

**PRACTICAL REPORT  
ON  
PPSCSMAJM301: WEB3 TECHNOLOGIES  
SUBMITTED BY  
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**ROLL NO: 18**

**SUBMITTED TO  
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**MSc. (COMPUTER SCIENCE) SEM -III  
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**CONDUCTED AT  
CHIKITSAK SAMUHA'S  
S. S. & L.S. PATKAR COLLEGE OF ARTS & SCIENCE  
AND  
V. P. VARDE COLLEGE OF COMMERCE & ECONOMICS**

**An Autonomous college, Affiliated to University  
of Mumbai**

**GOREGAON (W). MUMBAI -400062**

CHIKITSAK SAMUHA'S  
**SIR SITARAM & LADY SHANTABAI  
PATKAR COLLEGE OF ARTS & SCIENCE**  
&  
**V.P. VARDE COLLEGE OF  
COMMERCE & ECONOMICS**  
GOREGAON (WEST), MUMBAI - 400 104.  
An Autonomous College, University of Mumbai

## CERTIFICATE

*Certified that such of the experiments as have been duly signed  
were performed by Mr./Miss \_\_\_\_\_*  
*Roll No. \_\_\_\_\_ of \_\_\_\_\_ class \_\_\_\_\_*  
*Division \_\_\_\_\_ in the \_\_\_\_\_ Laboratory*  
*of this college during the year \_\_\_\_\_*

Professor-in-Charge

Examiner

Co-ordinator

Date: \_\_\_\_\_

\_\_\_\_\_ Department

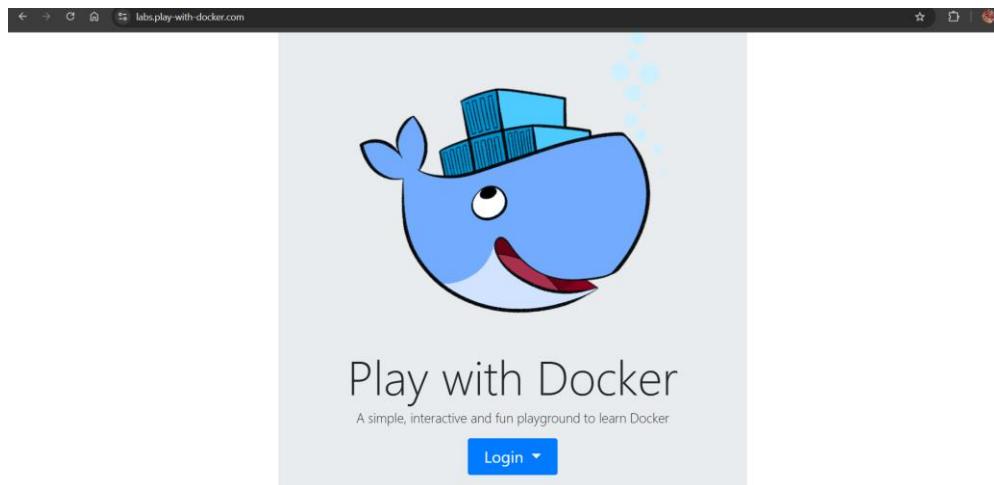
# INDEX

Sr.No	Date	Practical Aim	Sign
1.		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.	
2.		Create and deploy a block chain network using Hyperledger Fabric SDK for Java.	
3.		Interact with a block chain network. Execute transactions and requests against a block chain network by creating an app to test the network and its rules.	
4.		Deploy an asset-transfer app using block chain. Learn app development within a Hyperledger Fabric network.	
5.		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	
6.		Develop a voting application using Hyperledger and Ethereum. Build a decentralized app that combines Ethereum's Web3 and Solidity smart contracts with Hyperledger's hosting Fabric and Chaincode EVM(using solidity)	
7.		Create the Metamasks Account.	
8.		Create the Truffle project.	

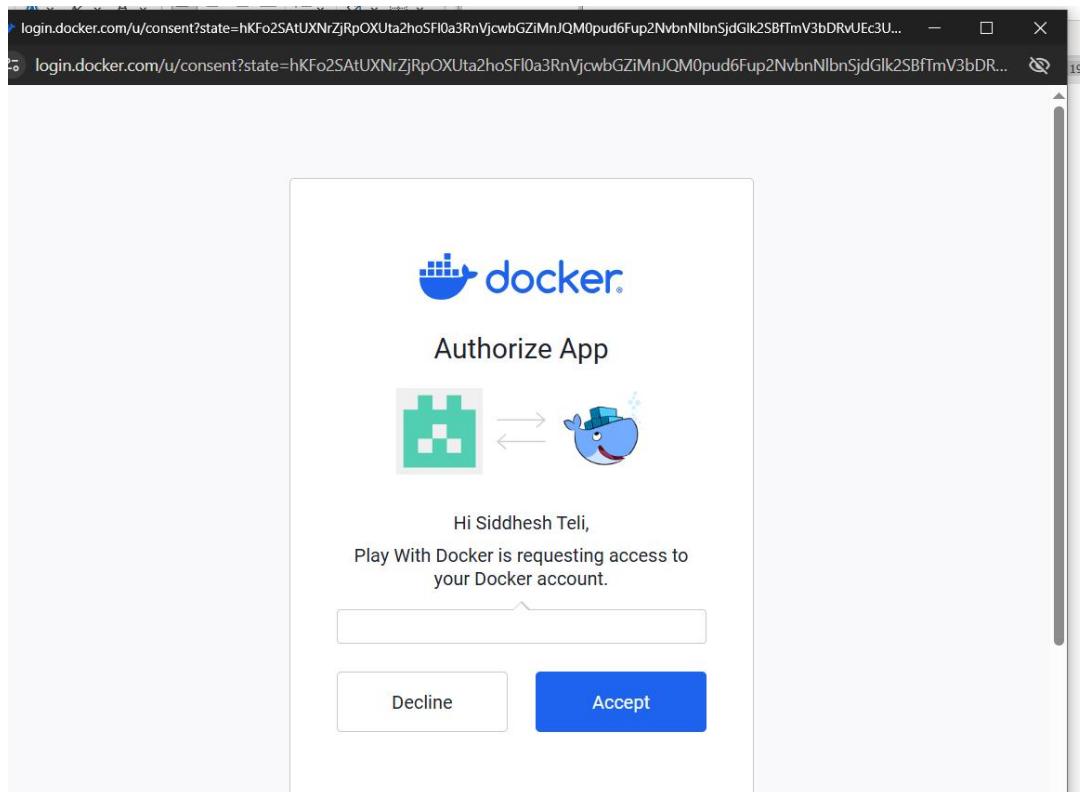
## Practical No. 1

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.

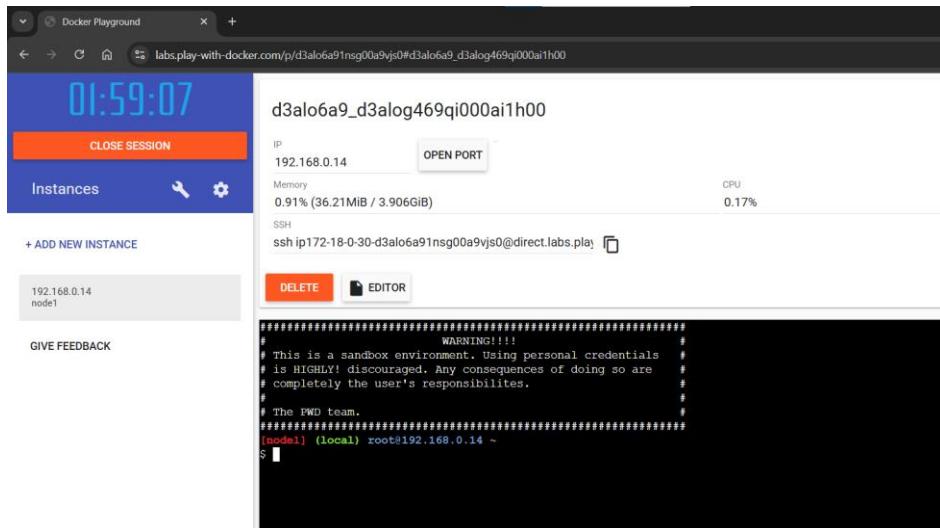
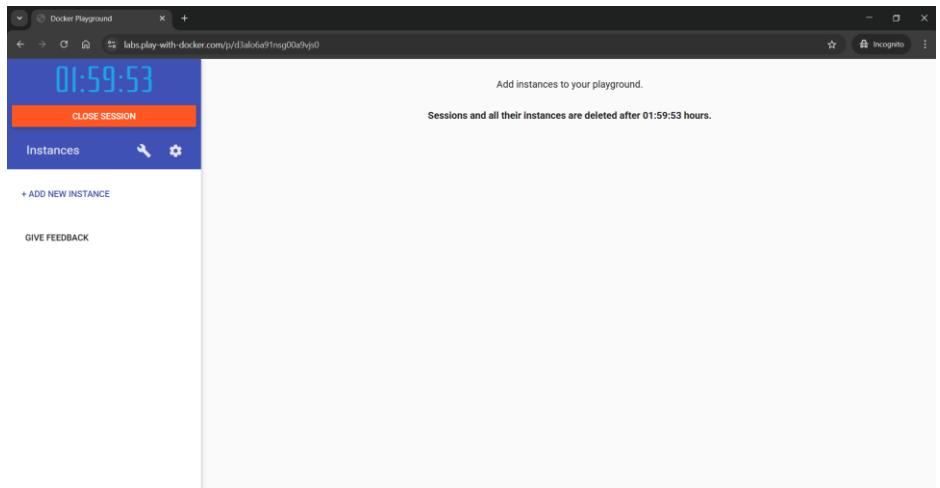
Step 1: Visit <https://labs.play-with-docker.com/> and click on login and click on docker



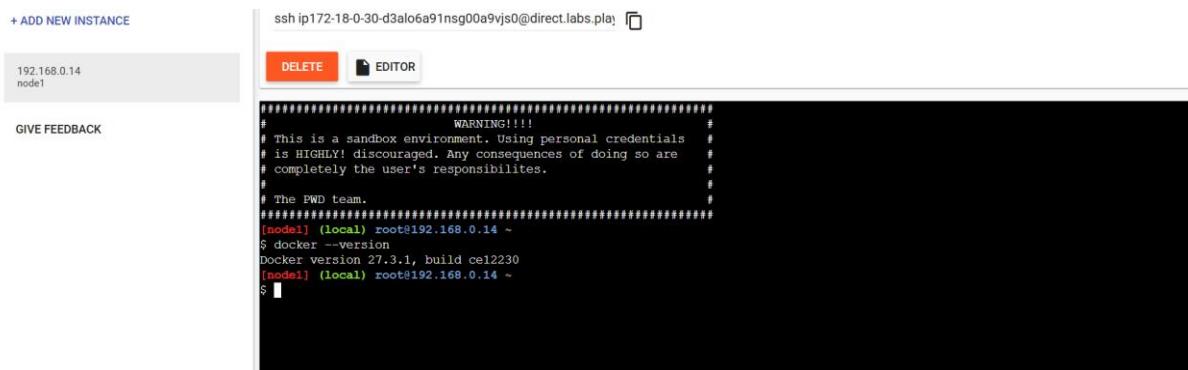
Step 2: Login with google account and create username and sign up



Step 3: Click on add new instance and New instance will be created



Step 4: Type command docker - -version



## Step 5: Type command docker pull rocker/verse

```
[node1] (local) root@192.168.0.14 ~
$ docker pull rocker/verse
Using default tag: latest
latest: Pulling from rocker/verse
953cd4d13371: Pulling fs layer
a33e8a4fb1f6: Pulling fs layer
9f2fc5c372ea: Pull complete
9080bb573c0: Pull complete
c377f1f7d0d7a: Pull complete
7df72cad19f7: Pull complete
14553b2c75b1: Pull complete
6bcf06f02b55: Extracting [=====] 133.7MB/199.9MB
947036b0063e: Download complete
9c7ee5355a0a: Download complete
c7f8f86ea1b1d: Download complete
9dff5eeef41ca: Download complete
ee43c9ac0df8: Download complete
6f4fa504789e: Download complete
1e82e390aa35: Download complete
7fb787291b53: Download complete
7fb787291b53: Download complete
004d011a03fb: Download complete
ca3cf20c1le7: Download complete
```

## Step 6: Type command docker images

```
c7ff86ea1b1d: Pull complete
9d4f5eef41ea: Pull complete
ee43c9ac0df8: Pull complete
6f4fa504789e: Pull complete
1e82e390aa35: Pull complete
7fb787291b53: Pull complete
004d011a03fb: Pull complete
ca3cf20c1le7: Pull complete
999dcfc1a2eed: Pull complete
2257787fd54f: Pull complete
7233f02dd450: Pull complete
841b3ab5622: Pull complete
a5f93fb1f84c: Pull complete
Digest: sha256:260b7cafc1af9d13d1d6c6871d47538643a3f192937fb01eb0f628e9e511dbd
Status: Downloaded newer image for rocker/verse:latest
docker.io/rocker/verse:latest
[node1] (local) root@192.168.0.14 ~
$ docker images
REPOSITORY          TAG      IMAGE ID      CREATED     SIZE
rocker/verse        latest   883369f9d713  5 days ago  3.9GB
[node1] (local) root@192.168.0.14 ~
```

## Step 7: Go to <https://hub.docker.com/> -> go to repositories-> and click on create repository

Welcome to Docker  
Download the desktop application  
Download for Windows  
Also available for Mac and Linux

Create a Repository  
Push container images to a repository on Docker Hub.

Docker Hub Basics  
Watch the guide on how to create and push your first image into a Docker Hub repository.

Language-Specific Guides  
Learn how to containerize language-specific applications using Docker.

Access the world's largest library of container images

## Step 8: Give repo name and create

The screenshot shows the Docker Hub interface. On the left, the sidebar for user 'siddhu2327' is visible. In the center, a 'Create repository' form is open. The 'Repository Name' field contains 'siddhesh23'. The 'Short description' field contains 'pulling and pushing images'. Under 'Visibility', the 'Public' radio button is selected, with the note 'Appears in Docker Hub search results'. On the right, a 'Pushing images' section provides CLI instructions: `docker tag local-image:tagname new-repo:tagname` and `docker push new-repo:tagname`. A note says to replace 'tagname' with the desired image repository tag. At the bottom right are 'Cancel' and 'Create' buttons.

The second part of the screenshot shows the newly created repository 'siddhesh23'. The 'General' tab is selected. It displays the repository name 'siddhu2327/siddhesh23' and a note 'Created less than a minute ago'. Below this is a 'Tags' section with a note 'Pushed images appear here.' To the right, there's a 'Docker commands' section with a 'Public view' button and a command `docker push siddhu2327/siddhesh23:tagname`. A 'buildcloud' integration card is also present.

## Step 9: Go to account settings->reset password->set new password->again sign in with username and password

The screenshot shows the Docker account settings page at [app.docker.com/accounts/siddhu2327/settings/password](https://app.docker.com/accounts/siddhu2327/settings/password). The left sidebar shows 'Siddhesh Teli' under 'Docker Personal' with options like Home, Hub, Build Cloud, Scout, Testcontainers Cloud, Docker Desktop, Settings, Account information, Email, Password (which is selected), 2FA, Personal access tokens, and Connected accounts. The main content area shows a 'Password' section with a note: 'You can change your password by initiating a reset via email.' A 'Reset password' button is present. Below this, a success message 'Password Changed!' is displayed with the note 'Your password has been changed successfully.' and a link 'Log in to app.docker.com'.

Step 10: Go to play with dockers command prompt type command docker login --username=siddhu2327 and enter password

```
28.55% (1.115GiB / 3.906GiB) 0.11%
SSH
ssh ip172-18-0-29-d3alo6a91nsg00a9vjs0@direct.labs.play [x]

+ ADD NEW INSTANCE
192.168.0.14 node1
GIVE FEEDBACK
DELETE EDITOR

999d7c3a2eed: Pull complete
2257787fd54f: Pull complete
7233f02dd450: Pull complete
841b3a1b5622: Pull complete
a5f93fb1f84c: Pull complete
Digest: sha256:260b7ca0c71af9d13d1d6c6871d47538643a3f192937fb01eb0f628e9e511dbd
Status: Downloaded newer image for rocker/verse:latest
docker.io/rocker/verse:latest
[node] (local) root@192.168.0.14 ~
$ docker images
REPOSITORY TAG IMAGE ID CREATED SIZE
rocker/verse latest 883369f9d713 5 days ago 3.9GB
[node] (local) root@192.168.0.14 ~
$ docker login --username=siddhu2327
Password:
WARNING! Your password will be stored unencrypted in /root/.docker/config.json.
Configure a credential helper to remove this warning. See
https://docs.docker.com/engine/reference/commandline/login/#credential-stores

Login Succeeded
[node] (local) root@192.168.0.14 ~
```

Step 11: Type command docker images and note image id

```
192.168.0.14 node1
GIVE FEEDBACK
DELETE EDITOR

a5f93fb1f84c: Pull complete
Digest: sha256:260b7ca0c71af9d13d1d6c6871d47538643a3f192937fb01eb0f628e9e511dbd
Status: Downloaded newer image for rocker/verse:latest
docker.io/rocker/verse:latest
[node] (local) root@192.168.0.14 ~
$ docker images
REPOSITORY TAG IMAGE ID CREATED SIZE
rocker/verse latest 883369f9d713 5 days ago 3.9GB
[node] (local) root@192.168.0.14 ~
$ docker login --username=siddhu2327
Password:
WARNING! Your password will be stored unencrypted in /root/.docker/config.json.
Configure a credential helper to remove this warning. See
https://docs.docker.com/engine/reference/commandline/login/#credential-stores

Login Succeeded
[node] (local) root@192.168.0.14 ~
$ docker images
REPOSITORY TAG IMAGE ID CREATED SIZE
rocker/verse latest 883369f9d713 5 days ago 3.9GB
[node] (local) root@192.168.0.14 ~
```

Step 12: Type this below given command

```
192.168.0.14 node1
GIVE FEEDBACK
DELETE EDITOR

[node] (local) root@192.168.0.14 ~
$ docker images
REPOSITORY TAG IMAGE ID CREATED SIZE
rocker/verse latest 883369f9d713 5 days ago 3.9GB
[node] (local) root@192.168.0.14 ~
$ docker login --username=siddhu2327
Password:
WARNING! Your password will be stored unencrypted in /root/.docker/config.json.
Configure a credential helper to remove this warning. See
https://docs.docker.com/engine/reference/commandline/login/#credential-stores

Login Succeeded
[node] (local) root@192.168.0.14 ~
$ docker images
REPOSITORY TAG IMAGE ID CREATED SIZE
rocker/verse latest 883369f9d713 5 days ago 3.9GB
[node] (local) root@192.168.0.14 ~
$ ^C
[node] (local) root@192.168.0.14 ~
$ docker tag 883369f9d713 siddhu23:T1
[node] (local) root@192.168.0.14 ~
```

Step 13: Type this command docker push siddhu2327/siddhu23:T1

```
GIVE FEEDBACK

[node1] (local) root@192.168.0.14 ~
$ ^C
[node1] (local) root@192.168.0.14 ~
$ docker tag 883369f9d713 siddhu23:T1
[node1] (local) root@192.168.0.14 ~
$ docker push siddhu23:T1
The push refers to repository [docker.io/library/siddhu23]
adf28f62043c: Preparing
3d36a799da7d: Preparing
3b747bd6b03e: Preparing
a8cb7fb549e4: Preparing
2abde6f4a3f0: Preparing
32b0577872db: Waiting
1d0a6c2144551: Waiting
8fde0b44b2c0: Waiting
efaf3fb99e5ea: Waiting
0f3e6f308424: Waiting
9bf2865a8c43: Waiting
601a5bf55003: Waiting
ba3206bf8c10: Waiting
8e51600eb0ff: Waiting
```

Step 14: docker push siddhu2327/siddhu23:T1

```
GIVE FEEDBACK

[node1] (local) root@192.168.0.14 ~
$ docker push siddhu2327/siddhu23:T1
The push refers to repository [docker.io/siddhu2327/siddhu23]
adf28f62043c: Preparing
3d36a799da7d: Preparing
3b747bd6b03e: Pushed
2abde6f4a3f0: Pushed
32b0577872db: Pushed
1d0a62144551: Pushing [=====>]
8fde0b44b2c0: Pushed
efaf3fb99e5ea: Pushing [==>]
0f3e6f308424: Pushed
9bf2865a8c43: Pushed
601a5bf55003: Pushed
ba3206bf8c10: Pushed
8e51600eb0ff: Pushed
5049ea4876d7: Pushed
1d8c052d02a9: Pushing [==>]
f5471609dfda: Pushed
251c9ec17628: Pushing [=====>]
```

Step 15: Go to hub and refresh

Repositories / siddhu23 / Tags

siddhu2327/siddhu23

Last pushed 2 minutes ago

Add a description ⓘ ⓘ

Add a category ⓘ ⓘ

General Tags Image Management ⚡ Collaborators Webhooks Settings

Sort by Newest Filter tags Delete

TAG

T1

Last pushed 2 minutes by siddhu2327

Digest	OS/ARCH	Last pull	Compressed size ⓘ
f38e0206e480	linux/amd64	less than 1 day	1.23 GB

Using 0 of 1 private repositories. [Get more](#)

Docker commands

To push a new tag to this repository:

```
docker push siddhu2327/siddhu23:tagname
```

Step 16: Create javascript file and name it as first.js

```
var http = require('http');

http.createServer(function(req,res){
    res.writeHead(200,{Content-Type:'text/html'});
    res.end("Hello 23_Siddhesh From Msc computer science ");
}).listen(8081);
```

Step 17: Open Browser and search localhost:8081



Step 18: Edit first.js file and also create new myfirstmodule.js

first.js

```
var http = require('http');
var dt = require('./myfirstmodule');
```

```
http.createServer(function (req, res) {
    res.writeHead(200, { 'Content-Type': 'text/html' });
    res.write("The date and time are currently: " + dt.myDateTime());
    res.end();
}).listen(8081);
console.log("Server running at http://localhost:8081/");
```

myfirstmodule.js

```
exports.myDateTime = function () {  
    return Date();  
};
```

