

Practical 1

Aim - Install and understand Docker container, Node js, Java and Hyperledger Fabric, Ethereum and perform necessary software installation on local machine/create instance on cloud to run.

Open power shell in Admin mode.



Enable windows SubSystem for Linux

```
dism.exe /online /enable-feature /featurename:Microsoft-Windows-Subsystem-Linux /all /norestart
```

```
PS C:\WINDOWS\system32> dism.exe /online /enable-feature /featurename:Microsoft-Windows-Subsystem-Linux /all /norestart
Deployment Image Servicing and Management tool
Version: 10.0.19041.3636
Image Version: 10.0.19045.4170
Enabling feature(s)
[=====100.0%=====]
The operation completed successfully.
```

Enable Virtual Machine feature

```
dism.exe /online /enable-feature /featurename:VirtualMachinePlatform /all /norestart
```

```
PS C:\WINDOWS\system32> dism.exe /online /enable-feature /featurename:VirtualMachinePlatform /all /norestart
Deployment Image Servicing and Management tool
Version: 10.0.19041.3636
Image Version: 10.0.19045.4170
Enabling feature(s)
[=====100.0%=====]
The operation completed successfully.
```

Set WSL-2 as default version

```
wsl --set-default-version 2
```

```
[=====100.0%=====]
The operation completed successfully.
PS C:\WINDOWS\system32> wsl --set-default-version 2
For information on key differences with WSL 2 please visit https://aka.ms/wsl2
The operation completed successfully.
```

Install Ubuntu app from windows store

Open the Microsoft Store and install Ubuntu 20.04 LTS here



Ubuntu 22.04.3 LTS
Canonical Group Limited

Open

Install windows terminal

It enables multiple tabs, quickly between the Linux command line and the windows command prompt.



Windows Terminal

Microsoft Corporation

Open

Download linux kernel update package:

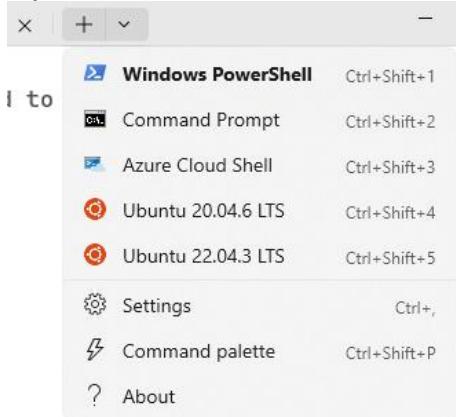
To update the WSL package download setup at the below-mentioned link, it needs admin privilege.

https://wslstorestorage.blob.core.windows.net/wslblob/wsl_update_x64.msi

Open Windows Terminal and add a new ubuntu tab, you won't be able to see the ubuntu terminal.

Under add new terminal section.

Open Installed, "Ubuntu 20.04 LTS" once, So that it will be linked with Windows terminal.



Updating and installing basic packages for Ubuntu.

sudo apt update & sudo apt upgrade

Enter new UNIX username: himu1234

New password:

Retype new password:

```
himu1234@UG-20:~$ sudo apt update
[sudo] password for himu1234:
Hit:1 http://archive.ubuntu.com/ubuntu focal InRelease
Get:2 http://security.ubuntu.com/ubuntu focal-security InRelease [128 kB]
Get:3 http://archive.ubuntu.com/ubuntu focal-updates InRelease [128 kB]
Get:4 http://security.ubuntu.com/ubuntu focal-security/main amd64 Packages [2985 kB]
Get:5 http://archive.ubuntu.com/ubuntu focal-backports InRelease [128 kB]
Get:6 http://security.ubuntu.com/ubuntu focal-security/main Translation-en [447 kB]
Get:7 http://archive.ubuntu.com/ubuntu focal/universe amd64 Packages [8628 kB]
Get:8 http://security.ubuntu.com/ubuntu focal-security/main amd64 c-n-f Metadata [13.2 kB]
Get:9 http://security.ubuntu.com/ubuntu focal-security/restricted amd64 Packages [2863 kB]
Get:10 http://security.ubuntu.com/ubuntu focal-security/restricted Translation-en [401 kB]
Get:11 http://security.ubuntu.com/ubuntu focal-security/restricted amd64 c-n-f Metadata [552 B]
Get:12 http://security.ubuntu.com/ubuntu focal-security/universe amd64 Packages [967 kB]
Get:13 http://security.ubuntu.com/ubuntu focal-security/universe Translation-en [205 kB]
Get:14 http://security.ubuntu.com/ubuntu focal-security/universe amd64 c-n-f Metadata [19.2 kB]
```

```
himu1234@UG-20:~$ sudo apt upgrade
Reading package lists... Done
Building dependency tree
Reading state information... Done
Calculating upgrade... Done
The following NEW packages will be installed:
  ubuntu-pro-client ubuntu-pro-client-l10n
The following packages will be upgraded:
accountsservice apparmor apport apt apt-utils base-files bind9-dnsutils bind9-host bind9-libs bsduutils
cloud-init cpio curl distro-info distro-info-data fdisk fwupd fwupd-signed gawk gcc-10-base git git-man
iputils-ping iputils-tracepath klibc-utilities kpartx krb5-locales landscape-common less libaccountsservice0
libapparmor1 libapt-pkg6.0 libblkid1 libc-bin libc6 libcap2 libcap2-bin libcurl3-gnutls libcurl4 libelf1
libfdisk1 libflac8 libfwupd2 libfwupdplugin5 libgcc-s1 libglib2.0-0 libglib2.0-bin libglib2.0-data
libgnutls30 libgpgme11 libgsapi-krb5-2 libk5crypto3 libklc libkrb5-3 libkrb5support0 libldap-2.4-2
libldap-common libmount1 libnetplan0 libnhttp2-14 libnspr4 libnss-systemd libnss3 libpam-cap
libpam-modules libpam-modules-bin libpam-runtime libpam-systemd libpam0g libperl5.30 libprocps8
libpython3.8 libpython3.8-minimal libpython3.8-stdlib libsmartcols1 libsndfile1 libsqlite3-0 libssh-4
libssl1.1 libstdc++6 libsystemd0 libtss2-esys0 libudev1 libuuid1 libuv1 libx11-data libx11-xcb1
```

Download Docker for windows latest version from
<https://desktop.docker.com/win/stable/amd64/Docker%20Desktop%20Installer.exe>

Install Docker

Enable Docker for Ubuntu

Go to Settings

Resources

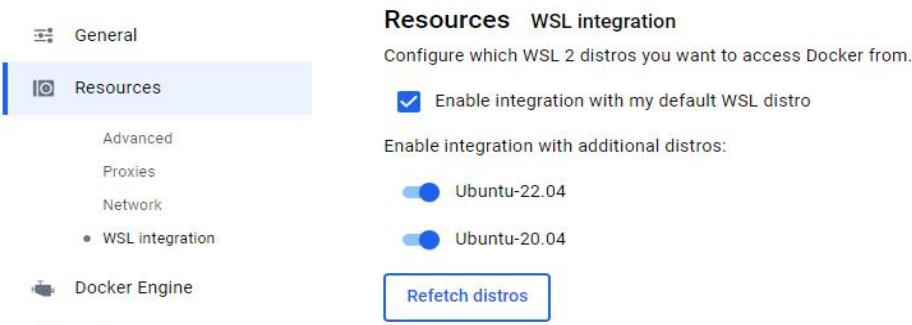
WSL integration

Enable Ubuntu-20.04

Then hit Apply & restart

This may take few minutes

After Enabling this we will get docker in the ubuntu command line



Run following command to check if you are able to access it on Ubuntu

docker –version

docker-compose –version

Run following command to install and update basic packages on Ubuntu

sudo apt update

sudo apt upgrade

CURL

Check if cURL already exists

curl –v

If cURL doesn't exists then install it via following command

sudo apt-get install curl

Check if Go lang exists

go version

If Go doesn't then install with following steps: Download the Go lang package for Linux from here.
`sudo wget https://golang.org/dl/go1.16.3.linux-amd64.tar.gz`

The following command will extract the zip file at the downloaded location
`tar xvf go1.16.3.linux-amd64.tar.gz`

Set GOPATH using following command

```
export GOPATH=$HOME/go
export PATH=$PATH:$GOPATH/bin
```

```
nikhil@UG-19:~$ export GOPATH=$HOME/go
nikhil@UG-19:~$ export PATH=$PATH:$GOPATH/bin
nikhil@UG-19:~$ go version
go version go1.16.3 linux/amd64
```

Run the following command to if git is installed

```
git --version
```

```
nikhil@UG-19:~$ git version
git version 2.34.1
nikhil@UG-19:~$
```

Install Hyperledger Fabric and Fabric samples

Note: **Hyperledger fabric version is 2.3.2**

Create a directory with following command

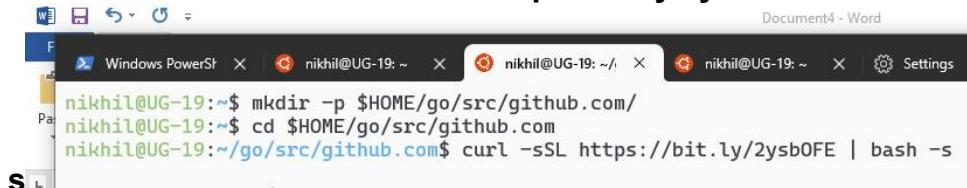
Creates a new Directory: `mkdir -p $HOME/go/src/github.com/`

Navigate to that created directory: `cd $HOME/go/src/github.com/`

Download the latest release of fabric samples and docker images.

