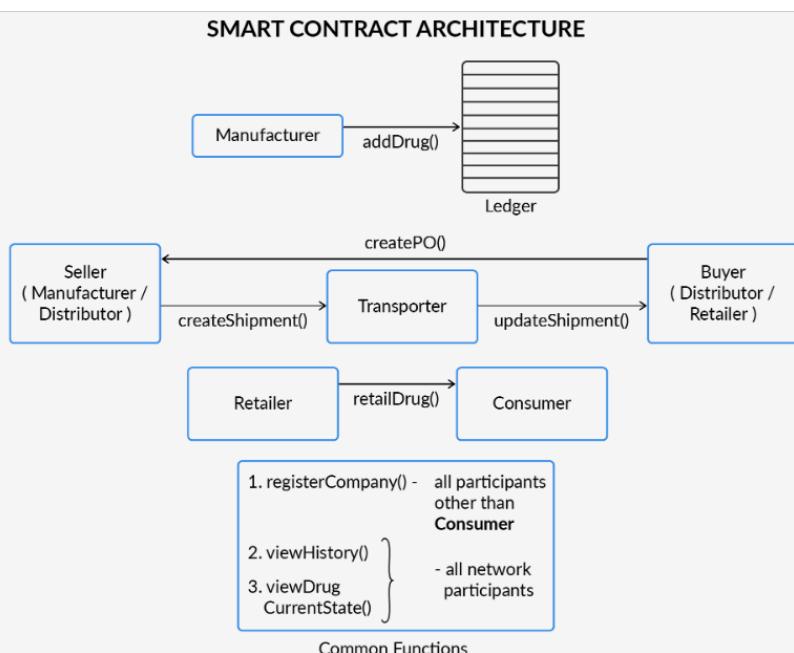
[END]

Segment2 : ChaincodeDevelopment – Invoking the functions

Introduction

The chaincode has one smart contracts a.Pharma Contract

Smart Contract Architecture



List Of Functions:

FunctionName	Parameters	Organisations Access to the functions
registerCompany	(companyCRN, companyName, location, organisationRole)	Manufacturer, Distributor, Retailer Transporter
addDrug	(drugName, serialNo, mfgDate, expDate, companyCRN)	Manufacturer
createPO	(buyerCRN, sellerCRN, drugName, quantity)	Distributor, Retailer
createShipment	(buyerCRN, drugName, listOfAssets, transporterCRN)	Manufacturer, Distributor
updateShipment	(buyerCRN, drugName, transporterCRN)	Transporter
retailDrug	(drugName, serialNo, retailerCRN, customerAadhar)	Retailer
ViewHistory	(drugName, serialNo)	Manufacturer, Distributor, Retailer Transporter, Consumer
viewDrugCurrentState	(drugName, serialNo)	Manufacturer, Distributor, Retailer Transporter, Consumer

Process Of Execution:

1. First the respective script of particular Org-peer is run in the tab of chaincode container
2. Second respective function of partitular Org is invoked by ssh ing into the respective peer container

Note 1:

1. *Make sure to be in the particular path `cd ~/workspace/pharma-net/network/`*
2. *SSH into chaincode container `docker exec -it chaincode /bin/bash` to start the chaincode service on the container in a new tab*
3. *`npm run start-dev1` for manufacturer*
4. *`npm run start-dev2` for distributor*
5. *`npm run start-dev3` for retailer*
6. *`npm run start-dev4` for transporter*
7. *`npm run start-dev5` for consumer*
8. *Before running the next script make sure stop the previously running script by `cntrl+c`*

Note 2:

1. *Make sure to be in the particular path `cd ~/workspace/pharma-net/network/`*
2. *For invoking the respective functions of that particular Organisation*
3. *Maintain five new tabs in the terminal for five Organisations*
4. *SSH into respective Peer for invoking the function from the respective tab*
5. *`docker exec -it peer0.manufacturer.pharma-network.com /bin/bash` for manufacturer*
6. *`docker exec -it peer0.distributor.pharma-network.com /bin/bash` for distributor*
7. *`docker exec -it peer0.retailer.pharma-network.com /bin/bash` for retailer*
8. *`docker exec -it peer0.transporter.pharma-network.com /bin/bash` for transporter*
9. *`docker exec -it peer0.consumer.pharma-network.com /bin/bash` for consumer*

TestCase1: Initiation

functionName	TestCases
RegisterCompany by Manufacturer, Distributor,Retailer, Transporter	(“MAN001”, “Sun Pharma”, “Chennai”, “Manufacturer”) (“DIST001”, “VG Pharma”, “Chennai”, “Distributor”) (“RET002”, “upgrad”, “Mumbai”, “Retailer”) (“TRA001”, “FedEx”, “Delhi”, “Transporter”) (“TRA002”, “Blue Dart”, “Banglore”, “Transporter”)
Validation	If a company is already registered : An error message is prompted (“MAN001”, “Sun Pharma”, “Chennai”, “Manufacturer”)
addDrug by Manufacturer(MAN001)	(“Paracetamol”, “001”, “04-20”, “03-23”, “MAN001”) (“Paracetamol”, “002”, “04-20”, “03-23”, “MAN002”) (“Paracetamol”, “003”, “04-20”, “03-23”, “MAN003”) (“Paracetamol”, “004”, “04-20”, “03-23”, “MAN004”)
Validation	If the Manufacturer is not registered on the network, but trying to add the drug : An error message is prompted (“Paracetamol”, “0016”, “04-20”, “03-23”, “MAN016”)

- registerCompany : Manufacturer – Sun Pharma
- docker exec -it peer0.manufacturer.pharma-network.com /bin/bash
- peer chaincode invoke -o orderer.pharma-network.com:7050 -C pharmachannel -n pharmanet -c '{ "Args": ["org.pharma-network.pharmanet:registerCompany", "MAN001", "Sun Pharma", "Chennai", "Manufacturer"]}'



```
test-blockchain [Running] - Oracle VM VirtualBox
File Machine View Input Devices Help
Activities Terminal Mon 23:41
root@4acda9fa84e6:/opt/gopath/src/github.com/hyperledger/fabric/peer
File Edit View Search Terminal Help
upgrad@upgrad-VirtualBox:~/workspace/pharma-net/network$ docker exec -it peer0.manufacturer.pharma-network.com /bin/bash
root@4acda9fa84e6:/opt/gopath/src/github.com/hyperledger/fabric/peer# peer chaincode invoke -o orderer.pharma-network.com:7050 -C pharmachannel -n pharmanet -c '{"Args": ["org.pharma-network.pharmanet:registerCompany", "MAN001", "Sun Pharma", "Chennai", "Manufacturer"]}'
2020-04-20 18:11:08.623 UTC [chaincodeCmd] chaincodeInvokeOrQuery -> INFO 001 Chaincode invoke successful. result: status:200 payload:{"companyID":"\u0000org.pharma-network.pharmanet.company\u0000MAN001-Sun Pharma\u0000","companyName":"Sun Pharma","location":"Chennai","organisationRole":"Manufacturer","hierarchyKey":1,"requestedBy":\u0000x509::C=US/ST=California/L=San Francisco/O=manufacturer.pharma-network.com/CN=ca.manufacturer.pharma-network.com","createdAt":"2020-04-20T18:11:08.597Z"}'
root@4acda9fa84e6:/opt/gopath/src/github.com/hyperledger/fabric/peer#
```

- Validation : Trying to register the same company : An error message is prompted
- peer chaincode invoke -o orderer.pharma-network.com:7050 -C pharmachannel -n pharmanet -c '{ "Args": ["org.pharma-network.pharmanet:registerCompany", "MAN001", "Sun Pharma", "Chennai", "Manufacturer"]}'



```
root@6d6338f9929a:/opt/gopath/src/github.com/hyperledger/fabric/peer# peer chaincode invoke -o orderer.pharma-network.com:7050 -C pharmachannel -n pharmanet -c '{ "Args": ["org.pharma-network.pharmanet:registerCompany", "MAN001", "Sun Pharma", "Chennai", "Manufacturer"]}' Error: endorsement failure during invoke. response: status:500 message:"transaction returned with failure: Error: Company Asset Already Exists in the network"
root@6d6338f9929a:/opt/gopath/src/github.com/hyperledger/fabric/peer#
```

- registerCompany : Distributor– VG Pharma
- docker exec -it peer0.distributor.pharma-network.com /bin/bash
- peer chaincode invoke -o orderer.pharma-network.com:7050 -C pharmachannel -n pharmanet -c '{"Args":["org.pharma-network.pharmanet:registerCompany","DIST001","VG Pharma", "Vizag", "Distributor"]}'

```

File Machine View Input Devices Help
Activities Terminal Mon 23:46
root@06e6cdf84e59:/opt/gopath/src/github.com/hyperledger/fabric/peer
File Edit View Search Terminal Tabs Help
upgrad@upgrad-VirtualBox:~/workspace/pharma-net/network$ docker exec -it peer0.distributor.pharma-network.com /bin/bash
root@06e6cdf84e59:/opt/gopath/src/github.com/hyperledger/fabric/peer# peer chaincode invoke -o orderer.pharma-network.com:7050 -C pharmachannel -n pharmanet -c '{"Args":["org.pharma-network.pharmanet:registerCompany","DIST001","VG Pharma", "Vizag", "Distributor"]}'
2020-04-28 19:16:11.514 UTC [chaincodeCmd] chaincodeInvokeOrQuery > INFO 001 Chaincode invoke successful. result: status:200 payload:>{"companyID":"\u0000org.pharma-network.pharmanet.company\u0000DIST001-VG Pharma\u0000"," companyName": "VG Pharma", "location": "Vizag", "organisationRole": "Distributor", "hierarchyKey": 2, "requestedBy": "x509::/C=US/ST=California/L=San Francisco/O=distributor.pharma-network.com", "createdAt": "2020-04-28T10:16:11.480Z"}'
root@06e6cdf84e59:/opt/gopath/src/github.com/hyperledger/fabric/peer#

```

- registerCompany : Retailer– upgrad
- docker exec -it peer0.retailer.pharma-network.com /bin/bash
- peer chaincode invoke -o orderer.pharma-network.com:7050 -C pharmachannel -n pharmanet -c '{"Args":["org.pharma-network.pharmanet:registerCompany","RET002","upgrad", "Mumbai", "Retailer"]}'

```

File Machine View Input Devices Help
Activities Terminal Mon 23:49
root@e8d968a33ae5:/opt/gopath/src/github.com/hyperledger/fabric/peer
File Edit View Search Terminal Tabs Help
upgrad@upgrad-Virt... x root@3637a4e6529d... x upgrad@upgrad-Virt... x root@4acda9fa84e6:... x root@06e6cdf84e59:... x root@e8d968a33ae5... x
upgrad@upgrad-VirtualBox:~/workspace/pharma-net/network$ docker exec -it peer0.retailer.pharma-network.com /bin/bash
root@e8d968a33ae5:/opt/gopath/src/github.com/hyperledger/fabric/peer# peer chaincode invoke -o orderer.pharma-network.com:7050 -C pharmachannel -n pharmanet -c '{"Args":["org.pharma-network.pharmanet:registerCompany","RET002","upgrad", "Mumbai", "Retailer"]}'
2020-04-28 18:18:46.052 UTC [chaincodeCmd] chaincodeInvokeOrQuery > INFO 001 Chaincode invoke successful. result: status:200 payload:>{"companyID":"\u0000org.pharma-network.pharmanet.company\u0000RET002-upgrad\u0000"," companyName": "upgrad", "location": "Mumbai", "organisationRole": "Retailer", "hierarchyKey": 3, "requestedBy": "x509::/C=US/ST=California/L=San Francisco/O=retailer.pharma-network.com/CN=ca.retailer.pharma-network.com", "createdAt": "2020-04-28T18:18:46.018Z"}'
root@e8d968a33ae5:/opt/gopath/src/github.com/hyperledger/fabric/peer#

```

- registerCompany : Transporter– FedEx
- docker exec -it peer0.transporter.pharma-network.com /bin/bash
- peer chaincode invoke -o orderer.pharma-network.com:7050 -C pharmachannel -n pharmanet -c '{"Args":["org.pharma-network.pharmanet:registerCompany","TRA001","FedEx","Delhi", "Transporter"]}]'
- registerCompany : Transporter– Blue Dart
- peer chaincode invoke -o orderer.pharma-network.com:7050 -C pharmachannel -n pharmanet -c '{"Args":["org.pharma-network.pharmanet:registerCompany","TRA002","Blue Dart", "Banglore", "Transporter"]}]'

```

root@8bef08e65018: /opt/gopath/src/github.com/hyperledger/fabric/peer
File Edit View Search Terminal Tabs Help
upgrad@upgrad... x root@3637a4e6... x upgrad@upgrad... x root@4acd9fa8a... x root@06ecd84... x root@e8d968a3... x root@8bef08e6... x
upgrad@upgrad-VirtualBox:~/workspace/pharma-net/network$ docker exec -it peer0.transporter.pharma-network.com /bin/bash
root@8bef08e65018:/opt/gopath/src/github.com/hyperledger/fabric/peer# peer chaincode invoke -o orderer.pharma-network.com:7050 -C pharmachannel -n pharmanet -c '{"Args":["org.pharma-network.pharmanet:registerCompany","TRA001","FedEx","Delhi", "Transporter"]}]'
2020-04-20 18:22:08.244 UTC [chaincodeCmd] chaincodeInvokeOrQuery -> INFO 001 Chaincode invoke successful. result: status:200 payload: "{\"companyID\":\"\\\"\\u0000org.pharma-network.pharmanet.company\\\"\\u0000TRA001-FedEx\\\"\\u0000\", \"companyName\":\"FedEx\", \"location\":\"Delhi\", \"organisationRole\":\"Transporter\", \"hierarchyKey\":0, \"requestedBy\":\"\\\"x509::C=US/ST=California/L=San Francisco/O=peer/CN=peer0.transporter.pharma-network.com::C=US/ST=California/L=San Francisco/O=transporter.pharma-network.com/CN=ca.transporter.pharma-network.com\\\", \"createdAt\":\"\\\"2020-04-20T18:22:08.187Z\\\""}"
root@8bef08e65018:/opt/gopath/src/github.com/hyperledger/fabric/peer# peer chaincode invoke -o orderer.pharma-network.com:7050 -C pharmachannel -n pharmanet -c '{"Args":["org.pharma-network.pharmanet:registerCompany","TRA002","Blue Dart", "Transporter"]}]'
2020-04-20 18:23:26.640 UTC [chaincodeCmd] chaincodeInvokeOrQuery -> INFO 001 Chaincode invoke successful. result: status:200 payload: "{\"companyID\":\"\\\"\\u0000org.pharma-network.pharmanet.company\\\"\\u0000TRA002-Blue Dart\\\"\\u0000\", \"companyName\":\"Blue Dart\", \"location\":\"Banglore\", \"organisationRole\":\"Transporter\", \"hierarchyKey\":0, \"requestedBy\":\"\\\"x509::C=US/ST=California/L=San Francisco/O=transporter.pharma-network.com::C=US/ST=California/L=San Francisco/O=transporter.pharma-network.com/CN=ca.transporter.pharma-network.com\\\", \"createdAt\":\"\\\"2020-04-20T18:23:26.621Z\\\""}"
root@8bef08e65018:/opt/gopath/src/github.com/hyperledger/fabric/peer#

```

- addDrug: Creating 4 strips of a drug named ‘Paracetamol’ with serial number starting from ‘001’ to ‘004’
- docker exec -it peer0.manufacturer.pharma-network.com /bin/bash
- peer chaincode invoke -o orderer.pharma-network.com:7050 -C pharmachannel -n pharmanet -c '{"Args":["org.pharma-network.pharmanet:addDrug","Paracetamol","001","04-20","03-23","MAN001"]}]'
- peer chaincode invoke -o orderer.pharma-network.com:7050 -C pharmachannel -n pharmanet -c '{"Args":["org.pharma-network.pharmanet:addDrug","Paracetamol","002","04-20","03-23","MAN001"]}]'
- peer chaincode invoke -o orderer.pharma-network.com:7050 -C pharmachannel -n pharmanet -c '{"Args":["org.pharma-network.pharmanet:addDrug","Paracetamol","003","04-20","03-23","MAN001"]}]'
- peer chaincode invoke -o orderer.pharma-network.com:7050 -C pharmachannel -n pharmanet -c '{"Args":["org.pharma-network.pharmanet:addDrug","Paracetamol","004","04-20","03-23","MAN001"]}]'

```

root@4acd9fa84e6:/opt/gopath/src/github.com/hyperledger/fabric/peer# peer chaincode invoke -o orderer.pharma-network.com:7050 -C pharmachannel -n pharmanet -c '{"Args":["org.pharma-network.pharmanet:addDrug","Paracetamol","001","04-20","03-23","MAN001"]}]'
2020-04-20 19:02:18.786 UTC [chaincodeCmd] chaincodeInvokeOrQuery -> INFO 001 Chaincode invoke successful. result: status:200 payload: "{\"productID\":\"\\\"\\u0000org.pharma-network.pharmanet.drug\\\"\\u0000Paracetamol-001\\\"\\u0000\", \"manufacturer\":\"\\\"\\u0000org.pharma-network.pharmanet.company\\\"\\u0000MAN001\\\"\\u0000\", \"drugName\":\"Paracetamol\", \"mfgDate\":\"04-20\", \"expDate\":\"03-23\", \"owner\":\"\\\"\\u0000org.pharma-network.pharmanet.company\\\"\\u0000MAN001\\\"\\u0000\", \"shipment\":[], \"addedBy\":\"\\\"x509::C=US/ST=California/L=San Francisco/O=peer0.manufacturer.pharma-network.com::C=US/ST=California/L=San Francisco/O=manufacturer.pharma-network.com/CN=ca.manufacturer.pharma-network.com\\\", \"transactionId\":\"\\\"2ebaca478b89d98da2cad41780efde95e4d2ee971d7aa8aa94e6bd9b55f52db\\\", \"createdAt\":\"\\\"2020-04-20T19:02:18.764Z\\\", \"updatedAt\":\"\\\"2020-04-20T19:02:18.764Z\\\""}"
root@4acd9fa84e6:/opt/gopath/src/github.com/hyperledger/fabric/peer# peer chaincode invoke -o orderer.pharma-network.com:7050 -C pharmachannel -n pharmanet -c '{"Args":["org.pharma-network.pharmanet:addDrug","Paracetamol","002","04-20","03-23","MAN001"]}]'
2020-04-20 19:04:09.366 UTC [chaincodeCmd] chaincodeInvokeOrQuery -> INFO 001 Chaincode invoke successful. result: status:200 payload: "{\"productID\":\"\\\"\\u0000org.pharma-network.pharmanet.drug\\\"\\u0000Paracetamol-002\\\"\\u0000\", \"manufacturer\":\"\\\"\\u0000org.pharma-network.pharmanet.company\\\"\\u0000MAN001\\\"\\u0000\", \"drugName\":\"Paracetamol\", \"mfgDate\":\"04-20\", \"expDate\":\"03-23\", \"owner\":\"\\\"\\u0000org.pharma-network.pharmanet.company\\\"\\u0000MAN001\\\"\\u0000\", \"shipment\":[], \"addedBy\":\"\\\"x509::C=US/ST=California/L=San Francisco/O=peer0.manufacturer.pharma-network.com::C=US/ST=California/L=San Francisco/O=manufacturer.pharma-network.com/CN=ca.manufacturer.pharma-network.com\\\", \"transactionId\":\"\\\"d18eabab41fc8fc6117f12fe3c86829fd8f1eea28fa34189d23fbfa2414aae6\\\", \"createdAt\":\"\\\"2020-04-20T19:04:09.355Z\\\", \"updatedAt\":\"\\\"2020-04-20T19:04:09.355Z\\\""}"
root@4acd9fa84e6:/opt/gopath/src/github.com/hyperledger/fabric/peer# peer chaincode invoke -o orderer.pharma-network.com:7050 -C pharmachannel -n pharmanet -c '{"Args":["org.pharma-network.pharmanet:addDrug","Paracetamol","003","04-20","03-23","MAN001"]}]'
2020-04-20 19:04:09.366 UTC [chaincodeCmd] chaincodeInvokeOrQuery -> INFO 001 Chaincode invoke successful. result: status:200 payload: "{\"productID\":\"\\\"\\u0000org.pharma-network.pharmanet.drug\\\"\\u0000Paracetamol-003\\\"\\u0000\", \"manufacturer\":\"\\\"\\u0000org.pharma-network.pharmanet.company\\\"\\u0000MAN001\\\"\\u0000\", \"drugName\":\"Paracetamol\", \"mfgDate\":\"04-20\", \"expDate\":\"03-23\", \"owner\":\"\\\"\\u0000org.pharma-network.pharmanet.company\\\"\\u0000MAN001\\\"\\u0000\", \"shipment\":[], \"addedBy\":\"\\\"x509::C=US/ST=California/L=San Francisco/O=peer0.manufacturer.pharma-network.com::C=US/ST=California/L=San Francisco/O=manufacturer.pharma-network.com/CN=ca.manufacturer.pharma-network.com\\\", \"transactionId\":\"\\\"d18eabab41fc8fc6117f12fe3c86829fd8f1eea28fa34189d23fbfa2414aae6\\\", \"createdAt\":\"\\\"2020-04-20T19:04:09.355Z\\\", \"updatedAt\":\"\\\"2020-04-20T19:04:09.355Z\\\""}"
root@4acd9fa84e6:/opt/gopath/src/github.com/hyperledger/fabric/peer# peer chaincode invoke -o orderer.pharma-network.com:7050 -C pharmachannel -n pharmanet -c '{"Args":["org.pharma-network.pharmanet:addDrug","Paracetamol","004","04-20","03-23","MAN001"]}]'
2020-04-20 19:11:16.895 UTC [chaincodeCmd] chaincodeInvokeOrQuery -> INFO 001 Chaincode invoke successful. result: status:200 payload: "{\"productID\":\"\\\"\\u0000org.pharma-network.pharmanet.drug\\\"\\u0000Paracetamol-003\\\"\\u0000\", \"manufacturer\":\"\\\"\\u0000org.pharma-network.pharmanet.company\\\"\\u0000MAN001\\\"\\u0000\", \"drugName\":\"Paracetamol\", \"mfgDate\":\"04-20\", \"expDate\":\"03-23\", \"owner\":\"\\\"\\u0000org.pharma-network.pharmanet.company\\\"\\u0000MAN001\\\"\\u0000\", \"shipment\":[], \"addedBy\":\"\\\"x509::C=US/ST=California/L=San Francisco/O=peer0.manufacturer.pharma-network.com::C=US/ST=California/L=San Francisco/O=manufacturer.pharma-network.com/CN=ca.manufacturer.pharma-network.com\\\", \"transactionId\":\"\\\"17b88cfed2636ad2b94bfe075fb3e3fe68889bf898fec09eaa4d31875b44d68\\\", \"createdAt\":\"\\\"2020-04-20T19:11:16.862Z\\\", \"updatedAt\":\"\\\"2020-04-20T19:11:16.862Z\\\""}"
root@4acd9fa84e6:/opt/gopath/src/github.com/hyperledger/fabric/peer# peer chaincode invoke -o orderer.pharma-network.com:7050 -C pharmachannel -n pharmanet -c '{"Args":["org.pharma-network.pharmanet:addDrug","Paracetamol","004","04-20","03-23","MAN001"]}]'
2020-04-20 19:11:41.781 UTC [chaincodeCmd] chaincodeInvokeOrQuery -> INFO 001 Chaincode invoke successful. result: status:200 payload: "{\"productID\":\"\\\"\\u0000org.pharma-network.pharmanet.drug\\\"\\u0000Paracetamol-004\\\"\\u0000\", \"manufacturer\":\"\\\"\\u0000org.pharma-network.pharmanet.company\\\"\\u0000MAN001\\\"\\u0000\", \"drugName\":\"Paracetamol\", \"mfgDate\":\"04-20\", \"expDate\":\"03-23\", \"owner\":\"\\\"\\u0000org.pharma-network.pharmanet.company\\\"\\u0000MAN001\\\"\\u0000\", \"shipment\":[], \"addedBy\":\"\\\"x509::C=US/ST=California/L=San Francisco/O=peer0.manufacturer.pharma-network.com::C=US/ST=California/L=San Francisco/O=manufacturer.pharma-network.com/CN=ca.manufacturer.pharma-network.com\\\", \"transactionId\":\"\\\"3afae4918e9c9e29c6872b45be2ff7a176a7c90062f61085b12d7281d1e6cb\\\", \"createdAt\":\"\\\"2020-04-20T19:11:41.747Z\\\", \"updatedAt\":\"\\\"2020-04-20T19:11:41.747Z\\\""}"