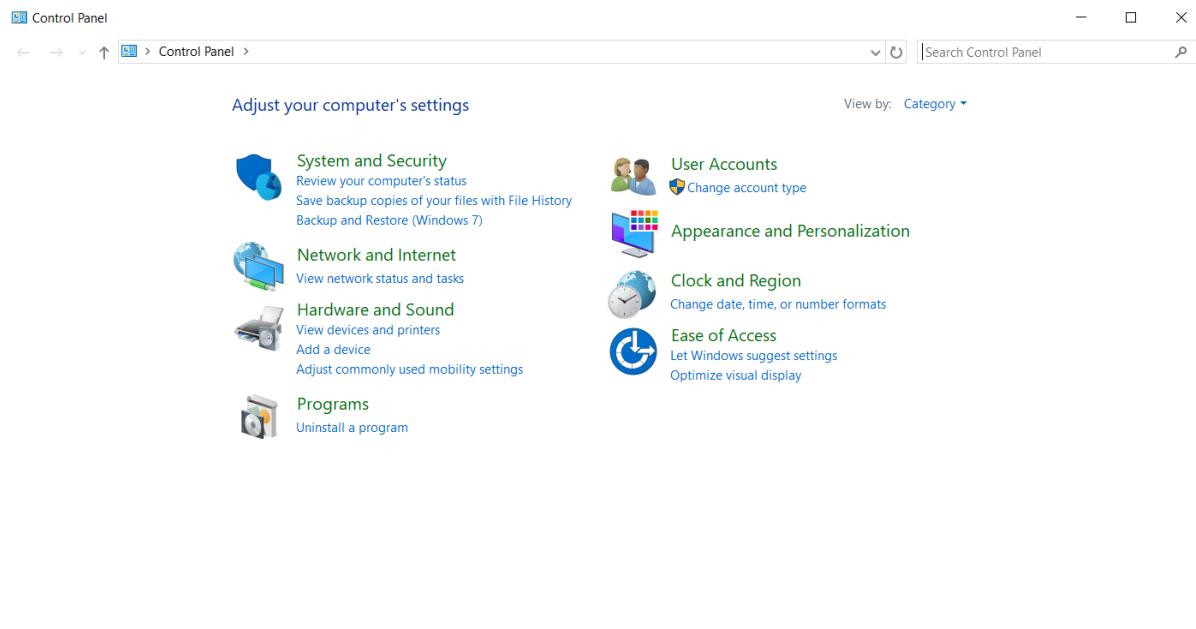
Step 19: Open Browser and search localhost:8081



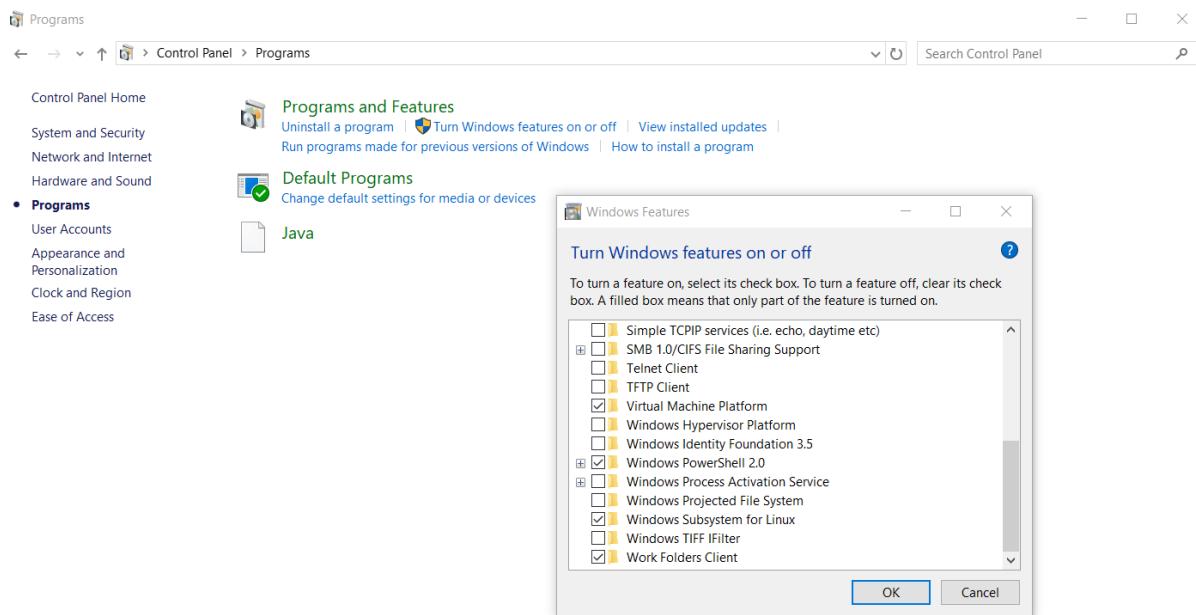
## Practical No. 2

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

### Step 1: - Go to Control Panel



Step 2: - Go into Programs then select option Turn windows feature on and off and tick on the check box of Windows Subsystem for Linux



Step 3: - Install WSL 2 in PowerShell and execute these commands

wsl --set-default-version 2

wsl -l -v

```
Command Prompt
Microsoft Windows [Version 10.0.19045.6093]
(c) Microsoft Corporation. All rights reserved.

C:\Users\Admin>wsl --set-default-version 2
For information on key differences with WSL 2 please visit https://aka.ms/wsl2
The operation completed successfully.

C:\Users\Admin>wsl -l -v
  NAME          STATE        VERSION
* Ubuntu        Stopped      2
  docker-desktop Stopped      2
  Ubuntu-22.04   Stopped      2

C:\Users\Admin>
```

Step 4: - Restart the WSL Service (Run CMD as administrator)

net stop LxssManager

net start LxssManager

```
Administrator: Command Prompt
Microsoft Windows [Version 10.0.19045.6093]
(c) Microsoft Corporation. All rights reserved.

C:\Windows\system32>net stop LxssManager
The LxssManager service is not started.

More help is available by typing NET HELPMSG 3521.

C:\Windows\system32>net start LxssManager
The LxssManager service is starting.
The LxssManager service was started successfully.

C:\Windows\system32>_
```

Step 5: - Install Required Libraries such as Python, GoLang Go, Docker, Docker compose, nodejs, curl in Ubuntu Terminal

```
siddhesh@DESKTOP-74T5BGT:~$ 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/2.5.18
Release-Date: 2022-01-05
Protocols: dict file ftp ftps gopher gophers http https imap imaps ldap ldaps mqtt pop3 pop3s rtmp rtsp scp sftp smb smb2 smtp smtps telnet tftp
Features: alt-svc AsyncDNS brotli GSS-API HSTS HTTP2 HTTPS-proxy IDN IPv6 Kerberos Largefile libz NTLM NTLM_WB PSL SPNEGO SSL TLS-SRP UnixSockets zstd
siddhesh@DESKTOP-74T5BGT:~$ docker --version
Docker version 28.1.1, build 4eba377
siddhesh@DESKTOP-74T5BGT:~$ docker -compose --version
Docker Compose version 2.1.1, build 4eba377
siddhesh@DESKTOP-74T5BGT:~$ python3 --version
Python 3.10.12
siddhesh@DESKTOP-74T5BGT:~$ sudo apt install golang-go
[sudo] password for siddhesh:
Sorry, try again.
[sudo] password for siddhesh:
Sorry, try again.
[sudo] password for siddhesh:
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
The following additional packages will be installed:
  bzip2 cpp cpp-11 g++ g++-11 gcc gcc-11 gcc-11-base golang-1.18-go golang-1.18-src golang-src libasan6 libatomic1
  libc-dev-bin libcc-dev libcrypt-dev libcurl4 libgcc1 liblber-dev liblber23 libltsan1 libltsan0 libmpc3 libnsl-dev libquadmath0 libstdc++-11-dev libtinfo5 libttsan0 libubsan1
  libxml2 libxml2-dev manpages-dev pkg-config rpcsvc-proto
Suggested packages:
```

```
111 packages can be upgraded. Run 'apt list --upgradable' to see them.
siddhesh@DESKTOP-74T5BGT:~$ sudo apt install nodejs npm -y
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
The following additional packages will be installed:
  build-essential bzip2 cpp cpp-11 dpkg-dev fakeroot g++ g++-11 gcc gcc-11 gcc-11-base gyp javascript-common
  libalgorithm-diff-perl libalgorithm-diff-xs-perl libalgorithm-merge-perl libasan6 libatomic1 libauthen-sasl-perl
  libc-ares2 libc-dev-bin libc-devtools libc6 libc6-dev libcc1-0 libclone-perl libcrypt-dev libdata-dump-perl
  libdpkg-perl libencode-locale-perl libfakeroot libfile-basedir-perl libfile-desktopentry-perl libfile-fcntllock-perl
  libfile-listing-perl libfile-mimeinfo-perl libfont-afm-perl libfontenc1 libgcc-11-dev libgd3 libgomp1 libgtk3-3-0
  libhtml-form-perl libhtml-format-perl libhtml-parser-perl libhtml-tagset-perl libhtml-tree-perl libhttp-cookies-perl
  libhttp-daemon-perl libhttp-date-perl libhttp-message-perl libhttp-negotiate-perl libice6 libio-html-perl
```

```
siddhesh@siddhesh-OptiPlex-5090:~$ node -v
v12.22.9
siddhesh@siddhesh-OptiPlex-5090:~$
```

Step 6: - Follow this below command to make directory and clone the repo

```
git config --global core.autocrlf false
```

```
git config --global core.longpaths true
```

```
Mkdir siddhesh_msccs
```

```
cd siddhesh_msccs
```

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

```
siddhesh@siddhesh-OptiPlex-5090:~/siddhesh_msccs$ git config --global core.autocrlf false
siddhesh@siddhesh-OptiPlex-5090:~/siddhesh_msccs$ git config --global core.longpaths true
siddhesh@siddhesh-OptiPlex-5090:~/siddhesh_msccs$ mkdir siddhesh_msccs
siddhesh@siddhesh-OptiPlex-5090:~/siddhesh_msccs$ cd siddhesh_msccs
siddhesh@siddhesh-OptiPlex-5090:~/siddhesh_msccs$ curl -sSL http://bit.ly/2ysbOFE | bash -s

Clone hyperledger/fabric-samples repo

====> Cloning hyperledger/fabric-samples repo
Cloning into 'fabric-samples'...
remote: Enumerating objects: 14996, done.
remote: Counting objects: 100% (350/350), done.
remote: Compressing objects: 100% (219/219), done.
remote: Total 14996 (delta 210), reused 131 (delta 131), pack-reused 14646 (from 3)
Receiving objects: 100% (14996/14996), 23.82 MiB | 3.48 MiB/s, done.
Resolving deltas: 100% (8264/8264), done.
fabric-samples v2.5.12 does not exist, defaulting to main. fabric-samples main branch is intended to be used with Docker images.
```

```
1.5.15: Pulling from hyperledger/fabric-ca
9cb31e2e37ea: Already exists
89ec368dc6e7: Pull complete
dc76d0d407d2: Pull complete
943126a1b0fb: Pull complete
Digest: sha256:1b64dc702bd400e14c8f452dedc0359b7dc06679b751b08937eb2bf2865fed40
Status: Downloaded newer image for hyperledger/fabric-ca:1.5.15
docker.io/hyperledger/fabric-ca:1.5.15
====> List out hyperledger docker images
hyperledger/fabric-orderer 2.5 fa56384e2773 5 months ago 118MB
hyperledger/fabric-orderer 2.5.12 fa56384e2773 5 months ago 118MB
hyperledger/fabric-orderer latest fa56384e2773 5 months ago 118MB
hyperledger/fabric-peer 2.5 6f5d5d210c59 5 months ago 151MB
hyperledger/fabric-peer 2.5.12 6f5d5d210c59 5 months ago 151MB
hyperledger/fabric-peer latest 6f5d5d210c59 5 months ago 151MB
hyperledger/fabric-ccenv 2.5 b30e9cc39553 5 months ago 676MB
hyperledger/fabric-ccenv 2.5.12 b30e9cc39553 5 months ago 676MB
hyperledger/fabric-ccenv latest b30e9cc39553 5 months ago 676MB
hyperledger/fabric-baseos 2.5 133ecaf78b3e 5 months ago 142MB
hyperledger/fabric-baseos 2.5.12 133ecaf78b3e 5 months ago 142MB
hyperledger/fabric-baseos latest 133ecaf78b3e 5 months ago 142MB
hyperledger/fabric-ca 1.5 09cb0b50ebdb 6 months ago 225MB
hyperledger/fabric-ca 1.5.15 09cb0b50ebdb 6 months ago 225MB
hyperledger/fabric-ca latest 09cb0b50ebdb 6 months ago 225MB
```

Step 7: - Navigate to fabric sample and then in test-network and then execute these command

cd fabric-samples/test-network

ll

./network.sh up

cat network.sh

./network.sh up

sudo apt-get install jq

./network.sh CreateChannel -c siddhesh

```
siddhesh@DESKTOP-74T5BGT:~/siddhesh_msccs/fabric-samples/test-network
fabric-samples
siddhesh@DESKTOP-74T5BGT:~/siddhesh_msccs$ cd fabric-samples
siddhesh@DESKTOP-74T5BGT:~/siddhesh_msccs/fabric-samples$ ls
CHANGELOG.md           asset-transfer-basic      builders          test-network-k8s
CODEOWNERS             asset-transfer-events    ci               test-network-nano-bash
CODE_OF_CONDUCT.md     asset-transfer-ledger-queries config        token-erc-1155
CONTRIBUTING.md        asset-transfer-private-data full-stack-asset-transfer-guide token-erc-20
LICENSE                asset-transfer-sbe       hardware-security-module token-erc-721
MAINTAINERS.md         asset-transfer-secured-agreement high-throughput   token-sdk
README.md              auction-dutch          off_chain_data  token-utxo
SECURITY.md            auction-simple         test-application
asset-transfer-abac    bin                  test-network
siddhesh@DESKTOP-74T5BGT:~/siddhesh_msccs/fabric-samples$ cd test-network
siddhesh@DESKTOP-74T5BGT:~/siddhesh_msccs/fabric-samples/test-network$ ll
total 100
drwxr-xr-x 10 siddhesh siddhesh 4096 Aug  9 16:23 .
drwxr-xr-x 30 siddhesh siddhesh 4096 Aug  9 16:23 ..
-rw-r--r--  1 siddhesh siddhesh 393 Aug  9 16:23 .gitignore
-rw-r--r--  1 siddhesh siddhesh 13707 Aug  9 16:23 CHAINCODE_AS_A_SERVICE_TUTORIAL.md
-rw-r--r--  1 siddhesh siddhesh 3538 Aug  9 16:23 README.md
drwxr-xr-x  4 siddhesh siddhesh 4096 Aug  9 16:23 addOrg3/
drwxr-xr-x  2 siddhesh siddhesh 4096 Aug  9 16:23 bft-config/
drwxr-xr-x  4 siddhesh siddhesh 4096 Aug  9 16:23 compose/
drwxr-xr-x  2 siddhesh siddhesh 4096 Aug  9 16:23 configtx/
-rwxr-xr-x  1 siddhesh siddhesh 782 Aug  9 16:23 monitordocker.sh*
-rw-r--r--  1 siddhesh siddhesh 1482 Aug  9 16:23 network.config
-rwrxr-xr-x  1 siddhesh siddhesh 23557 Aug  9 16:23 network.sh*
drwxr-xr-x  5 siddhesh siddhesh 4096 Aug  9 16:23 organizations/
drwxr-xr-x  7 siddhesh siddhesh 4096 Aug  9 16:23 prometheus-grafana/
drwxr-xr-x  5 siddhesh siddhesh 4096 Aug  9 16:23 scripts/
[+] Running 7/7 siddhesh siddhesh 4096 Aug  9 16:23 scripts/
  Network fabric_test                                Created          0.2s
  Volume "compose_peer0.org1.example.com"           Created          0.0s
  Volume "compose_peer0.org2.example.com"           Created          0.0s
  Volume "compose_orderer.example.com"              Created          0.0s
  Container orderer.example.com                     Started          3.8s
  Container peer0.org1.example.com                 Started          3.4s
  Container peer0.org2.example.com                 Started          3.2s
CONTAINER ID IMAGE                                     COMMAND          CREATED          STATUS
PORTS
NAME for using countoscan tool
```

```
siddhesh@DESKTOP-74T5BGT:~/siddhesh_msccs/fabric-samples/test-network$ ll
total 100
drwxr-xr-x 10 siddhesh siddhesh 4096 Aug  9 16:23 .
drwxr-xr-x 30 siddhesh siddhesh 4096 Aug  9 16:23 ..
-rw-r--r--  1 siddhesh siddhesh 393 Aug  9 16:23 .gitignore
-rw-r--r--  1 siddhesh siddhesh 13707 Aug  9 16:23 CHAINCODE_AS_A_SERVICE_TUTORIAL.md
-rw-r--r--  1 siddhesh siddhesh 3538 Aug  9 16:23 README.md
drwxr-xr-x  4 siddhesh siddhesh 4096 Aug  9 16:23 addOrg3/
drwxr-xr-x  2 siddhesh siddhesh 4096 Aug  9 16:23 bft-config/
drwxr-xr-x  4 siddhesh siddhesh 4096 Aug  9 16:23 compose/
drwxr-xr-x  2 siddhesh siddhesh 4096 Aug  9 16:23 configtx/
-rwxr-xr-x  1 siddhesh siddhesh 782 Aug  9 16:23 monitordocker.sh*
-rw-r--r--  1 siddhesh siddhesh 1482 Aug  9 16:23 network.config
-rwrxr-xr-x  1 siddhesh siddhesh 23557 Aug  9 16:23 network.sh*
drwxr-xr-x  5 siddhesh siddhesh 4096 Aug  9 16:23 organizations/
drwxr-xr-x  7 siddhesh siddhesh 4096 Aug  9 16:23 prometheus-grafana/
drwxr-xr-x  5 siddhesh siddhesh 4096 Aug  9 16:23 scripts/
[+] Running 7/7 siddhesh siddhesh 4096 Aug  9 16:23 scripts/
  Network fabric_test                                Created          0.2s
  Volume "compose_peer0.org1.example.com"           Created          0.0s
  Volume "compose_peer0.org2.example.com"           Created          0.0s
  Volume "compose_orderer.example.com"              Created          0.0s
  Container orderer.example.com                     Started          3.8s
  Container peer0.org1.example.com                 Started          3.4s
  Container peer0.org2.example.com                 Started          3.2s
CONTAINER ID IMAGE                                     COMMAND          CREATED          STATUS
PORTS
NAME for using countoscan tool
```

```
my. sudo apt install -y libcurl4-openssl-dev
siddhesh@DESKTOP-74T5BGT:~/siddhesh_msccs/fabric-samples/test-network$ cat network.sh
#!/usr/bin/env bash
#
# Copyright IBM Corp All Rights Reserved
#
# SPDX-License-Identifier: Apache-2.0
#
# This script brings up a Hyperledger Fabric network for testing smart contracts
# and applications. The test network consists of two organizations with one
# peer each, and a single node Raft ordering service. Users can also use this
# script to create a channel deploy a chaincode on the channel
#
# prepending $PWD/../bin to PATH to ensure we are picking up the correct binaries
# this may be commented out to resolve installed version of tools if desired
#
# However using PWD in the path has the side effect that location that
# this script is run from is critical. To ease this, get the directory

's
siddhesh@DESKTOP-74T5BGT:~/siddhesh_msccs/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'
LOCAL_VERSION=v2.5.12
DOCKER_IMAGE_VERSION=v2.5.12
WARN[0000] /home/siddhesh/siddhesh_msccs/fabric-samples/test-network/compose/compose-test-net.yaml: the attribute `version` is obsolete, it will be ignored, please remove it to avoid potential confusion
WARN[0000] /home/siddhesh/siddhesh_msccs/fabric-samples/test-network/compose/docker-compose-test-net.yaml: the attrs
siddhesh@DESKTOP-74T5BGT:~/siddhesh_msccs/fabric-samples/test-network$'

siddhesh@DESKTOP-74T5BGT:~/siddhesh_msccs/fabric-samples/test-network$ sudo apt-get install jq
[sudo] password for siddhesh:
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
The following additional packages will be installed:
  libjq1 libonig5
The following NEW packages will be installed:
  jq libjq1 libonig5
0 upgraded, 3 newly installed, 0 to remove and 109 not upgraded.

Processing triggers for libc-bin (2.33-0ubuntu3.8) ...
siddhesh@DESKTOP-74T5BGT:~/siddhesh_msccs/fabric-samples/test-network$ ./network.sh CreateChannel -c siddhesh
Using docker and docker-compose
Usage:
  network.sh <Mode> [Flags]
    Modes:
      prereq - Install Fabric binaries and docker images
      up - Bring up Fabric orderer and peer nodes. No channel is created
      up createChannel - Bring up fabric network with one channel
      createChannel - Create and join a channel after the network is created
      deployCC - Deploy a chaincode to a channel (defaults to asset-transfer-basic)
      cc - chaincode functions, use "network.sh cc -h" for options
      down - Bring down the network

    Flags:
    Used with network.sh prereq
      -i      FabricVersion (default: '2.5.13')
      -ca     Fabric CA Version (default: '1.5.15')

    Used with network.sh up, network.sh createChannel:
      -ca - Use Certificate Authorities to generate network crypto material
      -cfssl <use CFSSL> - Use CFSSL CA to generate network crypto material
      -bft - Use Orderers with consensus type BFT (Not available in Fabric v2.x)
      -c <channel name> - Name of channel to create (defaults to "mychannel")'
```

Step 8: - You will be able to see image files in local in Docker desktop

Name	Tag	Image ID	Created	Size	Actions
hyperledger/fabric-peer	2.5.12	6f5d5d210c59	5 months ago	151.14 MB	<a href="#">More</a>
hyperledger/fabric-peer	latest	6f5d5d210c59	5 months ago	151.14 MB	<a href="#">More</a>
hyperledger/fabric-orderer	2.5	fa56384e2773	5 months ago	117.87 MB	<a href="#">More</a>
hyperledger/fabric-orderer	2.5.12	fa56384e2773	5 months ago	117.87 MB	<a href="#">More</a>

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Container CPU usage 4.21% / 400% (4 CPUs available)

Container memory usage 175.9MB / 7.58GB [Show charts](#)

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<input type="checkbox"/>	Name	Container ID	Image	Port(s)	CPU (%)	Last started	Actions
<input type="checkbox"/>	elated_curran	ce2e900c9d49	zomato	3000:3000	0%	2 months ago	
<input type="checkbox"/>	epic_easley	f38c06db2353	amazon-prime	5000:3000	0%	2 months ago	
<input type="checkbox"/>	competent_brattain	85ad84d81d4a	zomato	3000:3000	0%	2 months ago	
<input type="checkbox"/>	minikube	d3be59e73c5d	k8s-minikube/kicbase:v0.4.5	0.22	0%	2 months ago	
<input type="checkbox"/>	amazing_jones	48e23572f965	ubuntu		0%	2 months ago	
<input type="checkbox"/>	sonarqube-server	0edbcb524f5e7	sonarqube:its-community	9000:9000	0%	2 months ago	
<input checked="" type="checkbox"/>	dev-peer0.org2.example.com-abac_1.0-437ef5	1af8ab4f7e37	dev-peer0.org2.example.com-abac_1.0-437ef5		0%	18 minutes ago	
<input checked="" type="checkbox"/>	dev-peer0.org1.example.com-abac_1.0-437ef5	fef838329d7a	dev-peer0.org1.example.com-abac_1.0-437ef5		0%	18 minutes ago	
<input type="checkbox"/>	compose				4.21%	35 minutes ago	

