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BCT PRACTICAL 7

AIM : To perform a thorough study of blockchain development on Hyperledger Fabric using Composer.

Installing Curl:

```
param@ubuntu:~/Desktop$ sudo apt install curl
Reading package lists... Done
Building dependency tree
Reading state information... Done
The following packages were automatically installed and are no longer required:
  libfprint-2-tod1 libllvm9
Use 'sudo apt autoremove' to remove them.
The following additional packages will be installed:
  libcurl4
The following NEW packages will be installed:
  curl
The following packages will be upgraded:
  libcurl4
1 upgraded, 1 newly installed, 0 to remove and 601 not upgraded.
Need to get 396 kB of archives.
After this operation, 419 kB of additional disk space will be used.
Do you want to continue? [Y/n] y
Get:1 http://us.archive.ubuntu.com/ubuntu focal-updates/main amd64 libcurl4 amd64 7.68.0-1ubuntu2.14 [235 kB]
Get:2 http://us.archive.ubuntu.com/ubuntu focal-updates/main amd64 curl amd64 7.68.0-1ubuntu2.14 [161 kB]
Fetched 396 kB in 3s (129 kB/s)
(Reading database ... 225281 files and directories currently installed.)
Preparing to unpack .../libcurl4_7.68.0-1ubuntu2.14_amd64.deb ...
Unpacking libcurl4:amd64 (7.68.0-1ubuntu2.14) over (7.68.0-1ubuntu2.2) ...
Selecting previously unselected package curl.
Preparing to unpack .../curl_7.68.0-1ubuntu2.14_amd64.deb ...
Unpacking curl (7.68.0-1ubuntu2.14) ...
Setting up libcurl4:amd64 (7.68.0-1ubuntu2.14) ...
Setting up curl (7.68.0-1ubuntu2.14) ...
Processing triggers for man-db (2.9.1-1) ...
Processing triggers for libc-bin (2.31-0ubuntu9.1) ...
param@ubuntu:~/Desktop$
```

Installing docker.io

```
param@ubuntu:~/Desktop$ sudo apt install docker.io -y
Reading package lists... Done
Building dependency tree
Reading state information... Done
The following packages were automatically installed and are no longer required:
  libfprint-2-tod1 libllvm9
Use 'sudo apt autoremove' to remove them.
The following additional packages will be installed:
  bridge-utils containerd libseccomp2 pigz runc ubuntu-fan
Suggested packages:
  ifupdown aufs-tools btrfs-progs cgroupfs-mount | cgroup-lite debootstrap docker-doc rinse zfs-fuse | zfsutils
The following NEW packages will be installed:
  bridge-utils containerd docker.io pigz runc ubuntu-fan
The following packages will be upgraded:
  libseccomp2
1 upgraded, 6 newly installed, 0 to remove and 600 not upgraded.
Need to get 68.9 MB of archives.
After this operation, 333 MB of additional disk space will be used.
Get:1 http://us.archive.ubuntu.com/ubuntu focal/universe amd64 pigz amd64 2.4-1 [57.4 kB]
Get:2 http://us.archive.ubuntu.com/ubuntu focal-updates/main amd64 libseccomp2 amd64 2.5.1-1ubuntu1~20.04.2 [42.5 kB]
Get:3 http://us.archive.ubuntu.com/ubuntu focal/main amd64 bridge-utils amd64 1.6-2ubuntu1 [30.5 kB]
Get:4 http://us.archive.ubuntu.com/ubuntu focal-updates/main amd64 runc amd64 1.1.0-0ubuntu1~20.04.1 [3,892 kB]
Get:5 http://us.archive.ubuntu.com/ubuntu focal-updates/main amd64 containerd amd64 1.5.9-0ubuntu1~20.04.4 [33.0 MB]
Get:6 http://us.archive.ubuntu.com/ubuntu focal-updates/universe amd64 docker.io amd64 20.10.12-0ubuntu2~20.04.1 [31.8 MB]
Get:7 http://us.archive.ubuntu.com/ubuntu focal-updates/main amd64 ubuntu-fan all 0.12.13ubuntu0.1 [34.4 kB]
Fetched 68.9 MB in 31s (2,238 kB/s)
```