```

- Validation: If the Manufacturer is not registered on the network, but trying to add the drug, then an error message is prompted
- `peer chaincode invoke -o orderer.pharma-network.com:7050 -C pharmachannel -n pharmanet -c '{"Args":["org.pharma-network.pharmanet:addDrug","Paracetamol","0016","04-20","03-23","MAN016"]}'`

```
root@4acda9fa84e6:/opt/gopath/src/github.com/hyperledger/fabric/peer# peer chaincode invoke -o orderer.pharma-network.com:7050 -C pharmachannel -n pharmanet -c '{"Args":["org.pharma-network.pharmanet:addDrug","Paracetamol","0016","04-20","03-23","MAN016"]}' 
Error: endorsement failure during invoke. response: status:500 message:"transaction returned with failure: Error: Please register.Manufacturer Asset doesnt exist in the network"
```

TestCase2: Supply Chain

Supply Chain is divided into three parts namely Part a, Part b, Part c

Supply Chain – Part a:

functionName	TestCases
createPO by Distributor(DIST001)	("DIST001","MAN001","Paracetamol","3")
Validation	If the hierarchy for placing the PurchaseOrder is not followed: An error-msg is prompted ("RET002","MAN001","Paracetamol","3")
createShipment by Manufacturer(MAN001)	("DIST001","Paracetamol","Paracetamol-001,Paracetamol-002,Paracetamol-003","TRA001")
Validation1	If the length of 'listOfAssets' is not equal to the quantity specified in the PO: An error message is prompted ("DIST001","Paracetamol","Paracetamol-001,Paracetamol-002","TRA001")
Validation2	If invalid ids of the drug asset is entered : An error message is prompted ("DIST001","Paracetamol","Paracetamol-100","TRA001")
UpdateShipment by Transporter(TRA001)	("DIST001","Paracetamol","TRA001")
Validation	If updateShipment is invoked by some other transporter(TRA002) : An error message is prompted ("DIST001","Paracetamol","TRA001")
Check : viewDrugCurrentState for three drugassets	The owner attribute of the three drugassets should be updated to the compositeKey of the DIST001 & shipment attribute with the shipmentKey ("Paracetamol","001") ("Paracetamol","002") ("Paracetamol","003")

- createPO by Distributor-DIST001
- docker exec -it peer0.distributor.pharma-network.com /bin/bash
- peer chaincode invoke -o orderer.pharma-network.com:7050 -C pharmachannel -n pharmanet -c '{"Args":["org.pharma-network.pharmanet:createPO","DIST001","MAN001","Paracetamol","3"]}'

```
root@06e6cdf84e59:/opt/gopath/src/github.com/hyperledger/fabric/peer# peer chaincode invoke -o orderer.pharma-network.com:7050 -C pharmachannel -n pharmanet -c '{"Args":["org.pharma-network.pharmanet:createPO","DIST001","MAN001","Paracetamol","3"]}'  
2020-04-20 19:42:35.184 UTC [chaincodeCmd] chaincodeInvokeOrQuery -> INFO 001 Chaincode invoke successful. result: status:200 payload:"{\\"poID\\":\"\\u0000org.pharma-network.pharmanet.purchaseOrder\\u0000DIST001-Paracetamol\\u0000\",\\\"drugName\\\":\\\"Paracetamol\\\",\\\"quantity\\\":\\\"3\\\",\\\"buyer\\\":\\\"\\u0000org.pharma-network.pharmanet.company\\u0000DIST001\\u0000\\\",\\\"seller\\\":\\\"\\u0000org.pharma-network.pharmanet.company\\u0000MAN001\\u0000\\\",\\\"createdBy\\\":\\\"x509::C=US/ST=California/L=San Francisco/OU=peer/CN=peer0.distributor.pharma-network.com::C=US/ST=California/L=San Francisco/O=distributor.pharma-network.com/CN=ca.distributor.pharma-network.com\\\",\\\"createdAt\\\":\\\"2020-04-20T19:42:35.167Z\\\"}"
```

- Validation: RET002 of hierarchy3 is trying to place purchase Order with MAN001 of hierarchy1 : An error message is prompted (Order of Hierarchy is Manufacturer-Distributor-Retailer)
- peer chaincode invoke -o orderer.pharma-network.com:7050 -C pharmachannel -n pharmanet -c '{"Args":["org.pharma-network.pharmanet:createPO","RET002","MAN001","Paracetamol","3"]}'

```
root@06e6cdf84e59:/opt/gopath/src/github.com/hyperledger/fabric/peer# peer chaincode invoke -o orderer.pharma-network.com:7050 -C pharmachannel -n pharmanet -c '{"Args":["org.pharma-network.pharmanet:createPO","RET002","MAN001","Paracetamol","3"]}'  
Error: endorsement failure during invoke. response: status:500 message:"transaction returned with failure: Error: PurchaseOrder Canceled: The purchase sequence of hierarchy is violated"
```

- createShipment by Manufacturer-MAN001
- docker exec -it peer0.manufacturer.pharma-network.com /bin/bash
- peer chaincode invoke -o orderer.pharma-network.com:7050 -C pharmachannel -n pharmanet -c '{"Args":["org.pharma-network.pharmanet:createShipment","DIST001","Paracetamol","Paracetamol-001,Paracetamol-002,Paracetamol-003","TRA001"]}'

```
root@4acda9fa84e6:/opt/gopath/src/github.com/hyperledger/fabric/peer# peer chaincode invoke -o orderer.pharma-network.com:7050 -C pharmachannel -n pharmanet -c '{"Args":["org.pharma-network.pharmanet:createShipment","DIST001","Paracetamol","Paracetamol-001,Paracetamol-002,Paracetamol-003","TRA001"]}'  
2020-04-20 22:12:37.906 UTC [chaincodeCmd] chaincodeInvokeOrQuery -> INFO 001 Chaincode invoke successful. result: status:200 payload:"{\\"shipmentID\\":\"\\u0000org.pharma-network.pharmanet.shipmentOrder\\u0000\",\\\"creator\\\":\\\"\\u0000org.pharma-network.pharmanet.company\\u0000MAN001\\u0000\\\",\\\"assets\\\":[],\\\"assets\\\":[],\\\"drug\\\":\\\"\\u0000Paracetamol-001\\u0000\\\",\\\"\\u0000org.pharma-network.pharmanet.drug\\u0000Paracetamol-002\\u0000\\\",\\\"\\u0000org.pharma-network.pharmanet.drug\\u0000Paracetamol-003\\u0000\\\",\\\"transporter\\\":\\\"\\u0000org.pharma-network.pharmanet.shipmentOrder\\u0000FedEx-TRA001\\u0000\\\",\\\"status\\\":\\\"in-transit\\\",\\\"createdBy\\\":\\\"x509::C=US/ST=California/L=San Francisco/OU=peer/CN=peer0.manufacturer.pharma-network.com::C=US/ST=California/L=San Francisco/O=manufacturer.pharma-network.com/CN=ca.manufacturer.pharma-network.com\\\",\\\"createdAt\\\":\\\"2020-04-20T22:12:37.890Z\\\",\\\"updateDate\\\":\\\"2020-04-20T22:12:37.890Z\\\"}"
```

- Validation1: If the length of 'listOfAssets'(2) is not equal to the quantity(3) specified in the PO: An error message is prompted
- peer chaincode invoke -o orderer.pharma-network.com:7050 -C pharmachannel -n pharmanet -c '{"Args":["org.pharmanetwork.pharmanet:createShipment","DIST001","Paracetamol","Paracetamol-001,Paracetamol-002","TRA001"]}'

```
root@4acda9fa84e6:/opt/gopath/src/github.com/hyperledger/fabric/peer# peer chaincode invoke -o orderer.pharma-network.com:7050 -C pharmachannel -n pharmanet -c '{"Args":["org.pharma-network.pharmanet:createShipment","DIST001","Paracetamol","Paracetamol-001,Paracetamol-002","TRA001"]}'  
Error: endorsement failure during invoke. response: status:500 message:"transaction returned with failure: Error: shipment Rejected : The listOfAssets and the quantity in the PO doesnt match"
```

- Validation2: If invalid ids of the drug asset(Paracetamol-100) is entered : An error message is prompted
- peer chaincode invoke -o orderer.pharma-network.com:7050 -C pharmachannel -n pharmanet -c '{"Args":["org.pharma-network.pharmanet:createShipment","DIST001","Paracetamol","Paracetamol-100","TRA001"]}'

```
root@4acda9fa84e6:/opt/gopath/src/github.com/hyperledger/fabric/peer# peer chaincode invoke -o orderer.pharma-network.com:7050 -C pharmachannel -n pharmanet -c '{"Args":["org.pharma-network.pharmanet:createShipment","DIST001","Paracetamol","Paracetamol-100","TRA001"]}'  
Error: endorsement failure during invoke. response: status:500 message:"transaction returned with failure: Error: Please register.The Drug Asset doesnt exist in the network"
```

- updateShipmeny by Transporter-TRA001
- docker exec -it peer0.transporter.pharma-network.com /bin/bash
- peer chaincode invoke -o orderer.pharma-network.com:7050 -C pharmachannel -n pharmanet -c '{"Args":["org.pharma-network.pharmanet:updateShipment","DIST001","Paracetamol","TRA001"]}'

```
root@8bef08e65018:/opt/gopath/src/github.com/hyperledger/fabric/peer# peer chaincode invoke -o orderer.pharma-network.com:7050 -C pharmachannel -n pharmanet -c '{"Args":["org.pharma-network.pharmanet:updateShipment","DIST001","Paracetamol","TRA001"]}'  
2020-04-20 22:45:33.875 UTC [chaincodeCmd] chaincodeInvokeOrQuery -> INFO 001 Chaincode invoke successful. result: status:200 payload:"{\\"shipmentID\\":\"\\\\u0000org.pharma-network.pharmanet.shipmentOrder\\\\u0000\\\",\"assets\":[:\"\\\\u0000org.pharma-network.pharmanet.drug\\\\u0000Paracetamol-001\\\\u0000\\\",\"\\\\u0000org.pharma-network.pharmanet.drug\\\\u0000Paracetamol-002\\\\u0000\\\",\"\\\\u0000org.pharma-network.pharmanet.drug\\\\u0000Paracetamol-003\\\\u0000\"],\"transporter\":\"\\\\u0000org.pharma-network.pharmanet.shipmentOrder\\\\u0000FedEx-TRA001\\\\u0000\",\"status\":\"delivered\",\"createdBy\":\"x509:::C=US/ST=California/L=San Francisco/O=peer0.manufacturer.pharma-network.com::C=US/ST=California/L=San Francisco/O=manufacturer.pharma-network.com/CN=ca.manufacturer.pharma-network.com\\\",\"createdAt\":\"2020-04-20T22:12:37.890Z\",\"updatedAt\":\"2020-04-20T22:45:33.859Z\"}"
```

- validation: If updateShipment is invoked by some other transporter(TRA002) : An error message is prompted
- peer chaincode invoke -o orderer.pharma-network.com:7050 -C pharmachannel -n pharmanet -c '{"Args":["org.pharma-network.pharmanet:updateShipment","DIST001","Paracetamol","TRA002"]}'

```
root@8bef08e65018:/opt/gopath/src/github.com/hyperledger/fabric/peer# peer chaincode invoke -o orderer.pharma-network.com:7050 -C pharmachannel -n pharmanet -c '{"Args":["org.pharma-network.pharmanet:updateShipment","DIST001","Paracetamol","TRA002"]}'  
Error: endorsement failure during invoke. response: status:500 message:"transaction returned with failure: Error: Shipment cancelled. The present transporterCRN does not match with the transporterCRN of the shipment"
```

- Check: After the successful delivery, the owner attribute and shipment attribute of three drugassests should be updated with the compositeKey DIST001 as owner and with the respective shipmentKey
- peer chaincode invoke -o orderer.pharma-network.com:7050 -C pharmachannel -n pharmanet -c '{"Args":["org.pharma-network.pharmanet:viewDrugCurrentState","Paracetamol","001"]}'
- peer chaincode invoke -o orderer.pharma-network.com:7050 -C pharmachannel -n pharmanet -c '{"Args":["org.pharma-network.pharmanet:viewDrugCurrentState","Paracetamol","002"]}'
- peer chaincode invoke -o orderer.pharma-network.com:7050 -C pharmachannel -n pharmanet -c '{"Args":["org.pharma-network.pharmanet:viewDrugCurrentState","Paracetamol","003"]}'

```
root@8bef08e65018:/opt/gopath/src/github.com/hyperledger/fabric/peer# peer chaincode invoke -o orderer.pharma-network.com:7050 -C pharmachannel -n pharmanet -c '{"Args":["org.pharma-network.pharmanet:viewDrugCurrentState","Paracetamol","001"]}'  
2020-04-21 11:58:35.472 UTC [chaincodeCmd] chaincodeInvokeOrQuery -> INFO 001 Chaincode invoke successful. result: status:200 payload:"{\\"productID\\":\"\\\\u0000org.pharma-network.pharmanet.drug\\\\u0000Paracetamol-001\\\\u0000\\\",\"manufacturer\":\"\\\\u0000org.pharma-network.pharmanet.company\\\\u0000MAN001\\\\u0000\\\",\"drugName\":\"Paracetamol\",\"mfgDate\":\"04-20\",\"expDate\":\"03-23\",\"owner\":\"\\\\u0000org.pharma-network.pharmanet.company\\\\u0000DIST001\\\\u0000\\\",\"shipmentOrder\\\\u0000\\\",\"addedBy\":\"x509:::C=US/ST=California/L=San Francisco/O=peer0.manufacturer.pharma-network.com::C=US/ST=California/L=San Francisco/O=manufacturer.pharma-network.com/CN=ca.manufacturer.pharma-network.com\\\",\"transactionId\":\"28ebaca478b88d9da2cad41780efde95e4d2ee971d7aa8aa94e6bd9b55f52db\\\",\"createdAt\":\"2020-04-20T19:02:18.764Z\",\"updatedAt\":\"2020-04-21T11:56:53.112Z\"}"
```

```
root@8bef08e65018:/opt/gopath/src/github.com/hyperledger/fabric/peer# peer chaincode invoke -o orderer.pharma-network.com:7050 -C pharmachannel -n pharmanet -c '{"Args":["org.pharma-network.pharmanet:viewDrugCurrentState","Paracetamol","002"]}'  
2020-04-21 12:48:58.796 UTC [chaincodeCmd] chaincodeInvokeOrQuery -> INFO 001 Chaincode invoke successful. result: status:200 payload:"{\\"productID\\":\"\\\\u0000org.pharma-network.pharmanet.drug\\\\u0000Paracetamol-002\\\\u0000\\\",\"manufacturer\":\"\\\\u0000org.pharma-network.pharmanet.company\\\\u0000MAN001\\\\u0000\\\",\"drugName\":\"Paracetamol\",\"mfgDate\":\"04-20\",\"expDate\":\"03-23\",\"owner\":\"\\\\u0000org.pharma-network.pharmanet.company\\\\u0000DIST001\\\\u0000\\\",\"shipmentOrder\\\\u0000\\\",\"addedBy\":\"x509:::C=US/ST=California/L=San Francisco/O=peer0.manufacturer.pharma-network.com::C=US/ST=California/L=San Francisco/O=manufacturer.pharma-network.com/CN=ca.manufacturer.pharma-network.com\\\",\"transactionId\":\"d18eabab4b1fc8fc6117f12fe3c86829fd8f1eea28fa34189d23fbfa2414aae0\\\",\"createdAt\":\"2020-04-20T19:04:09.355Z\",\"updatedAt\":\"2020-04-21T11:56:53.132Z\"}"
```

```
root@8bef08e65018:/opt/gopath/src/github.com/hyperledger/fabric/peer# peer chaincode invoke -o orderer.pharma-network.com:7050 -C pharmachannel -n pharmanet -c '{"Args":["org.pharma-network.pharmanet:viewDrugCurrentState","Paracetamol","003"]}'  
2020-04-21 12:49:13.671 UTC [chaincodeCmd] chaincodeInvokeOrQuery -> INFO 001 Chaincode invoke successful. result: status:200 payload:"{\\"productID\\":\"\\\\u0000org.pharma-network.pharmanet.drug\\\\u0000Paracetamol-003\\\\u0000\\\",\"manufacturer\":\"\\\\u0000org.pharma-network.pharmanet.company\\\\u0000MAN001\\\\u0000\\\",\"drugName\":\"Paracetamol\",\"mfgDate\":\"04-20\",\"expDate\":\"03-23\",\"owner\":\"\\\\u0000org.pharma-network.pharmanet.company\\\\u0000DIST001\\\\u0000\\\",\"addedBy\":\"x509:::C=US/ST=California/L=San Francisco/O=peer0.manufacturer.pharma-network.com::C=US/ST=California/L=San Francisco/O=manufacturer.pharma-network.com/CN=ca.manufacturer.pharma-network.com\\\",\"transactionId\":\"17b88cfed02636ad2b94bfe075fb3e3fe68089bf898fec09eaa4d31875b44d68\\\",\"createdAt\":\"2020-04-20T19:11:16.862Z\",\"updatedAt\":\"2020-04-21T11:56:53.147Z\"}"
```