### Practical No. 3

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

Step 1: sudo add-apt-repository -y ppa:ethereum/Ethereum

```
siddhesh@siddhesh-OptiPlex-5090:~$ sudo add-apt-repository -y ppa:ethereum/ethereum
[sudo] password for siddhesh:
Repository: 'deb https://ppa.launchpadcontent.net/ethereum/ethereum/ubuntu/ jammy main'
More info: https://launchpad.net/~ethereum/+archive/ubuntu/ethereum
Adding repository.
Adding deb entry to /etc/apt/sources.list.d/ethereum-ubuntu-ethereum-jammy.list
Adding disabled deb-src entry to /etc/apt/sources.list.d/ethereum-ubuntu-ethereum-jammy.list

Adding key to /etc/apt/trusted.gpg.d/ethereum-ubuntu-ethereum.gpg with fingerprint E66CB8FE57F8218E96B13446B50ABD2EE384B
7D4
Hit:1 http://archive.ubuntu.com/ubuntu jammy InRelease
Get:2 http://archive.ubuntu.com/ubuntu jammy-updates InRelease [128 kB]
Get:3 http://security.ubuntu.com/ubuntu jammy-security InRelease [129 kB]
Get:4 https://ppa.launchpadcontent.net/ethereum/ethereum/ubuntu jammy InRelease [18.3 kB]
Get:5 http://archive.ubuntu.com/ubuntu jammy-backports InRelease [127 kB]
Get:6 https://ppa.launchpadcontent.net/ethereum/ethereum/ubuntu jammy/main amd64 Packages [2572 B]
Get:7 http://archive.ubuntu.com/ubuntu jammy-updates/main amd64 Packages [2804 kB]
Get:8 https://ppa.launchpadcontent.net/ethereum/ethereum/ubuntu jammy/main Translation-en [772 B]
Get:9 http://archive.ubuntu.com/ubuntu jammy-updates/main Translation-en [443 kB]
Get:10 http://archive.ubuntu.com/ubuntu jammy-updates/restricted amd64 Packages [4163 kB]
Get:11 http://security.ubuntu.com/ubuntu jammy-security/main amd64 Packages [2559 kB]
Get:12 http://archive.ubuntu.com/ubuntu jammy-updates/restricted Translation-en [756 kB]
Get:13 http://archive.ubuntu.com/ubuntu jammy-updates/universe amd64 Packages [1226 kB]
Get:14 http://archive.ubuntu.com/ubuntu jammy-backports/universe amd64 Packages [38.0 kB]
```

Step 2: sudo apt-get update

```
Reading package lists... Done
siddhesh@siddhesh-OptiPlex-5090:~$ sudo apt-get update
Hit:1 http://security.ubuntu.com/ubuntu jammy-security InRelease
Hit:2 http://archive.ubuntu.com/ubuntu jammy InRelease
Hit:3 http://archive.ubuntu.com/ubuntu jammy-updates InRelease
Hit:4 https://ppa.launchpadcontent.net/ethereum/ethereum/ubuntu jammy InRelease
Hit:5 http://archive.ubuntu.com/ubuntu jammy-backports InRelease
Reading package lists... Done
siddhesh@siddhesh-OptiPlex-5090:~$
```

Step 3: sudo apt-get install Ethereum

```
Reading package lists... Done
siddhesh@siddhesh-OptiPlex-5090:~$ sudo apt-get install Ethereum
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
E: Unable to locate package Ethereum
siddhesh@siddhesh-OptiPlex-5090:~$
```

### Step 4: sudo apt install geth

```
siddhesh@DESKTOP-74T5BGT:~$ sudo apt install geth
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
The following NEW packages will be installed:
  geth
0 upgraded, 1 newly installed, 0 to remove and 110 not upgraded.
Need to get 15.3 MB of archives.
After this operation, 48.7 MB of additional disk space will be used.
Get:1 https://ppa.launchpadcontent.net/ethereum/ethereum/ubuntu jammy/main amd64 geth amd64 1.16.2+build1488+jammy [15.3
MB]
Fetched 15.3 MB in 10s (1458 kB/s)
Selecting previously unselected package geth.
(Reading database ... 70361 files and directories currently installed.)
Preparing to unpack .../geth_1.16.2+build1488+jammy_amd64.deb ...
Unpacking geth (1.16.2+build1488+jammy) ...
Setting up geth (1.16.2+build1488+jammy) ...
siddhesh@DESKTOP-74T5BGT:~$
```

### Step 5: geth -h

```
siddhesh@DESKTOP-74T5BGT:~$ geth -h
NAME:
  geth - the go-ethereum command line interface

USAGE:
  geth [global options] command [command options]

VERSION:
  1.16.2-stable-dd1ebac1

COMMANDS:
  account           Manage accounts
  attach            Start an interactive JavaScript environment (connect to node)
  console           Start an interactive JavaScript environment
  db                Low level database operations
  download-era     Fetches era1 files (pre-merge history) from an HTTP endpoint
  dump              Dump a specific block from storage
  dumpconfig        Export configuration values in a TOML format
  dumpgenesis      Dumps genesis block JSON configuration to stdout
  export            Export blockchain into file
  export-history    Export blockchain history to Era archives
  import            Import a blockchain file
  import-history   Import an Era archive
  import-preimages  Import the preimage database from an RLP stream
  init              Bootstrap and initialize a new genesis block
```

### Step 6:

mkdir privatetest

cd privatetest

mkdir node0

cd node0

cd..

mkdir node1

cd..

dir

```
siddhesh@siddhesh-DESKTOP-74T5BGT:~/privatetest$ mkdir privatetest
siddhesh@siddhesh-DESKTOP-74T5BGT:~/privatetest$ cd privatetest/
siddhesh@siddhesh-DESKTOP-74T5BGT:~/privatetest$ mkdir node0
siddhesh@siddhesh-DESKTOP-74T5BGT:~/privatetest$ cd node0/
siddhesh@siddhesh-DESKTOP-74T5BGT:~/privatetest/node0$ cd ..
siddhesh@siddhesh-DESKTOP-74T5BGT:~/privatetest$ mkdir node1
siddhesh@siddhesh-DESKTOP-74T5BGT:~/privatetest$ cd ..
siddhesh@siddhesh-DESKTOP-74T5BGT:~$ dir
go privatetest siddhesh_msccs
siddhesh@siddhesh-DESKTOP-74T5BGT:~/privatetest$ cd privatetest/
siddhesh@siddhesh-DESKTOP-74T5BGT:~/privatetest$ dir
node0 node1
siddhesh@siddhesh-DESKTOP-74T5BGT:~/privatetest$
```

### Step 7: geth --datadir ./node0 account new

```
node0 node1
siddhesh@siddhesh-DESKTOP-74T5BGT:~/privatetest$ geth --datadir ./node0 account new
INFO [08-15|13:16:47.918] Maximum peer count                                     ETH=50 total=50
INFO [08-15|13:16:47.921] Smartcard socket not found, disabling      err="stat /run/pcscd/pcscd.comm: no such file or directory"
Your new account is locked with a password. Please give a password. Do not forget this password.
Password:
Repeat password:

Your new key was generated

Public address of the key: 0xE40B17a86Fcd07f8a87B6085DfC41eA19B5D26CF
Path of the secret key file: node0/keystore/UTC--2025-08-15T07-46-59.859324099Z--e40b17a86fc07f8a87b6085dfc41ea19b5d26cf

- You can share your public address with anyone. Others need it to interact with you.
- You must NEVER share the secret key with anyone! The key controls access to your funds!
- You must BACKUP your key file! Without the key, it's impossible to access account funds!
- You must REMEMBER your password! Without the password, it's impossible to decrypt the key!
```

### Step 8: geth --datadir ./node1 account new

```
siddhesh@siddhesh-DESKTOP-74T5BGT:~/privatetest$ geth --datadir ./node1 account new
INFO [08-15|13:18:53.047] Maximum peer count                                     ETH=50 total=50
INFO [08-15|13:18:53.051] Smartcard socket not found, disabling      err="stat /run/pcscd/pcscd.comm: no such file or directory"
Your new account is locked with a password. Please give a password. Do not forget this password.
Password:
Repeat password:

Your new key was generated

Public address of the key: 0xfda2f2965958Ed9348Ce072214a6Fb3Bd8defB95
Path of the secret key file: node1/keystore/UTC--2025-08-15T07-49-00.857125125Z--fda2f2965958ed9348ce072214a6fb3bd8defb95

- You can share your public address with anyone. Others need it to interact with you.
- You must NEVER share the secret key with anyone! The key controls access to your funds!
- You must BACKUP your key file! Without the key, it's impossible to access account funds!
- You must REMEMBER your password! Without the password, it's impossible to decrypt the key!
```

node 0: - 0xE40B17a86Fcd07f8a87B6085DfC41eA19B5D26CF

node 1: - 0xfda2f2965958Ed9348Ce072214a6Fb3Bd8defB95

## Step 9: sudo apt install puppet

```
siddhesh@DESKTOP-74T5BGT:~/privatetest$ sudo apt install puppet
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
The following additional packages will be installed:
augeas-lenses debconf-utils facter fonts-lato hiera libaugeas0 libboost-filesystem1.74.0 libboost-locale1.74.0
libboost-log1.74.0 libboost-nowide1.74.0 libboost-program-options1.74.0 libboost-regex1.74.0 libboost-thread1.74.0
libcpp-hocon0.3.0 libfacter3.14.12 libjs-jquery libleatherman1.12.1 libruby3.0 libyaml-cpp0.7 rake ruby ruby-augeas
ruby-deep-merge ruby-net-telnet ruby-rbtree ruby-rubygems ruby-selinux ruby-shadow ruby-sorted-set ruby-webrick
ruby-xmlrpc ruby3.0 rubygems-integration unzip zip
Suggested packages:
augeas-doc mcollective-common puppet-common augeas-tools ruby-rrd ruby-hocon ri ruby-dev bundler
The following NEW packages will be installed:
augeas-lenses debconf-utils facter fonts-lato hiera libaugeas0 libboost-filesystem1.74.0 libboost-locale1.74.0
libboost-log1.74.0 libboost-nowide1.74.0 libboost-program-options1.74.0 libboost-regex1.74.0 libboost-thread1.74.0
libcpp-hocon0.3.0 libfacter3.14.12 libjs-jquery libleatherman1.12.1 libruby3.0 libyaml-cpp0.7 puppet rake ruby
ruby-augeas ruby-deep-merge ruby-net-telnet ruby-rbtree ruby-rubygems ruby-selinux ruby-shadow ruby-sorted-set
ruby-webrick ruby-xmlrpc ruby3.0 rubygems-integration unzip zip
0 upgraded, 36 newly installed, 0 to remove and 21 not upgraded.
Need to get 14.7 MB of archives.
After this operation, 71.5 MB of additional disk space will be used.
```

## Step 10: Create new file called genesis.json

```
{
  "config": {
    "chainId": 1234,
    "homesteadBlock": 0,
    "eip150Block": 0,
    "eip155Block": 0,
    "eip158Block": 0,
    "byzantiumBlock": 0,
    "constantinopleBlock": 0,
    "petersburgBlock": 0,
    "ethash": {},
    "terminalTotalDifficulty": 0,
    "terminalTotalDifficultyPassed": true
  },
  "difficulty": "4",
  "gasLimit": "8000000",
  "alloc": {}
}
```

Do nano genesis.json and paste the text and click ctrl+X to save

```
Processing triggers for man-db (2.10.2-1) ...
siddhesh@DESKTOP-74T5BGT:~/privatetest$ nano genesis.json
siddhesh@DESKTOP-74T5BGT:~/privatetest$ nano genesis.json
siddhesh@DESKTOP-74T5BGT:~/privatetest$
```

Step 11: geth --datadir ./node0 init genesis.json

```
siddhesh@DESKTOP-74T5BGT:~/privatetest$ geth --datadir ./node0 init genesis.json
INFO [08-15|13:39:45.051] Maximum peer count           ETH=50 total=50
INFO [08-15|13:39:45.056] Smartcard socket not found, disabling   err="stat /run/pcscd/pcscd.comm: no such file or directory"
INFO [08-15|13:39:45.069] Set global gas cap           cap=50,000,000
INFO [08-15|13:39:45.072] Initializing the KZG library      backend=gokzg
INFO [08-15|13:39:45.097] Defaulting to pebble as the backing database  database=/home/siddhesh/privatetest/node0/geth/chaindata
INFO [08-15|13:39:45.098] Allocated cache and file handles
ata cache=512.00MiB handles=524,288
INFO [08-15|13:39:45.453] Opened ancient database
ata/ancient/chain readonly=false
INFO [08-15|13:39:45.455] Opened Era store
ta/ancient/chain/era
INFO [08-15|13:39:45.458] State schema set to default
WARN [08-15|13:39:45.458] Head block is not reachable
INFO [08-15|13:39:45.459] Load database journal from disk
INFO [08-15|13:39:45.629] Opened ancient database
ata/ancient/state readonly=false
INFO [08-15|13:39:45.629] State snapshot generator is not found
INFO [08-15|13:39:45.629] Starting snapshot generation
dangling=0 elapsed="29.233µs"
root=56e81f..63b421 accounts=0 slots=0 storage=0.00B
```

Step 12: geth --datadir ./node1 init genesis.json

```
siddhesh@DESKTOP-74T5BGT:~/privatetest$ geth --datadir ./node1 init genesis.json
INFO [08-15|13:40:41.976] Maximum peer count           ETH=50 total=50
INFO [08-15|13:40:41.979] Smartcard socket not found, disabling   err="stat /run/pcscd/pcscd.comm: no such file or directory"
INFO [08-15|13:40:42.007] Set global gas cap           cap=50,000,000
INFO [08-15|13:40:42.009] Initializing the KZG library      backend=gokzg
INFO [08-15|13:40:42.012] Defaulting to pebble as the backing database  database=/home/siddhesh/privatetest/node1/geth/chaindata
INFO [08-15|13:40:42.014] Allocated cache and file handles
ata cache=512.00MiB handles=524,288
INFO [08-15|13:40:42.408] Opened ancient database
ata/ancient/chain readonly=false
INFO [08-15|13:40:42.408] Opened Era store
ta/ancient/chain/era
INFO [08-15|13:40:42.411] State schema set to default
WARN [08-15|13:40:42.412] Head block is not reachable
INFO [08-15|13:40:42.413] Load database journal from disk
INFO [08-15|13:40:42.710] Opened ancient database
ata/ancient/state readonly=false
INFO [08-15|13:40:42.710] State snapshot generator is not found
INFO [08-15|13:40:42.710] Starting snapshot generation
dangling=0 elapsed="41.002µs"
INFO [08-15|13:40:42.710] Initialized path database
3 history="last 90000 blocks"
INFO [08-15|13:40:42.711] Resuming snapshot generation
dangling=0 elapsed="666.225µs"
INFO [08-15|13:40:42.712] Generated snapshot
.713ms
INFO [08-15|13:40:42.715] Writing custom genesis block
INFO [08-15|13:40:42.732] Successfully wrote genesis state
root=56e81f..63b421 accounts=0 slots=0 storage=0.00B
triecache=16.00MiB statecache=16.00MiB buffer=64.00MiB
accounts=0 slots=0 storage=0.00B dangling=0 elapsed=1.713ms
database=chaindata hash=ac4d9a..2ca582
siddhesh@DESKTOP-74T5BGT:~/privatetest$
```

Step 13: geth --datadir node0 --networkid 1234 \  
--http --http.addr 127.0.0.1 --http.port 8545 --http.api personal,db,eth,net \  
--ws --ws.addr 127.0.0.1 --ws.port 8546 --port 30303 \  
--authrpc.port 8551 \  
--allow-insecure-unlock --nodiscover

```
geth keystore node0
siddhesh@DESKTOP-74T5BGT:~/privatetest/node0$ rm -r node0
siddhesh@DESKTOP-74T5BGT:~/privatetest/node0$ cd ..
siddhesh@DESKTOP-74T5BGT:~/privatetest$ geth --datadir node0 --networkid 1234 \
--http -> --http --http.addr 127.0.0.1 --http.port 8545 --http.api personal,db,eth,net \
--ws -> --ws --ws.addr 127.0.0.1 --ws.port 8546 --port 30303 \
authrpc.> --authrpc.port 8551 \
> --allow-insecure-unlock --nodiscover
INFO [08-15|15:31:09.795] Maximum peer count          ETH=50 total=50
INFO [08-15|15:31:09.798] Smartcard socket not found, disabling   err="stat /run/pcscd/pcscd.comm: no such file or directory"
WARN [08-15|15:31:09.798] Option --allow-insecure-unlock is deprecated and has no effect
INFO [08-15|15:31:09.812] Set global gas cap           cap=50,000,000
INFO [08-15|15:31:09.813] Initializing the KZG library    backend=gokzg
INFO [08-15|15:31:09.819] Allocated trie memory caches    clean=154.00MiB dirty=256.00MiB
INFO [08-15|15:31:09.820] Using pebble as the backing database database=/home/siddhesh/privatetest/node0/geth/chaindata cache=512.00MiB ha
INFO [08-15|15:31:09.820] Allocated cache and file handles  ndles=524,288
INFO [08-15|15:31:10.131] Opened ancient database        database=/home/siddhesh/privatetest/node0/geth/chaindata/ancient/chain read
only=false
INFO [08-15|15:31:10.131] Opened Era store               datadir=/home/siddhesh/privatetest/node0/geth/chaindata/ancient/chain/era
```

Step 14: Open different ubuntu console

cd privatetest

geth --datadir node1 --networkid 1234 \  
--http --http.addr 127.0.0.2 --http.port 8547 --http.api personal,db,eth,net \  
--ws --ws.addr 127.0.0.2 --ws.port 8548 --port 30304 \  
--authrpc.port 8553 \  
--allow-insecure-unlock --nodiscover

```
siddhesh@DESKTOP-74T5BGT:~/privatetest$ geth --datadir node1 --networkid 1234 \
--http --http.addr 127.0.0.2 --http.port 8547 --http.api personal,db,eth,net \
--ws --ws.addr 127.0.0.2 --ws.port 8548 --port 30304 \
--authrpc.port 8553 \
--allow-insecure-unlock --nodiscover
INFO [08-15|15:31:31.595] Maximum peer count          ETH=50 total=50
INFO [08-15|15:31:31.599] Smartcard socket not found, disabling   err="stat /run/pcscd/pcscd.comm: no such file or director
y"
WARN [08-15|15:31:31.599] Option --allow-insecure-unlock is deprecated and has no effect
INFO [08-15|15:31:31.608] Set global gas cap           cap=50,000,000
INFO [08-15|15:31:31.608] Initializing the KZG library    backend=gokzg
INFO [08-15|15:31:31.614] Allocated trie memory caches    clean=154.00MiB dirty=256.00MiB
INFO [08-15|15:31:31.615] Using pebble as the backing database database=/home/siddhesh/privatetest/node1/geth/chaindata
INFO [08-15|15:31:31.615] Allocated cache and file handles  cache=512.00MiB handles=524,288
INFO [08-15|15:31:31.911] Opened ancient database        database=/home/siddhesh/privatetest/node1/geth/chaindata/
ancient/chain readonly=false
INFO [08-15|15:31:31.911] Opened Era store               datadir=/home/siddhesh/privatetest/node1/geth/chaindata/a
ncient/chain/era
INFO [08-15|15:31:31.912] State schema set to default
INFO [08-15|15:31:31.912] Initialising Ethereum protocol
INFO [08-15|15:31:31.912] Load database journal from file
journal
scheme=path
network=1234 dbversion=9
path=/home/siddhesh/privatetest/node1/geth/triedb/merkle.
```

```
siddhesh@siddhesh-OptiPlex-5090:~/privatetest
[INFO] [08-15|13:54:09.316] IPC endpoint opened
[ERROR][08-15|13:54:09.317] Unavailable modules in HTTP API list
[INFO] [08-15|13:54:09.317] Loaded JWT secret file
[crc32=0xbe9cc717]
[INFO] [08-15|13:54:09.319] HTTP server started
[ss=localhost]
[INFO] [08-15|13:54:09.320] WebSocket enabled
[INFO] [08-15|13:54:09.321] WebSocket enabled
[INFO] [08-15|13:54:09.321] HTTP server started
[host vhosts=localhost]
[INFO] [08-15|13:54:09.322] Started log indexer
[NODE] [08-15|13:54:43.176] Beacon client online, but no consensus updates received in a while. Please fix your beacon client to follow the chain!
```

Step 15: Open new terminal and then execute this command

geth attach privatetest/node0/geth.ipc

```
siddhesh@siddhesh-OptiPlex-5090:~$ geth attach privatetest/node0/geth.ipc
Welcome to the Geth JavaScript console!

instance: Geth/v1.16.2-stable-dd1ebac1/linux-amd64/go1.24.4
at block: 0 (Thu Jan 01 1970 05:30:00 GMT+0530 (IST))
datadir: /home/siddhesh/privatetest/node0
modules: admin:1.0 debug:1.0 engine:1.0 eth:1.0 miner:1.0 net:1.0 rpc:1.0 txpool:1.0 web3:1.0

To exit, press ctrl-d or type exit
>
```

Step 16: open another new terminal and execute this command

geth attach privatetest/node1/geth.ipc

```
siddhesh@siddhesh-OptiPlex-5090:~$ geth attach privatetest/node1/geth.ipc
Welcome to the Geth JavaScript console!

instance: Geth/v1.16.2-stable-dd1ebac1/linux-amd64/go1.24.4
at block: 0 (Thu Jan 01 1970 05:30:00 GMT+0530 (IST))
datadir: /home/siddhesh/privatetest/node1
modules: admin:1.0 debug:1.0 engine:1.0 eth:1.0 miner:1.0 net:1.0 rpc:1.0 txpool:1.0 web3:1.0

To exit, press ctrl-d or type exit
>
```