Installing python3 and python2

```
param@ubuntu:~/Desktop$ sudo apt install python3 python3-pip ipython3
Reading package lists... Done
Building dependency tree
Reading state information... Done
python3 is already the newest version (3.8.2-0ubuntu2).
python3 set to manually installed.
The following packages were automatically installed and are no longer required:
  libfprint-2-tod1 libllvm9
Use 'sudo apt autoremove' to remove them.
The following additional packages will be installed:
  libexpat1 libexpat1-dev libpython3-dev libpython3.8 libpython3.8-dev libpython3.8-minimal libpython3.8-stdlib python-pip-whl python3-backcall python3-decorator python3-dev python3-ipython
  python3-ipython-genutils python3-jedi python3-parso python3-pickleshare python3-prompt-toolkit python3-pygments python3-traitlets python3-wcwidth python3-wheel python3.8 python3.8-dev
  python3.8-minimal zlib1g zlib1g-dev
Suggested packages:
  python-ipython-doc python-pygments-doc ttf-bitstream-vera python3.8-venv python3.8-doc binfmt-support
The following NEW packages will be installed:
  ipython3 libexpat1-dev libpython3-dev libpython3.8-dev python-pip-whl python3-backcall python3-decorator python3-dev python3-ipython python3-ipython-genutils python3-jedi python3-parso
  python3-pickleshare python3-pip python3-prompt-toolkit python3-pygments python3-traitlets python3-wcwidth python3-wheel python3.8-dev zlib1g-dev
The following packages will be upgraded:
  libexpat1 libpython3.8 libpython3.8-minimal libpython3.8-stdlib python3.8 python3.8-minimal zlib1g
7 upgraded, 21 newly installed, 0 to remove and 592 not upgraded.
Need to get 15.2 MB of archives.
After this operation, 37.7 MB of additional disk space will be used.
Do you want to continue? [Y/n] y
Get:1 http://us.archive.ubuntu.com/ubuntu focal-updates/main amd64 python3.8 amd64 3.8.10-0ubuntu1~20.04.5 [387 kB]
Get:2 http://us.archive.ubuntu.com/ubuntu focal-updates/main amd64 libpython3.8 amd64 3.8.10-0ubuntu1~20.04.5 [1,625 kB]
Get:3 http://us.archive.ubuntu.com/ubuntu focal-updates/main amd64 libpython3.8-stdlib amd64 3.8.10-0ubuntu1~20.04.5 [1,675 kB]
Get:4 http://us.archive.ubuntu.com/ubuntu focal-updates/main amd64 python3.8-minimal amd64 3.8.10-0ubuntu1~20.04.5 [1,905 kB]
Get:5 http://us.archive.ubuntu.com/ubuntu focal-updates/main amd64 libpython3.8-minimal amd64 3.8.10-0ubuntu1~20.04.5 [717 kB]
Get:6 http://us.archive.ubuntu.com/ubuntu focal-updates/main amd64 libexpat1 amd64 2.2.9-1ubuntu0.4 [74.4 kB]
Get:7 http://us.archive.ubuntu.com/ubuntu focal-updates/main amd64 zlib1g amd64 1:1.2.11.dfsg-2ubuntu1.5 [54.2 kB]
Get:8 http://us.archive.ubuntu.com/ubuntu focal/universe amd64 python3-backcall all 0.1.0-2 [11.2 kB]
Get:9 http://us.archive.ubuntu.com/ubuntu focal/main amd64 python3-decorator all 4.4.2-0ubuntu1 [10.3 kB]
Get:10 http://us.archive.ubuntu.com/ubuntu focal/universe amd64 python3-parso all 0.5.2-1ubuntu1 [62.8 kB]
Get:11 http://us.archive.ubuntu.com/ubuntu focal/universe amd64 python3-jedi all 0.15.2-1 [502 kB]