- Console logs in the chaincode container tab, showing for the three drugassets ownership change TRA001-DIST001 and also shipment attribute updated with shipmentKey after updateShipment

```

upgrad@upgrad... x root@3637a4e6... x upgrad@upgrad... x root@4acda9fa8... x root@06e6cd84... x root@e8d968a3... x root@8bef08e6... x
[ '0000org.pharma-network.pharmanet.drug\0000Paracetamol-001\0000',
  '\0000org.pharma-network.pharmanet.drug\0000Paracetamol-002\0000',
  '\0000org.pharma-network.pharmanet.drug\0000Paracetamol-003\0000' ] I
org.pharma-network.pharmanet.drugParacetamol-001
{ productID: '\u0000org.pharma-network.pharmanet.drug\u0000Paracetamol-001\u0000',
  manufacturer: '\u0000org.pharma-network.pharmanet.company\u0000MAN001\u0000',
  drugName: 'Paracetamol',
  mfgDate: '04-20',
  expDate: '03-23',
  owner: '\u0000org.pharma-network.pharmanet.shipmentOrder\u0000FedEx-TRA001\u0000',
  shipment: [],
  addedBy: 'x509::C=US/ST=California/L=San Francisco/O=peer/CN=peer0.manufacturer.pharma-network.com::/C=US/ST=California/L=San Francisco/O=manufacturer.pharma-network.com/CN=ca.manufacturer.pharma-network.com',
  transactionId: '28ebaca478b88d98da2cad41780efde95e4d2ee971d7aa8aa94e6bd9b55f52db',
  createdAt: '2020-04-20T19:02:18.764Z',
  updatedAt: '2020-04-20T22:12:37.869Z' }
{ productID: '\u0000org.pharma-network.pharmanet.drug\u0000Paracetamol-001\u0000',
  manufacturer: '\u0000org.pharma-network.pharmanet.company\u0000MAN001\u0000',
  drugName: 'Paracetamol',
  mfgDate: '04-20',
  expDate: '03-23',
  owner: '\u0000org.pharma-network.pharmanet.company\u0000DIST001\u0000',
  shipment: [
    '\u0000org.pharma-network.pharmanet.shipmentOrder\u0000DIST001-Paracetamol\u0000' ],
  addedBy: 'x509::C=US/ST=California/L=San Francisco/O=peer/CN=peer0.manufacturer.pharma-network.com::/C=US/ST=California/L=San Francisco/O=manufacturer.pharma-network.com/CN=ca.manufacturer.pharma-network.com',
  transactionId: '28ebaca478b88d98da2cad41780efde95e4d2ee971d7aa8aa94e6bd9b55f52db',
  createdAt: '2020-04-20T19:02:18.764Z',
  updatedAt: '2020-04-21T11:56:53.112Z' }
org.pharma-network.pharmanet.drugParacetamol-002
upgrad@upgrad... x root@3637a4e6... x upgrad@upgrad... x root@4acda9fa8... x root@06e6cd84... x root@e8d968a3... x root@8bef08e6... x
org.pharma-network.pharmanet.drugParacetamol-003
{ productID: '\u0000org.pharma-network.pharmanet.drug\u0000Paracetamol-003\u0000',
  manufacturer: '\u0000org.pharma-network.pharmanet.company\u0000MAN001\u0000',
  drugName: 'Paracetamol',
  mfgDate: '04-20',
  expDate: '03-23',
  owner: '\u0000org.pharma-network.pharmanet.shipmentOrder\u0000FedEx-TRA001\u0000',
  shipment: [],
  addedBy: 'x509::C=US/ST=California/L=San Francisco/O=peer/CN=peer0.manufacturer.pharma-network.com::/C=US/ST=California/L=San Francisco/O=manufacturer.pharma-network.com/CN=ca.manufacturer.pharma-network.com',
  transactionId: '17b88cfed02636ad2b94bfe075fb3e3fe68089bf898fec09eaa4d31875b44d68',
  createdAt: '2020-04-20T19:11:16.862Z',
  updatedAt: '2020-04-20T22:12:37.886Z' }
{ productID: '\u0000org.pharma-network.pharmanet.drug\u0000Paracetamol-003\u0000',
  manufacturer: '\u0000org.pharma-network.pharmanet.company\u0000MAN001\u0000',
  drugName: 'Paracetamol',
  mfgDate: '04-20',
  expDate: '03-23',
  owner: '\u0000org.pharma-network.pharmanet.company\u0000DIST001\u0000',
  shipment: [
    '\u0000org.pharma-network.pharmanet.shipmentOrder\u0000DIST001-Paracetamol\u0000' ],
  addedBy: 'x509::C=US/ST=California/L=San Francisco/O=peer/CN=peer0.manufacturer.pharma-network.com::/C=US/ST=California/L=San Francisco/O=manufacturer.pharma-network.com/CN=ca.manufacturer.pharma-network.com',
  transactionId: '17b88cfed02636ad2b94bfe075fb3e3fe68089bf898fec09eaa4d31875b44d68',
  createdAt: '2020-04-20T19:11:16.862Z',
  updatedAt: '2020-04-21T11:56:53.147Z' }
2020-04-21T11:56:53.168Z info [shim:lib/handler.js] [pharmacchannel-4576ec64] Calling chaincode Invoke() s
uccceeded. Sending COMPLETED message back to peer
2020-04-21T11:58:35.455Z info [shim:lib/handler.js] [pharmacchannel-b6bf5477] Calling chaincode Invoke() s
uccceeded. Sending COMPLETED message back to peer
2020-04-21T12:48:58.788Z info [shim:lib/handler.js] [pharmacchannel-95143064] Calling chaincode Invoke() s
org.pharma-network.pharmanet.drugParacetamol-002
[ productID: '\u0000org.pharma-network.pharmanet.drug\0000Paracetamol-002\0000',
  manufacturer: '\u0000org.pharma-network.pharmanet.company\0000MAN001\0000',
  drugName: 'Paracetamol',
  mfgDate: '04-20',
  expDate: '03-23',
  owner: '\u0000org.pharma-network.pharmanet.shipmentOrder\0000FedEx-TRA001\0000',
  shipment: [],
  addedBy: 'x509::C=US/ST=California/L=San Francisco/O=peer/CN=peer0.manufacturer.pharma-network.com::/C=US/ST=California/L=San Francisco/O=manufacturer.pharma-network.com/CN=ca.manufacturer.pharma-network.com',
  transactionId: 'd18eabab4b1fc8fc6117f12fe3c86829fd8f1eea28fa34189d23fbfa2414aae6',
  createdAt: '2020-04-20T19:04:09.355Z',
  updatedAt: '2020-04-20T22:12:37.873Z' ]
[ productID: '\u0000org.pharma-network.pharmanet.drug\0000Paracetamol-002\0000',
  manufacturer: '\u0000org.pharma-network.pharmanet.company\0000MAN001\0000',
  drugName: 'Paracetamol',
  mfgDate: '04-20',
  expDate: '03-23',
  owner: '\u0000org.pharma-network.pharmanet.company\0000DIST001\0000',
  shipment: [
    '\u0000org.pharma-network.pharmanet.shipmentOrder\0000DIST001-Paracetamol\0000' ],
  addedBy: 'x509::C=US/ST=California/L=San Francisco/O=peer/CN=peer0.manufacturer.pharma-network.com::/C=US/ST=California/L=San Francisco/O=manufacturer.pharma-network.com/CN=ca.manufacturer.pharma-network.com',
  transactionId: 'd18eabab4b1fc8fc6117f12fe3c86829fd8f1eea28fa34189d23fbfa2414aae6',
  createdAt: '2020-04-20T19:04:09.355Z',
  updatedAt: '2020-04-21T11:56:53.132Z' ]

```

Supply Chain – Part b :

functionName	TestCases
createPO by Retailer(RET002)	("RET002","DIST001","Paracetamol","2")
createShipment by Distributor(DIST001)	("RET002","Paracetamol","Paracetamol-001,Paracetamol-002","TRA002")
Check : viewDrugcurrentState for two drugassets	The owner attribute of the two drugassets should be updated to the compositeKey of the TRA002 ("Paracetamol","001") ("Paracetamol","002")
UpdateShipment by Transporter(TRA002)	("RET002","Paracetamol","TRA002")
Check : viewDrugcurrentState for two drugassets	The owner attribute of the three drugassets should be updated to the compositeKey of the RET002 & shipment attribute with the shipmentKey ("Paracetamol","001") ("Paracetamol","002")

- createPO by Retailer-RET002
- docker exec -it peer0.retailer.pharma-network.com /bin/bash
- peer chaincode invoke -o orderer.pharma-network.com:7050 -C pharmachannel -n pharmanet -c '{"Args":["org.pharma-network.pharmanet:createPO","RET002","DIST001","Paracetamol","2"]}'

```
root@e8d968a33ae5:/opt/gopath/src/github.com/hyperledger/fabric/peer# peer chaincode invoke -o orderer.pharma-network.com:7050 -C pharmachannel -n pharmanet -c '{"Args":["org.pharma-network.pharmanet:createPO","RET002","DIST001","Paracetamol","2"]}'

2020-04-21 14:25:59.663 UTC [chaincodeCmd] chaincodeInvokeOrQuery -> INFO 001 Chaincode invoke successful. result: status:200 payload:"{"poID":"\"\\u0000org.pharma-network.pharmanet.purchaseOrder\\u0000RET002-Paracetamol\\u0000","drugName":"Paracetamol","quantity":"2","buyer":"\\u0000org.pharma-network.pharmanet.company\\u0000RET002\\u0000","seller":"\\u0000org.pharma-network.pharmanet.company\\u0000DIST001\\u0000","createdBy":"x509::C=US/ST=California/L=San Francisco/OU=peer/CN=peer0.retailer.pharma-network.com:/C=US/ST=California/L=San Francisco/O=retailer.pharma-network.com/CN=ca.retailer.pharma-network.com","createdAt":"2020-04-21T14:25:59.625Z"}'
```

- createShipment by Distributor-DIST001
- docker exec -it peer0.distributor.pharma-network.com /bin/bash
- peer chaincode invoke -o orderer.pharma-network.com:7050 -C pharmachannel -n pharmanet -c '{"Args":["org.pharma-network.pharmanet:createShipment","RET002","Paracetamol","Paracetamol-001,Paracetamol-002","TRA002"]}'

```
root@06e6cdf84e59:/opt/gopath/src/github.com/hyperledger/fabric/peer# peer chaincode invoke -o orderer.pharma-network.com:7050 -C pharmachannel -n pharmanet -c '{"Args":["org.pharma-network.pharmanet:createShipment","RET002","Paracetamol","Paracetamol-001,Paracetamol-002","TRA002"]}'

2020-04-21 15:02:13.520 UTC [chaincodeCmd] chaincodeInvokeOrQuery -> INFO 001 Chaincode invoke successful. result: status:200 payload:"{"shipmentID":"\\u0000org.pharma-network.pharmanet.shipmentOrder\\u0000RET002-Paracetamol\\u0000","creator":"\\u0000org.pharma-network.pharmanet.company\\u0000DIST001\\u0000","assests":[{"\\u0000org.pharma-network.pharmanet.drug\\u0000Paracetamol-001\\u0000"}, {"\\u0000org.pharma-network.pharmanet.drug\\u0000Paracetamol-002\\u0000"}],"transporter":"\\u0000org.pharma-network.pharmanet.shipmentOrder\\u0000Blue Dart-TRA002\\u0000","status":"in-transit","createdBy":"x509::C=US/ST=California/L=San Francisco/OU=peer/CN=peer0.distributor.pharma-network.com:/C=US/ST=California/L=San Francisco/O=distributor.pharma-network.com/CN=ca.distributor.pharma-network.com","createdAt":"2020-04-21T15:02:13.486Z","updatedAt":"2020-04-21T15:02:13.486Z"}'
```

- Check: After the createShipment, the owner attribute of three drugassests should be updated with the compositeKey TRA002 as owner
- peer chaincode invoke -o orderer.pharma-network.com:7050 -C pharmachannel -n pharmanet -c '{"Args":["org.pharma-network.pharmanet:viewDrugCurrentState","Paracetamol","001"]}]'
- peer chaincode invoke -o orderer.pharma-network.com:7050 -C pharmachannel -n pharmanet -c '{"Args":["org.pharma-network.pharmanet:viewDrugCurrentState","Paracetamol","002"]}]'

```
root@06e6cdf84e59:/opt/gopath/src/github.com/hyperledger/fabric/peer# peer chaincode invoke -o orderer.pharma-network.com:7050 -C pharmachannel -n pharmanet -c '{"Args":["org.pharma-network.pharmanet:viewDrugCurrentState","Paracetamol","001"]}]'
2020-04-21 15:06:10.745 UTC [chaincodeCmd] chaincodeInvokeOrQuery -> INFO 001 Chaincode invoke successful. result: status:200 payload:"{\\"productID\\":\"\\\\u0000org.pharma-network.pharmanet.drug\\\\u0000Paracetamol-001\\\\u0000\\\",\\\"manufacturer\\\":\"\\\\u0000org.pharma-network.pharmanet.company\\\\u0000MAN001\\\\u0000\\\",\\\"drugName\\\":\"Paracetamol\\\",\\\"mfgDate\\\":\"04-20\\\",\\\"expDate\\\":\"03-23\\\",\\\"owner\\\":\"\\\\u0000org.pharma-network.pharmanet.shipmentOrder\\\\u00000Blue Dart-TRA002\\\\u0000\\\",\\\"shipment\\\":[\"\\\\u0000org.pharma-network.pharmanet.shipmentOrder\\\\u00000DIST001-Paracetamol\\\\u0000\\\",\"\\\\u0000org.pharma-network.pharmanet.shipmentOrder\\\\u00000DIST001-Paracetamol\\\\u0000\\\"],\\\"addedBy\\\":\"x509::/C=US/ST=California/L=San Francisco/OU=peer/CN=peer0.manufacturer.pharma-network.com::/C=US/ST=California/L=San Francisco/0=manufacturer.pharma-network.com/CN=ca.manufacturer.pharma-network.com\\\",\\\"transactionId\\\":\"28ebaca478b88d98da2cad41780efde95e4d2ee971d7aa8aa94e6bd9b5f52db\\\",\\\"createdAt\\\":\"2020-04-20T19:02:18.764Z\\\",\\\"updatedAt\\\":\"2020-04-21T15:02:13.424Z\\\"}"]"
```

```
root@06e6cdf84e59:/opt/gopath/src/github.com/hyperledger/fabric/peer# peer chaincode invoke -o orderer.pharma-network.com:7050 -C pharmachannel -n pharmanet -c '{"Args":["org.pharma-network.pharmanet:viewDrugCurrentState","Paracetamol","002"]}]'
2020-04-21 15:09:21.587 UTC [chaincodeCmd] chaincodeInvokeOrQuery -> INFO 001 Chaincode invoke successful. result: status:200 payload:"{\\"productID\\":\"\\\\u0000org.pharma-network.pharmanet.drug\\\\u0000Paracetamol-002\\\\u0000\\\",\\\"manufacturer\\\":\"\\\\u0000org.pharma-network.pharmanet.company\\\\u0000MAN001\\\\u0000\\\",\\\"drugName\\\":\"Paracetamol\\\",\\\"mfgDate\\\":\"04-20\\\",\\\"expDate\\\":\"03-23\\\",\\\"owner\\\":\"\\\\u0000org.pharma-network.pharmanet.shipmentOrder\\\\u00000Blue Dart-TRA002\\\\u0000\\\",\\\"shipment\\\":[\"\\\\u0000org.pharma-network.pharmanet.shipmentOrder\\\\u00000DIST001-Paracetamol\\\\u0000\\\",\"\\\\u0000org.pharma-network.pharmanet.shipmentOrder\\\\u00000DIST001-Paracetamol\\\\u0000\\\"],\\\"addedBy\\\":\"x509::/C=US/ST=California/L=San Francisco/OU=peer/CN=peer0.manufacturer.pharma-network.com::/C=US/ST=California/L=San Francisco/0=manufacturer.pharma-network.com/CN=ca.manufacturer.pharma-network.com\\\",\\\"transactionId\\\":\"d18eabab4b1fc8fc617f12fe3c86829fd8f1eea28fa34189d23fbfa2414aae6\\\",\\\"createdAt\\\":\"2020-04-20T19:04:09.355Z\\\",\\\"updatedAt\\\":\"2020-04-21T15:02:13.452Z\\\"}"]"
```

- updateShipment by Transporter-TRA002
- docker exec -it peer0.transporter.pharma-network.com /bin/bash
- peer chaincode invoke -o orderer.pharma-network.com:7050 -C pharmachannel -n pharmanet -c '{"Args":["org.pharma-network.pharmanet:updateShipment","RET002","Paracetamol","TRA002"]}]'

```
root@8bef08e65018:/opt/gopath/src/github.com/hyperledger/fabric/peer# peer chaincode invoke -o orderer.pharma-network.com:7050 -C pharmachannel -n pharmanet -c '{"Args":["org.pharma-network.pharmanet:updateShipment","RET002","Paracetamol","TRA002"]}]'
2020-04-21 15:14:42.290 UTC [chaincodeCmd] chaincodeInvokeOrQuery -> INFO 001 Chaincode invoke successful. result: status:200 payload:"{\\"shipmentID\\\":\"\\\\u0000org.pharma-network.pharmanet.shipmentOrder\\\\u0000RET002-Paracetamol\\\\u0000\\\",\\\"creator\\\":\"\\\\u0000org.pharma-network.pharmanet.company\\\\u00000DIST001\\\\u0000\\\",\\\"assets\\\":[\"\\\\u0000org.pharma-network.pharmanet.drug\\\\u00000Paracetamol-001\\\\u0000\\\",\"\\\\u0000org.pharma-network.pharmanet.drug\\\\u00000Paracetamol-002\\\\u0000\\\"],\\\"transporter\\\":\"\\\\u0000org.pharma-network.pharmanet.shipmentOrder\\\\u00000Blue Dart-TRA002\\\\u0000\\\",\\\"status\\\":\"delivered\\\",\\\"createdBy\\\":\"x509::/C=US/ST=California/L=San Francisco/OU=peer/CN=peer0.distributor.pharma-network.com::/C=US/ST=California/L=San Francisco/0=distributor.pharma-network.com/CN=ca.distributor.pharma-network.com\\\",\\\"createdAt\\\":\"2020-04-21T15:02:13.486Z\\\",\\\"updatedAt\\\":\"2020-04-21T15:14:42.252Z\\\"}"]"
```

- Check: After the successfull delivery, the owner attribute and shipment attribute of two drugassests should be updated with the compositeKey RET002 as owner and with the respective shipmentKey
- peer chaincode invoke -o orderer.pharma-network.com:7050 -C pharmachannel -n pharmanet -c '{"Args":["org.pharma-network.pharmanet:viewDrugCurrentState","Paracetamol","001"]}]'
- peer chaincode invoke -o orderer.pharma-network.com:7050 -C pharmachannel -n pharmanet -c '{"Args":["org.pharma-network.pharmanet:viewDrugCurrentState","Paracetamol","002"]}]'

```
root@06e6cdf84e59:/opt/gopath/src/github.com/hyperledger/fabric/peer# peer chaincode invoke -o orderer.pharma-network.com:7050 -C pharmachannel -n pharmanet -c '{"Args":["org.pharma-network.pharmanet:viewDrugCurrentState","Paracetamol","001"]}]'
2020-04-21 15:06:10.745 UTC [chaincodeCmd] chaincodeInvokeOrQuery -> INFO 001 Chaincode invoke successful. result: status:200 payload:"{\\"productID\\\":\"\\\\u0000org.pharma-network.pharmanet.drug\\\\u0000Paracetamol-001\\\\u0000\\\",\\\"manufacturer\\\":\"\\\\u0000org.pharma-network.pharmanet.company\\\\u0000MAN001\\\\u0000\\\",\\\"drugName\\\":\"Paracetamol\\\",\\\"mfgDate\\\":\"04-20\\\",\\\"expDate\\\":\"03-23\\\",\\\"owner\\\":\"\\\\u0000org.pharma-network.pharmanet.shipmentOrder\\\\u00000Blue Dart-TRA002\\\\u0000\\\",\\\"shipment\\\":[\"\\\\u0000org.pharma-network.pharmanet.shipmentOrder\\\\u00000DIST001-Paracetamol\\\\u0000\\\",\"\\\\u0000org.pharma-network.pharmanet.shipmentOrder\\\\u00000DIST001-Paracetamol\\\\u0000\\\"],\\\"addedBy\\\":\"x509::/C=US/ST=California/L=San Francisco/OU=peer/CN=peer0.manufacturer.pharma-network.com::/C=US/ST=California/L=San Francisco/0=manufacturer.pharma-network.com/CN=ca.manufacturer.pharma-network.com\\\",\\\"transactionId\\\":\"28ebaca478b88d98da2cad41780efde95e4d2ee971d7aa8aa94e6bd9b5f52db\\\",\\\"createdAt\\\":\"2020-04-20T19:02:18.764Z\\\",\\\"updatedAt\\\":\"2020-04-21T15:02:13.424Z\\\"}"]"
```

```
root@06e6cdf84e59:/opt/gopath/src/github.com/hyperledger/fabric/peer# peer chaincode invoke -o orderer.pharma-network.com:7050 -C pharmachannel -n pharmanet -c '{"Args":["org.pharma-network.pharmanet:viewDrugCurrentState","Paracetamol","002"]}]'
2020-04-21 15:09:21.587 UTC [chaincodeCmd] chaincodeInvokeOrQuery -> INFO 001 Chaincode invoke successful. result: status:200 payload:"{\\"productID\\\":\"\\\\u0000org.pharma-network.pharmanet.drug\\\\u0000Paracetamol-002\\\\u0000\\\",\\\"manufacturer\\\":\"\\\\u0000org.pharma-network.pharmanet.company\\\\u0000MAN001\\\\u0000\\\",\\\"drugName\\\":\"Paracetamol\\\",\\\"mfgDate\\\":\"04-20\\\",\\\"expDate\\\":\"03-23\\\",\\\"owner\\\":\"\\\\u0000org.pharma-network.pharmanet.shipmentOrder\\\\u00000Blue Dart-TRA002\\\\u0000\\\",\\\"shipment\\\":[\"\\\\u0000org.pharma-network.pharmanet.shipmentOrder\\\\u00000DIST001-Paracetamol\\\\u0000\\\",\"\\\\u0000org.pharma-network.pharmanet.shipmentOrder\\\\u00000DIST001-Paracetamol\\\\u0000\\\"],\\\"addedBy\\\":\"x509::/C=US/ST=California/L=San Francisco/OU=peer/CN=peer0.manufacturer.pharma-network.com::/C=US/ST=California/L=San Francisco/0=manufacturer.pharma-network.com/CN=ca.manufacturer.pharma-network.com\\\",\\\"transactionId\\\":\"d18eabab4b1fc8fc617f12fe3c86829fd8f1eea28fa34189d23fbfa2414aae6\\\",\\\"createdAt\\\":\"2020-04-20T19:04:09.355Z\\\",\\\"updatedAt\\\":\"2020-04-21T15:02:13.452Z\\\"}"]"
```

Supply Chain – Part c :

functionName	TestCases
retailDrug by Retailer(RET002)	("Paracetamol","001","RET002","AAD001")
Validation	This transaction should be invoked only by the retailer, who is the owner of the drug. If other than owner of the drug is trying to invoke this function :An error message is prompted ("Paracetamol","001","DISI002","AAD001")

- retailDrug by Retailer-RET002
- docker exec -it peer0.retailer.pharma-network.com /bin/bash
- peer chaincode invoke -o orderer.pharma-network.com:7050 -C pharmachannel -n pharmanet -c '{"Args":["org.pharma-network.pharmanet:retailDrug","Paracetamol","001","RET002","AAD001"]}'

```
root@e8d968a33ae5:/opt/gopath/src/github.com/hyperledger/fabric/peer# peer chaincode invoke -o orderer.pharma-network.com:7050 -C pharmachannel -n pharmanet -c '{"Args":["org.pharma-network.pharmanet:retailDrug","Paracetamol","001","RET002","AAD001"]}'  
2020-04-21 15:32:12.680 UTC [chaincodeCmd] chaincodeInvokeOrQuery > INFO 001 Chaincode invoke successful. result: status:200 payload:"{\\"productID\":\"\\u0000org.pharma-network.pharmanet.drug\\u0000Paracetamol-001\\u0000\",\"manufacturer\":\"\\u0000org.pharma-network.pharmanet.company\\u0000MAN001\\u0000\",\"drugName\":\"Paracetamol\",\"mfgDate\":\"04-20\",\"expDate\":\"03-23\",\"owner\":\"AAD001\",\"shipment\":[\\u0000org.pharma-network.pharmanet.shipmentOrder\\u0000DIST001-Paracetamol\\u0000,\"\\u0000org.pharma-network.pharmanet.shipmentOrder\\u0000RET002-Paracetamol\\u0000\"],\"addedBy\":\"x509::C=US/ST=California/L=San Francisco/O=manufacturer.pharma-network.com/CN=ca.manufacturer.pharma-network.com\",\"transactionId\":\"28ebaca478b88d98da2cad41780efde95e4d2ee971d7aa8aa94e6bd9b55f52db\"},\"createdAt\":\"2020-04-20T19:02:18.764Z\",\"updatedAt\":\"2020-04-21T15:32:12.663Z\"}"
```