## Step 17: Inside Node 0 console admin.nodeInfo

```
siddhesh@DESKTOP-74T5BGT: ~
instance: Geth/v1.16.2-stable-dd1ebac1/linux-amd64/go1.24.4
at block: 0 (Thu Jan 01 1970 05:30:00 GMT+0530 (IST))
datadir: /home/siddhesh/private/test/node0
modules: admin:1.0 debug:1.0 engine:1.0 eth:1.0 miner:1.0 net:1.0 rpc:1.0 txpool:1.0 web3:1.0

To exit, press ctrl-d or type exit
> admin.nodeInfo
{
  enode: "enode://15e981feba53a64a8324cea94122f3bd2997f17d07c6308fb4c1f9df1d24158cd5d8a672f592359441d8a632592b0bc178282a6776ae5bc5298478aa9b99e6@127.0.0.1:30303?discport=0",
  enr: "enr:Jy4QPcJwJC2tbUe-rQv0agPSHSpnh9VHK1SKpI8Cc_wIlUnL1swX5G8ZjWom02UpopF8v96F4fQGPXvmTRXcEnFuDmGAZiszcmOg2V0aMfGhL3NdjuAgnlkggnY0gmlwhh8AAAG1c2Vj0II1NmsxoQIV6YH-ul0mSoMkzqlBIV09KZfxfQfGMI-0wfnnfHSQvjIRzbmFwwIN0Y3CCd18",
  id: "a5f48a09687595a1c3b9fb0c99d02983460682c7c1649536880ead7eb706f091",
  ip: "127.0.0.1",
  listenAddr: "[::]:30303",
  name: "Geth/v1.16.2-stable-dd1ebac1/linux-amd64/go1.24.4",
  ports: {
    discovery: 0,
    listener: 30303
  },
  protocols: {
    eth: {
      config: {
        byzantiumBlock: 0,
        chainId: 1234,
        constantinopleBlock: 0,
        depositContractAddress: "0x0000000000000000000000000000000000000000000000000000000000000000",
        eip150Block: 0,
        eip155Block: 0,
        eip158Block: 0,
        ethash: {},
        homesteadBlock: 0,
        petersburgBlock: 0,
        terminalTotalDifficulty: 0
      },
      genesis: "0xac4d9a5f75e2d6ce6831373d57279fe25c60cbfe82da5b3adfe620d7fe2ca582",
      head: "0xac4d9a5f75e2d6ce6831373d57279fe25c60cbfe82da5b3adfe620d7fe2ca582",
      network: 1234
    },
    snap: {}
  }
}
```

## Step 18: inside Node 1 Console admin.nodeInfo

```
siddhesh@DESKTOP-74T5BGT: ~
datadir: /home/siddhesh/private/test/node1
modules: admin:1.0 debug:1.0 engine:1.0 eth:1.0 miner:1.0 net:1.0 rpc:1.0 txpool:1.0 web3:1.0

To exit, press ctrl-d or type exit
> admin.nodeInfo
{
  enode: "enode://d6aa64c138690d4f4997748722fd1ef9a76b68c66c727d4d75c558a9b31e03ac56b447704f137d37d5cc3af9add3612ef5ff569ac0c52374dd72a@127.0.0.1:30304?discport=0",
  enr: "enr:Jy4QC8L_Kb0-VtSyjNwNxv7nJuKalocz24qR0FfmDhq2PFIIP3Gz4Vw0Mie9Zhbv647BNVqNh1jf8cpo0dx3z2akGGAZis0EYgg2V0aMfGhL3N0gmwhH8AAAG1c2Vj0II1MsxoQLNwm1BGhN1T0mXd1ci_175p2toxmxyFU11xVipsx40rIRzbmFwwIN0Y3CCdmA",
  id: "4dcf0028627c0ee1c84383ccfc7a90f0ae2a0c6d55a215b8d590c5fb887b67",
  ip: "127.0.0.1",
  listenAddr: "[::]:30304",
  name: "Geth/v1.16.2-stable-dd1ebac1/linux-amd64/go1.24.4",
  ports: {
    discovery: 0,
    listener: 30304
  },
  protocols: {
    eth: {
      config: {
        byzantiumBlock: 0,
        chainId: 1234,
        constantinopleBlock: 0,
        depositContractAddress: "0x0000000000000000000000000000000000000000000000000000000000000000",
        eip150Block: 0,
        eip155Block: 0,
        eip158Block: 0,
        ethash: {},
        homesteadBlock: 0,
        petersburgBlock: 0,
        terminalTotalDifficulty: 0
      },
      genesis: "0xac4d9a5f75e2d6ce6831373d57279fe25c60cbfe82da5b3adfe620d7fe2ca582",
      head: "0xac4d9a5f75e2d6ce6831373d57279fe25c60cbfe82da5b3adfe620d7fe2ca582",
      network: 1234
    },
    snap: {}
  }
}>
```

Step 19: For connecting these two nodes copy enode address of node1 and add in following command execute this on node 0 and vice versa take enode address of node0 and execute command in node1

Do **admin.nodeInfo.enode** to get the code to add it in next command

In Node0 Terminal

```
admin.addPeer("enode://15e981feba53a64a8324cea94122f3bd2997f17d07c630
8fb4c1f9df1d24158cd5d8a672f592359441d8a632592b0bc178282a6776a8e85b
c5298478aa9b99e6@127.0.0.1:30303?discport=0")
```

```
> admin.addPeer("enode://d6aa64c138690d4f4997748722fd1ef9a76b68c66c727d4d75c558a9b31e03ac56b447704f137d37d5cc3af9add3612ef5ff5
69ac0c361c354fc0c52374dd72a@127.0.0.1:30304?discport=0")
true
> -
```

In Node1 Terminal

```
admin.addPeer("enode://15e981feba53a64a8324cea94122f3bd2997f17d07c630
8fb4c1f9df1d24158cd5d8a672f592359441d8a632592b0bc178282a6776a8e85b
c5298478aa9b99e6@127.0.0.1:30303?discport=0")
```

```
> admin.addPeer("enode://15e981feba53a64a8324cea94122f3bd2997f17d07c6308fb4c1f9df1d24158cd5d8a672f592359441d8a632592b0bc178282a6776a8e8
5b5c5298478aa9b99e6@127.0.0.1:30303?discport=0")
true
```

Step 20: For checking

For Node0

admin.peers

```
true
> admin.peers
[{
  caps: ["eth/68", "eth/69", "snap/1"],
  enode: "enode://d6aa64c138690d4f4997748722fd1ef9a76b68c66c727d4d75c558a9b31e03ac56b447704f137d37d5cc3af9add3612ef5ff569ac0
c361c354fc0c52374dd72a@127.0.0.1:55802",
  id: "4dfc0020627c6ee1c843836fcf77a960fae2a0c6d55a215b8d590c5fb8875b67",
  name: "Geth/v1.16.2-stable-dd1ebac1/linux-amd64/go1.24.4",
  network: {
    inbound: true,
    localAddress: "127.0.0.1:30303",
    remoteAddress: "127.0.0.1:55802",
    static: false,
    trusted: false
  },
  protocols: {
    eth: {
      earliestBlock: 0,
      latestBlock: 0,
      latestBlockHash: "0xac4d9a5f75e2d6ce6831373d57279fe25c60cbfe82da5b3adfe620d7fe2ca582",
      version: 69
    },
    snap: {
      version: 1
    }
  }
}]
```

## For Node1

admin.peers

```
> admin.peers
[{
  caps: ["eth/68", "eth/69", "snap/1"],
  enode: "enode://15e981feba53a64a8324cea94122f3bd2997f17d07c6308fb4c1f9df1d24158cd5d8a672f592359441d8a632592b0bc178282a6776a8e85bc52
98478aa9b99e6@127.0.0.1:30303?discport=0",
  id: "5f48a09687595a1c3b9fb0c99d02983460682c7c1649536880ead7eb706f091",
  name: "Geth/v1.16.2-stable-ddlebac1/linux-amd64/go1.24.4",
  network: {
    inbound: false,
    localAddress: "127.0.0.1:55802",
    remoteAddress: "127.0.0.1:30303",
    static: true,
    trusted: false
  },
  protocols: {
    eth: {
      earliestBlock: 0,
      latestBlock: 0,
      latestBlockHash: "0xac4d9a5f75e2d6ce6831373d57279fe25c60cbfe82da5b3adfe620d7fe2ca582",
      version: 69
    },
    snap: {
      version: 1
    }
  }
}]
> -
```

## Step 20: Open new Ubuntu Terminal

cd privatetest/

geth --datadir ./node0 account new

```
siddhesh@siddhesh-DESKTOP-74T5BGT:~/privatetest$ cd privatetest/
siddhesh@siddhesh-DESKTOP-74T5BGT:~/privatetest$ geth --datadir ./node0 account new
INFO [08-15|15:55:48.431] Maximum peer count           ETH=50 total=50
INFO [08-15|15:55:48.434] Smartcard socket not found, disabling   err="stat /run/pcscd/pcscd.comm: no such file or directory"
Your new account is locked with a password. Please give a password. Do not forget this password.
Password:
Repeat password:

Your new key was generated

Public address of the key: 0xbefE36b9A763c91578CFF0b0d4f28c9393A51586a
Path of the secret key file: node0/keystore/UTC--2025-08-15T10-25-55.288587660Z--bfe36b9a763c91578cff0b0d4f28c9393a51586a

- You can share your public address with anyone. Others need it to interact with you.
- You must NEVER share the secret key with anyone! The key controls access to your funds!
- You must BACKUP your key file! Without the key, it's impossible to access account funds!
- You must REMEMBER your password! Without the password, it's impossible to decrypt the key!

siddhesh@siddhesh-DESKTOP-74T5BGT:~/privatetest$
```

geth --datadir ./node1 account new

```
siddhesh@siddhesh-DESKTOP-74T5BGT:~/privatetest$ geth --datadir ./node1 account new
INFO [08-15|15:58:10.038] Maximum peer count           ETH=50 total=50
INFO [08-15|15:58:10.062] Smartcard socket not found, disabling   err="stat /run/pcscd/pcscd.comm: no such file or directory"
Your new account is locked with a password. Please give a password. Do not forget this password.
Password:
Repeat password:

Your new key was generated

Public address of the key: 0x018791FFC9e4beE770Ac1045EA7Fd27c32A946E0
Path of the secret key file: node1/keystore/UTC--2025-08-15T10-28-16.163181593Z--018791ffc9e4bee770ac1045ea7fd27c32a946e0

- You can share your public address with anyone. Others need it to interact with you.
- You must NEVER share the secret key with anyone! The key controls access to your funds!
- You must BACKUP your key file! Without the key, it's impossible to access account funds!
- You must REMEMBER your password! Without the password, it's impossible to decrypt the key!

siddhesh@siddhesh-DESKTOP-74T5BGT:~/privatetest$
```

In Node0 Terminal

```
]
> miner
{
  setExtra: function(),
  setGasLimit: function(),
  setGasPrice: function()
}
> miner.setExtra("Siddhesh")
true
> miner.setGas
undefined
> miner.setGasLimit(10000)
true
> miner.setGasPrice(200000)
true
> -
```

## Practical No. 4

Aim: - Deploy an asset-transfer app using block chain. Learn app development within a Hyperledger Fabric network.

Step 1: - We can use the Fabric test network to deploy and interact with the asset-transfer-abac smart contract. Run the following command to change into the test network directory and bring down any running nodes:

```
siddhesh@siddhesh-OptiPlex-5090:~/siddhesh_msccs/fabric-samples/test-network$ ./network.sh down
Using docker and docker-compose
Stopping network
WARN[0000] /home/siddhesh/siddhesh_msccs/fabric-samples/test-network/compose/compose-bft-test-net.yaml: the attribute `version` is obsolete, it will be ignored, please remove it to avoid potential confusion
WARN[0000] /home/siddhesh/siddhesh_msccs/fabric-samples/test-network/compose/docker/docker-compose-bft-test-net.yaml: the attribute `version` is obsolete, it will be ignored, please remove it to avoid potential confusion
WARN[0000] /home/siddhesh/siddhesh_msccs/fabric-samples/test-network/compose/compose-couch.yaml: the attribute `version` is obsolete, it will be ignored, please remove it to avoid potential confusion
WARN[0000] /home/siddhesh/siddhesh_msccs/fabric-samples/test-network/compose/docker/docker-compose-couch.yaml: the attribute `version` is obsolete, it will be ignored, please remove it to avoid potential confusion
WARN[0000] /home/siddhesh/siddhesh_msccs/fabric-samples/test-network/compose/compose-ca.yaml: the attribute `version` is obsolete, it will be ignored, please remove it to avoid potential confusion
WARN[0000] /home/siddhesh/siddhesh_msccs/fabric-samples/test-network/compose/docker/docker-compose-ca.yaml: the attribute `version` is obsolete, it will be ignored, please remove it to avoid potential confusion
WARN[0000] /home/siddhesh/siddhesh_msccs/fabric-samples/test-network/addOrg3/compose/compose-org3.yaml: the attribute `version` is obsolete, it will be ignored, please remove it to avoid potential confusion
WARN[0000] /home/siddhesh/siddhesh_msccs/fabric-samples/test-network/addOrg3/compose/docker/docker-compose-org3.yaml: the attribute `version` is obsolete, it will be ignored, please remove it to avoid potential confusion
WARN[0000] /home/siddhesh/siddhesh_msccs/fabric-samples/test-network/addOrg3/compose/compose-couch-org3.yaml: the attribute `version` is obsolete, it will be ignored, please remove it to avoid potential confusion
WARN[0000] /home/siddhesh/siddhesh_msccs/fabric-samples/test-network/addOrg3/compose/docker/docker-compose-couch-org3.yaml: the attribute `version` is obsolete, it will be ignored, please remove it to avoid potential confusion
```

Step 2: - Run the following command to deploy the test network using Certificate Authorities

```
[+] Running 4/4 - [OK]
  Network fabric_test Created                                0.5s
  Container ca_org2 Started                               5.3s
  Container ca_orderer Started                            5.0s
  Container ca_org1 Started                            4.5s
+ fabric-ca-client getcainfo -u https://admin:adminpw@localhost:7054 --caname ca-org1 --tls.certfiles /home/siddhesh/siddhesh_msccs/fabric-samples/test-network/organizations/fabric-ca/org1/ca-cert.pem          0.5s
2025/08/09 16:58:46 [INFO] Configuration file location: /home/siddhesh/siddhesh_msccs/fabric-samples/test-network/organizations/peerOrganizations/org1.example.com/fabric-ca-client-config.yaml      1.4s
2025/08/09 16:58:46 [INFO] TLS Enabled                           1.4s
2025/08/09 16:58:46 [INFO] Stored root CA certificate at /home/siddhesh/siddhesh_msccs/fabric-samples/test-network/organizations/peerOrganizations/org1.example.com/msp/cacerts/localhost-7054-ca-org1.pempose-ca.yaml: the attribute `version` is o 2025/08/09 16:58:46 [INFO] Stored Issuer public key at /home/siddhesh/siddhesh_msccs/fabric-samples/test-network/organizations/peerOrganizations/org1.example.com/msp/IssuerPublicKeyt-network/compose/docker/docker-compose-ca.yaml: the attribute 2025/08/09 16:58:46 [INFO] Stored Issuer revocation public key at /home/siddhesh/siddhesh_msccs/fabric-samples/test-network/organizations/peerOrganizations/org1.example.com/msp/IssuerRevocationPublicKey
+ res=0
Creating Org1 Identities
```

Step 3: - You can then use the test network script to deploy the asset-transfer-abac smart contract to a channel on the network

Note- Install golang-go before executing this command  
sudo apt install -y golang-go

Go to this folder - `~/siddhesh_msccs/fabric-samples/asset-transfer-abac/chaincode-go` and change the go version to 1.23.0 to 1.23 using this command

```
siddhesh@DESKTOP-74T5BGT:~/siddhesh_msccs/fabric-samples/asset-transfer-abac/chaincode-go$ nano go.mod
siddhesh@DESKTOP-74T5BGT:~/siddhesh_msccs/fabric-samples/asset-transfer-abac/chaincode-go$ cd ..
siddhesh@DESKTOP-74T5BGT:~/siddhesh_msccs/fabric-samples/asset-transfer-abac$ cd ..
```

Again, navigate back to our directory of test-network

```
siddhesh@DESKTOP-74T5BGT:~/siddhesh_msccs/fabric-samples/test-network$ ./network.sh deployCC -ccn abac -ccp ../asset-transfer-abac/chaincode-go/ -cc1 go
Using docker and docker-compose
deploying chaincode on channel 'mychannel'
executing with the following
- CHANNEL_NAME: mychannel
- CC_NAME: abac
- CC_SRC_PATH: ../asset-transfer-abac/chaincode-go/
- CC_SRC_LANGUAGE: go
- CC_VERSION: 1.0
- CC_SEQUENCE: auto
- CC_END_POLICY: NA
- CC_COLL_CONFIG: NA
- CC_INIT_FCN: NA
- DELAY: 3
- MAX_RETRY: 5
- VERBOSE: false
executing with the following
- CC_NAME: abac
- CC_SRC_PATH: ../asset-transfer-abac/chaincode-go/
- CC_SRC_LANGUAGE: go
- CC_VERSION: 1.0
Vendorizing Go dependencies at ../asset-transfer-abac/chaincode-go/
~/siddhesh_msccs/fabric-samples/asset-transfer-abac/chaincode-go ~/siddhesh_msccs/fabric-samples/test-network
```

Step 4: - We can use the one of the test network Certificate Authorities to register and enroll identities with the attribute of `abac.creator=true`. First, we need to set the following environment variables in order to use the Fabric CA client.

```
Version: 1.0, Sequence: 1, Endorsement Plugin: escc, Validation Plugin: vscc, Approvals: [Org1MSP: true, Org2MSP: true]
Query chaincode definition successful on peer0.org2 on channel 'mychannel'
Chaincode initialization is not required
siddhesh@DESKTOP-74T5BGT:~/siddhesh_msccs/fabric-samples/test-network$ export PATH=${PWD}/..:bin:$PATH
siddhesh@DESKTOP-74T5BGT:~/siddhesh_msccs/fabric-samples/test-network$ export FABRIC_CFG_PATH=${PWD}/../config/
siddhesh@DESKTOP-74T5BGT:~/siddhesh_msccs/fabric-samples/test-network$
```

Step 5: - We will create the identities using the Org1 CA. Set the Fabric CA client home to the MSP of the Org1 CA admin

```
siddhesh@DESKTOP-74T5BGT:~/siddhesh_msccs/fabric-samples/test-network$ export FABRIC_CFG_PATH=${PWD}/../config/
siddhesh@DESKTOP-74T5BGT:~/siddhesh_msccs/fabric-samples/test-network$ export FABRIC_CA_CLIENT_HOME=${PWD}/organizations/peerOrganizations/org1.example.com/
siddhesh@DESKTOP-74T5BGT:~/siddhesh_msccs/fabric-samples/test-network$
```

Step 6: - We will use both methods and create two identities in the process. The first method is to specify that the attribute be added to the certificate by default when the identity is registered. The following command will register an identity named creator1 with the attribute of abac.creator=true.

```
siddhesh@DESKTOP-74T5BGT:~/siddhesh_msccs/fabric-samples/test-network$ fabric-ca-client register --id.name creator1 --id.secret creator1pw --id.type client --id.affiliation org1 --id.attrs 'abac.creator=true:ecert' --tls.certfiles "${PWD}/organizations/fabric-ca/org1/tls-cert.pem"
2025/08/09 17:18:51 [INFO] Configuration file location: /home/siddhesh/siddhesh_msccs/fabric-samples/test-network/organizations/peerOrganizations/org1.example.com/fabric-ca-client-config.yaml
2025/08/09 17:18:51 [INFO] TLS Enabled
2025/08/09 17:18:51 [INFO] TLS Enabled
Password: creator1pw
siddhesh@DESKTOP-74T5BGT:~/siddhesh_msccs/fabric-samples/test-network$
```

Step 7: - The ecert suffix adds the attribute to the certificate automatically when the identity is enrolled. As a result, the following enroll command will contain the attribute that was provided in the registration command

```
siddhesh@DESKTOP-74T5BGT:~/siddhesh_msccs/fabric-samples/test-network$ fabric-ca-client enroll -u https://creator1:creator1pw@localhost:7054 --caname ca-org1 -M "${PWD}/organizations/peerOrganizations/org1.example.com/users/creator1@org1.example.com/msp" --tls.certfiles "${PWD}/organizations/fabric-ca/org1/tls-cert.pem"
2025/08/09 17:19:53 [INFO] TLS Enabled
2025/08/09 17:19:53 [INFO] generating key: &{A:ecdsa S:256}
2025/08/09 17:19:53 [INFO] encoded CSR
2025/08/09 17:19:53 [INFO] Stored client certificate at /home/siddhesh/siddhesh_msccs/fabric-samples/test-network/organizations/peerOrganizations/org1.example.com/users/creator1@org1.example.com/msp/signcerts/cert.pem
2025/08/09 17:19:53 [INFO] Stored root CA certificate at /home/siddhesh/siddhesh_msccs/fabric-samples/test-network/organizations/peerOrganizations/org1.example.com/users/creator1@org1.example.com/msp/cacerts/localhost-7054-ca-org1.pem
2025/08/09 17:19:53 [INFO] Stored Issuer public key at /home/siddhesh/siddhesh_msccs/fabric-samples/test-network/organizations/peerOrganizations/org1.example.com/users/creator1@org1.example.com/msp/IssuerPublicKey
2025/08/09 17:19:53 [INFO] Stored Issuer revocation public key at /home/siddhesh/siddhesh_msccs/fabric-samples/test-network/organizations/peerOrganizations/org1.example.com/users/creator1@org1.example.com/msp/IssuerRevocationPublicKey
siddhesh@DESKTOP-74T5BGT:~/siddhesh_msccs/fabric-samples/test-network$
```

Step 8: - Now that we have enrolled the identity, run the command below to copy the Node OU configuration file into the creator1 MSP folder.

```
siddhesh@DESKTOP-74T5BGT:~/siddhesh_msccs/fabric-samples/test-network$ cp "${PWD}/organizations/peerOrganizations/org1.example.com/msp/config.yaml" "${PWD}/organizations/peerOrganizations/org1.example.com/users/creator1@org1.example.com/msp/config.yaml"
siddhesh@DESKTOP-74T5BGT:~/siddhesh_msccs/fabric-samples/test-network$
```

Step 9: - The second method is to request that the attribute be added upon enrollment. The following command will register an identity named creator2 with the same abac.creator attribute.

```
com/msp/config.yaml" "${PWD}/organizations/peerOrganizations/org1.example.com/users/creator1@org1.example.com/msp/config.yaml"
siddhesh@DESKTOP-74T5BGT:~/siddhesh_msccs/fabric-samples/test-network$ fabric-ca-client register --id.name creator2 --id.secret creator2pw --id.type client --id.affiliation org1 --id.attrs 'abac.creator=true:' --tls.certfiles "${PWD}/organizations/fabric-ca/org1/tls-cert.pem"
2025/08/09 17:28:05 [INFO] Configuration file location: /home/siddhesh/siddhesh_msccs/fabric-samples/test-network/organizations/peerOrganizations/org1.example.com/fabric-ca-client-config.yaml
2025/08/09 17:28:05 [INFO] TLS Enabled
2025/08/09 17:28:05 [INFO] TLS Enabled
Password: creator2pw
siddhesh@DESKTOP-74T5BGT:~/siddhesh_msccs/fabric-samples/test-network$
```