Run following command under `$HOME/go/src/github.com/` directory

```
curl -sSL https://bit.ly/2ysbOFE | bash
```



A screenshot of a terminal window titled "Document4 - Word". The window shows a command-line interface with several tabs open. The active tab displays the following commands:

```
nikhil@UG-19:~$ mkdir -p $HOME/go/src/github.com/
nikhil@UG-19:~$ cd $HOME/go/src/github.com/
nikhil@UG-19:~/go/src/github.com$ curl -sSL https://bit.ly/2ysbOFE | bash -s
```

navigate to fabric folder

cd \$wsl

```
cd go/src/github.com/fabric-samples
```

```
hyperledger/fabric-ca      latest    e324dccb92c6e  6 days ago  209MB
nikhil@UG-19:~/go/src/github.com$ cd $wsl
nikhil@UG-19:~$ cd go/src/github.com/fabric-samples
nikhil@UG-19:~/go/src/github.com/fabric-samples$ ls
```

Go to test-network

```
cd test-network
```

Run following command to remove existing any container or artifacts form previous run.
./network.sh down

```
nikhil@UG-19:~/go/src/github.com/fabric-samples$ ls
CHANGELOG.md           asset-transfer-private-data      off_chain_data
CODEOWNERS             asset-transfer-sbe          test-application
CODE_OF_CONDUCT.md     asset-transfer-secured-agreement test-network
CONTRIBUTING.md       auction-dutch            test-network-k8s
LICENSE                auction-simple           test-network-nano-bash
MAINTAINERS.md         bin                      token-erc-1155
README.md              builders                 token-erc-20
SECURITY.md            ci                      token-erc-721
asset-transfer-abac    config                  token-sdk
asset-transfer-basic   full-stack-asset-transfer-guide token-utxo
asset-transfer-events  hardware-security-module
asset-transfer-ledger-queries  high-throughput

nikhil@UG-19:~/go/src/github.com/fabric-samples$ cd test-network
nikhil@UG-19:~/go/src/github.com/fabric-samples/test-network$ ./network.sh down
Using docker and docker-compose
Stopping network
WARN[0000] /home/nikhil/go/src/github.com/fabric-samples/test-network/compose/compose-bft-test-net.yaml: 'version' is obsolete
WARN[0000] /home/nikhil/go/src/github.com/fabric-samples/test-network/compose/docker/docker-compose-bft-test-net.yaml: 'version' is obsolete
WARN[0000] /home/nikhil/go/src/github.com/fabric-samples/test-network/compose/compose-couch.yaml: 'version' is obsolete
WARN[0000] /home/nikhil/go/src/github.com/fabric-samples/test-network/compose/docker/docker-compose-couch.yaml: 'version' is obsolete
WARN[0000] /home/nikhil/go/src/github.com/fabric-samples/test-network/compose/compose-ca.yaml: 'version' is obsolete
WARN[0000] /home/nikhil/go/src/github.com/fabric-samples/test-network/compose/docker/docker-compose-ca.yaml: 'version' is obsolete
WARN[0000] /home/himul1234/go/src/github.com/fabric-samples/test-network/addOrg3/compose/compose-org3.yaml: 'version' is obsolete
WARN[0000] /home/himul1234/go/src/github.com/fabric-samples/test-network/addOrg3/compose/docker/docker-compose-org3.yaml: 'version' is obsolete
WARN[0000] /home/himul1234/go/src/github.com/fabric-samples/test-network/addOrg3/compose-couch/docker/docker-compose-couch-org3.yaml: 'version' is obsolete
WARN[0000] /home/himul1234/go/src/github.com/fabric-samples/test-network/addOrg3/compose/compose-couch-org3.yaml: 'version' is obsolete
WARN[0000] /home/himul1234/go/src/github.com/fabric-samples/test-network/addOrg3/compose/docker/docker-compose-couch-org3.yaml: 'version' is obsolete
WARN[0000] /home/himul1234/go/src/github.com/fabric-samples/test-network/addOrg3/compose/compose-ca-org3.yaml: 'version' is obsolete
WARN[0000] /home/himul1234/go/src/github.com/fabric-samples/test-network/addOrg3/compose/docker/docker-compose-ca-org3.yaml: 'version' is obsolete
[+] Running 7/0
✓ Volume compose_orderer2.example.com  Removed          0.05
✓ Volume compose_peer0.org2.example.com  Removed          0.05
✓ Volume compose_orderer3.example.com  Removed          0.05
✓ Volume compose_orderer4.example.com  Removed          0.05
✓ Volume compose_peer0.org1.example.com  Removed          0.05
✓ Volume compose_orderer.example.com  Removed          0.05
✓ Volume compose_peer0.org3.example.com  Removed          0.05
Error response from daemon: get docker_orderer.example.com: no such volume
Error response from daemon: get docker_peer0.org1.example.com: no such volume
Error response from daemon: get docker_peer0.org2.example.com: no such volume
```

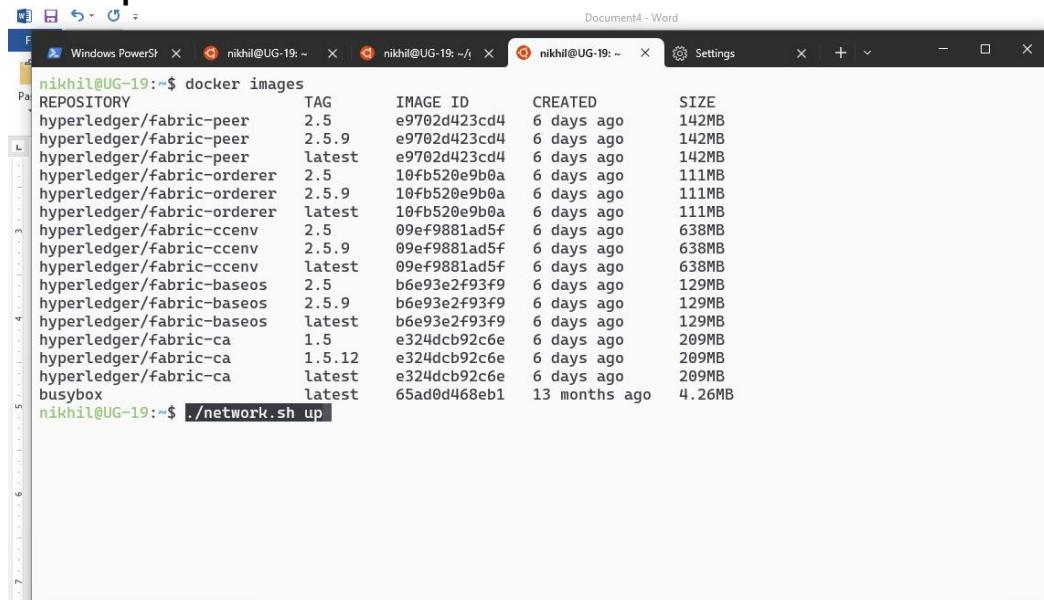
Running following will boot up fabric test network

./network.sh up

```
Digest: sha256:9ae97d36d26566ff84e8893c64a6dc4fe8ca6d1144bf5b87b2b85a32def253c7
Status: Downloaded newer image for busybox:latest
nikhil@UG-19:~/go/src/github.com/fabric-samples/test-network$ ./network.sh up
Using docker and docker-compose
Starting nodes with CLI timeout of '5' tries and CLI delay of '3' seconds and using database 'leveldb' with
crypto from 'cryptogen'
LOCAL_VERSION=v2.5.9
DOCKER_IMAGE_VERSION=v2.5.9
/home/nikhil/go/src/github.com/fabric-samples/test-network/../bin/cryptogen
Generating certificates using cryptogen tool
Creating Org1 Identities
+ cryptogen generate --config=./organizations/cryptogen/crypto-config-org1.yaml --output=organizations
org1.example.com
+ res=0
Creating Org2 Identities
+ cryptogen generate --config=./organizations/cryptogen/crypto-config-org2.yaml --output=organizations
org2.example.com
+ res=0
Creating Orderer Org Identities
+ cryptogen generate --config=./organizations/cryptogen/crypto-config-orderer.yaml --output=organizations
+ res=0
Generating CCP files for Org1 and Org2
WARN[0000] /home/nikhil/go/src/github.com/fabric-samples/test-network/compose/compose-test-net.yaml: `version` is obsolete
WARN[0000] /home/nikhil/go/src/github.com/fabric-samples/test-network/compose/docker/docker-compose-test-net.yaml: `version` is obsolete
[+] Running 7/7
 Network fabric_test                                     Created          0.0s
 ✓ Volume "compose_orderer.example.com"                 Created          0.05s
 ✓ Volume "compose_peer0.org1.example.com"              Created          0.05s
 ✓ Volume "compose_peer0.org2.example.com"              Created          0.05s
 ✓ Container peer0.org2.example.com                    Started          3.7s
 ✓ Container peer0.org1.example.com                    Started          3.8s
 ✓ Container orderer.example.com                      Started          3.9s
CONTAINER ID        IMAGE               COMMAND                  CREATED             STATUS              PORTS
 NAMES
2bb6dbc3e73a      hyperledger/fabric-peer:latest   "peer node start"  4 seconds ago       Up Less than a second  0.0.0.0:7051->7051/tcp
 , 0.0.0.0:9444->9444/tcp
d5f24b2f23f0      hyperledger/fabric-orderer:latest "orderer"        4 seconds ago       Up Less than a second  0.0.0.0:7050->7050/tcp
 , 0.0.0.0:7053->7053/tcp, 0.0.0.0:9443->9443/tcp
26bd500f54af      hyperledger/fabric-peer:latest   "peer node start"  4 seconds ago       Up Less than a second  0.0.0.0:9051->9051/tcp
 , 7051/tcp, 0.0.0.0:9445->9445/tcp
```

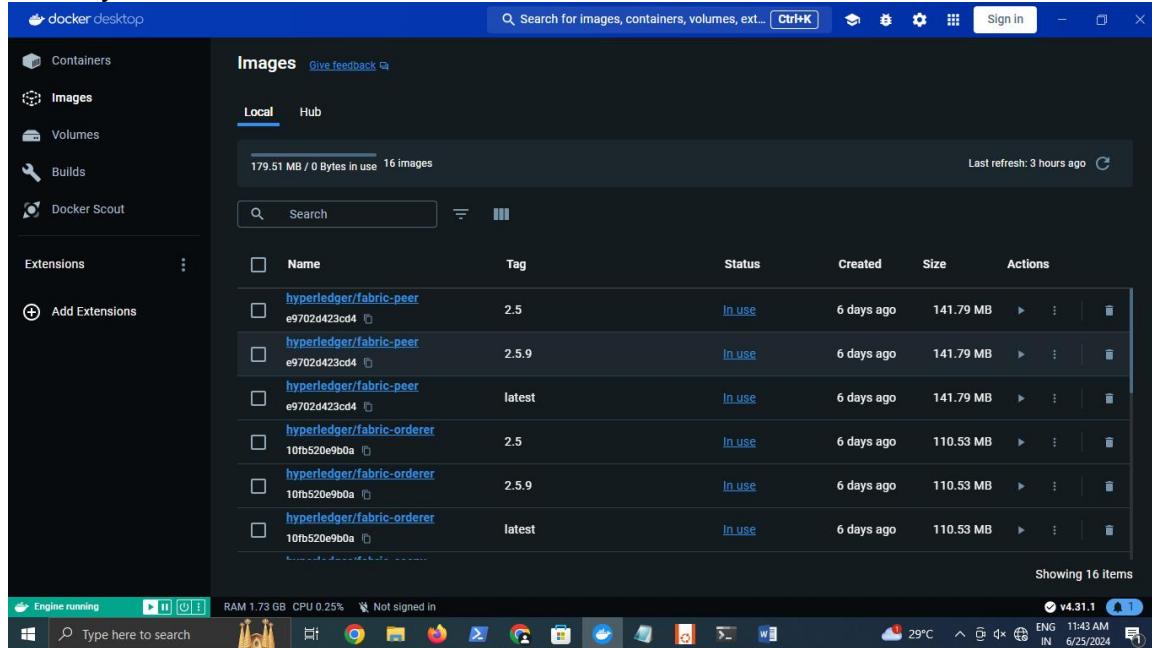
Run following command to list down all running docker images in docker