- validation: This transaction should be invoked only by the retailer, who is the owner of the drug. If other than owner of the drug is trying to invoke this function :An error message is prompted
- docker exec -it peer0.retailer.pharma-network.com /bin/bash
- peer chaincode invoke -o orderer.pharma-network.com:7050 -C pharmachannel -n pharmanet -c '{"Args":["org.pharma-network.pharmanet:retailDrug","Paracetamol","001","DISI002","AAD001"]}'
- Note: DISI002 is the assumed retailer who is not the owner of the drug

```
root@e8d968a33ae5:/opt/gopath/src/github.com/hyperledger/fabric/peer# peer chaincode invoke -o orderer.pharma-network.com:7050 -C pharmachannel -n pharmanet -c '{"Args":["org.pharma-network.pharmanet:retailDrug","Paracetamol","001","DISI002","AAD001"]}'  
Error: endorsement failure during invoke. response: status:500 message:"transaction returned with failure: Error: Not Authorized: The owner of the drug doesnt match with the retailer"  
root@e8d968a33ae5:/opt/gopath/src/github.com/hyperledger/fabric/peer#
```

TestCase3: History Track Down

functionName	TestCases
ViewHistory by Consumer-Aakash-AAD001	("Paracetamol","001")
ViewDrugCurrentState by Consumer-Aakash-AAD001	("Paracetamol","001")

- ViewHistory by Consumer-Akash-AAD001
- docker exec -it peer0.consumer.pharma-network.com /bin/bash
- peer chaincode invoke -o orderer.pharma-network.com:7050 -C pharmachannel -n pharmanet -c '{"Args":["org.pharma-network.pharmanet:viewHistory","Paracetamol","001"]}'

```
test-blockchain [Running] - Oracle VM VirtualBox
File Machine View Input Devices Help
Activities Terminal Tue 23:42
root@5eea23217afdf:/opt/gopath/src/github.com/hyperledger/fabric/peer# peer chaincode invoke -o orderer.pharma-network.com:7050 -C pharmachannel -n pharmanet -c '{"Args":["org.pharma-network.pharmanet:viewHistory","Paracetamol","001"]}'
[{"transactionId": "28ebaca478b88d98da2cad41780efde95e4d2ee971d7aa8aa94e6bd9b55f52db"}, {"obj1": {"productID": "\u00000org.pharma-network.pharmanet.company\u0000MAN001\u0000", "drugName": "Paracetamol", "mfgDate": "\u0000", "expDate": "\u0000", "owner": "\u0000", "manufacturer": "\u0000ca.manufacturer.pharma-network.com"}, {"obj2": {"productID": "\u00000org.pharma-network.pharmanet.drug\u0000Paracetamol-001\u0000", "drugName": "Paracetamol", "mfgDate": "\u0000", "expDate": "\u0000", "owner": "\u0000", "manufacturer": "\u0000ca.manufacturer.pharma-network.com"}, {"obj3": {"productID": "\u00000org.pharma-network.pharmanet.shipmentOrder\u00000DIST001\u0000", "drugs": [{"drugID": "28ebaca478b88d98da2cad41780efde95e4d2ee971d7aa8aa94e6bd9b55f52db", "quantity": 1}, {"drugID": "28ebaca478b88d98da2cad41780efde95e4d2ee971d7aa8aa94e6bd9b55f52db", "quantity": 1}], "order": "\u0000", "status": "PENDING", "owner": "\u0000", "mfgDate": "\u0000", "expDate": "\u0000", "createdAt": "\u0000", "updatedAt": "\u0000"}], "status": 200, "payload": "[{"transactionId": "28ebaca478b88d98da2cad41780efde95e4d2ee971d7aa8aa94e6bd9b55f52db"}, {"obj1": {"productID": "\u00000org.pharma-network.pharmanet.company\u0000MAN001\u0000", "drugName": "Paracetamol", "mfgDate": "\u0000-04-20", "expDate": "\u0000-05-23", "owner": "\u0000", "manufacturer": "\u0000ca.manufacturer.pharma-network.com"}, {"obj2": {"productID": "\u00000org.pharma-network.pharmanet.drug\u0000Paracetamol-001\u0000", "drugName": "Paracetamol", "mfgDate": "\u0000-04-20", "expDate": "\u0000-05-23", "owner": "\u0000", "manufacturer": "\u0000ca.manufacturer.pharma-network.com"}, {"obj3": {"productID": "\u00000org.pharma-network.pharmanet.shipmentOrder\u00000DIST001\u0000", "drugs": [{"drugID": "28ebaca478b88d98da2cad41780efde95e4d2ee971d7aa8aa94e6bd9b55f52db", "quantity": 1}, {"drugID": "28ebaca478b88d98da2cad41780efde95e4d2ee971d7aa8aa94e6bd9b55f52db", "quantity": 1}], "order": "\u0000", "status": "PENDING", "owner": "\u0000", "mfgDate": "\u0000-04-20", "expDate": "\u0000-05-23", "createdAt": "\u0000", "updatedAt": "\u0000"}]}]
```

- ViewDrugcurrentState by Consumer-Akash-AAD001
- docker exec -it peer0.consumer.pharma-network.com /bin/bash
- peer chaincode invoke -o orderer.pharma-network.com:7050 -C pharmachannel -n pharmanet -c '{"Args":["org.pharma-network.pharmanet:viewDrugcurrentState","Paracetamol","001"]}]'

```
root@5eea23217afdf:/opt/gopath/src/github.com/hyperledger/fabric/peer# peer chaincode invoke -o orderer.pharma-network.com:7050 -C pharmachannel -n pharmanet -c '{"Args":["org.pharma-network.pharmanet:viewDrugcurrentState","Paracetamol","001"]}]'
[{"transactionId": "28ebaca478b88d98da2cad41780efde95e4d2ee971d7aa8aa94e6bd9b55f52db"}, {"obj1": {"productID": "\u00000org.pharma-network.pharmanet.company\u0000MAN001\u0000", "drugName": "Paracetamol", "mfgDate": "04-20", "expDate": "05-23", "owner": "\u00000org.pharma-network.pharmanet.shipmentOrder\u00000DIST001-Paracetamol\u0000", "shipment": "\u00000org.pharma-network.pharmanet.shipmentOrder\u00000DIST001\u0000"}, {"obj2": {"productID": "\u00000org.pharma-network.pharmanet.drug\u0000Paracetamol-001\u0000", "drugName": "Paracetamol", "mfgDate": "04-20", "expDate": "05-23", "owner": "\u00000org.pharma-network.pharmanet.shipmentOrder\u00000DIST001-Paracetamol\u0000", "shipment": "\u00000org.pharma-network.pharmanet.shipmentOrder\u00000DIST001\u0000"}, {"obj3": {"productID": "\u00000org.pharma-network.pharmanet.shipmentOrder\u00000DIST001\u0000", "drugs": [{"drugID": "28ebaca478b88d98da2cad41780efde95e4d2ee971d7aa8aa94e6bd9b55f52db", "quantity": 1}], "order": "\u0000", "status": "PENDING", "owner": "\u0000", "mfgDate": "04-20", "expDate": "05-23", "createdAt": "\u0000", "updatedAt": "\u0000"}], "status": 200, "payload": "[{"transactionId": "28ebaca478b88d98da2cad41780efde95e4d2ee971d7aa8aa94e6bd9b55f52db"}, {"obj1": {"productID": "\u00000org.pharma-network.pharmanet.company\u0000MAN001\u0000", "drugName": "Paracetamol", "mfgDate": "04-20", "expDate": "05-23", "owner": "AAD001", "shipment": "\u00000org.pharma-network.pharmanet.shipmentOrder\u00000DIST001-Paracetamol\u0000", "order": "\u0000", "status": "PENDING", "owner": "\u0000", "mfgDate": "04-20", "expDate": "05-23", "createdAt": "\u0000", "updatedAt": "\u0000"}, {"obj2": {"productID": "\u00000org.pharma-network.pharmanet.drug\u0000Paracetamol-001\u0000", "drugName": "Paracetamol", "mfgDate": "04-20", "expDate": "05-23", "owner": "\u0000", "shipment": "\u00000org.pharma-network.pharmanet.shipmentOrder\u00000DIST001-Paracetamol\u0000", "order": "\u0000", "status": "PENDING", "owner": "\u0000", "mfgDate": "04-20", "expDate": "05-23", "createdAt": "\u0000", "updatedAt": "\u0000"}, {"obj3": {"productID": "\u00000org.pharma-network.pharmanet.shipmentOrder\u00000RET002-Paracetamol\u0000", "drugs": [{"drugID": "28ebaca478b88d98da2cad41780efde95e4d2ee971d7aa8aa94e6bd9b55f52db", "quantity": 1}], "order": "\u0000", "status": "PENDING", "owner": "\u0000", "mfgDate": "04-20", "expDate": "05-23", "createdAt": "\u0000", "updatedAt": "\u0000"}]}]
```

Segment3 : Node Application Development

Introduction

The application will be used by the organisations to interact with the functions defined inside the smart contract. Created the main folder with name “application”, which has sub-folders for each organisation. The subfolders are as follows consumer-application, distributor-application, manufacturer-application, retailer-application and transporter-application

Process of Execution: Starting the node application

- open a new tab in the terminal
- navigate to the consumer-application folder by typing `cd ./application/consumer-application/`
- Once inside the consumer-application , install the npm by typing `sudo apt npm install`
- Now install the dependencies by typing the below command `npm install`
- Note after this there will be node_modules folder gets formed in consumer-application
- Once dependencies are installed, start the node server by typing, `node .`
- If the server has started successfully, there will be a message prompted on the screen
- “Distributed Pharma-Net App listening on port 4000!”
- Repeat the same process for distributor-application, manufacturer-application, retailer-application, transporter-application
- Note that if an organisation is invoking its responsive functions, start its chaincode service in the chaincode container tab by running its specific script (refer to npm scripts mentioned in segment2 -list of funtions table)
- Followed by above step start the node server in the specific application folder, but make sure if any node server is on in any other organisation application folder, stop it by typing `ctrl + c`

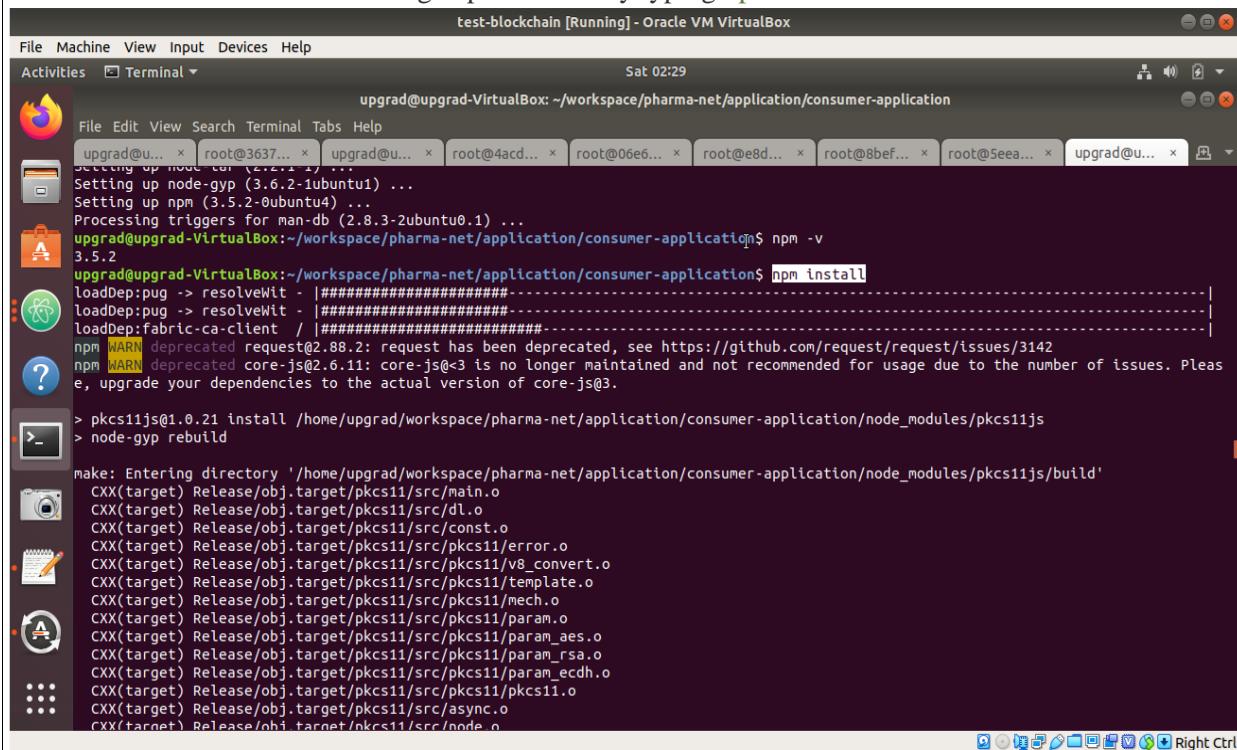
Below is the screenshot of installing node package manager

```

File Machine View Input Devices Help
Activities Terminal
File Edit View Search Terminal Tabs Help
upgrad@upgrad-VirtualBox: ~/workspace/pharma-net/application/consumer-application
[upgrad@upgrad-VirtualBox: ~/workspace/pharma-net/networks] cd ./application/consumer-application/
[upgrad@upgrad-VirtualBox: ~/workspace/pharma-net/application/consumer-application]$ sudo apt install npm
[sudo] password for upgrad:
Reading package lists... Done
Building dependency tree
Reading state information... Done
The following packages were automatically installed and are no longer required:
fonts-liberation2 fonts-opensymbol gir1.2-geocodeglib-1.0 gir1.2-gst-plugins-base-1.0 gir1.2-gstreamer-1.0 gir1.2-gudev-1.0
gir1.2-udisks-2.0 gir1.2-glro-plugins-0.3-base gstreamer1.0-gtk3 libboost-date-time1.65.1 libboost-filesystem1.65.1
libboost-locale1.65.1 libcdr-0.1.1 libclucene-controlisivs libclucene-coreisivs libcms-0.5-5 libcolamd2
libicu-55.2 liblock-free-2.0 liblz4-1.7 libmicrohttpd-0.9.3 libmonkey-0.7.2 libnativ2-14
libfreerdp-client2-2 libfreerdp2-2 libgcrypt2 libgee-0.8.2 libgexiv2-1 libglib-2.66 libgpod-2.4 libgpod4
liblangtag-common liblangtag1 liblirc-client0 liblucas3-0 libmediart-2.0-0 libmspub-0.1-1 libodfgen-0.1-1 libqalculate2vs5 librsvg2
librevenge-0.0.0 libsgutils2-2 libssh-4 libsubutesparseconfig libvncclient libwinpr2-2 libxapian30 libxmlsec1 libxmlsec1-nss
lp-solve media-player-info python3-nako python3-markupsafe syslinux syslinux-common syslinux-legacy usb-creator-common
Using previously downloaded archives...
Unpacking npm (from .../npm_7.10.0-1_amd64.deb) ...
The following additional packages will be installed:
  gyp Javascript-common libbsync-asyn libjs-inherits libjs-jquery libjs-node-uuid libjsunderscore libssl1.0-dev libuv1-dev node-abbrev
  node-ansi node-ansi-color-table node-archy node-asyn node-balancedbatch node-block-stream node-brace-expansion
  node-busboy node-claimed-lock node-combiner node-constantinople node-create-dns node-create-queue node-create-agent node-form-data
  node-is.realpath node-fstream node-fstream-ignore node-github-url-from-git node-glob node-graceful-fs node-host node-hosted-git-info
  node-inflight node-inherits node-int node-ls-built-in-module node-tsex node-json-stringify-safe node-lockfile node-lru-cache
  node-mime node-minimatch node-md5rp node-mute-stream node-node-uuid node-nopt node-normalize-package-data node-npmlog node-once
  node-osenv node-path-is-absolute node-pseudomod node-q5 node-read node-read-package-json node-request node-retry node-tarifier
  node-server node-sha node-slide node-spdx-correct node-spdx-expression-parse node-spdx-license-ids node-tar node-tunnelify
  node-u

  The following packages will be upgraded:
    nodejs-14 14.16.1-1+b1+deb11u1
  0 upgraded, 1 newly installed, 0 to remove and 0 not upgraded.
  Need to get 0 B/198 kB of archives.
  After this operation, 0 B of additional disk space will be used.
  Selecting previously unselected package nodejs-14.
  (Reading database ... 5418 files and directories currently installed.)
  Preparing to unpack .../nodejs-14_14.16.1-1+b1+deb11u1_amd64.deb ...
  Setting up nodejs-14 (14.16.1-1+b1+deb11u1) ...
  
```

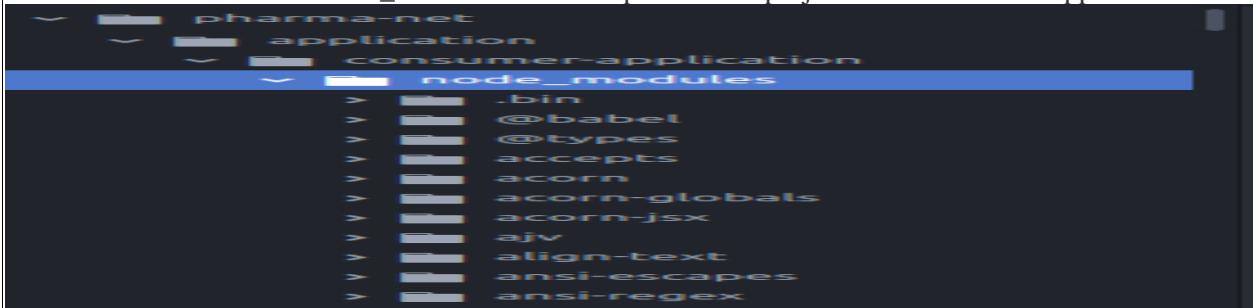
Below is the screenshot of installing dependencies by typing `npm install`



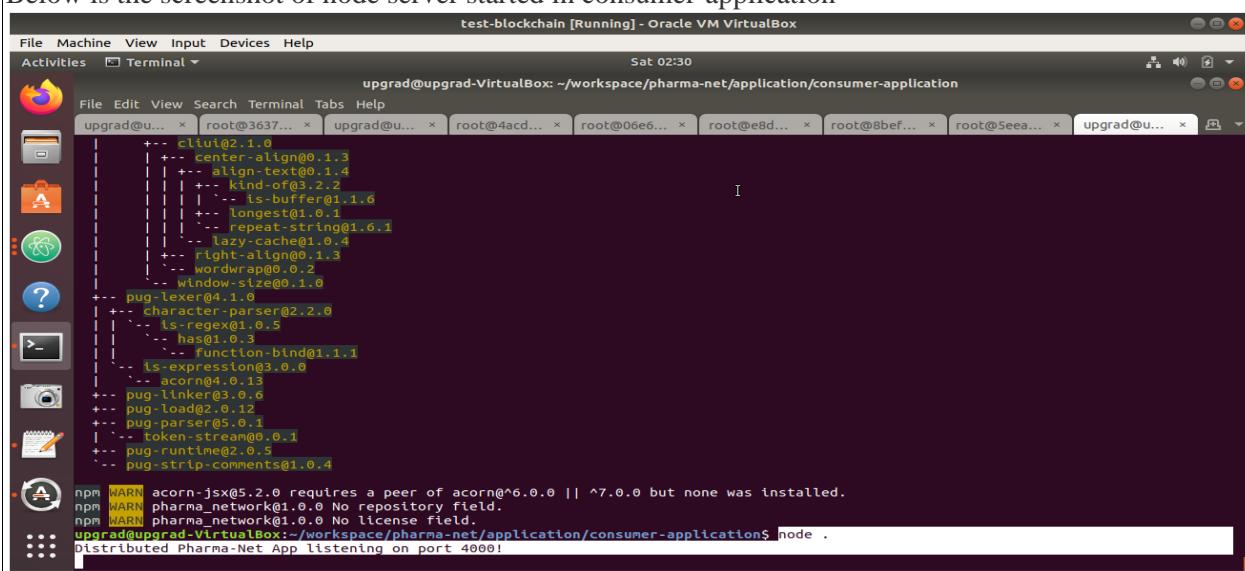
```
test-blockchain [Running] - Oracle VM VirtualBox
File Machine View Input Devices Help
Activities Terminal Sat 02:29
upgrad@upgrad-VirtualBox: ~/workspace/pharma-net/application/consumer-application
File Edit View Terminal Tabs Help
upgrad@u... x root@3637... x upgrad@u... x root@4acd... x root@06e6... x root@e8d... x root@8bef... x root@5eea... x upgrad@u... x
Setting up node-gyp (3.6.2-1ubuntu1) ...
Setting up npm (3.5.2-0ubuntu4) ...
Processing triggers for man-db (2.8.3-2ubuntu0.1) ...
upgrad@upgrad-VirtualBox:~/workspace/pharma-net/application/consumer-application$ npm -v
3.5.2
upgrad@upgrad-VirtualBox:~/workspace/pharma-net/application/consumer-application$ npm install
loadDep:upgrad -> resolveWit - |#####
loadDep:upgrad -> resolveWit - |#####
loadDep:fabric-ca-client / |#####
npm [WARN] deprecated request@2.88.2: request has been deprecated, see https://github.com/request/request/issues/3142
npm [WARN] deprecated core-js@2.6.11: core-js<3 is no longer maintained and not recommended for usage due to the number of issues. Please upgrade your dependencies to the actual version of core-js@3.
> pkcs11js@1.0.21 install /home/upgrad/workspace/pharma-net/application/consumer-application/node_modules/pkcs11js
> node-gyp rebuild

make: Entering directory '/home/upgrad/workspace/pharma-net/application/consumer-application/node_modules/pkcs11js/build'
  CXX(target) Release/obj.target/pkcs11/src/main.o
  CXX(target) Release/obj.target/pkcs11/src/dl.o
  CXX(target) Release/obj.target/pkcs11/src/const.o
  CXX(target) Release/obj.target/pkcs11/src/pkcs11/error.o
  CXX(target) Release/obj.target/pkcs11/src/pkcs11/v8_convert.o
  CXX(target) Release/obj.target/pkcs11/src/pkcs11/template.o
  CXX(target) Release/obj.target/pkcs11/src/pkcs11/mech.o
  CXX(target) Release/obj.target/pkcs11/src/pkcs11/param.o
  CXX(target) Release/obj.target/pkcs11/src/pkcs11/param_aes.o
  CXX(target) Release/obj.target/pkcs11/src/pkcs11/param_rsa.o
  CXX(target) Release/obj.target/pkcs11/src/pkcs11/param_ecdh.o
  CXX(target) Release/obj.target/pkcs11/src/pkcs11/pkcs11.o
  CXX(target) Release/obj.target/pkcs11/src/async.o
CXX(target) Release/obj.target/pkcs11/src/node.o
CXX(target) Release/obj.target/pkcs11/src/node_n.o
make: Leaving directory '/home/upgrad/workspace/pharma-net/application/consumer-application/node_modules/pkcs11js/build'
```