Step 10: - The following enroll command will add the attribute to the certificate

```
password: creator2pw
siddhesh@DESKTOP-74T5BGT:~/siddhesh_msccs/fabric-samples/test-network$ fabric-ca-client enroll -u https://creator2:creator2pw@localhost:7054 --caname ca-org1 --enrollment.attrs "abac.creator" -M "${PWD}/organizations/peerOrganizations/org1.example.com/users/creator2@org1.example.com/msp" --tls.certfiles "${PWD}/organizations/fabric-ca/org1/tls-cert.pem"
2025/08/09 17:28:54 [INFO] TLS Enabled
2025/08/09 17:28:54 [INFO] generating key: &{A:ecdsa S:256}
2025/08/09 17:28:54 [INFO] encoded CSR
2025/08/09 17:28:54 [INFO] Stored client certificate at /home/siddhesh/siddhesh_msccs/fabric-samples/test-network/organizations/peerOrganizations/org1.example.com/users/creator2@org1.example.com/msp/signcerts/cert.pem
2025/08/09 17:28:54 [INFO] Stored root CA certificate at /home/siddhesh/siddhesh_msccs/fabric-samples/test-network/organizations/peerOrganizations/org1.example.com/users/creator2@org1.example.com/msp/cacerts/localhost-7054-ca-org1.pem
2025/08/09 17:28:54 [INFO] Stored Issuer public key at /home/siddhesh/siddhesh_msccs/fabric-samples/test-network/organizations/peerOrganizations/org1.example.com/users/creator2@org1.example.com/msp/IssuerPublicKey
2025/08/09 17:28:54 [INFO] Stored Issuer revocation public key at /home/siddhesh/siddhesh_msccs/fabric-samples/test-network/organizations/peerOrganizations/org1.example.com/users/creator2@org1.example.com/msp/IssuerRevocationPublicKey
siddhesh@DESKTOP-74T5BGT:~/siddhesh_msccs/fabric-samples/test-network$
```

Step 11: - Run the command below to copy the Node OU configuration file into the creator2 MSP folder.

```
2025/08/09 17:28:54 [INFO] Stored Issuer revocation public key at /home/siddhesh/siddhesh_msccs/fabric-samples/test-network/organizations/peerOrganizations/org1.example.com/users/creator2@org1.example.com/msp/IssuerRevocationPublicKey
siddhesh@DESKTOP-74T5BGT:~/siddhesh_msccs/fabric-samples/test-network$ cp "${PWD}/organizations/peerOrganizations/org1.example.com/users/creator2@org1.example.com/msp/config.yaml" "${PWD}/organizations/peerOrganizations/org1.example.com/users/creator2@org1.example.com/msp/config.yaml"
siddhesh@DESKTOP-74T5BGT:~/siddhesh_msccs/fabric-samples/test-network$
```

Step 12: - You can use either identity with the abac.creator=true attribute to create an asset using the asset-transfer-abac smart contract. We will set the following environment variables to use the first identity that was generated, creator1

```
port 2025/08/09 17:35:09.667 IST 0001 INFO [chaincodeCmd] chaincodeInvokeOrQuery -> Chaincode invoke successful. result: status:200
siddhesh@DESKTOP-74T5BGT:~/siddhesh_msccs/fabric-samples/test-network$ export CORE_PEER_TLS_ROOTCERT_FILE="${PWD}/organizations/peerOrganizations/org1.example.com/peers/peer0.org1.example.com/tls/ca.crt"
siddhesh@DESKTOP-74T5BGT:~/siddhesh_msccs/fabric-samples/test-network$ export CORE_PEER_ADDRESS=localhost:7051
siddhesh@DESKTOP-74T5BGT:~/siddhesh_msccs/fabric-samples/test-network$ export TARGET_TLS_OPTIONS=(-o localhost:7050 --ordererTLSHostnameOverride orderer.example.com --tls -cafile "${PWD}/organizations/ordererOrganizations/example.com/orderers/orderer.example.com/msp/tlscacerts/tlscacert.pem" --peerAddresses localhost:7051 --tlscertFiles "${PWD}/organizations/peerOrganizations/org1.example.com/peers/peer0.org1.example.com/tls/ca.crt" --peerAddresses localhost:9051 --tlscertFiles "${PWD}/organizations/peerOrganizations/org2.example.com/peers/peer0.org2.example.com/tls/ca.crt")
siddhesh@DESKTOP-74T5BGT:~/siddhesh_msccs/fabric-samples/test-network$
```

Step 13: - Run the following command to create Asset1

```
2025/08/09 17:35:09.667 IST 0001 INFO [chaincodeCmd] chaincodeInvokeOrQuery -> Chaincode invoke successful. result: status:200
siddhesh@DESKTOP-74T5BGT:~/siddhesh_msccs/fabric-samples/test-network$ peer chaincode invoke "${TARGET_TLS_OPTIONS[@]}" -C mychannel -n abac -c '{"function":"CreateAsset","Args":["Asset1","blue","20","100"]}'
2025/08/09 17:35:09.667 IST 0001 INFO [chaincodeCmd] chaincodeInvokeOrQuery -> Chaincode invoke successful. result: status:200
siddhesh@DESKTOP-74T5BGT:~/siddhesh_msccs/fabric-samples/test-network$
```

Step 14: - You can use the command below to query the asset on the ledger

```
2025/08/09 17:35:09.667 IST 0001 INFO [chaincodeCmd] chaincodeInvokeOrQuery -> Chaincode invoke successful. result: status:200
siddhesh@DESKTOP-74T5BGT:~/siddhesh_msccs/fabric-samples/test-network$ peer chaincode query -C mychannel -n abac -c '{"function":"ReadAsset","Args":["Asset1"]}'
{"ID":"Asset1","color":"blue","size":20,"owner":"x509::CN=creator1,OU=org1+OU=client,O=Hyperledger,ST=North Carolina,C=US::CN=ca.org1.example.com,O=org1.example.com,L=Durham,ST=North Carolina,C=US","appraisedValue":100}
siddhesh@DESKTOP-74T5BGT:~/siddhesh_msccs/fabric-samples/test-network$
```

Step 15: - As the owner of Asset1, the creator1 identity has the ability to transfer the asset to another owner. In order to transfer the asset, the owner needs to provide the name and issuer of the new owner to the TransferAsset function. The asset-transfer-abac smart contract has a GetSubmittingClientIdentity function that allows users to retrieve their certificate information and provide it to the asset owner out of band (we omit this step). Issue the command below to transfer Asset1 to the user1 identity from Org1 that was created when the test network was deployed

```
Carolina,C=US","appraisedValue":100}  
ID:Asset1: command not found  
siddhesh@DESKTOP-74T5BGT:~/siddhesh_msccs/fabric-samples/test-network$ export RECIPIENT="x509::CN=user1,OU=client,O=Hyperledger  
,ST=North Carolina,C=US::CN=ca.org1.example.com,O=org1.example.com,L=Durham,ST=North Carolina,C=US"  
chaincode  
siddhesh@DESKTOP-74T5BGT:~/siddhesh_msccs/fabric-samples/test-network$ peer chaincode invoke "${TARGET_TLS_OPTIONS[@]}"  
-C mychannel -n abac -c '{"function":"TransferAsset","Args":["Asset1","'$RECIPIENT'"]}'  
2025-08-09 17:39:03.087 IST 0001 INFO [chaincodeCmd] chaincodeInvokeOrQuery -> Chaincode invoke successful. result: status:200  
siddhesh@DESKTOP-74T5BGT:~/siddhesh_msccs/fabric-samples/test-network$
```

Step 16: - Query the ledger to verify that the asset has a new owner

```
-C mychannel -n abac -c '{"function":"ReadAsset","Args":["Asset1"]}'  
2025-08-09 17:39:03.087 IST 0001 INFO [chaincodeCmd] chaincodeInvokeOrQuery -> Chaincode invoke successful. result: status:200  
siddhesh@DESKTOP-74T5BGT:~/siddhesh_msccs/fabric-samples/test-network$ peer chaincode query -C mychannel -n abac -c '{"function":  
": "ReadAsset", "Args": ["Asset1"]}'  
{"ID": "Asset1", "color": "blue", "size": 20, "owner": "x509::CN=user1,OU=client,O=Hyperledger,ST=North Carolina,C=US::CN=ca.org1.exam  
ple.com,O=org1.example.com,L=Durham,ST=North Carolina,C=US", "appraisedValue": 100}  
siddhesh@DESKTOP-74T5BGT:~/siddhesh_msccs/fabric-samples/test-network$
```

Step 17: - Run the following command to operate as the asset owner by setting the MSP path to User1

```
Error: endorsement failure during invoke. response: status:500 message: submitting client not authorized to update asset, does  
not own asset  
siddhesh@DESKTOP-74T5BGT:~/siddhesh_msccs/fabric-samples/test-network$ export CORE_PEER_MSPCONFIGPATH=${PWD}/organizations/peer  
Organizations/org1.example.com/users/User1@org1.example.com/msp  
siddhesh@DESKTOP-74T5BGT:~/siddhesh_msccs/fabric-samples/test-network$
```

Step 18: - We can now update the asset. Run the following command to change the asset color from blue to green. All other aspects of the asset will remain unchanged.

```
Organizations/org1.example.com/users/User1@org1.example.com/msp  
siddhesh@DESKTOP-74T5BGT:~/siddhesh_msccs/fabric-samples/test-network$ peer chaincode invoke "${TARGET_TLS_OPTIONS[@]}" -C mych  
annel -n abac -c '{"function":"UpdateAsset","Args":["Asset1","green","20","100"]}'  
2025-08-09 17:43:50.604 IST 0001 INFO [chaincodeCmd] chaincodeInvokeOrQuery -> Chaincode invoke successful. result: status:200  
siddhesh@DESKTOP-74T5BGT:~/siddhesh_msccs/fabric-samples/test-network$
```

Step 19: - Run the query command again to verify that the asset has changed color

```
annel -n abac -c '{"function":"UpdateAsset","Args":["Asset1","green","20","100"]}'  
2025-08-09 17:43:50.604 IST 0001 INFO [chaincodeCmd] chaincodeInvokeOrQuery -> Chaincode invoke successful. result: status:200  
siddhesh@DESKTOP-74T5BGT:~/siddhesh_msccs/fabric-samples/test-network$ peer chaincode query -C mychannel -n abac -c '{"function":  
": "ReadAsset", "Args": ["Asset1"]}'  
{"ID": "Asset1", "color": "green", "size": 20, "owner": "x509::CN=user1,OU=client,O=Hyperledger,ST=North Carolina,C=US::CN=ca.org1.exa  
mple.com,O=org1.example.com,L=Durham,ST=North Carolina,C=US", "appraisedValue": 100}  
siddhesh@DESKTOP-74T5BGT:~/siddhesh_msccs/fabric-samples/test-network$
```

Step 20: - The owner also has the ability to delete the asset. Run the following command to remove Asset1 from the ledger

```
siddhesh@DESKTOP-74T5BGT:~/siddhesh_msccs/fabric-samples/test-network$ peer chaincode invoke "${TARGET_TLS_OPTIONS[@]}" -C mychannel -n abac -c '{"function":"DeleteAsset","Args":["Asset1"]}'  
2025-08-09 17:47:13.706 IST 0001 INFO [chaincodeCmd] chaincodeInvokeOrQuery -> Chaincode invoke successful. result: status:200  
siddhesh@DESKTOP-74T5BGT:~/siddhesh_msccs/fabric-samples/test-network$
```

Step 21: - If you query the ledger once more, you will see that Asset1 no longer exists

```
2025-08-09 17:47:13.706 IST 0001 INFO [chaincodeCmd] chaincodeInvokeOrQuery -> Chaincode invoke successful. result: status:200  
siddhesh@DESKTOP-74T5BGT:~/siddhesh_msccs/fabric-samples/test-network$ peer chaincode query -C mychannel -n abac -c '{"function":"ReadAsset","Args":["Asset1"]}'  
Error: endorsement failure during query. response: status:500 message:"the asset Asset1 does not exist"  
siddhesh@DESKTOP-74T5BGT:~/siddhesh_msccs/fabric-samples/test-network$
```

Step 22: - When you are finished, you can run the following command to bring down the test network

```
siddhesh@DESKTOP-74T5BGT:~/siddhesh_msccs/fabric-samples/test-network$ ./network.sh down  
Using docker and docker-compose  
Stopping network  
WARN[0000] /home/siddhesh/siddhesh_msccs/fabric-samples/test-network/compose/compose-bft-test-net.yaml: the attribute `version` is obsolete, it will be ignored, please remove it to avoid potential confusion  
WARN[0000] /home/siddhesh/siddhesh_msccs/fabric-samples/test-network/compose/docker/docker-compose-bft-test-net.yaml: the attribute `version` is obsolete, it will be ignored, please remove it to avoid potential confusion  
WARN[0000] /home/siddhesh/siddhesh_msccs/fabric-samples/test-network/compose/compose-couch.yaml: the attribute `version` is obsolete, it will be ignored, please remove it to avoid potential confusion  
WARN[0000] /home/siddhesh/siddhesh_msccs/fabric-samples/test-network/compose/docker/docker-compose-couch.yaml: the attribute `version` is obsolete, it will be ignored, please remove it to avoid potential confusion  
WARN[0000] /home/siddhesh/siddhesh_msccs/fabric-samples/test-network/compose/compose-ca.yaml: the attribute `version` is obsolete, it will be ignored, please remove it to avoid potential confusion  
WARN[0000] /home/siddhesh/siddhesh_msccs/fabric-samples/test-network/compose/docker/docker-compose-ca.yaml: the attribute `version` is obsolete, it will be ignored, please remove it to avoid potential confusion  
WARN[0000] /home/siddhesh/siddhesh_msccs/fabric-samples/test-network/addOrg3/compose/org3.yaml: the attribute `version` is obsolete, it will be ignored, please remove it to avoid potential confusion  
WARN[0000] /home/siddhesh/siddhesh_msccs/fabric-samples/test-network/addOrg3/compose/docker-compose-org3.yaml: the attribute `version` is obsolete, it will be ignored, please remove it to avoid potential confusion  
WARN[0000] /home/siddhesh/siddhesh_msccs/fabric-samples/test-network/addOrg3/compose/compose-couch-org3.yaml: the attribute `version` is obsolete, it will be ignored, please remove it to avoid potential confusion  
WARN[0000] /home/siddhesh/siddhesh_msccs/fabric-samples/test-network/addOrg3/compose/docker/docker-compose-couch-org3.yaml: the attribute `version` is obsolete, it will be ignored, please remove it to avoid potential confusion  
[+] Running 10/10 on  
  Container ca_org2           Removed          13.9s  
  Container orderer.example.com Removed          1.8s  
  Container peer0.org2.example.com Removed          3.5s  
  Container ca_orderer        Removed          13.0s  
  Container peer0.org1.example.com Removed          4.1s  
  Container ca_org1           Removed          13.6s  
  Volume compose_peer0.org2.example.com Removed          0.1s
```

## Practical No. 5

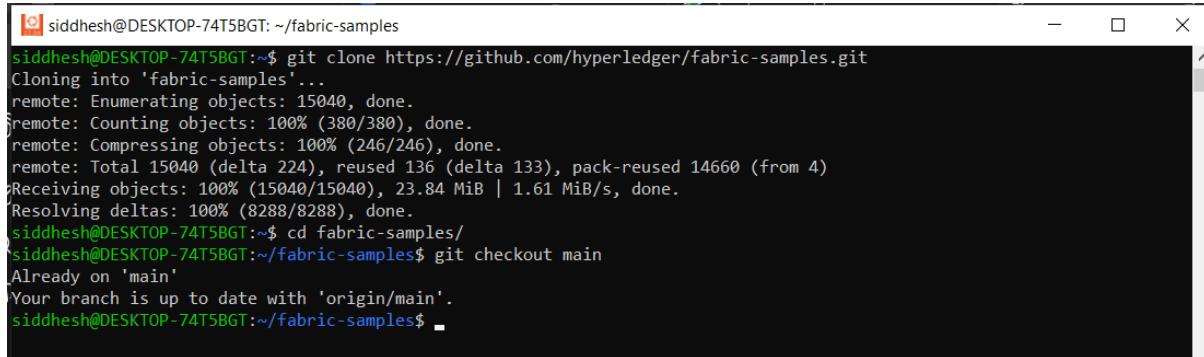
Aim: Car auction network: A Hello World example with Hyperledger Fabric Node SDK and IBM Block chain Starter Plan. Use Hyperledger Fabric to invoke chaincode while storing results and data in the starter plan.

Step 1: Open Ubuntu terminal and clone the repository

```
git clone -b release-2.2 https://github.com/hyperledger/fabric-samples.git
```

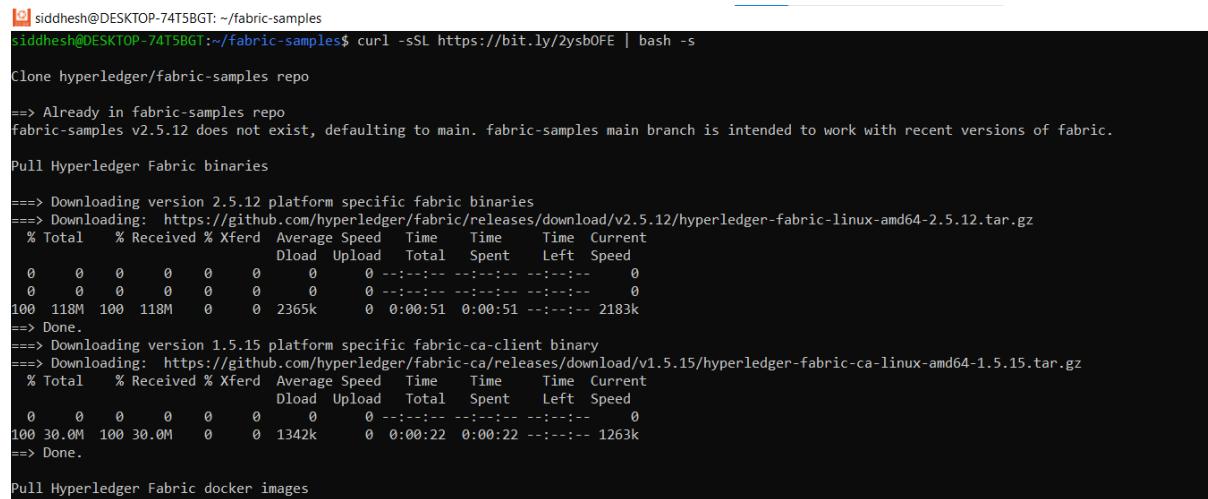
```
cd fabric-samples
```

```
git checkout main
```



```
siddhesh@DESKTOP-74T5BGT:~/fabric-samples
siddhesh@DESKTOP-74T5BGT:~$ git clone https://github.com/hyperledger/fabric-samples.git
Cloning into 'fabric-samples'...
remote: Enumerating objects: 15040, done.
remote: Counting objects: 100% (380/380), done.
remote: Compressing objects: 100% (246/246), done.
remote: Total 15040 (delta 224), reused 136 (delta 133), pack-reused 14660 (from 4)
Receiving objects: 100% (15040/15040), 23.84 MiB | 1.61 MiB/s, done.
Resolving deltas: 100% (8288/8288), done.
siddhesh@DESKTOP-74T5BGT:~$ cd fabric-samples/
siddhesh@DESKTOP-74T5BGT:~/fabric-samples$ git checkout main
Already on 'main'
Your branch is up to date with 'origin/main'.
siddhesh@DESKTOP-74T5BGT:~/fabric-samples$
```

Step 2: Install Binaries (peer, orderer, cryptogen, configtxgen)



```
siddhesh@DESKTOP-74T5BGT:~/fabric-samples
siddhesh@DESKTOP-74T5BGT:~/fabric-samples$ curl -sSL https://bit.ly/2ysb0FE | bash -
Clone hyperledger/fabric-samples repo
==> Already in fabric-samples repo
fabric-samples v2.5.12 does not exist, defaulting to main. fabric-samples main branch is intended to work with recent versions of fabric.
Pull Hyperledger Fabric binaries
==> Downloading version 2.5.12 platform specific fabric binaries
==> Downloading: https://github.com/hyperledger/fabric/releases/download/v2.5.12/hyperledger-fabric-linux-amd64-2.5.12.tar.gz
  % Total    % Received % Xferd  Average Speed   Time   Time     Current
                                 Dload  Upload Total Spent   Left Speed
  0     0    0     0    0      0      0 --:--:-- --:--:-- --:--:--    0
  0     0    0     0    0      0      0 --:--:-- --:--:-- --:--:--    0
100  118M  100  118M    0     0  2365k      0  0:00:51  0:00:51 --:--:-- 2183k
==> Done.
==> Downloading version 1.5.15 platform specific fabric-ca-client binary
==> Downloading: https://github.com/hyperledger/fabric-ca/releases/download/v1.5.15/hyperledger-fabric-ca-linux-amd64-1.5.15.tar.gz
  % Total    % Received % Xferd  Average Speed   Time   Time     Current
                                 Dload  Upload Total Spent   Left Speed
  0     0    0     0    0      0      0 --:--:-- --:--:-- --:--:--    0
100 30.0M  100 30.0M    0     0  1342k      0  0:00:22  0:00:22 --:--:-- 1263k
==> Done.
Pull Hyperledger Fabric docker images
```

## Step 3: Update PATH

## Add binaries to your session:

```
hyperledger/fabric-baseimage  amd64-0.4.18   9e353eca480f  5 years ago  1.3GB
siddhesh@DESKTOP-74T5BGT:~/fabric-samples$ export PATH=${PWD}/bin:$PATH
siddhesh@DESKTOP-74T5BGT:~/fabric-samples$ export FABRIC_CFG_PATH=${PWD}/config
siddhesh@DESKTOP-74T5BGT:~/fabric-samples$
```