docker ps -a



```
nikhil@UG-19:~$ docker images
REPOSITORY          TAG      IMAGE ID   CREATED        SIZE
hyperledger/fabric-peer  2.5     e9702d423cd4  6 days ago   142MB
hyperledger/fabric-peer  2.5.9   e9702d423cd4  6 days ago   142MB
hyperledger/fabric-peer  latest   e9702d423cd4  6 days ago   142MB
hyperledger/fabric-orderer  2.5    10fb520e9b0a  6 days ago   111MB
hyperledger/fabric-orderer  2.5.9   10fb520e9b0a  6 days ago   111MB
hyperledger/fabric-orderer  latest   10fb520e9b0a  6 days ago   111MB
hyperledger/fabric-ccenv   2.5     09ef9881ad5f  6 days ago   638MB
hyperledger/fabric-ccenv   2.5.9   09ef9881ad5f  6 days ago   638MB
hyperledger/fabric-ccenv   latest   09ef9881ad5f  6 days ago   638MB
hyperledger/fabric-baseos  2.5     b6e93e2f93f9  6 days ago   129MB
hyperledger/fabric-baseos  2.5.9   b6e93e2f93f9  6 days ago   129MB
hyperledger/fabric-baseos  latest   b6e93e2f93f9  6 days ago   129MB
hyperledger/fabric-ca       1.5     e324dc92c6e   6 days ago   209MB
hyperledger/fabric-ca       1.5.12  e324dc92c6e   6 days ago   209MB
hyperledger/fabric-ca       latest   e324dc92c6e   6 days ago   209MB
busybox                  latest   65ad0d468eb1  13 months ago 4.26MB
nikhil@UG-19:~$ ./network.sh up
```

Same you can look at docker GUI



Name	Tag	Status	Created	Size	Actions
hyperledger/fabric-peer	2.5	In use	6 days ago	141.79 MB	...
hyperledger/fabric-peer	2.5.9	In use	6 days ago	141.79 MB	...
hyperledger/fabric-peer	latest	In use	6 days ago	141.79 MB	...
hyperledger/fabric-orderer	2.5	In use	6 days ago	110.53 MB	...
hyperledger/fabric-orderer	2.5.9	In use	6 days ago	110.53 MB	...
hyperledger/fabric-orderer	latest	In use	6 days ago	110.53 MB	...

Practical no 2

Aim: Create and deploy a block chain network using Hyperledger Fabric SDK for Java on Ubuntu 22.04 LTS.

Step 1: Check if curl is installed.

Command: curl --version

Command if not installed: apt install curl

```
nikhil@nikhil-VirtualBox:~$ curl --version
curl 7.81.0 (x86_64-pc-linux-gnu) libcurl/7.81.0 OpenSSL/3.0.2 zlib/1.2.11 brotli/
1.0.9 zstd/1.4.8 libidn2/2.3.2 libpsl/0.21.0 (+libidn2/2.3.2) libssh/0.9.6/openssl
/zlib nghttp2/1.43.0 librtmp/2.3 OpenLDAP/2.5.16
Release-Date: 2022-01-05
Protocols: dict file ftp ftps gopher gophers http https imap imaps ldap ldaps mqtt
pop3 pop3s rtsp rtsp-scp sftp smb smbs smtp smtps telnet tftp
Features: alt-svc AsynchDNS brotli GSS-API HSTS HTTP2 HTTPS-proxy IDN IPv6 Kerberos
Largefile libz NTLM NTLM_WB PSL SPNEGO SSL TLS-SRP UnixSockets zstd
```

Step 2: Check if docker is installed.

Command: docker --version

Command if not installed: apt install docker.io

```
nikhil@nikhil-VirtualBox:~$ docker --version
Docker version 24.0.7, build 24.0.7-0ubuntu2~22.04.1
```

Step 3: Check if docker-compose is installed

Command: docker-compose --version

Docker-compose Command if not installed: apt install docker-compose

```
nikhil@nikhil-VirtualBox:~$ docker-compose --version
docker-compose version 1.29.2, build unknown
```

Step 4: Check if go is installed.

Command: go version

Command if not installed: apt install golang-go

```
nikhil@nikhil-VirtualBox:~$ go version
go version go1.18.1 linux/amd64
```

Step 5: Check if nodejs is installed.

Command: node -v

Command if not installed: apt install nodejs

```
nikhil@nikhil-VirtualBox:~$ node -v
v12.22.9
```

Step 6: Check if npm is installed.

Command: npm --version

Command if not installed: apt install npm

```
nikhil@nikhil-VirtualBox:~$ npm --version
8.5.1
```

Step 7: Check if git is installed.

Command: git --version

```
nikhil@nikhil-VirtualBox:~$ git --version
git version 2.34.1
```

Step 8: Check if python is installed.

Command: python3 --version

```
nikhil@nikhil-VirtualBox:~$ python3 --version
Python 3.10.12
```

Step 9: Configure some git properties.

Command: git config --global core.autocrlf false
git config --global core.longpaths true

Step 10: Create a separate directory for particular project.

Command: mkdir Blockchain

Step 11: Change to newly created directory.

Command: cd Blockchain

Step 12: Clone the repository.

Command: curl -sSL http://bit.ly/2ysbOFE | bash -s 1.4.4

```
nikhil@nikhil-VirtualBox:~$ git config --global core.autocrlf false
nikhil@nikhil-VirtualBox:~$ git config --global core.longpaths true
nikhil@nikhil-VirtualBox:~$ mkdir Blockchain
nikhil@nikhil-VirtualBox:~$ cd Blockchain
nikhil@nikhil-VirtualBox:~/Blockchain$ curl -sSL http://bit.ly/2ysbOFE | bash -s 1.4.4
```

Clone hyperledger/fabric-samples repo

```
====> Cloning hyperledger/fabric-samples repo
Cloning into 'fabric-samples'...
remote: Enumerating objects: 13906, done.
remote: Counting objects: 100% (788/788), done.
remote: Compressing objects: 100% (433/433), done.
remote: Total 13906 (delta 359), reused 628 (delta 297), pack-reused 13118
Receiving objects: 100% (13906/13906). 23.34 MiB / 6.00 MiB/s. done.
```

Note :If not work then run command –

sudo chmod 666 /var/run/docker.sock

```
nikhil@nikhil-VirtualBox:~/Blockchain$ sudo chmod 666 /var/run/docker.sock
nikhil@nikhil-VirtualBox:~/Blockchain$ curl -sSL http://bit.ly/2ysbOFE | bash -s 1.4.4
```

Clone hyperledger/fabric-samples repo

```
====> Changing directory to fabric-samples
====> Checking out v1.4.4 of hyperledger/fabric-samples
```

Pull Hyperledger Fabric binaries

```
====> Downloading version 1.4.4 platform specific fabric binaries
====> Downloading: https://github.com/hyperledger/fabric/releases/download/v1.4.4/hyperle
dger-fabric-linux-amd64-1.4.4.tar.gz
  % Total    % Received % Xferd  Average Speed   Time     Time     Current
          Dload  Upload Total Spent   Left Speed
  0     0     0     0      0       0  --::-- --::-- --::-- 0
100  79.6M  100  79.6M     0      0  9289k      0  0:00:08  0:00:08  --::-- 11.1M
==> Done.
====> Downloading version 1.5.12 platform specific fabric-ca-client binary
====> Downloading: https://github.com/hyperledger/fabric-ca/releases/download/v1.5.12/hyp
erledger-fabric-ca-linux-amd64-1.5.12.tar.gz
  % Total    % Received % Xferd  Average Speed   Time     Time     Current
          Dload  Upload Total Spent   Left Speed
```

```

====> docker.io/hyperledger/fabric-peer:1.4.4
1.4.4: Pulling from hyperledger/fabric-peer
b8f262c62ec6: Pull complete
9c2dad781fe8: Pull complete
7e48a048d895: Pull complete
4b5f2a9ec0f7: Pull complete
9332c2443003: Pull complete
f8823b03421b: Pull complete
Digest: sha256:92c2bef91e80f54f6d73a89b796eab1b616f372e2258431f17d50dd0c2ce316b
Status: Downloaded newer image for hyperledger/fabric-peer:1.4.4
docker.io/hyperledger/fabric-peer:1.4.4
====> docker.io/hyperledger/fabric-orderer:1.4.4
1.4.4: Pulling from hyperledger/fabric-orderer
b8f262c62ec6: Already exists
9c2dad781fe8: Already exists
7e48a048d895: Already exists
4b5f2a9ec0f7: Already exists
a38d313ebb74: Pull complete
391a02b02202: Pull complete
Digest: sha256:f7715923e2ca67cee526c21638d86b21480e179419e9d6c20078caabb241b20e
Status: Downloaded newer image for hyperledger/fabric-orderer:1.4.4
docker.io/hyperledger/fabric-orderer:1.4.4
====> docker.io/hyperledger/fabric-ccenv:1.4.4
1.4.4: Pulling from hyperledger/fabric-ccenv
7ddbc47eeb70: Pull complete
c1bbdc448b72: Pull complete
8c3b70e39044: Pull complete
45d437916d57: Pull complete
b5035666b1cd: Pull complete
94c898b5fdef: Pull complete
bee7bd3eb18f: Pull complete
9dc56c5637b5: Downloading [=====] 34.98MB/322.3MB
33954343759c: Download complete
09a5b37c7f4f: Download complete
947f6f3dd9ef: Download complete
d68f5147d7dd: Download complete

```

Step 13: Change to fabric-samples/first-network/ directory

Command: cd fabric-samples/ first-network/

Step 14: List out the contents in the file.

Command: ls or ll

```

nikhil@nikhil-VirtualBox:~/Blockchain$ cd fabric-samples/first-network/
nikhil@nikhil-VirtualBox:~/Blockchain/fabric-samples/first-network$ ls
base           connection-org3.yaml          docker-compose-kafka.yaml
byfn.sh        crypto-config.yaml          docker-compose-org3.yaml
ccp-generate.sh docker-compose-ca.yaml    eyfn.sh
ccp-template.json docker-compose-cli.yaml org3-artifacts
ccp-template.yaml docker-compose-couch-org3.yaml README.md
channel-artifacts docker-compose-couch.yaml scripts
configtx.yaml   docker-compose-e2e-template.yaml
connection-org3.json docker-compose-etcdrift2.yaml

```

Step 15: Generate certificates and Genesis block for mychannel.

Command: ./byfn.sh generate

```

nikhil@nikhil-VirtualBox:~/Blockchain/fabric-samples/first-network$ ./byfn.sh generate
Generating certs and genesis block for channel 'mychannel' with CLI timeout of '10' seconds and CLI delay of '3' seconds
Continue? [Y/n] Y
proceeding ...
/home/nikhil/Blockchain/fabric-samples/first-network/../bin/cryptogen

#####
##### Generate certificates using cryptogen tool #####
#####
+ cryptogen generate --config=./crypto-config.yaml

```

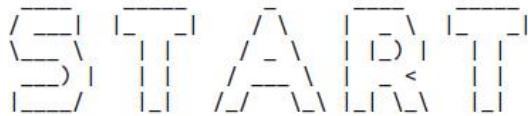
Step 16: Build your first network.