Below is the screenshot of node_modules formed in pharma-net project under consumer-application



Below is the screenshot of node server started in consumer-application



```
test-blockchain [Running] - Oracle VM VirtualBox
File Machine View Input Devices Help
Activities Terminal Sat 02:30
upgrad@upgrad-VirtualBox: ~/workspace/pharma-net/application/consumer-application
File Edit View Terminal Tabs Help
upgrad@u... x root@3637... x upgrad@u... x root@4acd... x root@06e6... x root@e8d... x root@8bef... x root@5eea... x upgrad@u... x
+-- cliui@0.1.0
|   +-- center-align@0.1.3
|   |   +-- align-text@0.1.4
|   |   +-- kind-of@0.3.2
|   |   |   +-- is-buffer@0.1.6
|   |   +-- longest@0.1.0
|   |   |   +-- repeat-string@0.1.1
|   |   +-- lazy-cache@0.1.4
|   |   +-- right-align@0.1.3
|   +-- wordwrap@0.0.2
|   +-- window-size@0.1.0
+-- pug-lexer@4.1.0
+-- character-parser@2.0.0
+-- ls-regex@0.0.5
+-- has@0.0.3
+-- function-bind@1.1.1
-- acorn@4.0.13
+-- pug-linker@3.0.6
+-- pug-load@2.0.12
+-- pug-parser@5.0.1
+-- token-stream@0.0.1
+-- pug-runtime@0.0.5
-- pug-strip-comments@1.0.4
npm [WARN] acorn-jsx@5.2.0 requires a peer of acorn@^6.0.0 || ^7.0.0 but none was installed.
npm [WARN] pharma_network@1.0.0 No repository field.
npm [WARN] pharma_network@1.0.0 No license field.
upgrad@upgrad-VirtualBox:~/workspace/pharma-net/application/consumer-application$ node .
Distributed Pharma-Net App listening on port 4000!
```

Segment4 : Send HTTP requests on Rest-api endpoints using Postman application & make a collection file

TestCase1: Initiation

Opened the postman and created a collection with name Initiation which has below requests

functionName	URL in Postman	RequestName in Postman	Remarks
addToWallet	localhost:4000/addToWallet/manufacturer	localhost:4000/addToWallet/manufacturer	AddtoWallet needs certificatePath & privateKeyPath as the arguments to be passed to create the identity of that Org
<i>certificatePath: /home/upgrad/workspace/pharma-net/network/crypto-config/peerOrganizations/manufacturer.pharma-network.com/users/Admin@manufacturer.pharma-network.com/msp/signcerts/Admin@manufacturer.pharma-network.com-cert.pem</i>			
<i>privateKeyPath: /home/upgrad/workspace/pharma-net/network/crypto-config/peerOrganizations/manufacturer.pharma-network.com/users/Admin@manufacturer.pharma-network.com/msp/keystore/bdec4c8e1870925014ec4b50f86f5eee848c79fb70101a34a2ed3028ced7f141_sk</i>			
registerCompany	localhost:4000/registerCompany	localhost:4000/registerCompany@Manufacturer-Sun Pharma	
addDrug	localhost:4000/addDrug	localhost:4000/addDrug@Paracetamol-001-MAN001	
addDrug	localhost:4000/addDrug	localhost:4000/addDrug@Paracetamol-002-MAN001	
addDrug	localhost:4000/addDrug	localhost:4000/addDrug@Paracetamol-003-MAN001	
addDrug	localhost:4000/addDrug	localhost:4000/addDrug@Paracetamol-004-MAN001	
Validation	localhost:4000/addDrug	localhost:4000/addDrug@Unauthorized-UnregisteredManufacturer	If the Manufacturer is not registered on the network, but trying to add the drug : An error message is prompted
addToWallet	localhost:4000/addToWallet/distributor	localhost:4000/addToWallet/distributor	
<i>certificatePath: /home/upgrad/workspace/pharma-net/network/crypto-config/peerOrganizations/distributor.pharma-network.com/users/Admin@distributor.pharma-network.com/msp/signcerts/Admin@distributor.pharma-network.com-cert.pem</i>			
<i>privateKeyPath: /home/upgrad/workspace/pharma-net/network/crypto-config/peerOrganizations/distributor.pharma-network.com/users/Admin@distributor.pharma-network.com/msp/keystore/b929fef7e726da4be52f1d42ea0b19347da972f5b5294227351d56ef49cdacb2_sk</i>			
registerCompany	localhost:4000/registerCompany	localhost:4000/registerCompany@Distributor-VG Pharma	
Validation	localhost:4000/addDrug	localhost:4000/addDrug@Unauthorized-DIST001	Distributor trying to add the drug : An error message is prompted

addToWallet	localhost:4000/addToWallet/ retailer	localhost:4000/addToWallet/retailer	
<i>certificatePath: /home/upgrad/workspace/pharma-net/network/crypto-config/peerOrganizations/retailer.pharma-network.com/users/Admin@retailer.pharma-network.com/msp/signcerts/Admin@retailer.pharma-network.com-cert.pem</i>			
registerCompany	localhost:4000/registerComp any	localhost:4000/registerCompany@Retaile r-upgrad	
addToWallet	localhost:4000/addToWallet/ transporter	localhost:4000/addToWallet/transporter	
<i>certificatePath: /home/upgrad/workspace/pharma-net/network/crypto-config/peerOrganizations/transporter.pharma-network.com/users/Admin@transporter.pharma-network.com/msp/signcerts/Admin@transporter.pharma-network.com-cert.pem</i>			
registerCompany	localhost:4000/registerComp any	localhost:4000/registerCompany@Transp orter-FedEx	
registerCompany	localhost:4000/registerComp any	localhost:4000/registerCompany@Transp orter-Blue Dart	
addToWallet	localhost:4000/addToWallet/ consumer	localhost:4000/addToWallet/consumer	
1. <i>certificatePath: /home/upgrad/workspace/pharma-net/network/crypto-config/peerOrganizations/consumer.pharma-network.com/users/Admin@consumer.pharma-network.com/msp/signcerts/Admin@consumer.pharma-network.com-cert.pem</i>			
2. <i>privateKeyPath: /home/upgrad/workspace/pharma-net/network/crypto-config/peerOrganizations/consumer.pharma-network.com/users/Admin@consumer.pharma-network.com/msp/keystore/55da3e5b15f8440984cc1be8cf8fe5889ebfd256f71bfa991e3b8d03b31089db_sk"</i>			

- AddToWallet – Manufacturer

The screenshot shows the Postman application interface. A collection named 'practise' is selected on the left sidebar. In the main workspace, a new request is being prepared with the following details:

- Method:** POST
- URL:** localhost:4000/addToWallet/manufacturer
- Body:** (x-www-form-urlencoded)

KEY	VALUE	DESCRIPTION
certificatePath	/home/upgrad/workspace/pharma-net/networ...	
privateKeyPath	/home/upgrad/workspace/pharma-net/networ...	
- Response:** Status: 200 OK, Time: 1938 ms, Size: 309 B
- Preview:** The response body is displayed as JSON:

```
1: { 2: "status": "success", 3: "message": "User credentials added to wallet" 4: }
```

- registerCompany – Manufacturer- MAN001

addDrug: Creating 4 strips of a drug named ‘Paracetamol’ with serial number starting from ‘001’ to ‘004’

addDrug - Paracetamol-001

addDrug - Paracetamol-002

POST localhost:4000/addDrug

KEY	VALUE	DESCRIPTION
drugName	Paracetamol	
serialNo	002	
mfgDate	04-20	
expDate	03-23	
companyCRN	MAN001	
Key	Value	Description

```

1  {
2     "status": "success",
3     "message": "Drug Added successfully",
4     "drug": {
5         "productID": "\u00000org.pharma-network.pharacet.dru\u0000Paracetamol-002\u0000",
6         "manufacturer": "\u00000org.pharma-network.pharacet.company\u0000MAN001\u0000",
7         "drugname": "Paracetamol",
8         "mfgdate": "04-20",
9         "expdate": "03-23",
10        "owner": "\u00000org.pharma-network.pharacet.company\u0000MAN001\u0000",
11        "shipment": [],
12        "addedby": "x509::/C=US/ST=California/L=San Francisco/O=client/CN=Admin@manufacturer.pharma-network.com::/C=US/ST=California/L=San Francisco/0=manufacturer.pharma-network.com/CN=ca.manufacturer.pharma-network.com",
13        "transactionID": "33e01ef6aa276f485defef264a661ff1ad9d1b7a058d16a9c1b104b02d75",
14        "createdAt": "2020-04-26T08:14:28.158Z",
15        "updatedAt": "2020-04-26T08:14:28.158Z"
16    }
17 }

```

addDrug – Paracetamol-003

POST localhost:4000/addDrug

KEY	VALUE	DESCRIPTION
drugName	Paracetamol	
serialNo	003	
mfgDate	04-20	
expDate	03-23	
companyCRN	MAN001	

```

1  {
2     "status": "success",
3     "message": "Drug Added successfully",
4     "drug": {
5         "productID": "\u00000org.pharma-network.pharacet.dru\u0000Paracetamol-003\u0000",
6         "manufacturer": "\u00000org.pharma-network.pharacet.company\u0000MAN001\u0000",
7         "drugname": "Paracetamol",
8         "mfgdate": "04-20",
9         "expdate": "03-23",
10        "owner": "\u00000org.pharma-network.pharacet.company\u0000MAN001\u0000",
11        "shipment": [],
12        "addedby": "x509::/C=US/ST=California/L=San Francisco/O=client/CN=Admin@manufacturer.pharma-network.com::/C=US/ST=California/L=San Francisco/0=manufacturer.pharma-network.com/CN=ca.manufacturer.pharma-network.com",
13        "transactionID": "33e01ef6aa276f485defef264a661ff1ad9d1b7a058d16a9c1b104b02d75",
14        "createdAt": "2020-04-26T08:24:19.498Z",
15        "updatedAt": "2020-04-26T08:24:19.498Z"
16    }
17 }

```

addDrug – Paracetamol -004

The screenshot shows the Postman interface with a collection named "Initiation". A POST request is made to "localhost:4000/addDrug" with the following body parameters:

KEY	VALUE	DESCRIPTION
drugName	Paracetamol	
serialNo	004	
mfgDate	04-20	
expDate	03-23	
companyCRN	MAN001	
Key	Value	Description

The response status is 200 OK, time 30699 ms, size 991 B.

Validation: If the Manufacturer is not registered on the network, but trying to add the drug :An error message is prompted

The screenshot shows the Postman interface with a collection named "Initiation". A POST request is made to "localhost:4000/addDrug@Unauthorized-UnregisteredManufacturer" with the following body parameters:

KEY	VALUE	DESCRIPTION
drugName	Paracetamol	
serialNo	004	
mfgDate	04-20	
expDate	03-23	
companyCRN	MAN019	

The response status is 500 Internal Server Error, with the following error message:

```

1 + {
2   "status": "error",
3   "message": "Failed",
4   "error": {
5     "message": "Error: No valid responses from any peers. 2 peer error responses:\n    peer=peer0.manufacturer.pharma-network.com, status=500, message=transaction returned with failure: Error: Please register.Manufacturer Asset doesn't exist in the network\n    peer=peer1.manufacturer.pharma-network.com, status=500, message=failed to execute transaction\n    2b57b052a969c98a20d4c4ccbe0b4609ce304279658499f8e6dcde36a8612d12: [channel pharmachannel] could not launch chaincode pharmenet\n    :1:1: chaincode registration failed: container exited with 0\n\n    stack": "Error: Error: No valid responses from any peers. 2 peer error responses:\n    peer=peer0.manufacturer.pharma-network.com, status=500, message=transaction returned with failure: Error: Please register.Manufacturer Asset doesn't exist in the network\n    peer=peer1.manufacturer.pharma-network.com, status=500, message=failed to execute transaction\n    2b57b052a969c98a20d4c4ccbe0b4609ce304279658499f8e6dcde36a8612d12: [channel pharmachannel] could not launch chaincode pharmenet\n    :1:1: chaincode registration failed: container exited with 0\n\n    at Object.main [as execute] (/home/upgrad/workspace/pharma\n    -net/application/manufacturer-application/3._addDrug.js:23:9)\n    at <anonymous>"
6   }
7 }
8

```

addToWallet – Distributor -DIST001

The screenshot shows the Postman interface with a collection named "Initiation". A POST request is made to "localhost:4000/addToWallet/distributor". The "Body" tab is selected, showing form-data fields "certificatePath" and "privateKeyPath" both set to "/home/upgrad/workspace/pharma-net/network/certs/DIST001.p12". The response status is 200 OK, and the JSON body is {"status": "success", "message": "User credentials added to wallet"}.

registerCompany - Distributor -DIST001

The screenshot shows two POST requests to "localhost:4000/registerCompany". The top request is for "Distributor-VG Pharma" with fields: companyCRN (DIST001), companyName (VG Pharma), location (Vizag), and organisationRole (Distributor). The bottom request is for "Distributor" with a single field "Key". Both requests return 200 OK status. The JSON response for the top request is {"status": "success", "message": "Company-Registered successfully", "company": {"companyID": "u0000org.pharma-network.pharangenet.company|u00000DIST001-VG Pharma|u0000", "companyName": "VG Pharma", "location": "Vizag", "organisationRole": "Distributor", "hierarchyKey": 2, "requestedBy": "x509::/C=US/ST=California/L=San Francisco/O=client/CN=Admin@distributor.pharma-network.com::/C=US/ST=California/L=San Francisco/O=distributor.pharma-network.com/CN=ca.distributor.pharma-network.con", "createdAt": "2029-04-27T12:38:54.852Z"}.

Validation : Distributor is trying to addDrug : An error message is prompted. Note only registered Manufacturer is allowed to addDrug

The screenshot shows the Postman interface with a collection named "Initiation-1.0" containing 11 requests. A specific POST request to "localhost:4000/addDrug@Unauthoriz..." is selected. The response body is displayed as:

```

1<!DOCTYPE html>
2<html lang="en">
3<head>
4    <meta charset="utf-8">
5    <title>Error</title>
6</head>
7<body>
8    <pre>Cannot POST /addDrug</pre>
9</body>
10</html>

```

addToWallet – Retailer

The screenshot shows the Postman interface with a collection named "practise" containing 5 requests. A specific POST request to "localhost:4000/addToWallet/retailer" is selected. The response body is displayed as:

```

1{
2    "status": "success",
3    "message": "User credentials added to wallet"
4}

```

registerCompany – Retailer -RET002

The screenshot shows the Postman interface with the following details:

- Request URL:** localhost:4000/registerCompany
- Method:** POST
- Body (x-www-form-urlencoded):**

KEY	VALUE
companyCRN	RET002
companyName	upgrad
location	Mumbai
organisationRole	Retailer
- Response:**

```
{
  "status": "success",
  "message": "Company Registered successfully",
  "company": {
    "companyID": "\u0000org.pharma-network.pharmanet.company\u0000RET002-upgrad\u0000",
    "companyName": "upgrad",
    "location": "Mumbai",
    "organisationRole": "Retailer",
    "hierarchyKey": 3,
    "requestedBy": "\u0000:/C=US/ST=California/L=San Francisco/O=client/CN=Admin@retailer.pharma-network.com::/C=US/ST=California/L=San Francisco/O=retailer.pharma-network.com/CN=ca.retailer.pharma-network.com",
    "createdAt": "2020-04-26T03:37:04.824Z"
  }
}
```

addToWallet -Transporter

The screenshot shows the Postman interface with the following details:

- Request URL:** localhost:4000/addToWallet/transporter
- Method:** POST
- Body (x-www-form-urlencoded):**

KEY	VALUE
certificatePath	/home/upgrad/workspace/pharma-net/netwo...
privateKeyPath	/home/upgrad/workspace/pharma-net/netwo...
Key	Value
- Response:**

```
{
  "status": "success",
  "message": "User credentials added to wallet"
}
```

registerCompany – Transporter -TRA001

The screenshot shows the Postman interface with a successful API call. The request URL is `localhost:4000/registerCompany`. The body contains the following JSON:

```

1 - {
2   "status": "success",
3   "message": "Company-Registered successfully",
4   "company": {
5     "companyID": "u0000org.pharma-network.pharmanet.company\u0000TRA001-FedEx\u0000",
6     "companyName": "FedEx",
7     "location": "Delhi",
8     "organisationRole": "Transporter",
9     "hierarchyKey": 0,
10    "requestedBy": "x509::C=US/ST=California/L=San Francisco/OU=client/CN=Admin@transporter.pharma-network.com::C=US/ST=California/L=San Francisco/O=transporter.pharma-network.com/CN=ca.transporter.pharma-network.com",
11    "createdAt": "2020-04-27T13:41:22.451Z"
12  }
13 }

```

registerCompany – Transporter -TRA002

The screenshot shows the Postman interface with a successful API call. The request URL is `localhost:4000/registerCompany`. The body contains the following JSON:

```

1 - {
2   "status": "success",
3   "message": "Company-Registered successfully",
4   "company": {
5     "companyID": "u0000org.pharma-network.pharmanet.company\u0000TRA002-Blue Dart\u0000",
6     "companyName": "Blue Dart",
7     "location": "Banglore",
8     "organisationRole": "Transporter",
9     "hierarchyKey": 0,
10    "requestedBy": "x509::C=US/ST=California/L=San Francisco/OU=client/CN=Admin@transporter.pharma-network.com::C=US/ST=California/L=San Francisco/O=transporter.pharma-network.com/CN=ca.transporter.pharma-network.com",
11    "createdAt": "2020-04-27T13:53:52.783Z"
12  }
13 }

```

addToWallet – Consumer

The screenshot shows the Postman interface with a successful API call. The request URL is `localhost:4000/addToWallet/consumer`. The body contains the following JSON:

```

1 - {
2   "status": "success",
3   "message": "User credentials added to wallet"
4 }

```

TestCase2: Supply Chain

Supply Chain is divided into three parts namely Part a, Part b, Part c

Created a collection with name 'SupplyChain' in Postman which has three subfolders namely Part a, Part b, Part c

Supply Chain –Part a:

functionName	URL in Postman	RequestName in Postman	Remarks
createPO by Distributor(DIST001)	localhost:4000/createPO	localhost:4000/createPO@DIST001-MAN001	
Validation1			If the hierarchy for placing the PurchaseOrder is not followed: An error-msg is prompted Note: This validation is covered in SupplyChain Part b
Validation2	localhost:4000/createPO	localhost:4000/createPO@Unauthorized-MAN001	createPO request raised by Manufacturer. An error is prompted. Note: createPO request has access only to Distributor/Retailer
createShipment by Manufacturer(MAN001)	localhost:4000/createShipment	localhost:4000/createShipment@MAN001-to-DIST001	
Validation1	localhost:4000/createShipment	localhost:4000/createShipment@Validation1-listOfAssets!=Quantity	If the length of 'listOfAssets' is not equal to the quantity specified in the PO: An error message is prompted
Validation2	localhost:4000/createShipment	localhost:4000/createShipment@Validation2-InvalidDrugId	If invalid ids of the drug asset is entered: An error message is prompted
Check : viewDrugCurrentState for three drugassets	localhost:4000/viewDrugCurrentState	localhost:4000/viewDrugCurrentState@Check1-OwnerUpdatedtoTRA001-for-Paracetamol-001 localhost:4000/viewDrugCurrentState@Check1-OwnerUpdatedtoTRA001-for-Paracetamol-001 localhost:4000/viewDrugCurrentState@Check1-OwnerUpdatedtoTRA001-for-Paracetamol-001	The owner attribute of the three drugassets should be updated to the compositeKey of the TRA001
updateShipment by Transporter(TRA001)	localhost:4000/updateShipment	localhost:4000/updateShipment@TRA001	
Validation1	localhost:4000/updateShipment	localhost:4000/updateShipment@Unauthorized-TRA002	If updateShipment is invoked by some other transporter(TRA002) : An error message is prompted
Validation2	localhost:4000/updateShipment	localhost:4000/updateShipment@Unauthorized-MAN001	updateShipment request raised by Manufacturer. An error is prompted. Note: updateShipment request has access only to Transporter
Check : viewDrugCurrentState for three drugassets	localhost:4000/viewDrugCurrentState	localhost:4000/viewDrugCurrentState@Check-OwnerUpdatedToDIST001-Paracetamol-001 localhost:4000/viewDrugCurrentState@Check-OwnerUpdatedToDIST001-Paracetamol-002 localhost:4000/viewDrugCurrentState@Check-OwnerUpdatedToDIST001-Paracetamol-003	The owner attribute of the three drugassets should be updated to the compositeKey of the DIST001 & shipment attribute with the shipmentKey

createPO by Distributor-DIST001

POST localhost:4000/createPO@DIST001-MAN001

Body (1)

KEY	VALUE	DESCRIPTION
buyerCRN	DIST001	
sellerCRN	MAN001	
drugName	Paracetamol	
quantity	3	