## Step 4: Start Test Network

```
cd test-network
```

./network.sh down

```
docker ps -a
```

```
docker rm -f $(docker ps -aq)
```

```
docker volume prune -f
```

```
./network.sh up createChannel -c mychannel -ca
```

```
siddhesh@DESKTOP-7A15BG1:~/fabric-samples$ cd test-network
siddhesh@DESKTOP-7A15BG1:~/fabric-samples/test-network$ ./network.sh down
Using docker and docker-compose
[sudo] password for siddhesh:
[WARN] [0000] /home/siddhesh/fabric-samples/test-network/compose/bft-test-net.yaml: the attribute 'version' is obsolete, it will be ignored, please remove it to avoid potential confusion
[WARN] [0000] /home/siddhesh/fabric-samples/test-network/compose/docker/docker-compose-bft-test-net.yaml: the attribute 'version' is obsolete, it will be ignored, please remove it to avoid potential confusion
[WARN] [0000] /home/siddhesh/fabric-samples/test-network/compose/couch.yaml: the attribute 'version' is obsolete, it will be ignored, please remove it to avoid potential confusion
[WARN] [0000] /home/siddhesh/fabric-samples/test-network/compose/docker/docker-compose-couch.yaml: the attribute 'version' is obsolete, it will be ignored, please remove it to avoid potential confusion
[WARN] [0000] /home/siddhesh/fabric-samples/test-network/compose/docker/docker-compose-couch.yaml: the attribute 'version' is obsolete, it will be ignored, please remove it to avoid potential confusion
[WARN] [0000] /home/siddhesh/fabric-samples/test-network/compose/couch.yaml: the attribute 'version' is obsolete, it will be ignored, please remove it to avoid potential confusion
[WARN] [0000] /home/siddhesh/fabric-samples/test-network/compose/docker/docker-compose-couch.yaml: the attribute 'version' is obsolete, it will be ignored, please remove it to avoid potential confusion
[WARN] [0000] /home/siddhesh/fabric-samples/test-network/compose/compose-org_3.yaml: the attribute 'version' is obsolete, it will be ignored, please remove it to avoid potential confusion
[WARN] [0000] /home/siddhesh/fabric-samples/test-network/admgdg/compose/compose-org_3.yaml: the attribute 'version' is obsolete, it will be ignored, please remove it to avoid potential confusion
[WARN] [0000] /home/siddhesh/fabric-samples/test-network/admgdg/compose/docker/docker-compose-org_3.yaml: the attribute 'version' is obsolete, it will be ignored, please remove it to avoid potential confusion
[WARN] [0000] /home/siddhesh/fabric-samples/test-network/admgdg/compose/compose-couch-org_3.yaml: the attribute 'version' is obsolete, it will be ignored, please remove it to avoid potential confusion
[WARN] [0000] /home/siddhesh/fabric-samples/test-network/admgdg/compose/docker/docker-compose-couch-org_3.yaml: the attribute 'version' is obsolete, it will be ignored, please remove it to avoid potential confu
[WARN] [0000] /home/siddhesh/fabric-samples/test-network/admgdg/compose/compose-ca-org_3.yaml: the attribute 'version' is obsolete, it will be ignored, please remove it to avoid potential confusion
[WARN] [0000] /home/siddhesh/fabric-samples/test-network/admgdg/compose/docker/docker-compose-ca-org_3.yaml: the attribute 'version' is obsolete, it will be ignored, please remove it to avoid potential confusion
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
```

```

liddhesh@EKS-STOP-7AT5BG1:~/fabric-samples/test-network$ docker ps -a
CONTAINER ID        IMAGE               COMMAND             CREATED            STATUS              PORTS
hyperledger/fabric-ca:latest   "sh -c 'fabric-ca-se..."  3 minutes ago      Up 3 minutes       0.0.0.0:8054->8054/tcp, 7054/tcp, 0.0.0.0:18054->18054/tcp
4a55d148538a        hyperledger/fabric-ca:latest   "sh -c 'fabric-ca-se..."  3 minutes ago      Up 3 minutes       0.0.0.0:9054->9054/tcp, 7054/tcp, 0.0.0.0:19054->19054/tcp
cdba08d38dfc        hyperledger/fabric-tools:latest  "/bin/bash"         6 days ago        Exited (255) 18 minutes ago  0.0.0.0:7054->7054/tcp, 0.0.0.0:17054->17054/tcp
91644ceca2ea        hyperledger/fabric-peer:latest  "peer node start"  6 days ago        Exited (255) 18 minutes ago  7051/tcp, 0.0.0.0:9051->9051/tcp
17ed2bcc0495        hyperledger/fabric-peer:latest  "peer node start"  6 days ago        Exited (255) 18 minutes ago  7051/tcp, 0.0.0.0:10051->10051/tcp
7d92d405b641        hyperledger/fabric-peer:latest  "peer node start"  6 days ago        Exited (255) 18 minutes ago  7051/tcp, 0.0.0.0:8051->8051/tcp
hyperledger/fabric-orderer:latest "orderer"          6 days ago        Exited (255) 18 minutes ago  0.0.0.0:7050->7050/tcp
e6552f7ee44        hyperledger/fabric-couchdb  "tini -- /docker-ent..." 6 days ago        Exited (255) 18 minutes ago  4369/tcp, 9100/tcp, 0.0.0.0:8984->8984/tcp
hyperledger/fabric-ca:latest   "sh -c 'fabric-ca-se..."  6 days ago        Exited (255) 18 minutes ago  0.0.0.0:7054->7054/tcp
e7885316cef9        hyperledger/fabric-ca:latest   "sh -c 'fabric-ca-se..."  6 days ago        Exited (255) 18 minutes ago  7054/tcp, 0.0.0.0:8054->8054/tcp
cdba08d38dfc        hyperledger/fabric-couchdb  "tini -- /docker-ent..." 6 days ago        Exited (255) 18 minutes ago  4369/tcp, 9100/tcp, 0.0.0.0:5984->5984/tcp
91644ceca2ea        hyperledger/fabric-couchdb  "tini -- /docker-ent..." 6 days ago        Exited (255) 18 minutes ago  4369/tcp, 9100/tcp, 0.0.0.0:7984->7984/tcp
135121422c26        hyperledger/fabric-couchdb  "tini -- /docker-ent..." 6 days ago        Exited (255) 18 minutes ago  4369/tcp, 9100/tcp, 0.0.0.0:5984->5984/tcp
8f05245655d         hyperledger/fabric-couchdb  "tini -- /docker-ent..." 6 days ago        Exited (255) 18 minutes ago  4369/tcp, 9100/tcp, 0.0.0.0:5984->5984/tcp
B1c3zd7B8#0         hyperledger/fabric-couchdb  "tini -- /docker-ent..." 6 days ago        Exited (255) 18 minutes ago  4369/tcp, 9100/tcp, 0.0.0.0:5984->5984/tcp
7d92d405b641        hyperledger/fabric-couchdb  "tini -- /docker-ent..." 6 days ago        Exited (255) 18 minutes ago  4369/tcp, 9100/tcp, 0.0.0.0:5984->5984/tcp
liddhesh@EKS-STOP-7AT5BG1:~/fabric-samples/test-network$ docker rm $(docker ps -aq)
liddhesh@EKS-STOP-7AT5BG1:~/fabric-samples/test-network$ docker volume prune -f
Deleted Volumes:
70e004b1c351beaa33f857d1fd7174e572b02780fb449f1f9fabf7a77ac7
e61cb29245d7a981523bd5cd170b474de944838783833c2959058465367011
4c149af16e67607d09760d658268eb319e8f768759bf2d73854545
911ac04501199466767092a926fc1ba260ad3fe91a102e190669880877c
e9e47ab42bd5261088f317ccb1c7c5a593bd5c86d3e154e7b36d5756

```

```
siddhesh@DESKTOP-74T5RG7:~/fabric-samples/test-network$ ./network.sh up createChannel -c mychannel -ca
Using docker and docker-compose
Creating channel 'mychannel'.
If network is not up, starting nodes with CLI timeout of '5' tries and CLI delay of '3' seconds and using database 'leveldb'
Bringing up network
[LOCAL_VERSION=v2.5.12
DOCKER_IMAGE_VERSION=v2.5.12
CA_LOCAL_VERSION=v1.5.15
CA_DOCKER_IMAGE_VERSION=v1.5.15
```

## Step 5: Deploy Fabcar Chaincode

```
./network.sh deployCC -ccn fabcar -ccl javascript -ccp  
..chaincode/fabcar/javascript
```

```
siddhesh@DESKTOP-74T5BGT:~/fabric-samples/test-network$ ./network.sh deployCC -ccn fabcar -ccl javascript -ccp ..chaincode/fabcar/javascript  
pt  
deploying chaincode on channel 'mychannel'  
executing with the following  
- CHANNEL_NAME: mychannel  
- CC_NAME: fabcar  
- CC_SRC_PATH: ../chaincode/fabcar/javascript  
- CC_SRC_LANGUAGE: javascript  
- CC_VERSION: 1.0  
- CC_SEQUENCE: 1  
- CC_END_POLICY: NA  
- CC_COLL_CONFIG: NA  
- CC_INIT_FCN: NA  
- DELAY: 3  
- MAX_RETRY: 5  
- VERBOSE: false  
+ peer lifecycle chaincode package fabcar.tar.gz --path ../chaincode/fabcar/javascript --lang node --label fabcar_1.0  
+ res=0  
Chaincode is packaged  
Installing chaincode on peer0.org1...  
Using organization 1  
+ peer lifecycle chaincode install fabcar.tar.gz
```

## Step 6: Navigate back to fabcar/javascript folder and then install npm\

Execute this command step by step

```
sudo apt-get purge -y nodejs npm libnode-dev
```

```
sudo apt-get autoremove -y
```

```
sudo apt-get autoclean
```

```
curl -fsSL https://deb.nodesource.com/setup_16.x | sudo -E bash -
```

```
sudo apt-get install -y nodejs
```

```
Reading package lists... Done  
2025-09-16 10:53:59 - Repository configured successfully. To install Node.js, run: apt-get install nodejs -y  
siddhesh@DESKTOP-74T5BGT:~/fabric-samples/fabcar/javascript$ sudo apt-get install -y nodejs  
Reading package lists... Done  
Building dependency tree... Done  
Reading state information... Done  
The following NEW packages will be installed:  
  nodejs  
0 upgraded, 1 newly installed, 0 to remove and 31 not upgraded.  
Need to get 0 B/27.5 MB of archives.  
After this operation, 128 MB of additional disk space will be used.  
(Reading databases ... 66475 files and directories currently installed.)  
Preparing to unpack .../nodejs_16.20.2-1nodesource1_amd64.deb ...  
Unpacking nodejs (16.20.2-1nodesource1) ...  
Setting up nodejs (16.20.2-1nodesource1) ...  
Processing triggers for man-db (2.10.2-1) ...  
siddhesh@DESKTOP-74T5BGT:~/fabric-samples/fabcar/javascript$ -
```

## Step 7: fix Fabcar app

```
rm -rf node_modules package-lock.json
```

```
npm install
```

```
siddhesh@DESKTOP-74T5BGT:~/fabric-samples/fabcar/javascript$ rm -rf node_modules package-lock.json
siddhesh@DESKTOP-74T5BGT:~/fabric-samples/fabcar/javascript$ npm install
npm WARN deprecated inflight@1.0.6: This module is not supported, and leaks memory. Do not use it. Check out lru-cache if you want a good and tested way to coalesce async requests by a key value, which is much more comprehensive and powerful.
npm WARN deprecated rimraf@2.6.3: Rimraf versions prior to v4 are no longer supported
npm WARN deprecated glob@7.2.3: Glob versions prior to v9 are no longer supported
npm WARN deprecated glob@7.1.2: Glob versions prior to v9 are no longer supported
npm WARN deprecated uid@3.4.0: Please upgrade to version 7 or higher. Older versions may use Math.random() in certain circumstances, which is known to be problematic. See https://v8.dev/blog/math-random for details.
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 sinon@7.5.0: 16.1.1
npm WARN deprecated eslint@5.16.0: This version is no longer supported. Please see https://eslint.org/version-support for other options.
[some output] @ refify:rxjs: timing refifyNode:node_modules/lodash Completed in 878ms
```

## Step 8: Enroll admin:

```
node enrollAdmin.js
```

```
siddhesh@DESKTOP-74T5BGT:~/fabric-samples/fabcar/javascript$ node enrollAdmin.js
Wallet path: /home/siddhesh/fabric-samples/fabcar/javascript/wallet
Successfully enrolled admin user "admin" and imported it into the wallet
siddhesh@DESKTOP-74T5BGT:~/fabric-samples/fabcar/javascript$
```

## Step 9: Register a new user:

```
node registerUser.js
```

```
siddhesh@DESKTOP-74T5BGT:~/fabric-samples/fabcar/javascript$ 
siddhesh@DESKTOP-74T5BGT:~/fabric-samples/fabcar/javascript$ node registerUser.js
Wallet path: /home/siddhesh/fabric-samples/fabcar/javascript/wallet
Successfully registered and enrolled admin user "appUser" and imported it into the wallet
siddhesh@DESKTOP-74T5BGT:~/fabric-samples/fabcar/javascript$ -
```

## Step 10: Query the Ledger

```
node query.js
```

```
successfully registered and enrolled admin user "appUser" and imported it into the wallet
siddhesh@DESKTOP-74T5BGT:~/fabric-samples/fabcar/javascript$ node query.js
Wallet path: /home/siddhesh/fabric-samples/fabcar/javascript/wallet
Transaction has been evaluated, result is: []
siddhesh@DESKTOP-74T5BGT:~/fabric-samples/fabcar/javascript$
```

## Step 11: Invoke Transactions

Change owner of a car by editing invoke.js:

```
node invoke.js
```

```
siddhesh@DESKTOP-74T5BGT:~/fabric-samples/fabcar/javascript$ 
siddhesh@DESKTOP-74T5BGT:~/fabric-samples/fabcar/javascript$ nano invoke.js
siddhesh@DESKTOP-74T5BGT:~/fabric-samples/fabcar/javascript$ node invoke.js
Wallet path: /home/siddhesh/fabric-samples/fabcar/javascript/wallet
Transaction has been submitted
```

## Step 12: Now change the owner

Edit invoke.js again:

nano invoke.js

replace this line

```
await contract.submitTransaction('createCar', 'CAR12', 'Honda', 'Accord',  
'Black', 'Tom');
```

with

```
await contract.submitTransaction('changeCarOwner', 'CAR12', 'Dave');
```

The screenshot shows a terminal window with two panes. The top pane displays the contents of the `invoke.js` file in the nano editor. The bottom pane shows the command-line interface where the script is run.

```
GNU nano 6.2
SPDX-License-Identifier: Apache-2.0
/*
'use strict';

const { Gateway, Wallets } = require('fabric-network');
const fs = require('fs');
const path = require('path');

async function main() {
    try {
        // Load the network configuration
        const ccpPath = path.resolve(__dirname, '..', '..', 'test-network', 'organizations', 'peerOrganizations', 'org1.example.com', 'connection-org1.json');
        let ccp = JSON.parse(fs.readFileSync(ccpPath, 'utf8'));

        // Create a new file system based wallet for managing identities.
        const walletPath = path.join(process.cwd(), 'wallet');
        const wallet = await Wallets.newFileSystemWallet(walletPath);
        console.log(`Wallet path: ${walletPath}`);

        // Check to see if we've already enrolled the user.
        const identity = await wallet.get('appUser');
        if (!identity) {
            console.log(`An identity for the user "appUser" does not exist in the wallet`);
            console.log(`Run the registerUser.js application before retrying`);
            return;
        }

        // Create a new gateway for connecting to our peer node.
        const gateway = new Gateway();
        await gateway.connect(ccp, { wallet, identity: 'appUser', discovery: { enabled: true, aslocalhost: true } });

        // Get the network (channel) our contract is deployed to.
        const network = await gateway.getNetwork('mychannel');

        // Get the contract from the network.
        const contract = network.getContract('fabcar');

        // Submit the specified transaction.
        // createCar transaction - requires 5 arguments, ex: ('createCar', 'CAR12', 'Honda', 'Accord', 'Black', 'Tom')
        // changeCarOwner transaction - requires 2 args , ex: ('changeCarOwner', 'CAR12', 'Dave')
        await contract.submitTransaction('changeCarOwner', 'CAR12', 'Dave');
        console.log('Transaction has been submitted');

        // Disconnect from the gateway.
        await gateway.disconnect();
    }
}
```

The bottom pane shows the command-line output:

```
Transaction has been submitted
siddhesh@DESKTOP-74T5BGT:~/fabric-samples/fabcar/javascript$ nano invoke.js
siddhesh@DESKTOP-74T5BGT:~/fabric-samples/fabcar/javascript$ node invoke.js
Wallet path: /home/siddhesh/fabric-samples/fabcar/javascript/wallet
Transaction has been submitted
```

## Step 13: Now you can see the car owner has been changed to Dave

node query.js

```
Transaction has been submitted
siddhesh@DESKTOP-74T5BGT:~/fabric-samples/fabcar/javascript$ node query.js
Wallet path: /home/siddhesh/fabric-samples/fabcar/javascript/wallet
Transaction has been evaluated, result is: [{"Key": "CAR12", "Record": {"color": "Black", "docType": "car", "make": "Honda", "model": "Accord", "owner": "Dave"}}]
siddhesh@DESKTOP-74T5BGT:~/fabric-samples/fabcar/javascript$
```

Name: Siddhesh Santosh Teli  
MSc CS

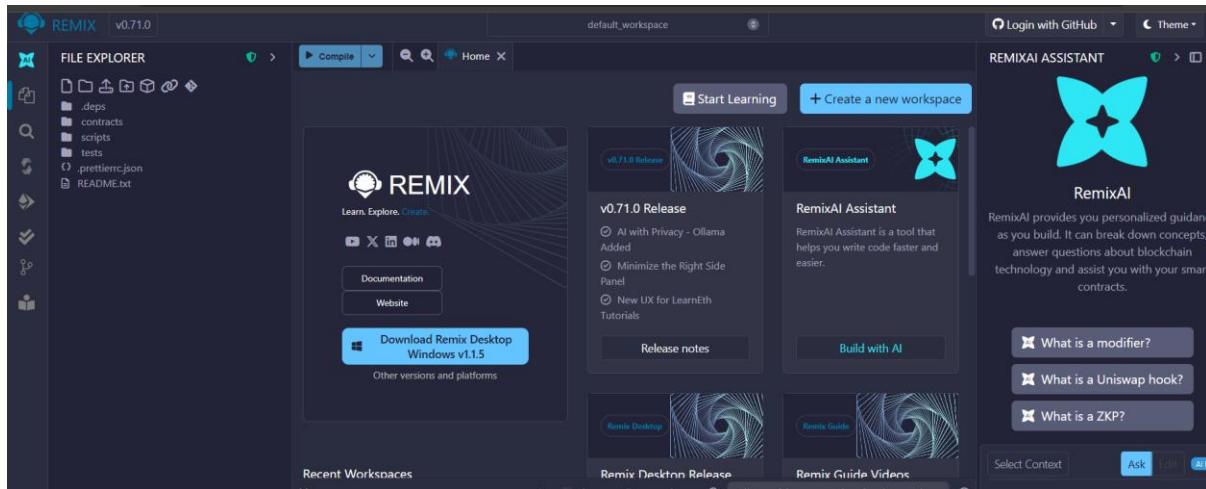
Roll No. 18

## Practical No. 6

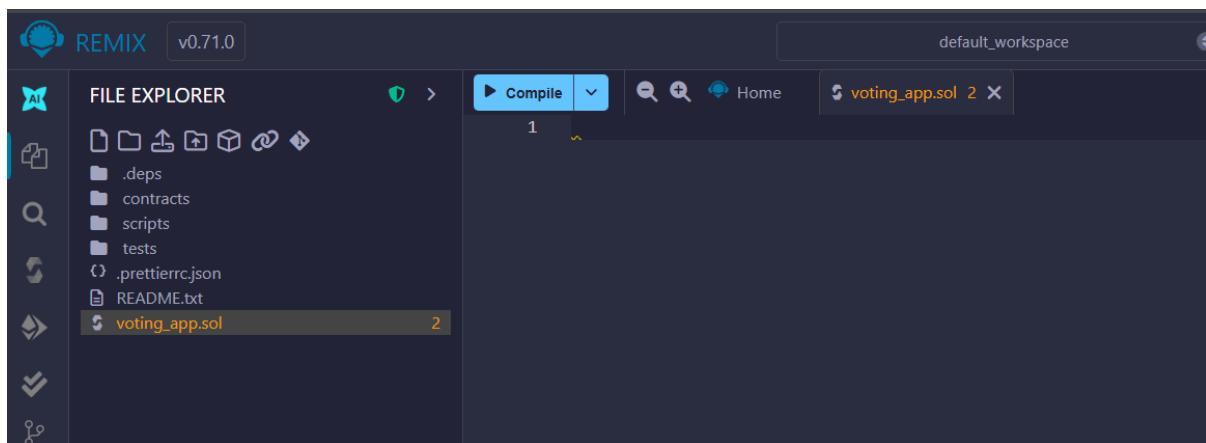
Aim: Develop a voting application using Hyperledger and Ethereum. Build a decentralized app that combines Ethereum's Web3 and Solidity smart contracts with Hyperledger's hosting Fabric and Chain code EVM(using solidity)

Step 1: Open Ethereum IDE

<https://remix.ethereum.org/>



Step 2: Create new file name as voting\_app.sol



Step 3: Go inside contracts then open file storage.sol and copy first 2 lines of code

```
// SPDX-License-Identifier: GPL-3.0
pragma solidity >=0.8.2 <0.9.0;
```

Step 4: Paste the first 2 line and this code in your voting\_app.sol

```
// SPDX-License-Identifier: GPL-3.0
```

```
pragma solidity >=0.8.2 <0.9.0;
```

```
contract VotingForTopper {
```

```
    address private owner;
```

```
    string public purpose;
```

```
    struct Voter {
```

```
        bool authorized;
```

```
        bool voted;
```

```
}
```

```
    uint public totalVotes;
```

```
    uint public teamA;
```

```
    uint public teamB;
```

```
    uint public teamC;
```

mapping(address => Voter) private info;

```
constructor(string memory _purpose) {
    purpose = _purpose;
    owner = msg.sender;
}
```

```
modifier onlyOwner() {
    require(msg.sender == owner, "Not authorized");
    _;
}
```

```
function authorize(address _person) public onlyOwner {
    info[_person].authorized = true;
}
```

```
function voteForTeamA() public {
    require(!info[msg.sender].voted, "You have already voted");
    require(info[msg.sender].authorized, "You are not authorized to vote");
    info[msg.sender].voted = true;
    teamA++;
    totalVotes++;
}
```

```
function voteForTeamB() public {
    require(!info[msg.sender].voted, "You have already voted");
    require(info[msg.sender].authorized, "You are not authorized to vote");
```

```
info[msg.sender].voted = true;  
teamB++;  
totalVotes++;  
}
```

```
function voteForTeamC() public returns (string memory) {  
    require(!info[msg.sender].voted, "You have already voted");  
    require(info[msg.sender].authorized, "You are not authorized to vote");  
    info[msg.sender].voted = true;  
    teamC++;  
    totalVotes++;  
    return "Thanks for Voting";  
}
```

```
function getTotalVotes() public view returns (uint) {  
    return totalVotes;  
}
```