Command: ./byfn.sh up -l java

```

nikhil@nikhil-VirtualBox:~/Blockchain/fabric-samples/first-network$ ./byfn.sh up -l java
Starting for channel 'mychannel' with CLI timeout of '10' seconds and CLI delay of '3' se
conds
Continue? [Y/n] Y
proceeding ...
LOCAL_VERSION=1.4.4
DOCKER_IMAGE_VERSION=v2.5.9
===== WARNING =====
  Local fabric binaries and docker images are
  out of sync. This may cause problems.
=====
Recreating peer1.org1.example.com ... done
Recreating peer1.org2.example.com ... done
Recreating orderer.example.com ... done
Recreating peer0.org2.example.com ... done
Recreating peer0.org1.example.com ... done
Recreating cli ... done
CONTAINER ID   IMAGE                               COMMAND                  CREATED             NAMES
ATUS           hyperledger/fabric-tools:latest    "/bin/bash"            1 second ago       Up
Less than a second
b72ff88d7178  hyperledger/fabric-orderer:latest "orderer"
  1 second          0.0.0.0:7050->7050/tcp, :::7050->7050/tcp
49497ad37a23  hyperledger/fabric-peer:latest   "peer node start"
  2 seconds         0.0.0.0:10051->10051/tcp, :::10051->10051/tcp
com
c043d6632e1d  hyperledger/fabric-peer:latest   "peer node start"
  2 seconds         0.0.0.0:8051->8051/tcp, :::8051->8051/tcp
peer1.org1.example.
com

```



Build your first network (BYFN) end-to-end test

```

Channel name : mychannel
Creating channel...
+ peer channel create -o orderer.example.com:7050 -c mychannel -f ./channel-artifacts/cha
nnel.tx --tls true --cafile /opt/gopath/src/github.com/hyperledger/fabric/peer/crypto/ord
ererOrganizations/example.com/orderers/orderer.example.com/msp/tlscacerts/tlsca.example.c
om-cert.pem
+ res=1
+ set +x
2024-07-04 04:06:24.248 UTC 0001 INFO [channelCmd] InitCmdFactory -> Endorser and orderer

```

```

Ubuntu 22.04 [Running] - Oracle VM VirtualBox
File Machine View Input Devices Help
C:\Users\nikhil\Hyperledger\fabric-peer:latest peer node start 3 seconds ago up 1 second 0.0.0.0:8051->8051/tcp
609c1a548f49 hyperledger/fabric-peer:latest "peer node start" 3 seconds ago Up Less than a second 0.0.0.0:8051->8051/tcp
Build your first network (BYFN) end-to-end test
Channel name : mychannel
Creating channel...
+ peer channel create -o orderer.example.com:7050 -c mychannel -f ./channel-artifacts/channel.tx --tls true --cafile /opt/gopath/src
/github.com/hyperledger/fabric/peer/crypto/ordererOrganizations/example.com/orderers/orderer.example.com/msp/tlscacerts/tlsca.example
.com-cert.pem
+ res=0
+ set +x
2024-07-03 04:03:23.892 UTC 0001 INFO [channelCmd] InitCmdFactory -> Endorser and orderer connections initialized
2024-07-03 04:03:23.924 UTC 0002 INFO [cli_common] readBlock -> Received block: 0
===== Channel 'mychannel' created =====
Having all peers join the channel...
+ peer channel join -b mychannel.block
+ res=0
+ set +x
2024-07-03 04:03:24.047 UTC 0001 INFO [channelCmd] InitCmdFactory -> Endorser and orderer connections initialized
2024-07-03 04:03:24.101 UTC 0002 INFO [channelCmd] executeJoin -> Successfully submitted proposal to join channel
===== peer0.org1 joined channel 'mychannel' =====
+ peer channel join -b mychannel.block
+ res=0
+ set +x
2024-07-03 04:03:27.230 UTC 0001 INFO [channelCmd] InitCmdFactory -> Endorser and orderer connections initialized
2024-07-03 04:03:27.290 UTC 0002 INFO [channelCmd] executeJoin -> Successfully submitted proposal to join channel

```

```
Ubuntu 22.04 [Running] - Oracle VM VirtualBox
File Machine View Input Devices Help
  "invoke", "a", "b", "10" ]
+ res=0
+ set +x
2024-07-03 04:04:29.476 UTC 0001 INFO [chaincodeCmd] chaincodeInvokeOrQuery -> Chaincode invoke successful. result: status:200 message:"Invoke finished successfully" payload:"a: 90 b: 210"
+ peer chaincode install -n mycc -v 1.0 -l java -p /opt/gopath/src/github.com/chaincode/chaincode_example02/java/
=====
Installing chaincode on peer1.org2...
+ res=0
+ set +x
2024-07-03 04:04:29.613 UTC 0001 INFO [chaincodeCmd] checkChaincodeCmdParams -> Using default escc
2024-07-03 04:04:29.614 UTC 0002 INFO [chaincodeCmd] checkChaincodeCmdParams -> Using default vscc
2024-07-03 04:04:29.640 UTC 0003 INFO [chaincodeCmd] submitInstallProposal -> Installed remotely: response:<status:200 payload:"OK"
>
=====
Chaincode is installed on peer1.org2 =====
Querying chaincode on peer1.org2...
=====
Querying on peer1.org2 on channel 'mychannel'...
+ peer chaincode query -C mychannel -n mycc -c '{"Args":["query","a"]}'
Attempting to Query peer1.org2 ...3 secs
+ res=0
+ set +x
90
=====
Query successful on peer1.org2 on channel 'mychannel' =====
=====
All GOOD, BYFN execution completed =====
root@valbhav-VirtualBox:/home/valbhav/Blockchain/fabric-samples/first-network#
```

Step 17: Down your network

Command: ./byfn.sh down

```
Ubuntu 22.04 [Running] - Oracle VM VirtualBox
File Machine View Input Devices Help
=====
All GOOD, BYFN execution completed =====
root@valbhav-VirtualBox:/home/valbhav/Blockchain/fabric-samples/first-network# ./byfn.sh down
Stopping for channel 'mychannel' with CLI timeout of '10' seconds and CLI delay of '3' seconds
Continue? [Y/n] y
proceeding ...
WARNING: The BYFN_C1_PRIVATE_KEY variable is not set. Defaulting to a blank string.
WARNING: The BYFN_C2_PRIVATE_KEY variable is not set. Defaulting to a blank string.
Stopping cli ... done
Stopping peer1.org2.example.com ... done
Stopping peer0.org2.example.com ... done
Stopping orderer.example.com ... done
Stopping peer0.org1.example.com ... done
Stopping peer1.org1.example.com ... done
Removing cli ... done
Removing peer1.org2.example.com ... done
Removing peer0.org2.example.com ... done
Removing orderer.example.com ... done
Removing peer0.org1.example.com ... done
Removing peer1.org1.example.com ... done
Removing network net_byfn
Removing volume net_orderer.example.com
Removing volume net_peer0.org1.example.com
Removing volume net_peer1.org1.example.com
Removing volume net_peer0.org2.example.com
Removing volume net_peer1.org2.example.com
Removing volume net_orderer2.example.com
WARNING: Volume net_orderer2.example.com not found.
Removing volume net_orderer3.example.com
WARNING: Volume net_orderer3.example.com not found.
```

Practical no 3

Aim: Interact with a blockchain network. Execute transactions and requests against blockchain network by creating an app to test the network and its rules.

Commands -

- git clone https://github.com/IBM/InteractingWithABlockchainNetwork.git
- ls

```
Ubuntu 22.04 [Running] - Oracle VM VirtualBox
File Machine View Input Devices Help
Activities Terminal Jul 10 08:03
vaibhav@vaibhav-VirtualBox:~$ git clone https://github.com/IBM/InteractingWithABlockchainNetwork.git
Cloning into 'InteractingWithABlockchainNetwork'...
remote: Enumerating objects: 13596, done.
remote: Total 13596 (delta 0), reused 0 (delta 0), pack-reused 13596
Receiving objects: 100% (13596/13596), 30.71 MB | 9.38 MiB/s, done.
Resolving deltas: 100% (2471/2471), done.
vaibhav@vaibhav-VirtualBox:~$ ls
Blockchain Desktop Documents Downloads InteractingWithABlockchainNetwork Music Pictures Public snap Templates Videos
vaibhav@vaibhav-VirtualBox:~/InteractingWithABlockchainNetwork$ ls
backend configtxgen fitcoinCertificateAuthority peer-base.yaml shopCertificateAuthority
backend configtxgen fitcoinPeer rabbitClient shopPeer
build.sh configuration generate-certs.sh rabbitClientHAProxy.cfg testApplication
ca-base.yaml crypto-config.yaml generate-cfgtx.sh rabbitCluster ubuntu
ccfunctions.md cryptogen images rabbitServerClusterHAProxy.cfg README.md
clean.sh docker-compose.yaml instructions.md redisCluster
cliloadTester docker-images.sh orderer redisCluster
configtxgen docker-images.sh
vaibhav@vaibhav-VirtualBox:~/InteractingWithABlockchainNetwork$
```