Pretty

```

1 {
2   "status": "success",
3   "message": "PurchaseOrder-Created successfully",
4   "purchaseOrder": {
5     "poID": "\u0000org.pharma-network.pharanet.purchaseOrder\u0000DIST001-Paracetamol\u0000",
6     "drugName": "Paracetamol",
7     "quantity": "3",
8     "buyer": "\u0000org.pharma-network.pharanet.company\u0000DIST001\u0000",
9     "seller": "\u0000org.pharma-network.pharanet.company\u0000MAN001\u0000",
10    "createdBy": "\u0000org.pharma-network.pharanet.client/CN=Admin@distributor.pharma-network.com:/C=US/ST=California/L=San Francisco/O=distributor.pharma-network.com/CN=ca.distributor.pharma-network.com",
11    "createdAt": "2020-04-27T14:40:35.633Z"
12  }
13 }
```

Validation: CreatePO request raised by Manufacturer. An error is prompted. Note that createPO request has access only to Distributor/Retailer

POST localhost:4000/createPO@Unauthorized-MAN001

Body (1)

KEY	VALUE	DESCRIPTION
buyerCRN	MAN001	
sellerCRN	MAN001	
drugName	Paracetamol	
quantity	3	

Body

```

1 <!DOCTYPE html>
2 <html lang="en">
3   <head>
4     <meta charset="utf-8">
5     <title>Error</title>
6   </head>
7   <body>
8     <pre>Cannot POST /createPO</pre>
9   </body>
10  </html>
```

createShipment by Manufacturer-MAN001

The screenshot shows the Postman interface with a successful API call. The URL is `localhost:4000/createShipment@MAN001-to-DIST001`. The request method is POST to `localhost:4000/createShipment`. The Body tab shows the following JSON payload:

```

1  {
2     "status": "success",
3     "message": "Shipment-Created successfully",
4     "shipment": {
5         "shipmentID": "\u0000org.pharma-network.pharmanet.shipmentOrder\u0000DIST001-Paracetamol\u0000",
6         "creator": "\u0000org.pharma-network.pharmanet.company\u0000MAN001\u0000",
7         "assests": [
8             "\u0000org.pharma-network.pharmanet.drug\u0000Paracetamol-001\u0000",
9             "\u0000org.pharma-network.pharmanet.drug\u0000Paracetamol-002\u0000",
10            "\u0000org.pharma-network.pharmanet.drug\u0000Paracetamol-003\u0000"
11        ],
12        "transporterCRN": "TRA001",
13        "transporter": "\u0000org.pharma-network.pharmanet.shipmentOrder\u0000FedEx-TRA001\u0000",
14        "status": "in-transit",
15        "createdBy": "x509::C=US/ST=California/L=San Francisco/O=manufacturer.pharma-network.com/CN=Admin@manufacturer.pharma-network.com",
16        "createdAt": "2020-04-27T15:16:19.813Z",
17        "updatedAt": "2020-04-27T15:16:19.813Z"
18    }
19 }

```

Validation1: If the length of 'listOfAssets'(2) is not equal to the quantity(3) specified in the PO: An error message is prompted

The screenshot shows the Postman interface with an error response. The URL is `localhost:4000/createShipment@Validation1-listOfAssets!=Quantity`. The request method is POST to `localhost:4000/createShipment`. The Body tab shows the following JSON payload:

```

1  {
2     "buyerCRN": "DIST001",
3     "drugName": "Paracetamol",
4     "listOfAssets": "Paracetamol-001,Paracetamol-002",
5     "transporterCRN": "TRA001"
6 }

```

The response status is 500 Internal Server Error. The Body tab displays the error message:

```

1  {
2     "status": "error",
3     "message": "Failed",
4     "error": {
5         "message": "Error: No valid responses from any peers. 2 peer error responses:\npeer=peer0.manufacturer.pharma-network.com, status=500, message=transaction returned with failure: Error: shipment Rejected : The l\nistofAssets and the quantity in the PO doesnt match\npeer=peer1.manufacturer.pharma-network.com, status=500, message=failed to execute transaction 3a89227f3ff0a27a19460897a4a1b94ed2389\n65c03ebb15854bf12e4052f1011: [channel pharmachannel] could not launch chaincode pharmanet:1.1: chaincode registration failed: container exited with 0",
6         "stack": "Error: Error: No valid responses from any peers. 2 peer error responses:\npeer=peer0.manufacturer.pharma-network.com, status=500, message=transaction returned with failure: Error: shipment Rejected : The l\nistofAssets and the quantity in the PO doesnt match\npeer=peer1.manufacturer.pharma-network.com, status=500, message=failed to execute transaction 3a89227f3ff0a27a19460897a4a1b94ed2389\n65c03ebb15854bf12e4052f1011: [channel pharmachannel] could not launch chaincode pharmanet:1.1: chaincode registration failed: container exited with 0\nat Object.main [as execute] (/home/upgrad/workspace/pharma\n-net/application/manufacturer-application/_createShipment.js:23:9)\n at <anonymous>"
7     }
8 }

```

The terminal below shows the detailed error log:

```

Error: No valid responses from any peers. 2 peer error responses:
peer=peer0.manufacturer.pharma-network.com, status=500, message=transaction returned with failure: Error: shipment Rejected : The l
istofAssets and the quantity in the PO doesnt match
peer=peer1.manufacturer.pharma-network.com, status=500, message=failed to execute transaction 3a89227f3ff0a27a19460897a4a1b94ed2389
65c03ebb15854bf12e4052f1011: [channel pharmachannel] could not launch chaincode pharmanet:1.1: chaincode registration failed: container
exited with 0

....Disconnecting from Fabric Gateway

```

Validation2: If invalid ids of the drug asset (Paracetamol-100) is entered : An error message is prompted

The screenshot shows the Postman interface with a failed API call. The request URL is `localhost:4000/createShipment@Validation2-InvalidDrugId`. The response status is 500 Internal Server Error, with a response body containing JSON error messages. The error details indicate that no valid responses were received from peers, and two peer error responses were returned, both related to a drug asset that doesn't exist in the network.

```

{
  "status": "error",
  "message": "Failed",
  "error": {
    "message": "Error: No valid responses from any peers. 2 peer error responses:\npeer=peer0.manufacturer.pharma-network.com, status=500, message=transaction returned with failure: Error: Please register. The Drug Asset doesn't exist in the network\npeer=peer1.manufacturer.pharma-network.com, status=500, message=failed to execute transaction 96e5a3eb9e0d5649da4940de5ae682c99aa45713569848b3bc91be7e04f1168b: [channel pharmachannel] could not launch chaincode pharmanet:1.1: chaincode registration failed: container exited with 0",
    "stack": "Error: Error: No valid responses from any peers. 2 peer error responses:\npeer=peer0.manufacturer.pharma-network.com, status=500, message=transaction returned with failure: Error: Please register. The Drug Asset doesn't exist in the network\npeer=peer1.manufacturer.pharma-network.com, status=500, message=failed to execute transaction 96e5a3eb9e0d5649da4940de5ae682c99aa45713569848b3bc91be7e04f1168b: [channel pharmachannel] could not launch chaincode pharmanet:1.1: chaincode registration failed: container exited with 0\nat Object.nain [as execute] (/home/upgrad/workspace/pharma-net/application/manufacturer-application/5._createShipment.js:23:9)\n at <anonymous>"
  }
}

```

Below the API call results, a terminal window shows the error message again:

```

Error: No valid responses from any peers. 2 peer error responses:
peer=peer0.manufacturer.pharma-network.com, status=500, message=transaction returned with failure: Error: Please register. The Drug Asset doesn't exist in the network
peer=peer1.manufacturer.pharma-network.com, status=500, message=failed to execute transaction 96e5a3eb9e0d5649da4940de5ae682c99aa45713569848b3bc91be7e04f1168b: [channel pharmachannel] could not launch chaincode pharmanet:1.1: chaincode registration failed: container exited with 0

....Disconnecting from Fabric Gateway

```

Check: After the Shipment created by Manufacturer-MAN001 to Distributor-DIST001, the owner of the drug Paracetamol-001, Paracetamol-002, Paracetamol-003 should be updated to Transporter-TRA001

The screenshot shows the Postman interface with a successful API call. The request URL is `localhost:4000/viewDrugCurrentState@Check1-OwnerUpdatedtoTRA001`. The response status is 200 OK, indicating that the drug owner has been successfully updated to Transporter-TRA001.

Pretty Raw Preview JSON  

```

1 { "status": "success",
2   "message": "Drug-CurrentState fetched successfully",
3   "drugStatus": {
4     "productID": "\u0000org.pharma-network.pharmanet.drug\u0000Paracetamol-001\u0000",
5     "manufacturer": "\u0000org.pharma-network.pharmanet.company\u0000MAN001\u0000",
6     "drugName": "Paracetamol",
7     "mfgDate": "04-20",
8     "expDate": "03-23",
9     "owner": "\u0000org.pharma-network.pharmanet.shipmentOrder\u0000FedEx-TRA001\u0000",
10    "shipment": [],
11    "addedBy": "x509::C=US/ST=California/L=San Francisco/OU=client/CN=Admin@manufacturer.pharma-network.com:/C=US/ST=California/L=San Francisco/O=manufacturer.pharma-network.com/CN=ca.manufacturer.pharma-network.com",
12    "transactionId": "15ec5da7b16f7c38e2fd9bc782ea6514aad154c16277ee9933b45d83227af9b",
13    "createdAt": "2020-04-27T12:13:04.281Z",
14    "updatedAt": "2020-04-27T15:16:19.769Z"
15  }
16 }
17 }
```

 Filter History Collections Trash

POST localhost:4000/viewDrugCurrentState POST localhost:4000/viewDrugCurrentState X + ... No Environment Examples (0) ↴

localhost:4000/viewDrugCurrentState@Check1-OwnerUpdatedtoTRA001-for-Paracetamol-002

POST localhost:4000/viewDrugCurrentState

Params Authorization Headers (1) Body  Pre-request Script Tests Cookies Code Comments (0)

none practise data x-www-form-urlencoded raw binary

KEY	VALUE	DESCRIPTION	...	Bulk Edit
<input checked="" type="checkbox"/> drugName	Paracetamol			
<input checked="" type="checkbox"/> serialNo	002			
Key	Value	Description		

Body Cookies Headers (7) Test Results Status: 200 OK Time: 8275 ms Size: 1 KB Save Download

Body Cookies Headers (7) Test Results Status: 200 OK Time: 8275 ms Size: 1 KB Save Download

Pretty Raw Preview JSON  

```

1 { "status": "success",
2   "message": "Drug-CurrentState fetched successfully",
3   "drugStatus": {
4     "productID": "\u0000org.pharma-network.pharmanet.drug\u0000Paracetamol-002\u0000",
5     "manufacturer": "\u0000org.pharma-network.pharmanet.company\u0000MAN001\u0000",
6     "drugName": "Paracetamol",
7     "mfgDate": "04-20",
8     "expDate": "03-23",
9     "owner": "\u0000org.pharma-network.pharmanet.shipmentOrder\u0000FedEx-TRA001\u0000",
10    "shipment": [],
11    "addedBy": "x509::C=US/ST=California/L=San Francisco/OU=client/CN=Admin@manufacturer.pharma-network.com:/C=US/ST=California/L=San Francisco/O=manufacturer.pharma-network.com/CN=ca.manufacturer.pharma-network.com",
12    "transactionId": "6991dfacb90cd951dc15ef20769852042537b553dbd1dc61b31a0c57941ddae",
13    "createdAt": "2020-04-27T12:19:58.205Z",
14    "updatedAt": "2020-04-27T15:16:19.786Z"
15  }
16 }
17 }
```

 Filter History Collections Trash

POST localhost:4000/viewDrugCurrentState POST localhost:4000/viewDrugCurrentState POST localhost:4000/viewDrugCurrentState X + ... No Environment Examples (0) ↴

localhost:4000/viewDrugCurrentState@Check1-OwnerUpdatedtoTRA001-for-Paracetamol-003

POST localhost:4000/viewDrugCurrentState

Params practise action Headers (1) Body  Pre-request Script Tests Cookies Code Comments (0)

none form-data x-www-form-urlencoded raw binary

KEY	VALUE	DESCRIPTION	...	Bulk Edit
<input checked="" type="checkbox"/> drugName	Paracetamol			
<input checked="" type="checkbox"/> serialNo	003			
Key	Value	Description		

Body Cookies Headers (7) Test Results Status: 200 OK Time: 7356 ms Size: 1 KB Save Download

Pretty Raw Preview JSON  

```

1 { "status": "success",
2   "message": "Drug-CurrentState fetched successfully",
3   "drugStatus": {
4     "productID": "\u0000org.pharma-network.pharmanet.drug\u0000Paracetamol-003\u0000",
5     "manufacturer": "\u0000org.pharma-network.pharmanet.company\u0000MAN001\u0000",
6     "drugName": "Paracetamol",
7     "mfgDate": "04-20",
8     "expDate": "03-23",
9     "owner": "\u0000org.pharma-network.pharmanet.shipmentOrder\u0000FedEx-TRA001\u0000",
10    "shipment": [],
11    "addedBy": "x509::C=US/ST=California/L=San Francisco/O=client/CN=Admin@manufacturer.pharma-network.com::C=US/ST=California/L=San Francisco/O=manufacturer.pharma-network.com/CN=ca.manufacturer.pharma-network.com",
12    "transactionId": "a6f31e48aafb4be5b4900fcfc2c7998cf83646703d95f8357c020527930618",
13    "createdAt": "2020-04-27T12:21:52.737Z",
14    "updatedAt": "2020-04-27T15:16:19.808Z"
15  }
16}
17

```

updateShipment by Transporter-TRA001

Filter  Collections  Examples (0)  

History  No Environment

Trash  9 requests

Part a:   

- POST localhost:4000/createPO@DIST00...
- POST localhost:4000/createPO@Unauth...
- POST localhost:4000/createShipment@V...
- POST localhost:4000/createShipment@V...
- POST localhost:4000/createShipment@...
- POST localhost:4000/viewDrugCurrentSt...
- POST localhost:4000/updateShipment@...

Part a:   

POST localhost:4000/updateShipment X POST localhost:4000/viewDrugCurrentSt + ...

localhost:4000/updateShipment@TRA001

POST localhost:4000/updateShipment

Params Authorization Headers (1) Body  Pre-request Script Tests Cookies Code Comments (0)

KEY	VALUE	DESCRIPTION	...	Bulk Edit
<input checked="" type="checkbox"/> buyerCRN	DIST001			
<input checked="" type="checkbox"/> drugName	Paracetamol			
<input checked="" type="checkbox"/> transporterCRN	TRA001			
Key	Value	Description		

```

1 { "status": "success",
2   "message": "Shipment-Updated successfully",
3   "shipment": {
4     "productID": "\u0000org.pharma-network.pharmanet.shipmentOrder\u0000DIST001-Paracetamol\u0000",
5     "manufacturer": "\u0000org.pharma-network.pharmanet.company\u0000MAN001\u0000",
6     "assets": [
7       "\u0000org.pharma-network.pharmanet.drug\u0000Paracetamol-001\u0000",
8       "\u0000org.pharma-network.pharmanet.drug\u0000Paracetamol-002\u0000",
9       "\u0000org.pharma-network.pharmanet.drug\u0000Paracetamol-003\u0000"
10    ],
11    "transporterCRN": "TRA001",
12    "transporter": "\u0000org.pharma-network.pharmanet.shipmentOrder\u0000FedEx-TRA001\u0000",
13    "status": "delivered",
14    "addedBy": "x509::C=US/ST=California/L=San Francisco/O=client/CN=Admin@manufacturer.pharma-network.com::C=US/ST=California/L=San Francisco/O=manufacturer.pharma-network.com/CN=ca.manufacturer.pharma-network.com",
15    "createdAt": "2020-04-27T15:16:19.813Z",
16    "updatedAt": "2020-04-27T16:22:21.227Z"
17  }
18}
19

```

Validation: updateShipment request raised by Transporter-TRA002 who is not the transporter of this shipment. An error is prompted. Note that the Transporter of this shipment is TRA001

localhost:4000/updateShipment@Unauthorized-TRA002 Examples (0) 

POST localhost:4000/updateShipment

Send Save

Params Authorization Headers (1) Body  Pre-request Script Tests Cookies Code Comments (0)

KEY	VALUE	DESCRIPTION	...	Bulk Edit
<input checked="" type="checkbox"/> buyerCRN	DIST001			
<input checked="" type="checkbox"/> drugName	Paracetamol			
<input checked="" type="checkbox"/> transporterCRN	TRA002			

Body Cookies Headers (7) Test Results Status: 500 Internal Server Error Time: 8681 ms Size: 1.58 KB Save Download

Pretty Raw Preview JSON  

```

1 { "status": "error",
2   "message": "Failed",
3   "error": {
4     ...
5       "message": "Error: No valid responses from any peers. 2 peer error responses:\n      peer=peer0.transporter.pharma-network.com, status=500, message=transaction returned with failure: Error: Shipment cancelled. The present transporterCRN does not match with the transporterCRN of the shipment\n      peer=peer1.transporter.pharma-network.com, status=500, message=failed to execute transaction 97af84e6010e3888665fc893d32c52c680c47d6812149c589dbf10b9b6a4106f: [channel pharmachannel] could not launch chaincode pharmenet:1.1: chaincode registration failed: container exited with 0",
6       "stack": "Error: Error: No valid responses from any peers. 2 peer error responses:\n      peer=peer0.transporter.pharma-network.com, status=500, message=transaction returned with failure: Error: Shipment cancelled. The present transporterCRN does not match with the transporterCRN of the shipment\n      peer=peer1.transporter.pharma-network.com, status=500, message=failed to execute transaction 97af84e6010e3888665fc893d32c52c680c47d6812149c589dbf10b9b6a4106f: [channel pharmachannel] could not launch chaincode pharmenet:1.1: chaincode registration failed: container exited with 0\n        at Object.main [as execute] (/home/upgrad/workspace/pharma-net/application/transporter-application/6_updateShipment.js:23:9)\n        at <anonymous>"
7     }
8   }

```

Validation2: updateShipment request raised by Manufacturer. An error is prompted. Note that updateShipment request has access only to Transporter

localhost:4000/updateShipment@Unauthorized-MAN001 Examples (0)

POST localhost:4000/updateShipment Send Save

Params	Authorization	Headers (1)	Body	Pre-request Script	Tests	Cookies	Code	Comments (0)																									
<input type="radio"/> none	<input type="radio"/> form-data	<input checked="" type="radio"/> x-www-form-urlencoded	<input type="radio"/> raw	<input type="radio"/> binary																													
<table border="1"> <thead> <tr> <th>KEY</th> <th>VALUE</th> <th>DESCRIPTION</th> <th>...</th> <th>Bulk Edit</th> </tr> </thead> <tbody> <tr> <td>buyerCRN</td> <td>DIST001</td> <td></td> <td></td> <td></td> </tr> <tr> <td>drugName</td> <td>Paracetamol</td> <td></td> <td></td> <td></td> </tr> <tr> <td>transporterCRN</td> <td>MAN001</td> <td></td> <td></td> <td></td> </tr> <tr> <td>...</td> <td></td> <td></td> <td></td> <td></td> </tr> </tbody> </table>									KEY	VALUE	DESCRIPTION	...	Bulk Edit	buyerCRN	DIST001				drugName	Paracetamol				transporterCRN	MAN001				...				
KEY	VALUE	DESCRIPTION	...	Bulk Edit																													
buyerCRN	DIST001																																
drugName	Paracetamol																																
transporterCRN	MAN001																																
...																																	

Body Cookies Headers (8) Test Results Status: 404 Not Found Time: 176 ms Size: 435 B Save Download

Pretty Raw Preview HTML  

```

1 <!DOCTYPE html>
2 <html lang="en">
3   <head>
4     <meta charset="utf-8">
5     <title>Error</title>
6   </head>
7   <body>
8     <pre>Cannot POST /updateShipment</pre>
9   </body>
10  </html>

```

Check: After the updateShipment by TRA001 to DIST001, the owner attribute of the drugObject Paracetamol-001, Paracetamol-002, Paracetamol-003, should be changed to DIST001 and shipment attribute of drug Object should be updated with the compositeKey of Shipment

The screenshot shows two separate Postman requests. Both requests are POST methods to localhost:4000/viewDrugCurrentState.