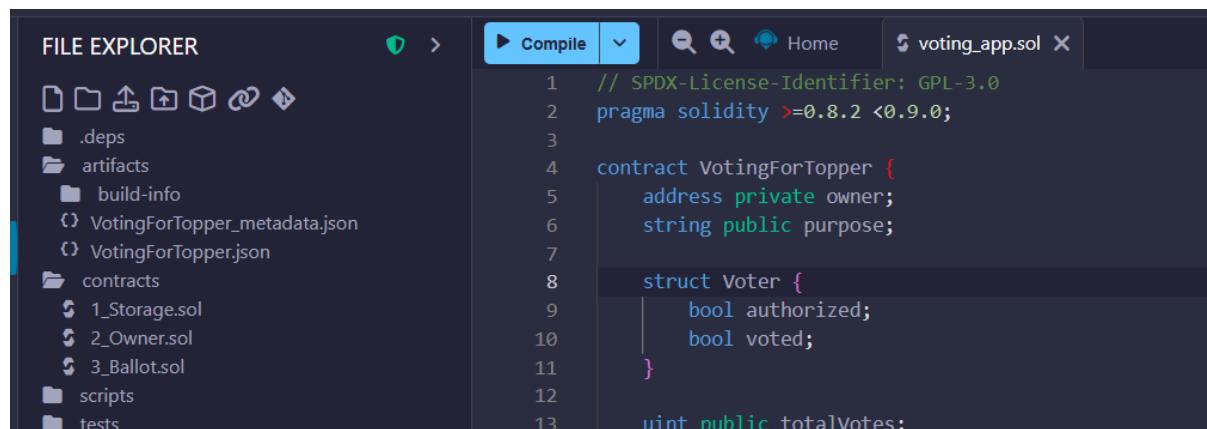
```
function getResult() public view returns (string memory) {  
    if (teamA > teamB && teamA > teamC) {  
        return "Team A is winning";  
    } else if (teamB > teamA && teamB > teamC) {  
        return "Team B is winning";  
    } else if (teamC > teamA && teamC > teamB) {  
        return "Team C is winning";  
    } else {  
        return "It's a tie";  
    }
```

```
}
```

```
}
```

```
}
```

## Step 5: Compile the code



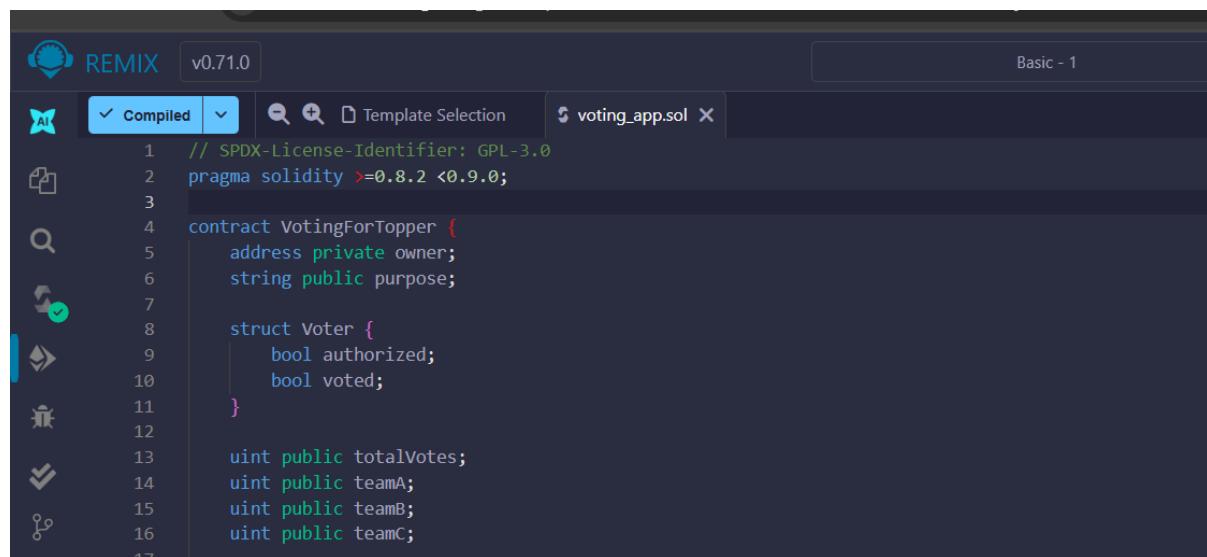
```
// SPDX-License-Identifier: GPL-3.0
pragma solidity >=0.8.2 <0.9.0;

contract VotingForTopper {
    address private owner;
    string public purpose;

    struct Voter {
        bool authorized;
        bool voted;
    }

    uint public totalVotes;
```

## Step 6: Click on compile option and compile the code



```
// SPDX-License-Identifier: GPL-3.0
pragma solidity >=0.8.2 <0.9.0;

contract VotingForTopper {
    address private owner;
    string public purpose;

    struct Voter {
        bool authorized;
        bool voted;
    }

    uint public totalVotes;
    uint public teamA;
    uint public teamB;
    uint public teamC;
```

Step 7: Go to Deploy and run transaction in the left side of panel

```
// SPDX-License-Identifier: GPL-3.0
pragma solidity >0.8.2 <0.9.0;

contract VotingForTopper {
    address private owner;
    string public purpose;

    struct Voter {
        bool authorized;
        bool voted;
    }

    uint public totalVotes;
    uint public teamA;
    uint public teamB;
    uint public teamC;

    mapping(address => Voter) private info;

    constructor(string memory _purpose) {
        purpose = _purpose;
        owner = msg.sender;
    }

    modifier onlyOwner() {
}
```

Step 9: Scroll down on left side and go to the option Deployed contracts and enter the account number. Click on the authorize then click on voteforteamA and then getresult

**Balance: 0 ETH**

**Deployed contracts**

- authorize
- voteForTeamA
- voteForTeamB
- voteForTeamC
- getResult
- getTotalVotes
- purpose

**getResult - call**

**0: string: It's a tie**

**Explain contract**

The following libraries are accessible:

- web3.js
- ethers.js

Type the library name to see available commands.

**getResult** [vm] from: 0x5B3...eddC4 to: VotingForTopper.(constructor) value: 0 wei data: 0x608...00000 logs: 0 hash: 0x496...2bfba transact to VotingForTopper.authorize pending ...

Step 10: If you try to vote again you will get error

**voteForTeamB**

**voteForTeamC**

**getResult**

**0: string: Team A is winning**

**getTotalVotes**

**purpose**

**teamA**

**teamB**

**teamC**

**Debug**

**[vm] from: 0x5B3...eddC4 to: VotingForTopper.voteForTeamA() 0xd91...39138 value: 0 wei data: 0x3e...a1266 logs: 0 hash: 0x900...73bac**

**call to VotingForTopper.getResult**

**[call] from: 0x5B3...eddC4 to: VotingForTopper.getResult() data: 0xde2...92789**

**transact to VotingForTopper.voteForTeamB pending ...**

**[vm] from: 0x5B3...eddC4 to: VotingForTopper.voteForTeamB() 0xd91...39138 value: 0 wei data: 0x1fa...63402 logs: 0 hash: 0x2b0...e586e**

**transact to VotingForTopper.voteForTeamB errored: Error occurred: revert.**

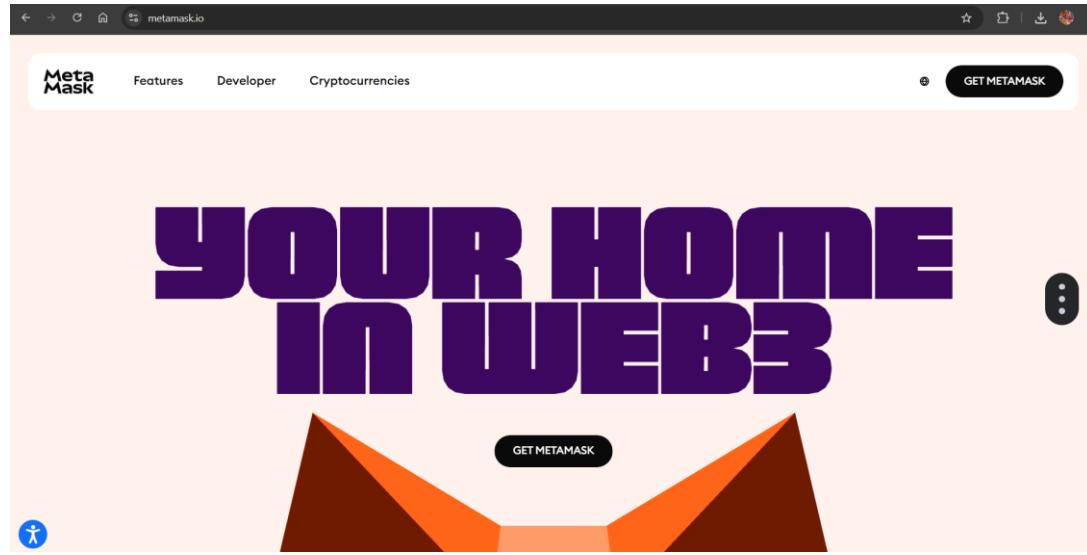
**revert**

The transaction has been reverted to the initial state.  
Reason provided by the contract: "You have already voted"  
If the transaction failed for not having enough gas, try increasing the gas limit gently.

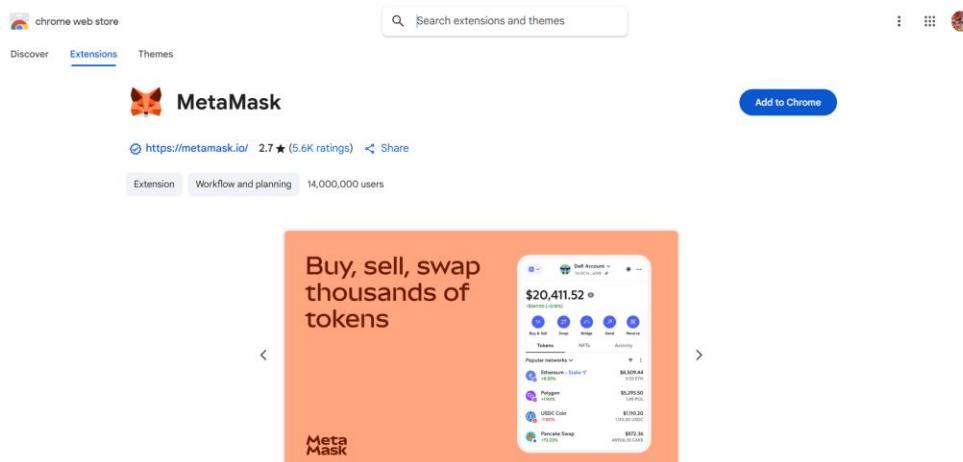
## Practical No. 7

Aim: Create the MetaMasks Account.

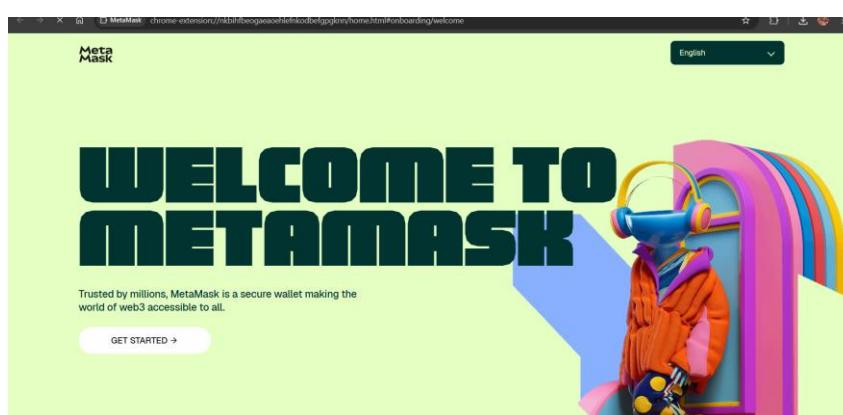
Step 1: Go to google search for metamask.io or open <https://metamask.io/>



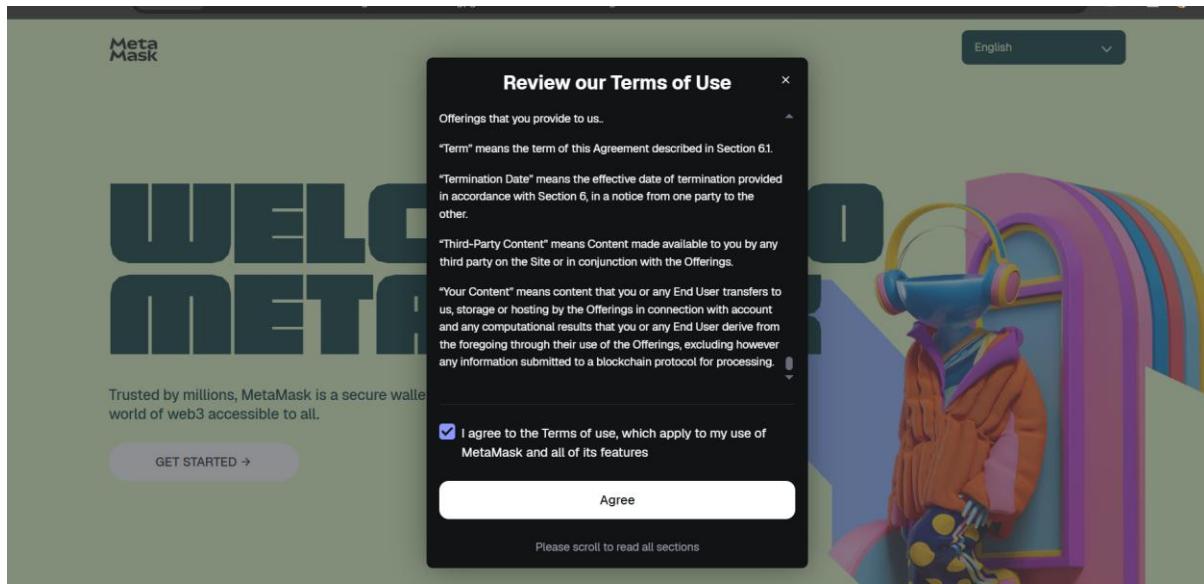
Step 2: Click on get Metamask and add to Chrome



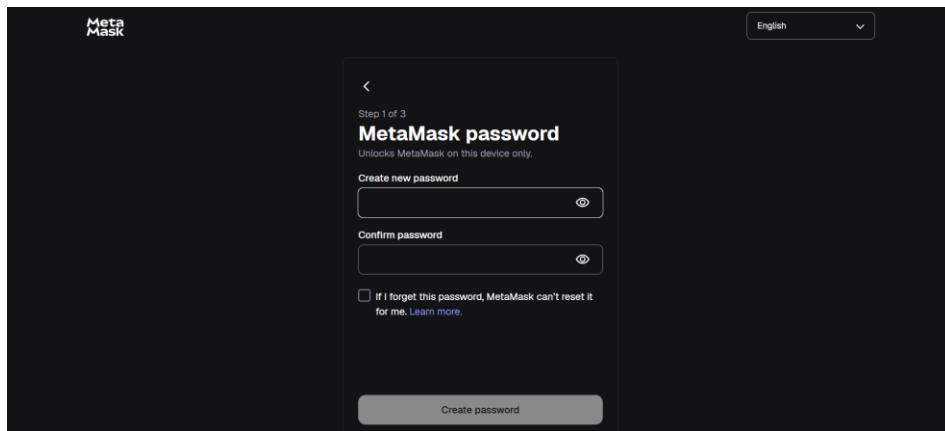
Step 3: MetaMask got added click on Get started



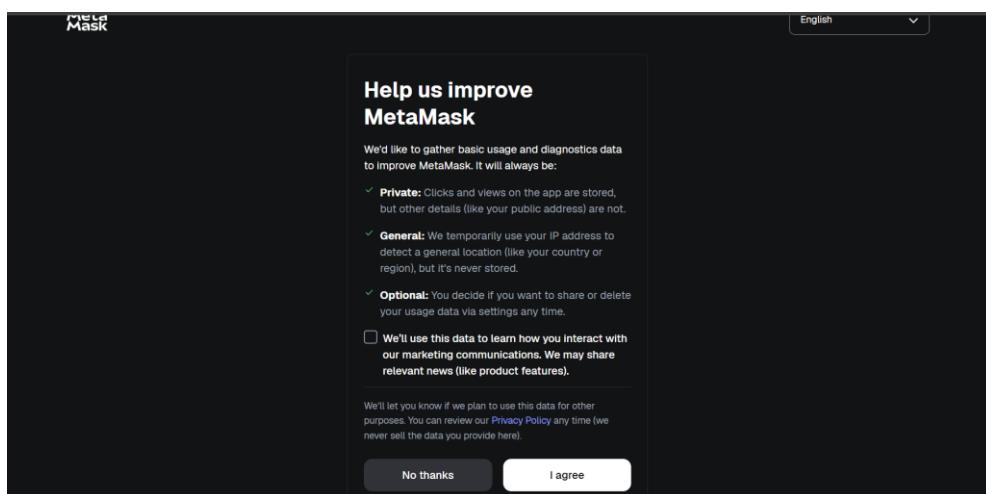
Step 4: Click on I agree



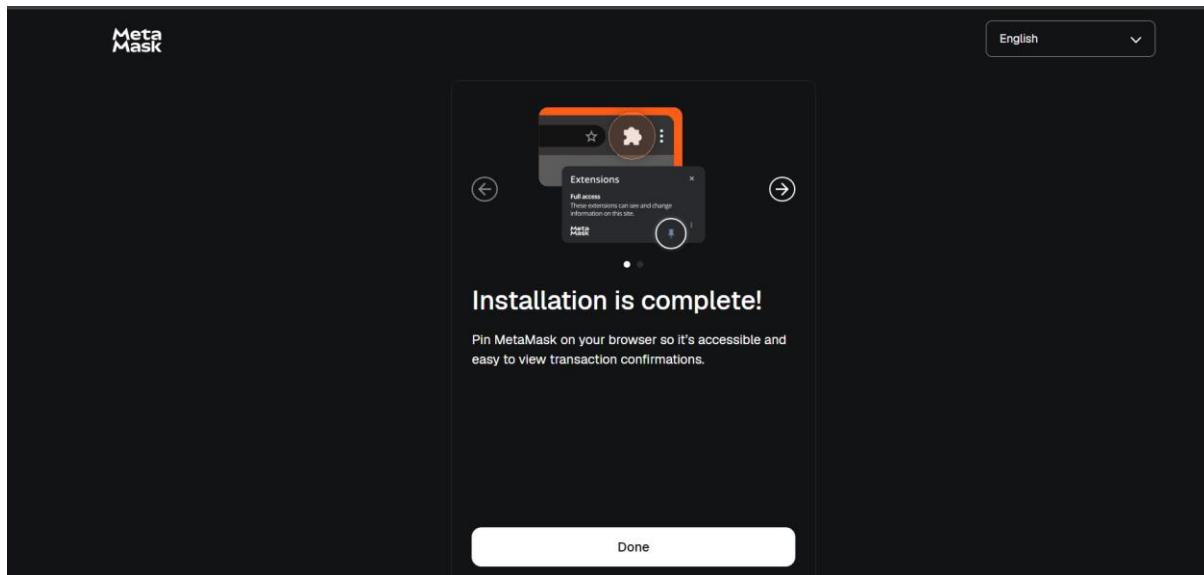
Step 5: Click on create new wallet and then secret recovery phrase and then set the password



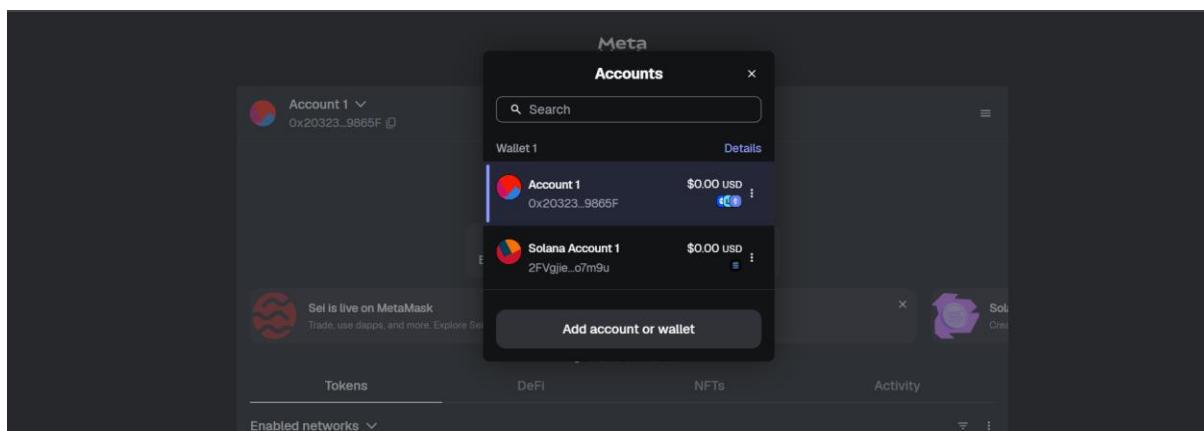
Step 6: click on skip and then click on I agree