- export FABRIC_CFG_PATH=\$(pwd)
- chmod +x cryptogen
- chmod +x configtxgen
- chmod +x ./rabbitCluster/cluster-entrypoint.sh
- chmod +x generate-certs.sh
- chmod +x generate-cfgtx.sh
- chmod +x docker-images.sh
- chmod +x build.sh
- chmod +x clean.sh
- ./build.sh

```
root@vaibhav-VirtualBox:~# cd InteractingWithABlockchainNetwork/
root@vaibhav-VirtualBox:~/InteractingWithABlockchainNetwork# ls
backend cryptogen rabbitClient
backend docker-compose.yaml rabbitClientHAProxy.cfg
build.sh docker-images.sh rabbitCluster
ca-base.yaml fitcoinCertificateAuthority rabbitServerClusterHAProxy.cfg
ccfunctions.md fitcoinPeer README.md
clean.sh generate-certs.sh redisCluster
cliloadTester generate-cfgtx.sh shopCertificateAuthority
configtxgen images shopPeer
configtxgen instructions.md testApplication
configuration orderer ubuntu
root@vaibhav-VirtualBox:~/InteractingWithABlockchainNetwork# export FABRIC_CFG_PATH=$(pwd)
root@vaibhav-VirtualBox:~/InteractingWithABlockchainNetwork# chmod +x cryptogen
root@vaibhav-VirtualBox:~/InteractingWithABlockchainNetwork# chmod +x configtxgen
root@vaibhav-VirtualBox:~/InteractingWithABlockchainNetwork# chmod +x ./rabbitCluster/cluster-entrypoint.sh
root@vaibhav-VirtualBox:~/InteractingWithABlockchainNetwork# chmod +x generate-certs.sh
root@vaibhav-VirtualBox:~/InteractingWithABlockchainNetwork# chmod +x generate-cfgtx.sh
root@vaibhav-VirtualBox:~/InteractingWithABlockchainNetwork# chmod +x docker-images.sh
root@vaibhav-VirtualBox:~/InteractingWithABlockchainNetwork# chmod +x build.sh
root@vaibhav-VirtualBox:~/InteractingWithABlockchainNetwork# chmod +x clean.sh
```

```
Ubuntu 22.04 [Running] - Oracle VM VirtualBox
File Machine View Input Devices Help
Digest: sha256:0644a13f2d663364df4f413ae18d3b03647a70f9b08cde09b235006488e6001
Status: Downloaded newer image for hyperledger/fabric-peer:x86_64-1.0.6
docker.io/hyperledger/fabric-peer:x86_64-1.0.6
==> FABRIC IMAGE: peer

x86_64-1.0.6: Pulling from hyperledger/fabric-orderer
d5c6f90da05d: Already exists
1300883d87d5: Already exists
c220aa3cf1b1: Already exists
2e9398f099dc: Already exists
dc27a084064f: Already exists
87675a0d4030: Already exists
93e601aafdab8: Already exists
4edd5985c72: Already exists
c669b4e4962d: Pull complete
1e479b1bdb81: Pull complete
Digest: sha256:c74234ffdc4ea6bb2fb97767786bc4800c851f740ef14180115926432ed0aeea
Status: Downloaded newer image for hyperledger/fabric-orderer:x86_64-1.0.6
docker.io/hyperledger/fabric-orderer:x86_64-1.0.6
==> FABRIC IMAGE: orderer

x86_64-1.0.6: Pulling from hyperledger/fabric-ccenv
d5c6f90da05d: Already exists
1300883d87d5: Already exists
c220aa3cf1b1: Already exists
2e9398f099dc: Already exists
dc27a084064f: Already exists
87675a0d4030: Already exists
93e601aafdab: Already exists
6be6b5cbce6b: Pull complete
c90d7a44426d: Downloading [=> ] 4.322MB/123MB
9767b1c8440b: Download complete
b96b60c73863: Downloading [=====] 86MB/253.4MB
e34402132dde: Downloading [=====] 13.46MB/15.9MB
b9e520aaec05: Waiting
097745e8dd9: Waiting
```

```
Ubuntu 22.04 [Running] - Oracle VM VirtualBox
File Machine View Input Devices Help
WARNING: Service "rabbitclient1" uses an undefined secret file "/root/InteractingWithABlockchainNetwork/configuration/config.json", the following file should be created "/root/InteractingWithABlockchainNetwork/configuration/config.json"
WARNING: Service "rabbitclient2" uses an undefined secret file "/root/InteractingWithABlockchainNetwork/configuration/config.json", the following file should be created "/root/InteractingWithABlockchainNetwork/configuration/config.json"
WARNING: Service "rabbitclient3" uses an undefined secret file "/root/InteractingWithABlockchainNetwork/configuration/config.json", the following file should be created "/root/InteractingWithABlockchainNetwork/configuration/config.json"
Pulling blockchain-setup (blockchain-setup)...
ERROR: The image for the service you're trying to recreate has been removed. If you continue, volume data could be lost. Consider backing up your data before continuing.

Continue with the new image? [y/N]
Pulling blockchain-setup (blockchain-setup)...
ERROR: pull access denied for blockchain-setup, repository does not exist or may require 'docker login': denied: requested access to the resource is denied

A ^C
root@vaibhav-VirtualBox:~/InteractingWithABlockchainNetwork# docker logs blockchain-setup
Error response from daemon: No such container: blockchain-setup
root@vaibhav-VirtualBox:~/InteractingWithABlockchainNetwork# docker pss
docke: 'pss' is not a docker command.
See 'docker --help'
root@vaibhav-VirtualBox:~/InteractingWithABlockchainNetwork# docker ps
CONTAINER ID IMAGE COMMAND CREATED STATUS PORTS
387935c543d7 orderer-peer "orderer" About a minute ago Up About a minute 0.0.0.0:7050->7050/tcp
p, ::::7050->7050/tcp
fbc70724fb8b ishangulhane/fabric-couchdb "tini -- /docker-ent..." About a minute ago Up About a minute 4369/tcp, 9100/tcp, 0
0.0.0.0:9894->9894/tcp
cbc6371b8c5e ishangulhane/fabric-couchdb "tini -- /docker-ent..." About a minute ago Up About a minute 4369/tcp, 9100/tcp, 0
0.0.0.0:9894->9894/tcp, ::::9894->9894/tcp
04aae22c9cf7 ishangulhane/fabric-couchdb "tini -- /docker-ent..." About a minute ago Up About a minute 4369/tcp, 9100/tcp, 0
0.0.0.0:9894->9894/tcp, ::::9894->9894/tcp
bcbab1bc2369 shop-ca "fabric-ca-server st..." About a minute ago Up About a minute 0.0.0.0:7054->7054/tcp
p, ::::7054->7054/tcp
01e1386fdbfd fitcoin-ca "fabric-ca-server st..." About a minute ago Up About a minute 0.0.0.0:8054->7054/tcp
p, ::::8054->7054/tcp
root@vaibhav-VirtualBox:~/InteractingWithABlockchainNetwork#
```

- docker ps
 - docker logs fitcoin-ca
 - ls
 - cd testApplication

```

Ubuntu 22.04 [Running] - Oracle VM VirtualBox
File Machine View Input Devices Help
Error response from daemon: No such container: blockchain-setup
root@valbhav-VirtualBox:~/InteractingWithABlockchainNetwork# docker ps
See 'docker --help'
root@valbhav-VirtualBox:~/InteractingWithABlockchainNetwork# docker ps
CONTAINER ID IMAGE COMMAND CREATED STATUS PORTS
387935c543d7 orderer-peer "orderer" About a minute ago Up About a minute 0.0.0.0:7050->7050/tcp
p_:::7050->7050/tcp
fbc70724fb8b lshangulhane/fabric-couchdb "tini -- /docker-ent..." About a minute ago Up About a minute 4369/tcp, 9100/tcp, 0
cb6c371b8c5e lshangulhane/fabric-couchdb "tini -- /docker-ent..." About a minute ago Up About a minute 4369/tcp, 9100/tcp, 0
.0.0.0:5984->5984/tcp, ::::5984->5984/tcp
04aae22c9cf7 lshangulhane/fabric-couchdb "tini -- /docker-ent..." About a minute ago Up About a minute 4369/tcp, 9100/tcp, 0
.0.0.0:5984->5984/tcp, ::::5984->5984/tcp
bcbab1c23693 shop-ca "fabric-ca-server st..." About a minute ago Up About a minute 0.0.0.0:7054->7054/tcp
p_:::7054->7054/tcp
01e1386fd8fb fitcoin-ca "fabric-ca-server st..." About a minute ago Up About a minute 0.0.0.0:8054->7054/tcp
P_:::8054->7054/tcp
root@valbhav-VirtualBox:~/InteractingWithABlockchainNetwork# docker logs fitcoin-ca
2024/07/05 03:30:58 [INFO] Configuration file location: /ca/fabric-ca-server-config.yaml
2024/07/05 03:30:58 [INFO] Starting server in home directory: /ca
2024/07/05 03:30:58 [INFO] The CA key and certificate files already exist
2024/07/05 03:30:58 [INFO] Key file location: /ca/ca/key.pem
2024/07/05 03:30:58 [INFO] Certificate file location: /ca/ca/cert.pem
2024/07/05 03:30:58 [INFO] Initialized sqlite3 database at /ca/fabric-ca-server.db
2024/07/05 03:30:58 [INFO] Home directory for default CA: /ca
2024/07/05 03:30:58 [INFO] Listening on https://0.0.0.0:7054
root@valbhav-VirtualBox:~/InteractingWithABlockchainNetwork# ls
backend configtxgen fitcoinCertificateAuthority peer-base.yaml
blockchainNetwork configtx.yaml fitcoinPeer rabbitClient
build.sh configuration generate-certs.sh rabbitClientHAProxy.cfg
ca-base.yaml crypto-config.yaml generate-cfgtx.sh rabbitCluster
ccfunctions.md cryptogen images rabbitServerClusterHAProxy.cfg
clean.sh docker-compose.yaml instructions.md README.md
cilloadTester docker-images.sh orderer rediscluster
root@valbhav-VirtualBox:~/InteractingWithABlockchainNetwork# cd testApplication