Request 1 (Top):

- URL:** localhost:4000/viewDrugCurrentState@Check-OwnerUpdatedToDIST001
- Body (x-www-form-urlencoded):**

KEY	VALUE	DESCRIPTION
drugName	Paracetamol	
serialNo	001	
- Response Body (Pretty JSON):**

```

1  {
2   "status": "success",
3   "message": "Drug-CurrentState fetched successfully",
4   "drugStatus": [
5     {
6       "productID": "\u0000org.pharma-network.pharmanet.drug\u0000Paracetamol-001\u0000",
7       "manufacturer": "\u0000org.pharma-network.pharmanet.company\u0000MAN001\u0000",
8       "drugName": "Paracetamol",
9       "mfgDate": "04-20",
10      "expDate": "03-23",
11      "owner": "\u0000org.pharma-network.pharmanet.company\u0000DIST001\u0000",
12      "shipment": [
13        "\u0000org.pharma-network.pharmanet.shipmentOrder\u0000DIST001-Paracetamol\u0000"
14      ],
15      "addedBy": "x509::C=US/ST=California/L=San Francisco/OU=client/CN=Admin@manufacturer.pharma-network.com::/C=US/ST=California/L=San Francisco/O=manufacturer.pharma-network.com/CN=ca.manufacturer.pharma-network.com",
16      "transactionId": "15ec5da7b16f7c38e2fd9bc782ea6514aad154c16277ee9933b45d83227af9b",
17      "createdAt": "2020-04-27T12:13:04.281Z",
18      "updatedAt": "2020-04-27T16:22:21.195Z"
19    }
  ]
}

```

Request 2 (Bottom):

- URL:** localhost:4000/viewDrugCurrentState@Check-OwnerUpdatedToDIST001-Paracetamol-002
- Body (x-www-form-urlencoded):**

KEY	VALUE	DESCRIPTION
drugName	Paracetamol	
serialNo	002	

Body [Parameters \(7\)](#) Test Results Status: 200 OK Time: 7654 ms Size: 1.07 KB Save Download

Pretty Raw Preview JSON ↻

```

1  {
2    "status": "success",
3    "message": "Drug-CurrentState fetched successfully",
4    "drugStatus": {
5      "productID": "\u0000org.pharma-network.pharmanet.drug\u0000Paracetamol-002\u0000",
6      "manufacturer": "\u0000org.pharma-network.pharmanet.company\u0000MAN001\u0000",
7      "drugName": "Paracetamol",
8      "mfgDate": "04-20",
9      "expDate": "03-23",
10     "owner": "\u0000org.pharma-network.pharmanet.company\u0000DIST001\u0000",
11     "shipment": [
12       "\u0000org.pharma-network.pharmanet.shipmentOrder\u0000DIST001-Paracetamol\u0000"
13     ],
14     "addedBy": "x509::C=US/ST=California/L=San Francisco/O=client/CN=Admin@manufacturer.pharma-network.com::C=US/ST=California/L=San Francisco/O=manufacturer.pharma-network.com/CN=ca.manufacturer.pharma-network.com",
15     "transactionId": "6991dfac90cd951dcbb15ef20769852042537b553dbd1dc61b31a0c57941ddae",
16     "createdAt": "2020-04-27T12:19:58.205Z",
17     "updatedAt": "2020-04-27T16:22:21.206Z"
18   }
19 }
```

localhost:4000/viewDrugCurrentState@Check-OwnerUpdatedToDIST001-Paracetamol-003 Examples (0) ▾

POST localhost:4000/viewDrugCurrentState Send Save

Params Authorization Headers (1) Body ● Pre-request Script Tests Cookies Code Comments (0)

none form-data x-www-form-urlencoded raw binary

KEY	VALUE	DESCRIPTION	...	Bulk Edit
<input checked="" type="checkbox"/> drugName	Paracetamol			
<input checked="" type="checkbox"/> serialNo	003			

Pretty Raw Preview JSON ↻

```

1  {
2    "status": "success",
3    "message": "Drug-CurrentState fetched successfully",
4    "drugStatus": {
5      "productID": "\u0000org.pharma-network.pharmanet.drug\u0000Paracetamol-003\u0000",
6      "manufacturer": "\u0000org.pharma-network.pharmanet.company\u0000MAN001\u0000",
7      "drugName": "Paracetamol",
8      "mfgDate": "04-20",
9      "expDate": "03-23",
10     "owner": "\u0000org.pharma-network.pharmanet.company\u0000DIST001\u0000",
11     "shipment": [
12       "\u0000org.pharma-network.pharmanet.shipmentOrder\u0000DIST001-Paracetamol\u0000"
13     ],
14     "addedBy": "x509::C=US/ST=California/L=San Francisco/O=client/CN=Admin@manufacturer.pharma-network.com::C=US/ST=California/L=San Francisco/O=manufacturer.pharma-network.com/CN=ca.manufacturer.pharma-network.com",
15     "transactionId": "a6f31e48aafbb4be5b4900f1cf2c7998dcf83646703d95f8357c020527930618",
16     "createdAt": "2020-04-27T12:21:52.737Z",
17     "updatedAt": "2020-04-27T16:22:21.215Z"
18   }
19 }
```

Supply Chain –Part b :

functionName	URL in Postman	RequestName in Postman	Remarks
createPO by Retailer(RET002)	localhost:4000/createPO	localhost:4000/createPO@RET002-DIST001	
Validation	localhost:4000/createPO	localhost:4000/createPO@Validation-RET002-MAN001-HierarchyNotFollowed"	If the hierarchy for placing the PurchaseOrder is not followed: An error-msg is prompted
createShipment by Distributor(DIST001)	localhost:4000/createShipment	localhost:4000/createShipment@DIST001-to-RET002	
Check : viewDrugCurrentState for two drugassets	localhost:4000/viewDrugCurrentState	localhost:4000/viewDrugCurrentState@Check1-OwnerUpdatedtoTRA002-for-Paracetamol-001 localhost:4000/viewDrugCurrentState@Check1-OwnerUpdatedtoTRA002-for-Paracetamol-002	The owner attribute of the two drugassets should be updated to the compositeKey of the TRA002 ("Paracetamol", "001") ("Paracetamol", "002")
UpdateShipment by Transporter(TRA002)	localhost:4000/updateShipment	localhost:4000/updateShipment@TRA002	
Check : viewDrugCurrentState for two drugassets	localhost:4000/viewDrugCurrentState	localhost:4000/viewDrugCurrentState@Check-OwnerUpdatedToRET002-Paracetamol-001 localhost:4000/viewDrugCurrentState@Check-OwnerUpdatedToRET002-Paracetamol-002	The owner attribute of the three drugassets should be updated to the compositeKey of the RET002 & shipment attribute with the shipmentKey ("Paracetamol", "001") ("Paracetamol", "002")

createPO by Retailer-RET002

POST localhost:4000/createPO@RET002-DIST001

localhost:4000/createPO@RET002-DIST001

POST localhost:4000/createPO

Send Save

Params Supply Chain Headers (1) Body Pre-request Script Tests Cookies Code Comments (0)

buyerCRN: RET002
sellerCRN: DIST001
drugName: Paracetamol
quantity: 2

Pretty Raw Preview JSON

```

1  {
2   "status": "success",
3   "message": "PurchaseOrder-Created successfully",
4   "purchaseOrder": {
5     "poID": "\u0000org.pharma-network.pharmanet.purchaseOrder\u0000RET002-Paracetamol\u0000",
6     "drugName": "Paracetamol",
7     "quantity": "2",
8     "buyer": "\u0000org.pharma-network.pharmanet.company\u0000RET002\u0000",
9     "seller": "\u0000org.pharma-network.pharmanet.company\u0000DIST001\u0000",
10    "createdBy": "x509::/C=US/ST=California/L=San Francisco/OU=client/CN=Admin@retailer.pharma-network.com::/C=US/ST=California/L=San Francisco/O=retailer.pharma-network.com/CN=ca.retailer.pharma-network.com",
11    "createdAt": "2020-04-27T18:21:57.421Z"
12  }
13 }
```

Validation: Checking for the transfer of drugs taking place in a hierachial manner.If the hierarchy is not followed an error message is prompted.In the below case retailer of hierarchy “3” is purchasing drug from manufacturer of hierarchy 1. Hence an error message is prompted

The screenshot shows a Postman collection named "Part b:" containing several POST requests. One request, "localhost:4000/createPO@RET002...", is selected. The "Body" tab shows a JSON payload:

```

    {
      "buyerCRN": "RET002",
      "sellerCRN": "MAN001",
      "drugName": "Paracetamol",
      "quantity": 2
    }
  
```

The response status is 500 Internal Server Error. The error message in the body is:

```

  {
    "status": "error",
    "message": "Failed",
    "error": {
      "message": "Error: No valid responses from any peers. 2 peer error responses:\n      peer=peer0.retailer.pharma-network.com, status\n      =500, message=transaction returned with failure: Error: PurchaseOrder Cancelled: The purchase sequence of hierarchy is\n      violated\n      peer=peer1.retailer.pharma-network.com, status=500, message=failed to execute transaction\n      3cba23b8908f504fcf96514bf85f59c7a4af441a3feaa6ca1d8a96638be0b428: [channel pharmachannel] could not launch chaincode pharmonet\n      :1.1: chaincode registration failed: container exited with 0",
      "stack": "Error: Error: No valid responses from any peers. 2 peer error responses:\n      peer=peer0.retailer.pharma-network.com,\n      status=500, message=transaction returned with failure: Error: PurchaseOrder Cancelled: The purchase sequence of hierarchy is\n      violated\n      peer=peer1.retailer.pharma-network.com, status=500, message=failed to execute transaction\n      3cba23b8908f504fcf96514bf85f59c7a4af441a3feaa6ca1d8a96638be0b428: [channel pharmachannel] could not launch chaincode pharmonet\n      :1.1: chaincode registration failed: container exited with 0\n      at Object.main [as execute] (/home/upgrad/workspace/pharma\n      -net/application/retailer-application/4_createPO.js:23:9)\n      at <anonymous>"
    }
  }
  
```

createShipment by Distributor-DIST001

The screenshot shows a Postman collection named "Supply Chain" containing two POST requests: "localhost:4000/createPO@RET002..." and "localhost:4000/createShipment". The "localhost:4000/createShipment" request is selected. The "Body" tab shows a JSON payload:

```

    {
      "buyerCRN": "RET002",
      "drugName": "Paracetamol",
      "listOfAssets": "Paracetamol-001,Paracetamol-002",
      "transporterCRN": "TRA002"
    }
  
```

Body Cookies Headers (7) Test Results Status: 200 OK Time: 15638 ms Size: 1.05 KB Save Download

Pretty Raw Preview JSON  

```

1  {
2    "status": "success",
3    "message": "Shipment-Created successfully",
4    "shipment": [
5      {
6        "shipmentID": "\u0000org.pharma-network.pharmanet.shipmentOrder\u0000RET002-Paracetamol\u0000",
7        "creator": "\u0000org.pharma-network.pharmanet.company\u0000DIST001\u0000",
8        "assests": [
9          "\u0000org.pharma-network.pharmanet.drug\u0000Paracetamol-001\u0000",
10         "\u0000org.pharma-network.pharmanet.drug\u0000Paracetamol-002\u0000"
11       ],
12       "transporterCRN": "TRA002",
13       "transporter": "\u0000org.pharma-network.pharmanet.shipmentOrder\u0000Blue Dart-TRA002\u0000",
14       "status": "in-transit",
15       "createdBy": "x509::C=US/ST=California/L=San Francisco/OU=client/CN=Admin@distributor.pharma-network.com::/C=US/ST=California/L=San Francisco/O=distributor.pharma-network.com/CN=ca.distributor.pharma-network.com",
16       "createdAt": "2020-04-27T18:29:05.822Z",
17       "updatedAt": "2020-04-27T18:29:05.822Z"
18     }
19   }

```

Check: After the Shipment created by Distributor-DIST001 to Retailer-RET002, the owner of the drug Paracetamol-001, Paracetamol-002 should be updated to Transporter-TRA002

localhost:4000/viewDrugCurrentState@Check1-OwnerUpdatedtoTRA002-for-Paracetamol-001 Examples (0)

POST localhost:4000/viewDrugCurrentState Send Save

Params	Authorization	Headers (1)	Body 	Pre-request Script	Tests	Cookies	Code	Comments (0)
<input type="radio"/> none	<input type="radio"/> form-data	<input checked="" type="radio"/> x-www-form-urlencoded	<input type="radio"/> raw	<input type="radio"/> binary				

Params Authorization Headers (1) Body Pre-request Script Tests Cookies Code Comments (0)

KEY VALUE DESCRIPTION  Bulk Edit

<input checked="" type="checkbox"/> drugName	Paracetamol	
<input checked="" type="checkbox"/> serialNo	001	

Body Cookies Headers (7) Test Results Status: 200 OK Time: 8421 ms Size: 1.08 KB Save Download

Pretty Raw Preview JSON  

```

1  {
2    "status": "success",
3    "message": "Drug-CurrentState fetched successfully",
4    "drugStatus": [
5      {
6        "productID": "\u0000org.pharma-network.pharmanet.drug\u0000Paracetamol-001\u0000",
7        "manufacturer": "\u0000org.pharma-network.pharmanet.company\u0000MAN001\u0000",
8        "drugName": "Paracetamol",
9        "mfgDate": "04-20",
10       "expDate": "03-23",
11       "owner": "\u0000org.pharma-network.pharmanet.shipmentOrder\u0000Blue Dart-TRA002\u0000",
12       "shipment": [
13         "\u0000org.pharma-network.pharmanet.shipmentOrder\u0000DIST001-Paracetamol\u0000"
14       ],
15       "addedBy": "x509::C=US/ST=California/L=San Francisco/OU=client/CN=Admin@manufacturer.pharma-network.com::/C=US/ST=California/L=San Francisco/O=manufacturer.pharma-network.com/CN=ca.manufacturer.pharma-network.com",
16       "transactionId": "15eec5da7b16f7c38e2fd9bc782ea6514aad154c16277ee9933b45d83227af9b",
17       "createdAt": "2020-04-27T12:13:04.281Z",
18       "updatedAt": "2020-04-27T18:29:05.811Z"
19     }
20   }

```

localhost:4000/viewDrugCurrentState@Check1-OwnerUpdatedtoTRA002-for-Paracetamol-002 Examples (0) ▾

POST localhost:4000/viewDrugCurrentState Send Save

Params Authorization Headers (1) Body ● Pre-request Script Tests Cookies Code Comments (0)

none form-data x-www-form-urlencoded raw binary

KEY	VALUE	DESCRIPTION	...	Bulk Edit
<input checked="" type="checkbox"/> drugName	Paracetamol			
<input checked="" type="checkbox"/> serialNo	002			

Pretty Raw Preview JSON

```

1+ {
  "status": "success",
  "message": "Drug-CurrentState fetched successfully",
  "drugStatus": {
    "productID": "\u0000org.pharma-network.pharmanet.drug\u0000Paracetamol-002\u0000",
    "manufacturer": "\u0000org.pharma-network.pharmanet.company\000MAN001\u0000",
    "drugName": "Paracetamol",
    "mfgDate": "04-20",
    "expDate": "03-23",
    "owner": "\u0000org.pharma-network.pharmanet.shipmentOrder\0000Blue Dart-TRA002\u0000",
    "shipment": [
      "\u0000org.pharma-network.pharmanet.shipmentOrder\0000DIST001-Paracetamol\u0000"
    ],
    "addedBy": "x509:::/C=US/ST=California/L=San Francisco/OU=client/CN=Admin@manufacturer.pharma-network.com::/C=US/ST=California/L=San Francisco/O=manufacturer.pharma-network.com/CN=ca.manufacturer.pharma-network.com",
    "transactionId": "6991dfacb90cd951dcb15ef20769852042537b553dbd1dc61b31a0c57941ddae",
    "createdAt": "2020-04-27T12:19:58.205Z",
    "updatedAt": "2020-04-27T18:29:05.818Z"
  }
}

```

updateShipment by Transporter-TRA002

localhost:4000/updateShipment@TRA002 Examples (0) ▾

POST localhost:4000/updateShipment Send Save

Params Authorization Headers (1) Body ● Pre-request Script Tests Cookies Code Comments (0)

none form-data x-www-form-urlencoded raw binary

KEY	VALUE	DESCRIPTION	...	Bulk Edit
<input checked="" type="checkbox"/> buyerCRN	RET002			
<input checked="" type="checkbox"/> drugName	Paracetamol			
<input checked="" type="checkbox"/> transporterCRN	TRA002			

Body Cookies Headers (7) Test Results Status: 200 OK Time: 19321 ms Size: 1.04 KB Save Download

Pretty Raw Preview JSON

```

1+ {
  "status": "success",
  "message": "Shipment-Updated successfully",
  "shipment": {
    "shipmentID": "\u0000org.pharma-network.pharmanet.shipmentOrder\0000RET002-Paracetamol\u0000",
    "creator": "\u0000org.pharma-network.pharmanet.company\0000DIST001\u0000",
    "assests": [
      "\u0000org.pharma-network.pharmanet.drug\0000Paracetamol-001\u0000",
      "\u0000org.pharma-network.pharmanet.drug\0000Paracetamol-002\u0000"
    ],
    "transporterCRN": "TRA002",
    "transporter": "\u0000org.pharma-network.pharmanet.shipmentOrder\0000Blue Dart-TRA002\u0000",
    "status": "delivered",
    "createdBy": "x509:::/C=US/ST=California/L=San Francisco/OU=client/CN=Admin@distributor.pharma-network.com::/C=US/ST=California/L=San Francisco/O=distributor.pharma-network.com/CN=ca.distributor.pharma-network.com",
    "createdAt": "2020-04-27T18:29:05.822Z",
    "updatedAt": "2020-04-27T18:46:25.525Z"
  }
}

```

Check: After the shipment delivered by TRA002 to RET002, the owner attribute of the drugObject Paracetamol-001, Paracetamol-002 should be changed to RET002 and shipment attribute of drug Object should be updated with the compositeKey of Shipment

localhost:4000/viewDrugCurrentState@Check-OwnerUpdatedToRET002-Paracetamol-001

POST localhost:4000/viewDrugCurrentState

Params: none

Headers: (1)

Body (x-www-form-urlencoded)

Pre-request Script

Tests

Cookies

Code

Comments (0)

KEY	VALUE	DESCRIPTION	...	Bulk Edit
<input checked="" type="checkbox"/> drugName	Paracetamol			
<input checked="" type="checkbox"/> serialNo	001			

Pretty

Raw

Preview

JSON

```

1  {
2    "status": "success",
3    "message": "Drug-CurrentState fetched successfully",
4    "drugStatus": [
5      {
6        "productID": "\u0000org.pharma-network.pharmanet.drug\u0000Paracetamol-001\u0000",
7        "manufacturer": "\u0000org.pharma-network.pharmanet.company\u0000MAN001\u0000",
8        "drugName": "Paracetamol",
9        "mfgDate": "04-20",
10       "expDate": "03-23",
11       "owner": "\u0000org.pharma-network.pharmanet.company\u0000RET002\u0000",
12       "shipment": [
13         "\u0000org.pharma-network.pharmanet.shipmentOrder\u0000DIST001-Paracetamol\u0000",
14         "\u0000org.pharma-network.pharmanet.shipmentOrder\u0000RET002-Paracetamol\u0000"
15       ],
16       "addedBy": "x509:::/C=US/ST=California/L=San Francisco/OU=client/CN=Admin@manufacturer.pharma-network.com::/C=US/ST=California/L=San Francisco/O=manufacturer.pharma-network.com/CN=ca.manufacturer.pharma-network.com",
17       "transactionId": "15ec5da7b16f7c38e2fd9bc782ea6514aad154c16277ee9933b45d83227af9b",
18       "createdAt": "2020-04-27T12:13:04.281Z",
19       "updatedAt": "2020-04-27T18:46:25.503Z"
20     }
  ]
}

```

Supply Chain –Part c :

functionName	URL in Postman	RequestName in Postman	Remarks
retailDrug by Retailer(RET002)	localhost:4000/retailDrug	localhost:4000/retailDrug@RET002-AAD001	
Validation	localhost:4000/retailDrug	localhost:4000/retailDrug@Unauthorized-RET002-OwnerOfDrug-AAD001	This transaction should be invoked only by the retailer, who is the owner of the drug. If other than owner of the drug is trying to invoke this function : An error message is prompted

retailDrug by Retailer-RET002

request: localhost:4000/retailDrug

response: The data of the drug asset bought by Akash

The screenshot shows a Postman request configuration for the 'retailDrug' endpoint. The method is 'POST', the URL is 'localhost:4000/retailDrug', and the body is set to 'x-www-form-urlencoded' with the following parameters:

KEY	VALUE	DESCRIPTION
drugName	Paracetamol	
serialNo	001	
retailerCRN	RET002	
customerAadhar	AAD001	

The response status is 200 OK, and the response body is a JSON object:

```
1 {  
2   "status": "success",  
3   "message": "Retailer-Sold successfully",  
4   "drug": {  
5     "productID": "\u0000org.pharma-network.pharmanet.drug\u0000Paracetamol-001\u0000",  
6     "manufacturer": "\u0000org.pharma-network.pharmanet.company\u0000MAN001\u0000",  
7     "drugName": "Paracetamol",  
8     "mfgDate": "04-20",  
9     "expDate": "03-23",  
10    "owner": "AAD001",  
11    "shipment": [  
12      "\u0000org.pharma-network.pharmanet.shipmentOrder\u0000DIST001-Paracetamol\u0000",  
13      "\u0000org.pharma-network.pharmanet.shipmentOrder\u0000RET002-Paracetamol\u0000"  
14    ],  
15    "addedBy": "x509::C=US/ST=California/L=San Francisco/O=client/CN=Admin@manufacturer.pharma-network.com::/C=US/ST=California/L=San Francisco/O=manufacturer.pharma-network.com/CN=ca.manufacturer.pharma-network.com",  
16    "transactionId": "15eec5da7b16f7c38e2fd9bc782ea6514aad154c16277ee9933b45d83227af9b",  
17    "createdAt": "2020-04-27T12:13:04.281Z",  
18    "updatedAt": "2020-04-27T19:35:36.623Z"  
19  },  
20}
```

Validation: This transaction should be invoked only by the retailer, who is the owner of the drug. If other than owner of the drug is trying to invoke this function an error message is prompted

Note: After selling the drug Paracetamol-001 by RET002 to Aakash-AAD001, the owner of the drug is now Aakash-AAD001. But the retailer RET002 is trying to sell the same drug, so in this case an error msg is prompted

request: localhost:4000/retailDrug

response: Error Message

The screenshot shows a Postman interface with the following details:

- Method:** POST
- URL:** localhost:4000/retailDrug
- Headers:** (1) (highlighted)
- Body:** (radio button selected)
- Params:** drugName: Paracetamol, serialNo: 001, retailerCRN: RET002, customerAadhar: AAD001
- Body Content (Raw JSON):**

```

1 {
2   "status": "error",
3   "message": "Failed",
4   "error": {
5     "message": "Error: No valid responses from any peers. 2 peer error responses:\n      peer=peer0.retailer.pharma-network.com, status\n      =500, message=transaction returned with failure: Error: Not Authorized: The owner of the drug doesnt match with the retailer\n      peer=peer1.retailer.pharma-network.com, status=500, message=failed to execute transaction\n      cacd39ef89ce2e31bf5f0cd4475b28f87969ac7ce5561af17d854aacc002942c: [channel pharmachannel] could not launch chaincode pharmanet\n      :1.1: chaincode registration failed: container exited with 0",
6     "stack": "Error: Error: No valid responses from any peers. 2 peer error responses:\n      peer=peer0.retailer.pharma-network.com,\n      status=500, message=transaction returned with failure: Error: Not Authorized: The owner of the drug doesnt match with the\n      retailer\n      peer=peer1.retailer.pharma-network.com, status=500, message=failed to execute transaction\n      cacd39ef89ce2e31bf5f0cd4475b28f87969ac7ce5561af17d854aacc002942c: [channel pharmachannel] could not launch chaincode pharmanet\n      :1.1: chaincode registration failed: container exited with 0\n      at Object.main [as execute] (/home/upgrad/workspace/pharma\n      -net/application/retailer-application/_retailDrug.js:23:9)\n      at <anonymous>"
7   }
8 }
```