```
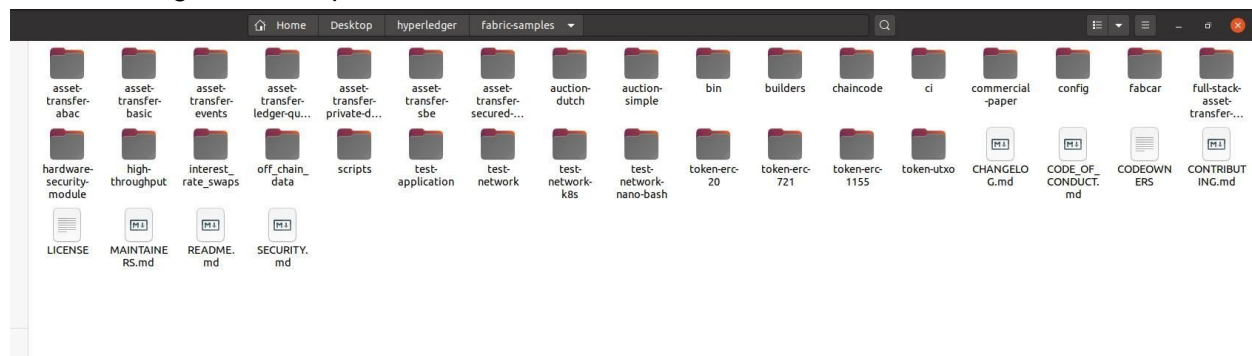
Installing golang

```
Processing triggers for desktop-file-utils (0.24-1ubuntu3) ...
param@ubuntu:~/Desktop$ sudo apt install golang-go
Reading package lists... Done
Building dependency tree
Reading state information... Done
The following packages were automatically installed and are no longer required:
  libfprint-2-tod1 libllvm9
Use 'sudo apt autoremove' to remove them.
The following additional packages will be installed:
  golang-1.13-go golang-1.13-race-detector-runtime golang-1.13-src golang-race-detector-runtime golang-src
Suggested packages:
  bzr | brz mercurial subversion
The following NEW packages will be installed:
  golang-1.13-go golang-1.13-race-detector-runtime golang-1.13-src golang-go golang-race-detector-runtime golang-src
0 upgraded, 6 newly installed, 0 to remove and 592 not upgraded.
Need to get 60.9 MB of archives.
After this operation, 324 MB of additional disk space will be used.
Do you want to continue? [Y/n] y
Get:1 http://us.archive.ubuntu.com/ubuntu focal-updates/main amd64 golang-1.13-src amd64 1.13.8-1ubuntu1.1 [12.6 MB]
Get:2 http://us.archive.ubuntu.com/ubuntu focal-updates/main amd64 golang-1.13-go amd64 1.13.8-1ubuntu1.1 [47.6 MB]
Get:3 http://us.archive.ubuntu.com/ubuntu focal/main amd64 golang-1.13-race-detector-runtime amd64 0.0+svn332029-0ubuntu2 [713 kB]
Get:4 http://us.archive.ubuntu.com/ubuntu focal/main amd64 golang-src amd64 2:1.13~1ubuntu2 [4,044 B]
Get:5 http://us.archive.ubuntu.com/ubuntu focal/main amd64 golang-go amd64 2:1.13~1ubuntu2 [22.0 kB]
Get:6 http://us.archive.ubuntu.com/ubuntu focal/main amd64 golang-race-detector-runtime amd64 2:1.13~1ubuntu2 [3,836 B]
Fetched 60.9 MB in 1min 5s (934 kB/s)
Selecting previously unselected package golang-1.13-src.
(Reading database ... 229709 files and directories currently installed.)
Preparing to unpack .../0-golang-1.13-src_1.13.8-1ubuntu1.1_amd64.deb ...
Unpacking golang-1.13-src (1.13.8-1ubuntu1.1) ...
Selecting previously unselected package golang-1.13-go.
Preparing to unpack .../1-golang-1.13-go_1.13.8-1ubuntu1.1_amd64.deb ...
Unpacking golang-1.13-go (1.13.8-1ubuntu1.1) ...
Selecting previously unselected package golang-1.13-race-detector-runtime.
Preparing to unpack .../2-golang-1.13-race-detector-runtime_0.0+svn332029-0ubuntu2_amd64.deb ...
Unpacking golang-1.13-race-detector-runtime (0.0+svn332029-0ubuntu2) ...
Selecting previously unselected package golang-src.
Preparing to unpack .../3-golang-src_2%3a1.13~1ubuntu2_amd64.deb ...
Unpacking golang-src (2:1.13~1ubuntu2) ...
Selecting previously unselected package golang-go.
Preparing to unpack .../4-golang-go_2%3a1.13~1ubuntu2_amd64.deb ...
Unpacking golang-go (2:1.13~1ubuntu2) ...
Selecting previously unselected package golang-race-detector-runtime.
Preparing to unpack .../5-golang-race-detector-runtime_2%3a1.13~1ubuntu2_amd64.deb ...
Unpacking golang-race-detector-runtime (2:1.13~1ubuntu2) ...
```