```

- npm install
- node index.js

```

Ubuntu 22.04 [Running] - Oracle VM VirtualBox
File Machine View Input Devices Help
at Object.<anonymous> (/root/InteractingWithABlockchainNetwork/testApplication/index.js:17:17)
  at Module._compile (internal/modules/cjs/loader.js:99:30)
  at Object.Module._extensions..js (internal/modules/cjs/loader.js:1027:10)
  at Module.load (internal/modules/cjs/loader.js:863:32)
  at Function.Module._load (internal/modules/cjs/loader.js:708:14)
  at Function.executeUserEntryPoint [as runMain] (internal/modules/run_main.js:60:12) {
  code: 'MODULE_NOT_FOUND',
  requireStack: [
    '/root/InteractingWithABlockchainNetwork/testApplication/index.js'
  ]
}
root@valbhav-VirtualBox:~/InteractingWithABlockchainNetwork/testApplication# npm install
npm WARN old lockfile
npm WARN old lockfile The package-lock.json file was created with an old version of npm,
npm WARN old lockfile so supplemental metadata must be fetched from the registry.
npm WARN old lockfile This is a one-time fix-up, please be patient...
npm WARN old lockfile
npm WARN EBAENGINE Unsupported engine {
npm WARN   EBAENGINE package: 'amqplib@0.5.2',
npm WARN   EBAENGINE required: { node: '>=0.8 <=9' },
npm WARN   EBAENGINE current: { node: 'v12.22.9', npm: '8.5.1' }
npm WARN EBAENGINE }

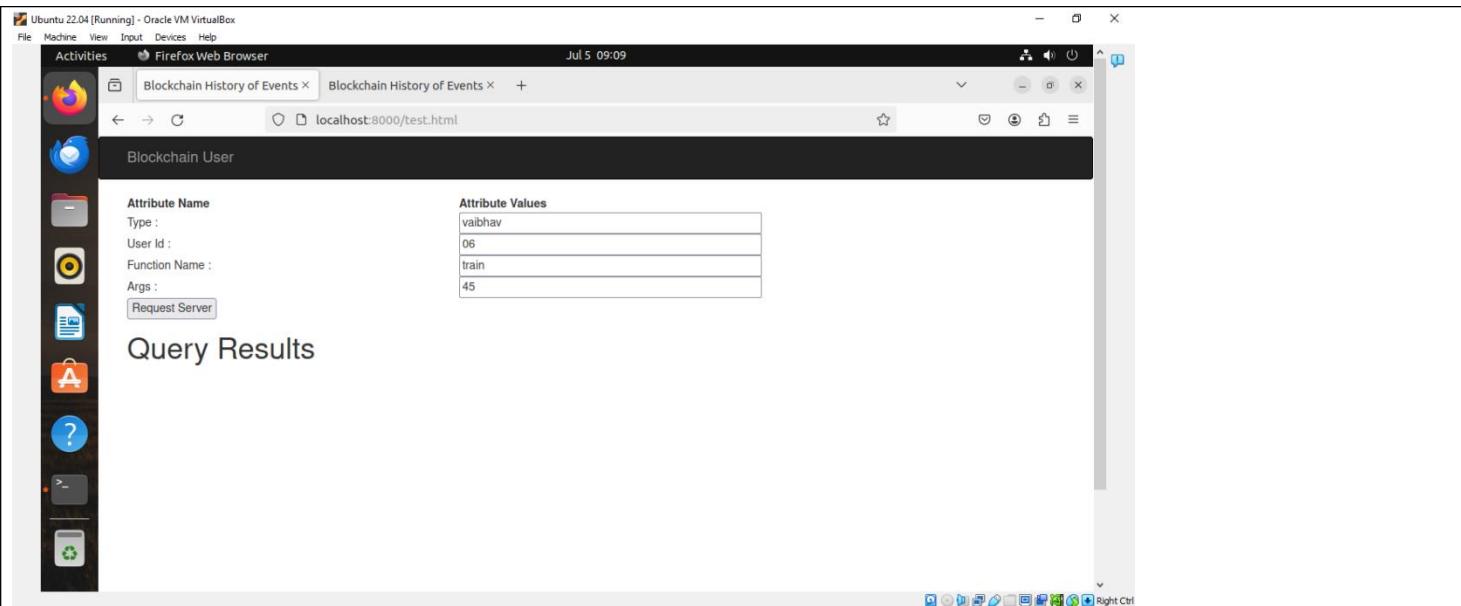
added 57 packages, and audited 58 packages in 7s
3 high severity vulnerabilities

To address all issues, run:
  npm audit fix

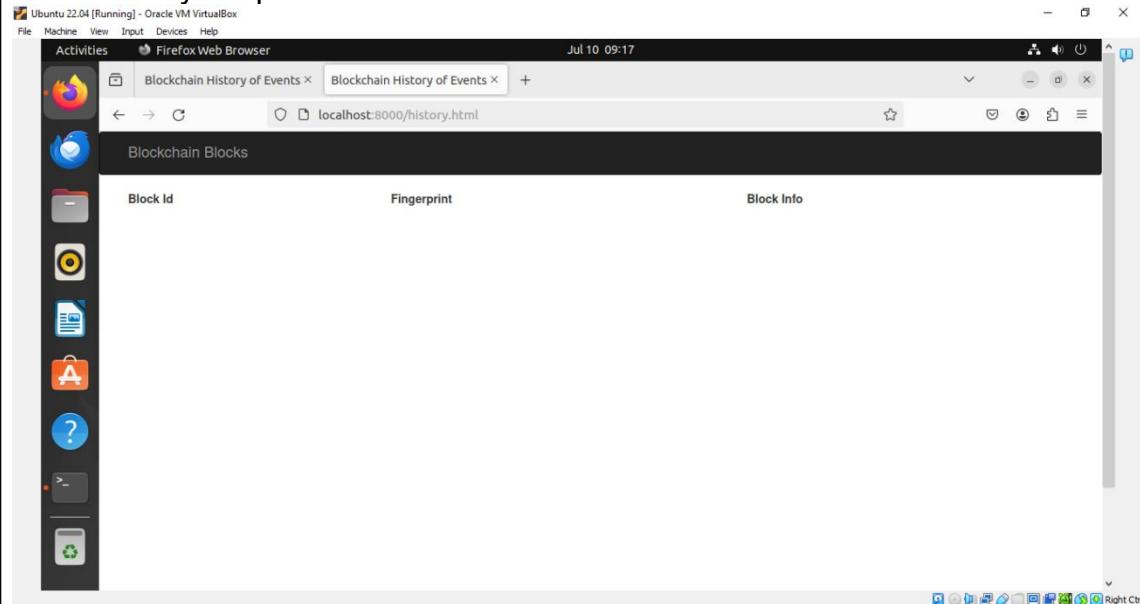
Run 'npm audit' for details.
root@valbhav-VirtualBox:~/InteractingWithABlockchainNetwork/testApplication# ls
client.js index.js node_modules package.json package-lock.json public
root@valbhav-VirtualBox:~/InteractingWithABlockchainNetwork/testApplication# node index.js
Server running on port: 8000

```

- Go to the browser
- Localhost:8000/test.html
- Query Request –



- Localhost:8000/test.html
- Query Output –



Practical no 4

Aim: Develop a voting application using Hyperledger and Ethereum.

Code –

```
// SPDX-License-Identifier: MIT
pragma solidity ^0.8.0;

contract Vote{

    struct Voter {
        bool hasVoted;
        uint256 votedProposalId;
    }

    struct Candidate {
        string name;
        uint256 voteCount;
    }

    address adminAddr;
    uint startTime;
    uint endTime;
    mapping(address => Voter) voters;
    Candidate[] proposals;
    mapping (string => uint) candidate_votes;
    event Voted(address indexed voter, uint256 indexed proposalId);
    event ProposalAdded(uint256 indexed proposalId, string name);

    constructor(){
        adminAddr = msg.sender;
    }

    modifier adminAccess(){
        require(msg.sender == adminAddr,"Not an admin");
        ;
    }

    modifier checkTime(){
        require(startTime < block.timestamp && endTime > block.timestamp , "Out of time");
        ;
    }

    modifier resultTime(){
        require(endTime < block.timestamp , "Voting is ongoing");
        ;
    }

    modifier hasNotVoted() {
        require(!voters[msg.sender].hasVoted, "You have already voted");
    }
}
```

```

    }

modifier validProposal(uint256 proposalId) {
    require(proposalId < proposals.length, "Invalid proposal ID");
}

function createVoterList(string memory _name1, string memory _name2,uint256
_votingDurationMinutes) public adminAccess {
    proposals.push(Candidate({name: _name1, voteCount: 0}));
    proposals.push(Candidate({name: _name2, voteCount: 0}));
    startTime = block.timestamp;
    endTime = startTime + (_votingDurationMinutes * 1 minutes);
}

function vote(uint256 proposalId) external hasNotVoted checkTime validProposal(proposalId) {
    voters[msg.sender].hasVoted = true;
    voters[msg.sender].votedProposalId = proposalId;
    proposals[proposalId].voteCount++;
    emit Voted(msg.sender, proposalId);
}

function getProposal(uint256 proposalId) external view validProposal(proposalId) returns (string
memory) {
    Candidate memory proposal = proposals[proposalId];
    return (proposal.name);
}

function hasVotingEnded() public view returns (bool) {
    return block.timestamp > endTime;
}

function Winner() public view returns (string memory, uint256) {
    require(block.timestamp > endTime, "Voting is not over yet.");
    uint256 winningVoteCount = 0;
    string memory winner = "";
    bool isTie = false;
    for (uint256 i = 0; i < proposals.length; i++) {
        Candidate memory candidate = proposals[i];

        if (candidate.voteCount > winningVoteCount) {
            winningVoteCount = candidate.voteCount;
            winner = candidate.name;
            isTie = false;
        } else if (candidate.voteCount == winningVoteCount && bytes(winner).length != 0) {
            isTie = true;
        }
    }
    if (isTie) {
        return ("There is a tie between the candidates!", winningVoteCount);
    }
}

```

```

        return (winner, winningVoteCount);
    }
}

```

Output –

Select address as admin & deploy it -

The screenshot shows two panels of the Remix IDE interface. The left panel displays a list of accounts with their addresses and balances. One account, `0xAb8...35cb2 (99.9999999999721544 eth)`, is highlighted. The right panel shows the deployment configuration. It includes fields for **ENVIRONMENT** (set to `Remix VM (Cancun)`), **ACCOUNT** (set to the same account), **GAS LIMIT** (set to `Estimated Gas`), **VALUE** (set to `0 Wei`), and **CONTRACT** (set to `Vote - VotingApp.sol`). A **Deploy** button is visible at the bottom.

Voting Functions:

This screenshot shows the Remix IDE after deployment. The left panel indicates that no pinned contracts were found. The right panel lists the **Deployed/Unpinned Contracts** section, which contains a single entry: `VOTE AT 0X332..D486D (MEMORY)`. Below this, under **Balance: 0 ETH**, are several function definitions: `createVoterList`, `vote`, `getProposal`, `hasVotingEnd...`, and `Winner`.

List the Candidate names and Voting duration, this will done by admin only -

The screenshot shows the Truffle UI interface. On the left, the 'Deployed/Unpinned Contracts' section displays a successful transaction for 'VOTE AT 0X332...D4B6D (MEMORY)'. The transaction details are as follows:

- status**: 0 (transaction mined and execution succeed)
- transaction hash**: 0xffff03701703abc57de337a8c55f951dc1f5d20e2e647794a5ea2664ce9c051367
- block hash**: 0x79fd5baaf96885ab01321d96db6c3f9a2af9bb563756672d7aa86472ae8aa88d
- block number**: 45
- from**: 0x58380a6a701c568545dCfcB83FcB875f56beDDc4
- to**: Vote.createVoterList(string,string,uint256) 0x3328358128832A260C76A4141e19E2A943CD4B6D
- gas**: 165071 gas
- transaction cost**: 143540 gas
- execution cost**: 121352 gas
- input**: 0xdce...00000
- decoded input**: {

 "string _name1": "vaibhav",

 "string _name2": "siddesh",

 "uint256 _votingDurationMinutes": "1"
 }

On the right, the transaction details are also displayed in a separate window.

If you are not admin then it will not done

The screenshot shows the Truffle UI interface. On the left, the 'Deployed/Unpinned Contracts' section displays a failed transaction for 'VOTE AT 0X4A9...E31BF (MEMORY)'. The transaction details are as follows:

- transaction cost**: 26489 gas
- execution cost**: 4381 gas
- input**: 0xdce...00000
- decoded input**: {

 "string _name1": "vaibhav",

 "string _name2": "siddesh",

 "uint256 _votingDurationMinutes": "1"
 }
- decoded output**: {}
- logs**: []

A revert message is shown:

```

revert
The transaction has been reverted to the initial state.
Reason provided by the contract: "Not an admin".
You may want to cautiously increase the gas limit if the transaction went out of gas.