TestCase3: History Track Down

Created a collection in postman with name History which has below requests

functionName	URL in Postman	RequestName in Postman	Remarks
ViewHistory by Consumer-Aakash-AAD001	localhost:4000/viewHistory	localhost:4000/viewHistory@BY-Consumer-Aakash-AAD001-for-Paracetamol-001	drug : Paracetamol -001
ViewHistory by Consumer-Aakash-AAD001	localhost:4000/viewHistory	localhost:4000/viewHistory@BY-Consumer-Aakash-AAD001-for-Paracetamol-003-Testing	drug : Paracetamol -002 Note: screenshots are not taken
ViewDrugCurrentState by Consumer-Aakash-AAD001	localhost:4000/viewDrugcurrentState	localhost:4000/viewDrugcurrentState@ByConsumer-Aakash-AAD001-for-Paracetamol-001	drug : Paracetamol -001
<p><i>Note : The outcome of viewHistory records the transactionId followed by the drugObject The drugObject has a getTransactionId as one of the attribute, which is the one who has first initiated the transaction</i></p>			

ViewHistory by Consumer-Aakash-AAD001 for drug Paracetamol-001

request: localhost:4000/viewHistory

response: The entire life cycle of the drug Asset

The screenshot shows the Postman interface with the following details:

- Method:** POST
- URL:** localhost:4000/viewHistory
- Headers:** (1) (highlighted)
- Body:** (radio button selected)
- Params:** none
- Authorization:** none
- Body Content:**

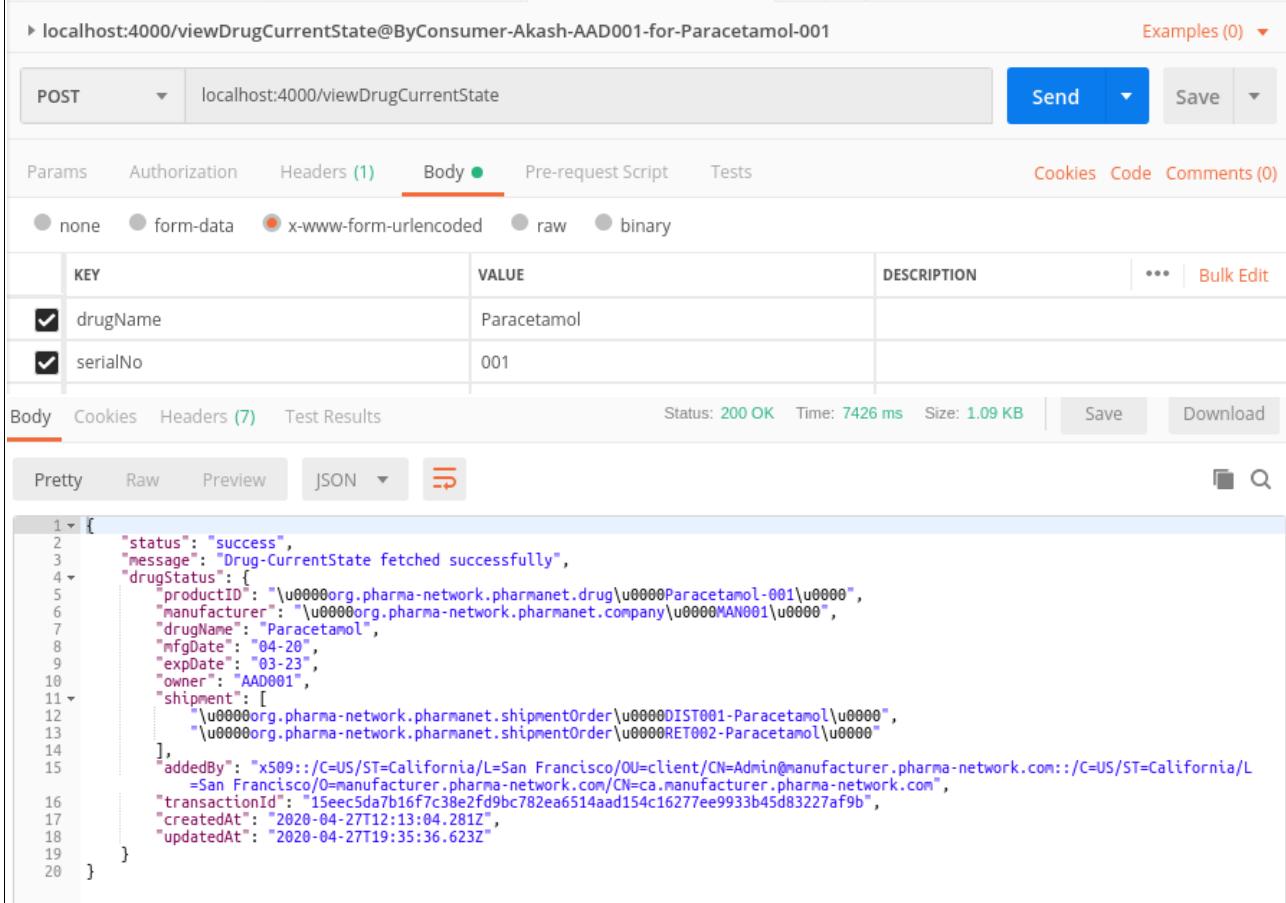
KEY	VALUE	DESCRIPTION	...	Bulk Edit
drugName	Paracetamol			
serialNo	001			
- Tests:** none
- Cookies:** none
- Code:** none
- Comments:** (0)

```

Pretty Raw Preview JSON ▾ 🔍
1  {
2    "status": "success",
3    "message": "Drug-History fetched successfully",
4    "drugHistory": [
5      {
6        "transactionId": "15eec5da7b16f7c38e2fd9bc782ea6514aad154c16277ee9933b45d83227af9b",
7        "obj": {
8          "productID": "\u0000org.pharma-network.pharmanet.drug\u0000Paracetamol-001\u0000",
9          "manufacturer": "\u0000org.pharma-network.pharmanet.company\u0000MAN001\u0000",
10         "drugName": "Paracetamol",
11         "mfgDate": "04-20",
12         "expDate": "03-23",
13         "owner": "\u0000org.pharma-network.pharmanet.company\u0000MAN001\u0000",
14         "shipment": [],
15         "addedBy": "x509::/C=US/ST=California/L=San Francisco/OU=client/CN=Admin@manufacturer.pharma-network.com::/C=US/ST=California/L=San Francisco/O=manufacturer.pharma-network.com/CN=ca.manufacturer.pharma-network.com",
16         "transactionId": "15eec5da7b16f7c38e2fd9bc782ea6514aad154c16277ee9933b45d83227af9b",
17         "createdAt": "2020-04-27T12:13:04.281Z",
18         "updatedAt": "2020-04-27T12:13:04.281Z"
19       },
20     },
21   ],
22   [
23     {
24       "transactionId": "e22508ba383a97a04da9af2c8eedbad326bc2734fbf276a455ef52a5ef90ea9",
25       "obj": {
26         "productID": "\u0000org.pharma-network.pharmanet.drug\u0000Paracetamol-001\u0000",
27         "manufacturer": "\u0000org.pharma-network.pharmanet.company\u0000MAN001\u0000",
28         "drugName": "Paracetamol",
29         "mfgDate": "04-20",
30         "expDate": "03-23",
31         "owner": "\u0000org.pharma-network.pharmanet.shipmentOrder\u0000FedEx-TRA001\u0000",
32         "shipment": [],
33         "addedBy": "x509::/C=US/ST=California/L=San Francisco/OU=client/CN=Admin@manufacturer.pharma-network.com::/C=US/ST=California/L=San Francisco/O=manufacturer.pharma-network.com/CN=ca.manufacturer.pharma-network.com",
34         "transactionId": "15eec5da7b16f7c38e2fd9bc782ea6514aad154c16277ee9933b45d83227af9b",
35         "createdAt": "2020-04-27T12:13:04.281Z",
36         "updatedAt": "2020-04-27T15:16:19.769Z"
37     },
38   ],
39   [
40     {
41       "transactionId": "02c8feed4e5066d8ea9610762328334d9769fe68546df9f9833233cf867f01a3",
42       "obj": {
43         "productID": "\u0000org.pharma-network.pharmanet.drug\u0000Paracetamol-001\u0000",
44         "manufacturer": "\u0000org.pharma-network.pharmanet.company\u0000MAN001\u0000",
45         "drugName": "Paracetamol",
46         "mfgDate": "04-20",
47         "expDate": "03-23",
48         "owner": "\u0000org.pharma-network.pharmanet.company\u0000DIST001\u0000",
49         "shipment": [
50           "\u0000org.pharma-network.pharmanet.shipmentOrder\u0000DIST001-Paracetamol\u0000"
51         ],
52         "addedBy": "x509::/C=US/ST=California/L=San Francisco/OU=client/CN=Admin@manufacturer.pharma-network.com::/C=US/ST=California/L=San Francisco/O=manufacturer.pharma-network.com/CN=ca.manufacturer.pharma-network.com",
53         "transactionId": "15eec5da7b16f7c38e2fd9bc782ea6514aad154c16277ee9933b45d83227af9b",
54         "createdAt": "2020-04-27T12:13:04.281Z",
55         "updatedAt": "2020-04-27T16:22:21.195Z"
56     },
57   ],
58   [
59     {
60       "transactionId": "e4a5f959791e5eb8b4779e32c52efaea8a8424f0a3ebbf1244e14ceb5ae40e32",
61       "obj": {
62         "productID": "\u0000org.pharma-network.pharmanet.drug\u0000Paracetamol-001\u0000",
63         "manufacturer": "\u0000org.pharma-network.pharmanet.company\u0000MAN001\u0000",
64         "drugName": "Paracetamol",
65         "mfgDate": "04-20",
66         "expDate": "03-23",
67         "owner": "\u0000org.pharma-network.pharmanet.shipmentOrder\u0000Blue Dart-TRA002\u0000",
68         "shipment": [
69           "\u0000org.pharma-network.pharmanet.shipmentOrder\u0000DIST001-Paracetamol\u0000"
70         ],
71         "addedBy": "x509::/C=US/ST=California/L=San Francisco/OU=client/CN=Admin@manufacturer.pharma-network.com::/C=US/ST=California/L=San Francisco/O=manufacturer.pharma-network.com/CN=ca.manufacturer.pharma-network.com",
72         "transactionId": "15eec5da7b16f7c38e2fd9bc782ea6514aad154c16277ee9933b45d83227af9b",
73         "createdAt": "2020-04-27T12:13:04.281Z",
74         "updatedAt": "2020-04-27T18:29:05.811Z"
75     },
76   ],
77   [
78     {
79       "transactionId": "405b58c41ed8d30d5a5b46058e2a52079c904350b621d20b87b4983624b7ce6a",
80       "obj": {
81         "productID": "\u0000org.pharma-network.pharmanet.drug\u0000Paracetamol-001\u0000",
82         "manufacturer": "\u0000org.pharma-network.pharmanet.company\u0000MAN001\u0000",
83         "drugName": "Paracetamol",
84         "mfgDate": "04-20",
85         "expDate": "03-23",
86         "owner": "\u0000org.pharma-network.pharmanet.company\u0000RET002\u0000",
87         "shipment": [
88           "\u0000org.pharma-network.pharmanet.shipmentOrder\u0000DIST001-Paracetamol\u0000",
89           "\u0000org.pharma-network.pharmanet.shipmentOrder\u0000RET002-Paracetamol\u0000"
90         ],
91         "addedBy": "x509::/C=US/ST=California/L=San Francisco/OU=client/CN=Admin@manufacturer.pharma-network.com::/C=US/ST=California/L=San Francisco/O=manufacturer.pharma-network.com/CN=ca.manufacturer.pharma-network.com",
92         "transactionId": "15eec5da7b16f7c38e2fd9bc782ea6514aad154c16277ee9933b45d83227af9b",
93         "createdAt": "2020-04-27T12:13:04.281Z",
94         "updatedAt": "2020-04-27T18:46:25.503Z"
95     }
96   ]
97 }

```

viewDrugCurrentState by Consumer-Aakash-AAD001 for drug Paracetamol-001
 request: localhost:4000/viewDrugCurrentState
 response: The current state of the drug Asset



The screenshot shows a Postman request for the endpoint `localhost:4000/viewDrugCurrentState@ByConsumer-Aakash-AAD001-for-Paracetamol-001`. The request method is POST, and the URL is `localhost:4000/viewDrugCurrentState`. The Body tab is selected, showing two parameters: `drugName` (value: Paracetamol) and `serialNo` (value: 001). The response status is 200 OK, with a time of 7426 ms and a size of 1.09 KB. The response body is a JSON object:

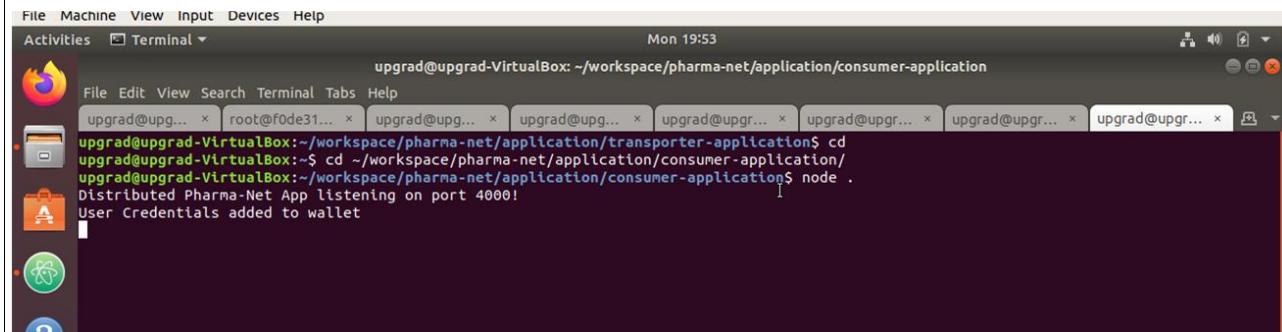
```

1  {
2   "status": "success",
3   "message": "Drug-CurrentState fetched successfully",
4   "drugStatus": {
5     "productID": "\u0000org.pharma-network.pharmanet.drug\u0000Paracetamol-001\u0000",
6     "manufacturer": "\u0000org.pharma-network.pharmanet.company\u0000MAN001\u0000",
7     "drugName": "Paracetamol",
8     "mfgDate": "04-28",
9     "expDate": "03-23",
10    "owner": "AAD001",
11    "shipment": [
12      "\u0000org.pharma-network.pharmanet.shipmentOrder\u0000IST001-Paracetamol\u0000",
13      "\u0000org.pharma-network.pharmanet.shipmentOrder\u0000RET002-Paracetamol\u0000"
14    ],
15    "addedBy": "x509::C=US/ST=California/L=San Francisco/O=client/CN=Admin@manufacturer.pharma-network.com::/C=US/ST=California/L=San Francisco/O=manufacturer.pharma-network.com/CN=ca.manufacturer.pharma-network.com",
16    "transactionId": "15eec5da7b16f7c38e2fd9bc782ea6514aad154c16277ee9933b45d83227af9b",
17    "createdAt": "2020-04-27T12:13:04.281Z",
18    "updatedAt": "2020-04-27T19:35:36.623Z"
19  }
20

```

Some Other Screenshots from the terminal

Below is the screenshot of starting the node server for consumer-application and after adding the identity a message “User Credentials added to Wallet” is prompted



The terminal window shows the command `node .` being run in the directory `~/workspace/pharma-net/application/consumer-application`. The output indicates that the application is listening on port 4000 and that user credentials have been added to the wallet.

```

File Machine View Input Devices Help
Activities Terminal Mon 19:53
upgrad@upgrad-VirtualBox: ~/workspace/pharma-net/application/consumer-application
File Edit View Search Terminal Tabs Help
upgrad@upg... x root@f0de31... x upgrad@upg... x upgrad@upg... x upgrad@upgr... x upgrad@upgr... x upgrad@upgr... x upgrad@upgr... x
upgrad@upgrad-VirtualBox:~$ cd ~/workspace/pharma-net/application/transporter-application/
upgrad@upgrad-VirtualBox:~$ cd ~/workspace/pharma-net/application/consumer-application/
upgrad@upgrad-VirtualBox:~/workspace/pharma-net/application/consumer-application$ node .
Distributed Pharma-Net App listening on port 4000!
User Credentials added to wallet

```

Below are the screenshots from the terminal of manufacturer-application

```
upgrad@upgrad-VirtualBox:~$ cd ~/workspace/pharma-net/application/manufacturer-application/
Upgrad@upgrad-VirtualBox:~/workspace/pharma-net/application/manufacturer-application$ node .
Distributed Pharma-Net App listening on port 4000!
User Credentials added to wallet
.....Connecting to Fabric Gateway
.....Connecting to channel - pharmachannel
.....Connecting to pharmanet Smart Contract
.....Requesting for registerCompany on the Network
.....Processing register company Transaction Response

{ companyID: '\u0000org.pharma-network.pharmanet.company\u0000MAN001-Sun Pharma\u0000',
  companyName: 'Sun Pharma',
  location: 'Chennai',
  organisationRole: 'Manufacturer',
  hierarchyKey: 1,
  requestedBy: 'x509::C=US/ST=California/L=San Francisco/OU=client/CN=Admin@manufacturer.pharma-network.com::/C=US/ST=California/L=San Francisco/O=manufacturer.pharma-network.com/CN=ca.manufacturer.pharma-network.com',
  createdAt: '2020-04-27T12:11:30.586Z' }

.....Register company Transaction Complete!
.....Disconnecting from Fabric Gateway
registerCompany request submitted on the Network
.....Connecting to Fabric Gateway
.....Connecting to channel - pharmachannel
.....Connecting to pharmanet Smart Contract
.....Requesting for addDrug on the Network
.....Processing Add drug Transaction Response

{ productID: '\u0000org.pharma-network.pharmanet.drug\u0000Paracetamol-002\u0000',
  manufacturer: '\u0000org.pharma-network.pharmanet.company\u0000MAN001\u0000',
  drugName: 'Paracetamol',
  mfgDate: '04-20',
  expDate: '03-23',
  owner: '\u0000org.pharma-network.pharmanet.company\u0000MAN001\u0000',
  shipment: [],
  addedBy: 'x509::C=US/ST=California/L=San Francisco/OU=client/CN=Admin@manufacturer.pharma-network.com::/C=US/ST=California/L=San Francisco/O=manufacturer.pharma-network.com/CN=ca.manufacturer.pharma-network.com',
  transactionId: '6991dfac90cd951dcb15ef20769852042537b553dbd1dc61b31a0c57941ddae',
  createdAt: '2020-04-27T12:19:58.205Z',
  updatedAt: '2020-04-27T12:19:58.205Z' }

.....Add drug Transaction Complete!
.....Disconnecting from Fabric Gateway
```

After Testing from Postman, close the network by typing the command `./fabricNetwork.sh down`

Remove the exited containers by typing the command `docker rm $(docker ps -a -f status=exited -q)`

Check the status of containers typing the command `docker ps -a`

```
File Edit View Search Terminal Help
upgrad@upgrad-VirtualBox:~/workspace/pharma-net/network$ ./fabricNetwork.sh down
Stopping 'orderer' channel 'pharmachannel' with CLI timeout of '15' seconds and CLI delay of '5' seconds and chaincode version '1.1'
Continue? [Y/n] y
proceeding...
Removing cli ... done
Removing chaincode ... done
Removing peer1.consumer.pharma-network.com ... done
Removing ca.transporter.pharma-network.com ... done
Removing peer1.retailer.pharma-network.com ... done
Removing peer0.pharmanet.pharma-network.com ... done
Removing peer0.manufacturer.pharma-network.com ... done
Removing ca.manufacturer.pharma-network.com ... done
Removing peer0.retailer.pharma-network.com ... done
Removing ca.consumer.pharma-network.com ... done
Removing ca.distributor.pharma-network.com ... done
Removing peer0.distributor.pharma-network.com ... done
Removing peer0.consumer.pharma-network.com ... done
Removing peer0.transporter.pharma-network.com ... done
Removing peer1.distributor.pharma-network.com ... done
Removing peer1.manufacturer.pharma-network.com ... done
Removing orderer.pharma-network.com ... done
Removing network.network_pharma
Removing volume network.orderer.pharma-network.com
Removing volume network.peer0.manufacturer.pharma-network.com
Removing volume network.peer1.manufacturer.pharma-network.com
Removing volume network.peer0.distributor.pharma-network.com
Removing volume network.peer1.distributor.pharma-network.com
Removing volume network.peer0.consumer.pharma-network.com
Removing volume network.peer1.consumer.pharma-network.com
Removing volume network.peer0.transporter.pharma-network.com
Removing volume network.peer1.transporter.pharma-network.com
Removing volume network.peer0.retailer.pharma-network.com
Removing volume network.peer1.retailer.pharma-network.com
---- No containers available for deletion ----
---- No images available for deletion ----
upgrad@upgrad-VirtualBox:~/workspace/pharma-net/network$ docker rm $(docker ps -a -f status=exited -q)
c16fb99cd8b
ec06bd1a6f08
18f2f95e4e4c
upgrad@upgrad-VirtualBox:~/workspace/pharma-net/network$ docker ps -a
CONTAINER ID        IMAGE               COMMAND             CREATED            STATUS              PORTS               NAMES
upgrad@upgrad-VirtualBox:~/workspace/pharma-net/network$
```

Conclusion:

Followed as per the Capstone project guidelines and executed the Test Cases.
All the Test Cases are passing and achieved the desired functionality.

References:

Upgrade course content, stackoverflow, Hyperledger documentation,
<https://stackoverflow.com/questions/59093015/gethistoryforkey-hyperledger-fabric-get-transactions-from-buffer-nodejs>
<https://github.com/lesleyannjordan/fabric-chaincode-node-laj/blob/7b4154e15de4b1d7acf2987b57a3f3f8532004f6/docs/apidocs/tutorials/using-iterators.md> etc

Future Enhancements: ----to do-----