Installing nodejs

```
param@ubuntu:~/Desktop$ sudo apt install nodejs
Reading package lists... Done
Building dependency tree
Reading state information... Done
The following packages were automatically installed and are no longer required:
  libfprint-2-tod1 libllvm9
Use 'sudo apt autoremove' to remove them.
The following additional packages will be installed:
  libc-ares2 libnode64 nodejs-doc
Suggested packages:
  npm
The following NEW packages will be installed:
  libc-ares2 libnode64 nodejs nodejs-doc
0 upgraded, 4 newly installed, 0 to remove and 592 not upgraded.
Need to get 6,807 kB of archives.
After this operation, 30.7 MB of additional disk space will be used.
Do you want to continue? [Y/n] y
Get:1 http://us.archive.ubuntu.com/ubuntu focal-updates/main amd64 libc-ares2 amd64 1.15.0-1ubuntu0.1 [38.2 kB]
Get:2 http://us.archive.ubuntu.com/ubuntu focal/universe amd64 libnode64 amd64 10.19.0~dfsg-3ubuntu1 [5,765 kB]
Get:3 http://us.archive.ubuntu.com/ubuntu focal/universe amd64 nodejs-doc all 10.19.0~dfsg-3ubuntu1 [942 kB]
Get:4 http://us.archive.ubuntu.com/ubuntu focal/universe amd64 nodejs amd64 10.19.0~dfsg-3ubuntu1 [61.1 kB]
Fetched 6,807 kB in 35s (193 kB/s)
Selecting previously unselected package libc-ares2:amd64.
(Reading database ... 239850 files and directories currently installed.)
Preparing to unpack .../libc-ares2_1.15.0-1ubuntu0.1_amd64.deb ...
Unpacking libc-ares2:amd64 (1.15.0-1ubuntu0.1) ...
Selecting previously unselected package libnode64:amd64.
Preparing to unpack .../libnode64_10.19.0~dfsg-3ubuntu1_amd64.deb ...
Unpacking libnode64:amd64 (10.19.0~dfsg-3ubuntu1) ...
Selecting previously unselected package nodejs-doc.
Preparing to unpack .../nodejs-doc_10.19.0~dfsg-3ubuntu1_all.deb ...
Unpacking nodejs-doc (10.19.0~dfsg-3ubuntu1) ...
Selecting previously unselected package nodejs.
Preparing to unpack .../nodejs_10.19.0~dfsg-3ubuntu1_amd64.deb ...
Unpacking nodejs (10.19.0~dfsg-3ubuntu1) ...
Setting up libc-ares2:amd64 (1.15.0-1ubuntu0.1) ...
Setting up libnode64:amd64 (10.19.0~dfsg-3ubuntu1) ...
Setting up nodejs-doc (10.19.0~dfsg-3ubuntu1) ...
Setting up nodejs (10.19.0~dfsg-3ubuntu1) ...
```