```

Give vote using ID – for eg. 0 or 1

The screenshot shows the Truffle UI interface. On the left, the 'Deployed/Unpinned Contracts' section displays a successful transaction for 'vote'. The transaction details are as follows:

- proposalId**: 1
- input**: 0x812...00001
- decoded input**: {

 "uint256 proposalId": "1"
 }
- decoded output**: {}
- logs**: [

 {

 "from": "0x3328358128832A260C76A4141e19E2A943CD4B6D",

 "topic": "0xd999b957a2bc29a30ebd96a7be8e68fe58a3c781db28a91436408b7d53870ca4",

 "event": "Voted",

 "args": {

 "0": "0x58380a6a701c568545dCfcB83FcB875f56beDDc4",

 "1": "1",

 "voter": "0x58380a6a701c568545dCfcB83FcB875f56beDDc4",

 "proposalId": "1"
 }
 }
]

To check click on getProposal enter id it will show candidate names -

Deployed/Unpinned Contracts

VOTE AT 0xC58...905F2 (MEMORY)

Balance: 0 ETH

createVoterList string _name1, string _name2, uint256

vote 0

getProposal

proposalId: "0"

0: string: vaibhav

hasVotingEnd...

Winner

call to Vote.getProposal

```
CALL [call] from: 0x78731D3Ca6b7E34aC0F824c42a7cC18A495cabab8 to: Vote.getProposal(uint256) data: 0xc7f...00000
```

from 0x78731D3Ca6b7E34aC0F824c42a7cC18A495cabab8

to Vote.getProposal(uint256) 0xC5862Ba753F3DabC4120E9803c01e0813D7905F2

execution cost 8151 gas (Cost only applies when called by a contract)

input 0xc7f...00000

decoded input { "uint256 proposalId": "0" }

decoded output { "0": "string: vaibhav" }

logs []

To check voting is completed or not, click on hasVotingEnd -

Deployed/Unpinned Contracts

VOTE AT 0xC58...905F2 (MEMORY)

Balance: 0 ETH

createVoterList string _name1, string _name2, uint256

vote uint256 proposalId

getProposal uint256 proposalId

0: string: vaibhav

hasVotingEnd...

0: bool: false

Winner

call to Vote.hasVotingEnded

```
CALL [call] from: 0x78731D3Ca6b7E34aC0F824c42a7cC18A495cabab8 to: Vote.hasVotingEnded() data: 0x3dd...079c0
```

from 0x78731D3Ca6b7E34aC0F824c42a7cC18A495cabab8

to Vote.hasVotingEnded() 0xC5862Ba753F3DabC4120E9803c01e0813D7905F2

execution cost 2443 gas (Cost only applies when called by a contract)

input 0x3dd...079c0

decoded input {}

decoded output { "0": "bool: false" }

logs []

When click on Winner, if time complete then it will show result, otherwise voting is not over yet-

Deployed/Unpinned Contracts

VOTE AT 0xC58...905F2 (MEMORY)

Balance: 0 ETH

createVoterList string _name1, string _name2, uint256

vote uint256 proposalId

getProposal uint256 proposalId

0: string: vaibhav

hasVotingEnd...

0: bool: false

Winner

Low level interactions

CALldata

to Vote.Winner() 0xC5862Ba753F3DabC4120E9803c01e0813D7905F2

execution cost 2576 gas (Cost only applies when called by a contract)

input 0xb2b...98ed2

decoded input {}

decoded output { "error": "Failed to decode output: Error: overflow [See: https://links.ethers.org/v5-errors-NUMERIC_FAULT-overflow] [Fault:\\overflow\\", operation:\\toNumber\\", value:\\396387739119734443557983463481156\\4221700746820753546331534351508865746944\\", code:\\NUMERIC_FAULT\\, version:\\bigNumber\\/5.7.0\\"]" }

logs []

call to Vote.Winner errored: Error occurred: revert.

revert The transaction has been reverted to the initial state.
Reason provided by the contract: "Voting is not over yet."
You may want to cautiously increase the gas limit if the transaction went out of gas.

If you voted already you can't vote again -

Deployed/Unpinned Contracts

VOTE AT 0x1C9...2B4BD (MEMORY)

Balance: 0 ETH

createVoterList string _name1, string _name2, uint256

vote 1

getProposal uint256 proposalId

hasVotingEnd...

Winner

Low level interactions

CALLDATA

transaction cost 24112 gas ⓘ

execution cost 2908 gas ⓘ

input 0x012...00001 ⓘ

decoded input { "uint256 proposalId": "1" } ⓘ

decoded output {} ⓘ

logs [] ⓘ ⓘ

transact to Vote.vote errored: Error occurred: revert.

revert The transaction has been reverted to the initial state.
Reason provided by the contract: "You have already voted".
You may want to cautiously increase the gas limit if the transaction went out of gas.

If you want to vote but time completed -

Deployed/Unpinned Contracts

VOTE AT 0x4A9...E31BF (MEMORY)

Balance: 0 ETH

createVoterList string _name1, string _name2, uint256

vote 0

getProposal uint256 proposalId

hasVotingEnd...

Winner

Low level interactions

CALLDATA

Transact

gas 3000000 gas ⓘ

transaction cost 28352 gas ⓘ

execution cost 7168 gas ⓘ

input 0x012...00000 ⓘ

decoded input { "uint256 proposalId": "0" } ⓘ

decoded output {} ⓘ

logs [] ⓘ ⓘ

transact to Vote.vote errored: Error occurred: revert.

revert The transaction has been reverted to the initial state.
Reason provided by the contract: "out of time".
You may want to cautiously increase the gas limit if the transaction went out of gas.

Winner result after time completed -

Deployed/Unpinned Contracts

VOTE AT 0x4A9...E31BF (MEMORY)

Balance: 0 ETH

createVoterList string _name1, string _name2, uint256

vote 0

getProposal uint256 proposalId

hasVotingEnd...

Winner

0: string: vaibhav
1: uint256: 7

Low level interactions

CALLDATA

call to Vote.Winner

call [call] from: 0xd870fA1b7C4700F2BD7f44238821C26f7392148 to: Vote.Winner() data: 0xb2b...98ed2

from 0xd870fA1b7C4700F2BD7f44238821C26f7392148 ⓘ

to Vote.Winner() 0x49C121088f609250fc01a3f418595fd172e31bf ⓘ

execution cost 15797 gas (Cost only applies when called by a contract) ⓘ

input 0xb2b...98ed2 ⓘ

decoded input {} ⓘ

decoded output { "0": "string: vaibhav", "1": "uint256: 7" } ⓘ

logs [] ⓘ ⓘ

Practical no 5

Aim: Car auction network: A Hello World example with Hyperledger Fabric Node SDK and IBM Block chain Starter Plan. Use Hyperledger Fabric to invoke chaincode while storing results and data in the starter plan.

Code –

```
// SPDX-License-Identifier: MIT
pragma solidity ^0.8.0;

contract CarAuction {
    address public owner;
    address public highestBidder;
    uint public highestBid;
    bool public auctionEnded;

    struct Car{
        string carModel;
        string carCondition;
        uint carYear;
        uint _startingBid;
    }
    Car public car;
    event NewBid(address indexed bidder, uint amount);
    event AuctionEnded(address winner, uint amount);
    event Withdrawn(address indexed bidder, uint amount);

    constructor (
        string memory _carModel,
        string memory _carCondition,
        uint _carYear,
        uint _startingBid
    ) {
        owner = msg.sender;
        car = Car(_carModel, _carCondition, _carYear, _startingBid);
        auctionEnded = false;
    }

    // Function to place a bid
    function placeBid() external payable {
        require(!auctionEnded, "Auction has already ended.");
        require(msg.value > highestBid, "Bid must be higher than the current highest bid.");

        // Refund the previous highest bidder
        if (highestBidder != address(0)) {
            payable(highestBidder).transfer(highestBid);
        }

        highestBidder = msg.sender;
        highestBid = msg.value;
    }
}
```

```
        emit NewBid(msg.sender, msg.value);
    }

// Function to end the auction
function endAuction() external {
    require(msg.sender == owner, "Only the owner can end the auction.");
    require(!auctionEnded, "Auction has already ended.");
    auctionEnded = true;
    emit AuctionEnded(highestBidder, highestBid);
}

// Function to withdraw funds for the highest bidder after auction ends
function withdraw() external {
    require(auctionEnded, "Auction has not ended yet.");
    require(msg.sender == owner, "Only the owner can withdraw.");

    uint amount = highestBid;
    require(amount > 0, "No funds to withdraw."); // Prevent withdrawing zero funds
    require(address(this).balance >= amount, "Insufficient contract balance");

    highestBid = 0; // Prevent re-entrancy attacks
    payable(owner).transfer(amount);

    emit Withdrawn(owner, amount); // Emit event after successful transfer
}
function contractBalance() public view returns(uint){
    return address(this).balance;
}
}
```

Output -

The screenshot shows the Remix IDE interface. On the left, the "DEPLOY & RUN TRANSACTIONS" section is active. It displays account information (0x5B3...eddC4 (100 ether)), gas settings (GAS LIMIT: Estimated Gas, 3000000 Wei), and a dropdown for the CONTRACT (CarAuction - car.sol). Below these are deployment parameters: _CARMODEL: Suzuki, _CARCONDITION: Good, _CARYEAR: 2018, and _startingBid: 700000. At the bottom are buttons for Calldata, Parameters, and transact. On the right, the "TRANSACTIONS" section is open, showing a deployed contract at address 0xD91...3913 with a balance of 0 ETH. A dropdown menu for this contract lists several functions: endAuction, placeBid, withdraw, auctionEnded, car, contractBalance, highestBid, highestBidder, and owner.

Check Information -

This screenshot shows the function signatures for the CarAuction contract. It includes four sections: car, contractBalance, highestBid, and highestBidder. The car section has one signature: 0: string; carModel Suzuki. The contractBalance section has one signature: 0: uint256;. The highestBid section has one signature: 0: uint256;. The highestBidder section has one signature: 0: address;. Below these is the owner section, which has one signature: 0: address;.

This screenshot shows a list of accounts and their balances. The accounts listed are: 0x5B3...eddC4 (99.99999999998055332 ether), 0xA8...35cb2 (100 ether), 0x4B2...C02db (100 ether), 0x787...cabaB (100 ether), 0x617...5E7f2 (100 ether), 0x17F...8c372 (100 ether), 0x5c6...21678 (100 ether), 0x03C...D1FF7 (100 ether), 0x1aE...E454C (100 ether), and 0x0A0...C70DC (100 ether).

Set value

VALUE
9000000 Wei

CONTRACT
CarAuction - car.sol

evm version: cancun

And place Bid

DEPLOY & RUN TRANSACTIONS ✓ > □

endAuction

placeBid

withdraw

auctionEnded

car

0: string; carModel Suzuki
1: string; carCondition Good
2: uint256; carYear 2018
3: uint256; _startingBid 7000000

contractBalance

0: uint256; 9000000

highestBid

0: uint256; 9000000

highestBidder

0: address: 0xAb8483F64d9C6d1EcF9b849 Ae677dD3315835cb2

Remix - Ethereum IDE

https://remix.ethereum.org/#lang=en&optimize=false&runs=200&evmVersion=null&version=soljson-v0.8.26+commit. 110% ⚡

DEPLOY & RUN TRANSACTIONS

CARACTION AT 0xd91...39138

Balance: 0.0000000009 ETH

endAuction

placeBid

withdraw

auctionEnded

car

contractBal...

highestBid

Did you know? To learn new contract patterns and prototype, you can activate and try the cookbook plugin!