After installing fabric-samples:

After running ./network.sh up:

After running ./network.sh createChannel

Running ./network.sh deployCC -ccn basic -ccp ../asset-transfer-basic/chaincode-go -ccl go :

Hence, our basic chaincode is deployed.

Initializing the ledger with assets:

param@ubuntu:~/Desktop/hyperledger/fabric-samples/test-network$ peer chaincode invoke -o localhost:7050 --ordererTLSHostnameOverride orderer.example.com --tls --cafile "${PWD}/organizations/ordererOrgani
zations/example.com/orderers/orderer.example.com/msp/tlscacerts/tlsca.example.com-cert.pem" -C mychannel -n basic --peerAddresses localhost:7051 --tlsRootCertFiles "${PWD}/organizations/peerOrganizations
/org1.example.com/peers/peer0.org1.example.com/tls/ca.crt" --peerAddresses localhost:9051 --tlsRootCertFiles "${PWD}/organizations/peerOrganizations/org2.example.com/peers/peer0.org2.example.com/tls/ca.c
rt" -c '{"function":"InitLedger","Args":[]}'
2022-11-20 10:26:56.272 PST 0001 INFO [chaincodeCmd] chaincodeInvokeOrQuery -> Chaincode invoke successful. result: status:200
param@ubuntu:~/Desktop/hyperledger/fabric-samples/test-network$

List of assets in ledger :

param@ubuntu:~/Desktop/hyperledger/fabric-samples/test-network$ peer chaincode query -C mychannel -n basic -c '{"Args":["GetAllAssets"]}'
[{"AppraisedValue":300,"Color":"blue","ID":"asset1","Owner":"Tomoko","Size":5},{"AppraisedValue":400,"Color":"red","ID":"asset2","Owner":"Brad","Size":5},{"AppraisedValue":500,"Color":"green","ID":"asset
3","Owner":"Jin Soo","Size":10},{"AppraisedValue":600,"Color":"yellow","ID":"asset4","Owner":"Max","Size":10},{"AppraisedValue":700,"Color":"black","ID":"asset5","Owner":"Adriana","Size":15},{"AppraisedV
alue":800,"Color":"white","ID":"asset6","Owner":"Michel","Size":15}]

Reading a asset :

param@ubuntu:~/Desktop/hyperledger/fabric-samples/test-network$ peer chaincode query -C mychannel -n basic -c '{"Args":["ReadAsset","asset6"]}'
{"AppraisedValue":800,"Color":"white","ID":"asset6","Owner":"Christopher","Size":15}
param@ubuntu:~/Desktop/hyperledger/fabric-samples/test-network$

Running go application using certificate authority:

param@ubuntu:~/Desktop/hyperledger/fabric-samples/asset-transfer-basic/application-gateway-go$ go run .
2022/11/20 10:44:02 ============ application-golang starts ============
initLedger:
Submit Transaction: InitLedger, function creates the initial set of assets on the ledger
*** Transaction committed successfully
getAllAssets:
Evaluate Transaction: GetAllAssets, function returns all the current assets on the ledger
*** Result:[
 {
  "AppraisedValue": 300,
  "Color": "blue",
  "ID": "asset1",
  "Owner": "Tomoko",
  "Size": 5
 },
 {
  "AppraisedValue": 400,
  "Color": "red",
  "ID": "asset2",
  "Owner": "Brad",
  "Size": 5
 },
 {
  "AppraisedValue": 500,
  "Color": "green",
  "ID": "asset3",
  "Owner": "Jin Soo",
  "Size": 10
 },
 {
  "AppraisedValue": 600,
  "Color": "yellow",
  "ID": "asset4",
  "Owner": "Max",
  "Size": 10
 },