Initialize as git repo

Remix Copilot (enabled) Scam Alert

DEPLOY & RUN TRANSACTIONS

Pinned Contracts (network: vm-cancun)

No pinned contracts found for selected workspace & network

Deployed/Unpinned Contracts

CARACTION AT 0xd91...39138

Balance: 0.0000000009 ETH

endAuction

placeBid

withdraw

auctionEnded

car

contractBal...

highestBid

highestBidder

Balance: 0.00000000012 ETH

contractBal...

0: uint256: 12000000

highestBid

0: uint256: 12000000

highestBidder

0: address: 0x78731D3Ca6b7E34aC0F824c42 a7cC18A495cabab

// SPDX-License-Identifier: MIT
pragma solidity ^0.8.0;

contract CarAuction {
 address public owner;

 function endAuction() external {
 require(msg.sender == owner, "Only the owner can end the auction.");
 // ...
 }

 function placeBid(uint256 bid) external {
 require(bid > highestBid, "Bid must be higher than the current highest bid.");
 highestBid = bid;
 highestBidder = msg.sender;
 // ...
 }

 function withdraw() external {
 require(msg.sender == owner, "Only the owner can withdraw funds.");
 owner.transfer(highestBid);
 // ...
 }

 function auctionEnded() external {
 require(owner != msg.sender, "The auction has not ended yet.");
 owner.transfer(highestBid);
 // ...
 }

 struct Car {
 string model;
 string condition;
 uint year;
 uint startingBid;
 }

 Car car;

 mapping(address => uint) balances;

 uint highestBid;
 address highestBidder;
}

Remix - Ethereum IDE

https://remix.ethereum.org/#lang=en&optimize=false&runs=200&evmVersion=null&version=soljson-v0.8.26+commit:110%

DEPLOY & RUN TRANSACTIONS

Pinned Contracts (network: vm-cancun)

No pinned contracts found for selected workspace & network

Deployed/Unpinned Contracts

CARACTION AT 0xd91...39138

Balance: 0.00000000012 ETH

endAuction

placeBid

withdraw

auctionEnded

0: bool: true

car

[vm] from: 0x5B3...eddC4 to: CarAuction.endAuction() 0xd91...39138 value: 0 wei data: 0xfe6...7a54b logs: 1 Debug

[vm] from: 0x5B3...eddC4 to: CarAuction.placeBid() 0xd91...39138 value: 0 wei data: 0xecf...c7ecc logs: 0 Debug

revert

The transaction has been reverted to the initial state.
Reason provided by the contract: "Auction has already ended."
You may want to cautiously increase the gas limit if the transaction went out of gas.

call to CarAuction.auctionEnded

[call] from: 0x5B38Da6a701c568545dCfcB03FcB875f56beddC4 to: CarAuction.auctionEnded() data: 0x864...33374 Debug

Initialize as git repo

Did you know? To learn new contract patterns and prototype, you can activate and try the cookbook plugin!

Remix Copilot (enabled) Scam Alert

DEPLOY & RUN TRANSACTIONS

Balance: 0 ETH

endAuction

placeBid

withdraw

auctionEnded

0: bool: true

car

0: string: carModel Suzuki
1: string: carCondition Good
2: uint256: carYear 2018
3: uint256: _startingBid 7000000

contractBalan...

0: uint256: 0

highestBid

0: uint256: 0

Practical No. 6

Aim: Create a global finance block chain application with IBM Block chain Platform extension for VS Code. Develop a Node.js smart contract and web app for a Global Finance with block chain use case

Code

```
// SPDX-License-Identifier: MIT
pragma solidity ^0.8.0;

contract FinancialContract {
    address public owner;
    mapping(address => uint256) public etherBalances;
    mapping(address => uint256) public assetBalances;

    constructor(uint balance) {
        owner = msg.sender;
        etherBalances[msg.sender] += balance;
    }
    modifier onlyOwner() {
        require(
            msg.sender == owner,
            "Only the owner can perform this operation."
        );
        _;
    }
    function transferFunds(address payable to, uint256 amount) public {
        require(msg.sender != to, "You cannot send funds to yourself.");
        require(etherBalances[msg.sender] >= amount, "Insufficient balance.");
        etherBalances[to] += amount;
        etherBalances[msg.sender] -= amount;
    }
    function issueAsset(address recipient, uint256 amount) public onlyOwner {
        assetBalances[recipient] += amount;
    }
    function transferAsset(address to, uint256 amount) public {
        require(assetBalances[msg.sender] >= amount, "Insufficient assets.");
        assetBalances[msg.sender] -= amount;
        assetBalances[to] += amount;
    }
    receive() external payable {
        etherBalances[msg.sender] += msg.value;
    }
}
```

Output

Select Admin

ACCOUNT + 📄 🗑️

0x5B3...eddC4 (100 ether)

0x5B3...eddC4 (100 ether)

0xAb8...35cb2 (100 ether)

Set minimum ether balance before deploying

evm version: cancun

Deploy

gas: 500

Publish to IPFS

Select another user account

ACCOUNT + 📄 🗑️

0xA8b...35cb2 (100 ether)

0x5B3...eddC4 (99.99999999999865816 ether)

0xA8b...35cb2 (100 ether)

Only owner can set asset balance for himself

issueAsset

recipient: 0xA8483F64d9C6d1EcP9b849

amount: 100

Calldata Parameters transact

Select account on which the asset will transfer

ACCOUNT + 📄 🗑️

0x4B2...C02db (100 ether)

0x5B3...eddC4 (99.999999999998465818 ether)

0xA8b...35cb2 (99.99999999999850352 ether)

0x4B2...C02db (100 ether)

Asset is transfer to another account

transferAsset

to: 0x4B20993Bc481177ec7E8f571e

amount: 50

Calldata Parameters **transact**

decoded input {
 "address recipient": "0xAB8483F64d9C6d1EcF9b849Ae677dD3315835cb2",
 "uint256 amount": "100"

Asset balance of transfer account

assetBalances

: 0x4B20993Bc481177ec7E8f571e

Calldata Parameters **call**

0: uint256: 50

Transfer Funds

Select and copy random account

ACCOUNT

- 0x787...cabaB (100 ether)
- 0x5B3...eddC4 (99.99999999998465818 ether)
- 0xA8...35cb2 (99.999999999999850352 ether)
- 0x4B2...C02db (100 ether)
- 0x787...cabaB (100 ether)**

Paste the account number and transfer the fund to that account

transferFunds

to: 0x78731D3Ca6b7E34aC0F824c1

amount: 200

Calldata Parameters **transact**

Select admin

ACCOUNT

0x787...cabaB (100 ether)

0x5B3...eddC4 (99.999999999998465818 ether)

0xA8...35cb2 (99.99999999999850352 ether)

Deploy

```
decoded input {  
    "address to": "0x78731D3Ca6b7E34aC0F824c42a7cC18A495cabab",  
    "uint256 amount": "200"  
}
```

Send balance is added to the account

etherBalances

: 0x78731D3Ca6b7E34aC0F824c

Calldata Parameters call

0: uint256: 200

Ether balance of admin is deducted

etherBalances

: 0x5B38Da6a701c568545dCfc80

Calldata Parameters call

0: uint256: 300

Practical No. 7

Aim: Use block chain to track fitness club rewards.

Build a web app that uses Hyperledger Fabric to track and trace member rewards.

Code

```
// SPDX-License-Identifier: MIT
pragma solidity ^0.8.0;

contract fitness {
    struct activity {
        address userid;
        string name ;
        uint points;
        uint time;
    }

    activity[] activity_array;
    mapping(string => uint) public act_score;
    mapping(uint => activity) public activity_list;
    uint a_points = 0;
    event New_activity(address useraddress,string activityname);

    function register_activity(string memory name, uint score) public returns(string memory){
        act_score[name] = score;
        return "Activity Registered";
    }

    function add_activity(string memory a_name,uint a_time)public returns(string memory) {
        a_points = act_score[a_name];
        activity_array.push(activity({userid: msg.sender, name:a_name, points:a_points, time:a_time}));
        uint i= activity_array.length-1;
        activity_list[i]=activity({userid: msg.sender, name:a_name, points:a_points, time:a_time});
        emit New_activity(msg.sender, a_name);
        return "added successfully";
    }

    function getPoints(address user_id) public view returns(uint){
        uint temp = 0;
        for(uint j = 0; j<=activity_array.length-1; j++){
            address add = activity_list[j].userid;
            if(add == user_id){
                temp = temp + activity_list[j].points;
            }
        }
        return temp;
    }
}
```

Output –

FITNESS AT 0X358...D5EE3 (View Details) Copy Open X

Balance: 0 ETH

add_activity string a_name, uint256

register_activity string name, uint256 score

act_score string

activity_list uint256

getPoints address user_id

Register activity name and score –

register_activity

name: Walking

score: 10

Calldata Parameters **transact**

register_activity

name: Running

score: 20

Calldata Parameters **transact**

register_activity

name: Swimming

score: 30

Calldata Parameters **transact**

Start activity –

add_activity

a_name: Walking

a_time: 5

Calldata Parameters **transact**

add_activity

a_name: Swimming

a_time: 7

Calldata Parameters **transact**

add_activity

a_name: Running

a_time: 6

Calldata Parameters **transact**

add_activity

a_name: Walking

a_time: 4

Calldata Parameters **transact**

add_activity

a_name: Running
a_time: 6

Calldata Parameters **transact**

Get activity score –

act_score Walking

0: uint256: 10

act_score Running

0: uint256: 20

Get activity list of userid –

activity_list 1

0: address: userid 0x5B38Da6a701c56854
5dCfcB03FcB875f56beddC4
1: string: name Swimming
2: uint256: points 30
3: uint256: time 7

activity_list 2

0: address: userid 0xAB8483F64d9C6d1Ec
F9b849Ae677dD3315835cb2
1: string: name Walking
2: uint256: points 10
3: uint256: time 4

activity_list 3

0: address: userid 0x4B20993Bc481177ec
7E8f571ceCaE8A9e22C02db
1: string: name Walking
2: uint256: points 10
3: uint256: time 4

activity_list 4

0: address: userid 0x5B38Da6a701c56854
5dCfcB03FcB875f56beddC4
1: string: name Walking
2: uint256: points 10
3: uint256: time 5

activity_list 5

0: address: userid 0x4B20993Bc481177ec
7E8f571ceCaE8A9e22C02db
1: string: name Running
2: uint256: points 20
3: uint256: time 6

Get overall points of that userid –