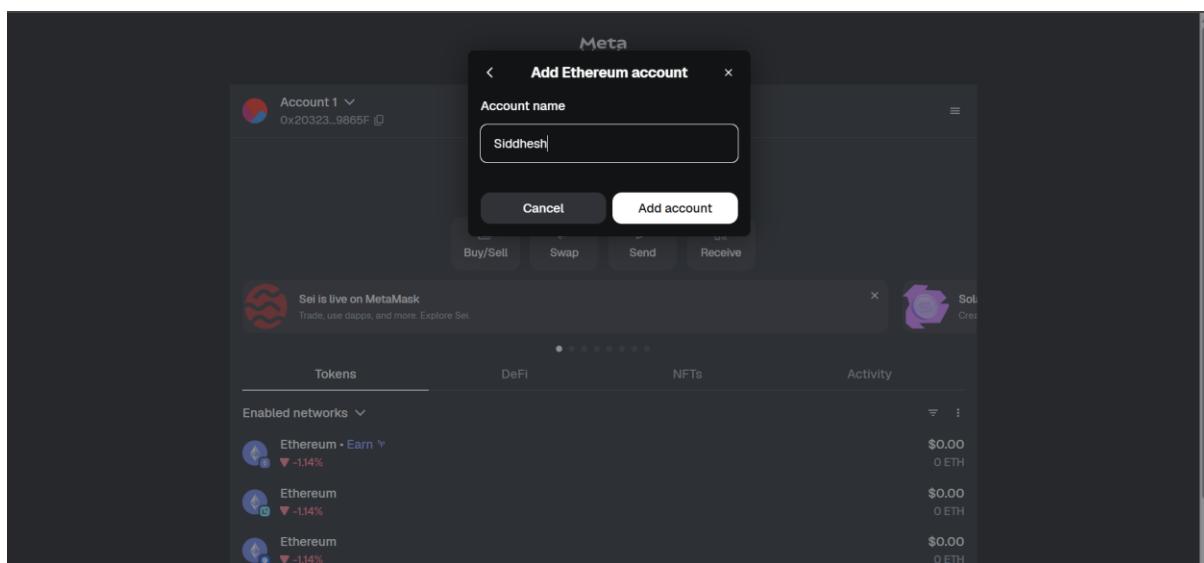
### Step 7: Installation is complete



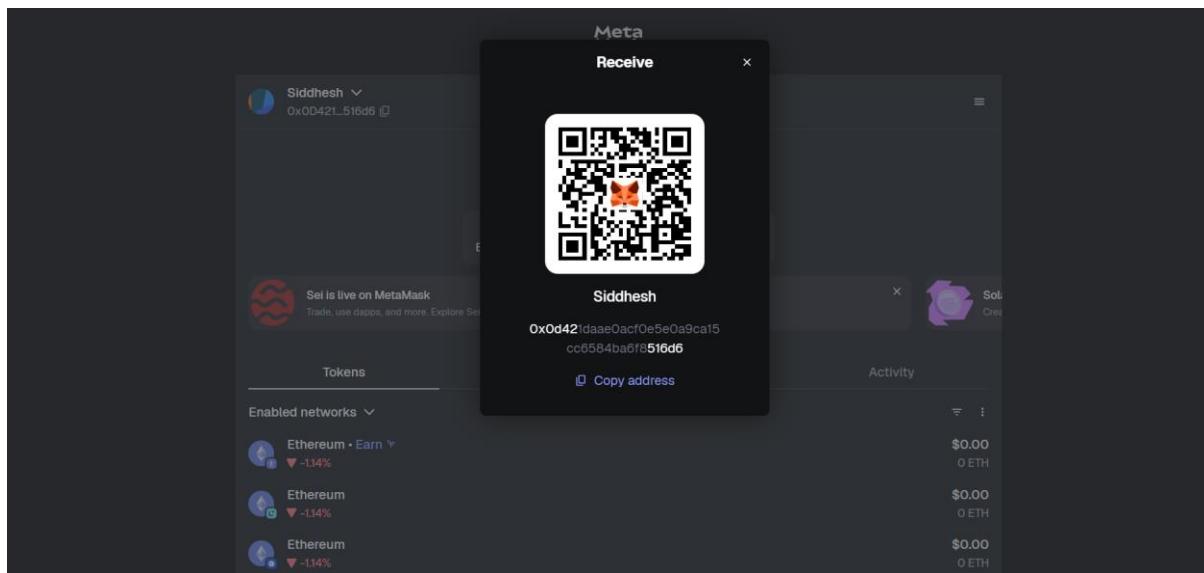
### Step 8: Click on account and add new account



### Step 9: Add Ethereum account and give account name



Step 10: Click on receive and the QR will appear on screen

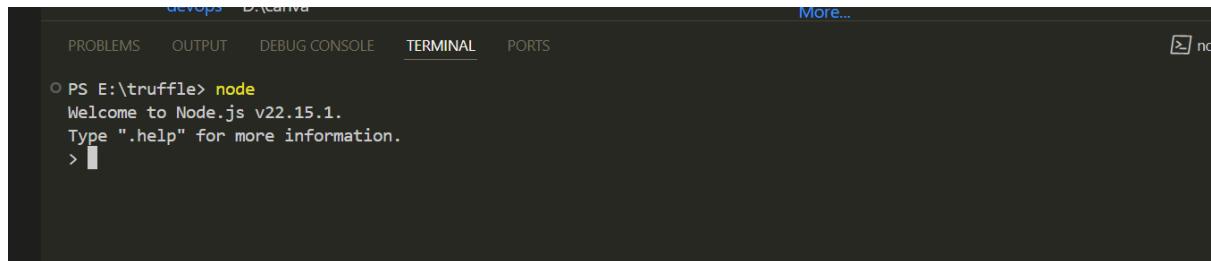


## Practical No. 8

Aim: Create the Truffle Project

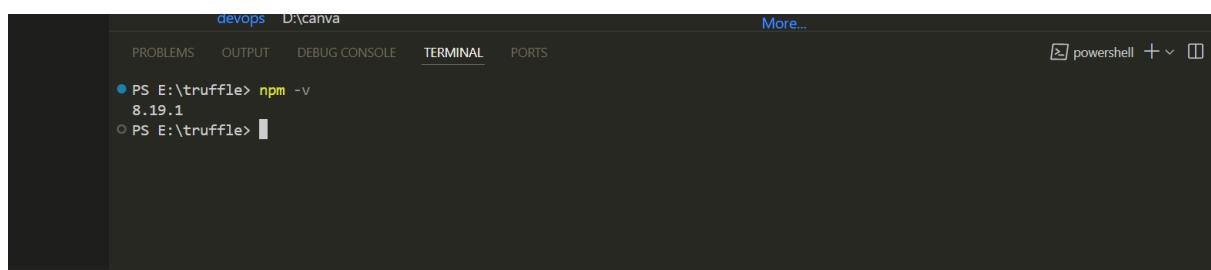
Step 1: create a folder for truffle then import it in VS code

Step 2: Type node in terminal



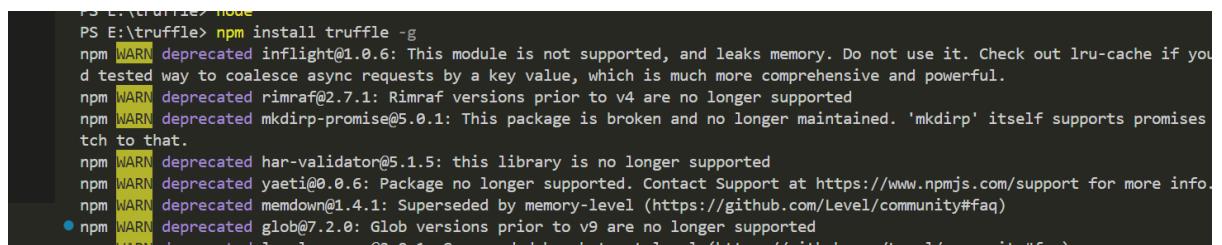
```
devops D:\canva
PROBLEMS OUTPUT DEBUG CONSOLE TERMINAL PORTS More...
PS E:\truffle> node
Welcome to Node.js v22.15.1.
Type ".help" for more information.
> █
```

Step 3: npm-v



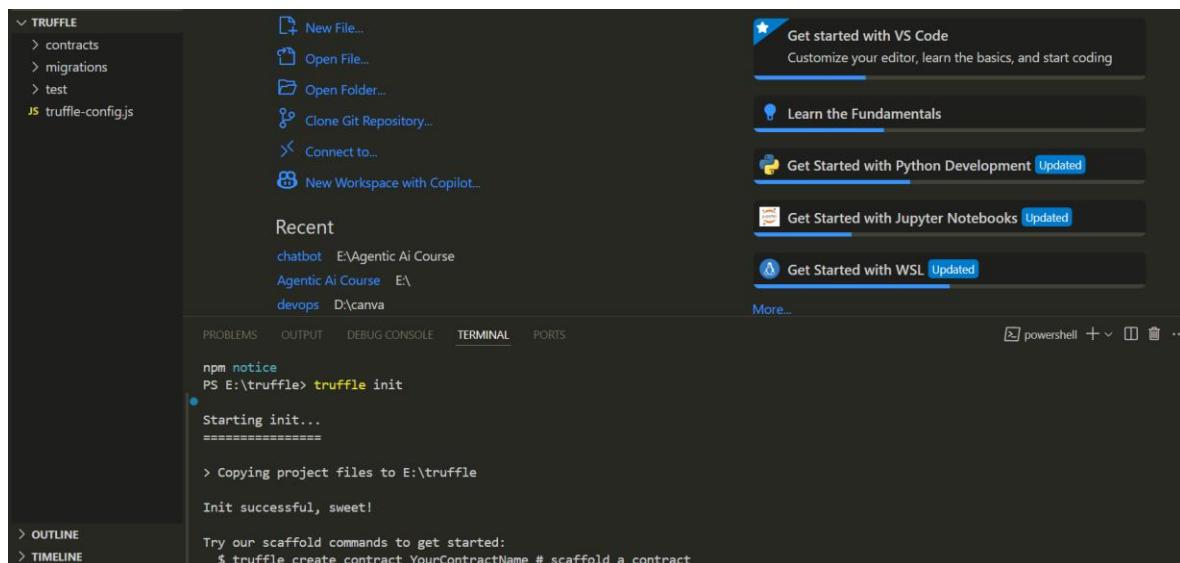
```
devops D:\canva
PROBLEMS OUTPUT DEBUG CONSOLE TERMINAL PORTS More...
PS E:\truffle> npm -v
8.19.1
PS E:\truffle> █
```

Step 4: npm install truffle -g



```
PS E:\truffle> node
PS E:\truffle> npm install truffle -g
npm [WARN] deprecated inflight@1.0.6: This module is not supported, and leaks memory. Do not use it. Check out lru-cache if you'd tested way to coalesce async requests by a key value, which is much more comprehensive and powerful.
npm [WARN] deprecated rimraf@2.7.1: Rimraf versions prior to v4 are no longer supported
npm [WARN] deprecated mkdirp-promise@5.0.1: This package is broken and no longer maintained. 'mkdirp' itself supports promises tch to that.
npm [WARN] deprecated har-validator@5.1.5: this library is no longer supported
npm [WARN] deprecated yaeti@0.0.6: Package no longer supported. Contact Support at https://www.npmjs.com/support for more info.
npm [WARN] deprecated memdown@01.4.1: Superseded by memory-level (https://github.com/Level/community#faq)
npm [WARN] deprecated glob@7.2.0: Glob versions prior to v9 are no longer supported
npm [WARN] deprecated level-down@0.2.1: Superseded by level (https://github.com/Level/community#faq)
```

Step 5: truffle init then you will able to see the repository / folder of truffle



The screenshot shows the VS Code interface with the following details:

- Sidebar:** Shows a tree view of the Truffle project structure with files like contracts, migrations, test, and truffle-config.js.
- Terminal:** Displays the command "truffle init" being run, followed by the output:

```
npm notice
PS E:\truffle> truffle init
Starting init...
=====
> Copying project files to E:\truffle
Init successful, sweet!
```
- Bottom Status Bar:** Shows the status bar with icons for PROBLEMS, OUTPUT, DEBUG CONSOLE, TERMINAL, and PORTS, along with a powershell tab and other UI elements.

## Step 6: truffle unbox metacoin

```
PS E:\truffle> truffle unbox metacoin
● This directory is non-empty...
? Proceed anyway? (Y/n)
Starting unbox...
=====
? Proceed anyway? Yes
✓ Preparing to download box
✓ Downloading
contracts already exists in this directory...
? Overwrite contracts? No
migrations already exists in this directory...
? Overwrite migrations? Yes
test already exists in this directory...
? Overwrite test? No
truffle-config.js already exists in this directory...
? Overwrite truffle-config.js? No
✓ Cleaning up temporary files
✓ Setting up box

Unbox successful, sweet!

Commands:

  Compile contracts: truffle compile
  Migrate contracts: truffle migrate
  Test contracts:   truffle test

○ PS E:\truffle> []
```

## Step 7: truffle compile

```
● PS E:\truffle> truffle compile

Compiling your contracts...
=====
✓ Fetching solc version list from solc-bin. Attempt #1
✓ Downloading compiler. Attempt #1.
> Everything is up to date, there is nothing to compile.

○ PS E:\truffle> []
```

## Step 8: truffle develop

```
○ PS E:\truffle> truffle develop
This version of μWS is not compatible with your Node.js build:

Error: Cannot find module '../binaries/uws_win32_x64_127.node'
Require stack:
- C:\Users\Admin\AppData\Roaming\npm\node_modules\truffle\node_modules\ganache\node_modules@\trufflesuite\uws-js-unofficial\src\uws.js
- C:\Users\Admin\AppData\Roaming\npm\node_modules\truffle\node_modules\ganache\dist\node\core.js
- C:\Users\Admin\AppData\Roaming\npm\node_modules\truffle\build\develop.bundled.js
- C:\Users\Admin\AppData\Roaming\npm\node_modules\truffle\node_modules\original-require\index.js
- C:\Users\Admin\AppData\Roaming\npm\node_modules\truffle\build\cli.bundled.js
Falling back to a NodeJS implementation; performance may be degraded.

Truffle Develop started at http://127.0.0.1:9545/

Accounts:
(0) 0xf5de1cb1f817e7e225f14416c0fbcb5b445fe9f40
(1) 0x0e5353e5cd94f1426b21d4c89c095d3b6fe96453
(2) 0xf7020b20e714ce930d4c1c87614b6ea3004b6479
(3) 0xf7c30cf9b8ce43c571662ed0c8818c1436817e25
(4) 0x1b2f1746bf56f244e56059c0cbeeee4f398b87dab
(5) 0x154c13ca1c7eacd011fb28220ff5d4d9b1befb5
(6) 0x8f676f877c993eb3908644ba347d7dd1e02d2e5
(7) 0xd69048273e3417c0a19c7a350de11ffd384d844e
(8) 0xfd88dc4a581d2e13bfa8201f32530edcd9b06ca1
(9) 0x90b15bb9b20ac5ffbf3cfac015794e06695fc64
```

Step 9: On the Truffle Develop prompt, Truffle commands can be run by omitting the truffle prefix. For example, to run truffle compile on the prompt, type compile. The command to deploy your compiled contracts to the blockchain is truffle migrate. By default, truffle migrate will also run truffle compile, so you can just do the following:

```
truffle(develop)> compile
Compiling your contracts...
=====
> Everything is up to date, there is nothing to compile.

truffle(develop)> migrate
Compiling your contracts...
=====
> Everything is up to date, there is nothing to compile.

Starting migrations...
=====
> Network name:    'develop'
> Network id:      5777
> Block gas limit: 6721975 (0x6691b7)

1_deploy_contracts.js
=====
```

Step 10: now we have to install ganache to set the network `npm install -g ganache-cli`

```
npm should be run outside of the Node.js REPL, in your normal shell.
(Press Ctrl+D to exit.)
truffle(develop)> .exit
PS E:\truffle> npm install -g ganache-cli
● npm [WARN] deprecated ganache-cli@6.12.2: ganache-cli is now ganache; visit https://trfl.io/g7 for details

added 1 package, and audited 102 packages in 16s

2 packages are looking for funding
  run `npm fund` for details

  8 vulnerabilities (6 high, 2 critical)

To address all issues, run:
  npm audit fix

Run `npm audit` for details.
```

Step 11: start Ganache, ensure the workspace is open, and confirm that the local blockchain is active.

### Ganache-cli

```
PS E:\truffle> ganache-cli
○ Ganache CLI v6.12.2 (ganache-core: 2.13.2)

Available Accounts
=====
(0) 0x05E112A1C014f42418B30b4d91bA9D0a895334C8 (100 ETH)
(1) 0x852c022Ed15FBf733f48CdC9abE10c0761Dc800 (100 ETH)
(2) 0x0EA71327D9889c520F44728d6A3a8D1Abe0E639 (100 ETH)
(3) 0x9B2fbD7C0164904e83e046Be93Cf6669Ed4E3bAA (100 ETH)
(4) 0x7034C94612a882017A52613a9eFc845D586Ca11 (100 ETH)
(5) 0x73300520cAE79ad4bE2BF10d51A26D4559Dc3fa6 (100 ETH)
(6) 0x2f98A75D89f22588a16C0762e60ECF7D7547de70 (100 ETH)
(7) 0xAF3D46d3e0d029176C5C2AB6564260F75CA08E39 (100 ETH)
(8) 0x69e2A10c538511F42cc096910628d0cce6b3764 (100 ETH)
(9) 0x4B23f343CF22F93566Ac8Ce0AA927Cc854fE8185 (100 ETH)

Private Keys
=====
(0) 0x64bdaf1e3e587b65033578b644ebada7fd5cf26a91912c7e3ab8c451c0114ae7
(1) 0x035f9947eb7e79a891bc8daeeb508b3da2f7ddc720ad0e551308fb71cb51905
(2) 0xb643671832378652bc8a664f174323a6279c89f18bb1160f2d375de42f4c8cf
(3) 0x014a412b57631f0170e67618c3f19e1da201e9bc9f14f3969529b2219e4e05
(4) 0xae760a305ca698d4e50b86c4510025c2ea44898cef0b1b3276aafd6136c87713
(5) 0xfdebfd897cf47def1e0c8ff239b118c01c1aaa1f32ed3ee63681a4db754c5c6
(6) 0xf61e3bae522bc016a2e5e35a6a03a2f8e35bc2130668bf0bf3a5c7ee8ef18d7
(7) 0x308cd73bc4955f90bf82830f12014cba42c7c4e15877a2218ba890ee186acaa
(8) 0x4b973b9594abc04a51bcc0468e675ae76894a16bc4a7d937c97913db860a
(9) 0xcbddb6b18a202abb7ad016a62c3b6e7c092e8c9c9bcb589abe82e6def1d1c765
```

```
HD Wallet
=====
Mnemonic: fruit judge obvious garden tragic answer arch pass dance grit twist velvet
Base HD Path: m/44'/60'/0'/0/{account_index}

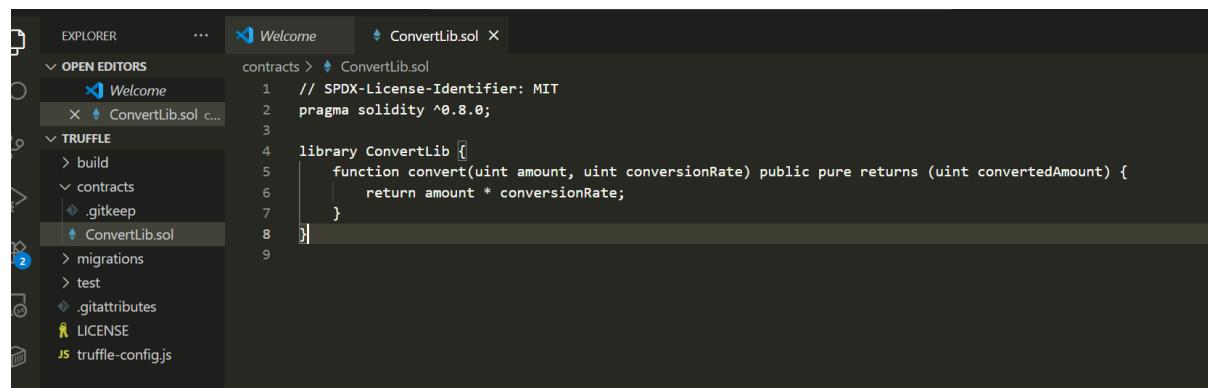
Gas Price
=====
20000000000

Gas Limit
=====
6721975

Call Gas Limit
=====
9007199254740991

Listening on 127.0.0.1:8545
```

Step 12: create file under contract and give name to file “ConvertLib.sol” and paste this code



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

library ConvertLib {
    function convert(uint amount, uint conversionRate) public pure returns (uint convertedAmount) {
        return amount * conversionRate;
    }
}
```

### Step 13: In cmd truffle compile

```
> truffle compile

PS E:\truffle> truffle compile
● Compiling your contracts...
=====
> Compiling .\contracts\ConvertLib.sol
> Artifacts written to E:\truffle\build\contracts
> Compiled successfully using:
  - solc: 0.8.21+commit.d9974bed.Emscripten clang
○ PS E:\truffle>
```

### Step 14: Create file in contract “ MetaCoin.sol” and paste this code

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

import "./ConvertLib.sol";

contract MetaCoin {

    using ConvertLib for uint;

    mapping (address => uint) balances;

    event Transfer(address indexed _from, address indexed _to, uint256 _value); constructor() {
        balances[msg.sender] = 10000;
    }

    function sendCoin(address receiver, uint amount) public returns(bool sufficient) { if
        (balances[msg.sender] < amount) return false;
        balances[msg.sender] -= amount; balances[receiver] += amount;
        emit Transfer(msg.sender, receiver, amount); return true;
    }

    function getBalanceInEth(address addr) public view returns(uint){
        return balances[addr].convert(2); // Call the convert function as a library
    }

    function getBalance(address addr) public view returns(uint) { return
        balances[addr];
    }
}
```

Step 15: In cmd in truffle develop type truffle compile

```
truffle(develop)> truffle compile

Compiling your contracts...

=====
> Compiling .\contracts\ConvertLib.sol

> Compiling .\contracts\MetaCoin.sol

> Artifacts written to E:\truffle\build\contracts

> Compiled successfully using:
- solc: 0.8.21+commit.d9974bed.Emscripten clang

truffle(develop)>
```

Step 16: In cmd under truffle develop type truffle migrate --reset

```
truffle(develop)> truffle migrate --reset

Compiling your contracts...

=====
> Compiling .\contracts\ConvertLib.sol

> Compiling .\contracts\MetaCoin.sol

> Artifacts written to E:\truffle\build\contracts

> Compiled successfully using:
- solc: 0.8.21+commit.d9974bed.Emscripten clang


Starting migrations...
=====
> Network name: 'develop'
> Network id: 5777
> Block gas limit: 6721975 (0x6691b7)

1_deploy_contracts.js
=====
```

```
1_deploy_contracts.js
=====

Deploying 'ConvertLib'
-----
> transaction hash: 0x07523ed25365f8670b43370443e4a96b38b67ca87a85c6b077be98e6df501a0e
> Blocks: 0 Seconds: 0
> contract address: 0x657027Aa1fc3b7d7c4135C89545138f8b770Eb0C
> block number: 1
> block timestamp: 1755626189
> account: 0xf5dE1Cb1F817E7E225f14416c0fbC5b445FE9f40
> balance: 99.999495413875
> gas used: 149507 (0x24803)
> gas price: 3.375 gwei
> value sent: 0 ETH
> total cost: 0.000504586125 ETH

Linking
-----
* Contract: MetaCoin <--> Library: ConvertLib (at address: 0x657027Aa1fc3b7d7c4135C89545138f8b770Eb0C)

Deploying 'MetaCoin'
-----
```

```
Deploying 'MetaCoin'
-----
> transaction hash: 0x29c043389bcce3b4b477d68814f56a3008f5531fc311331c052b7c5477f371fb4
> Blocks: 0 Seconds: 0
> contract address: 0x53Ab0D162452B57bA919C9935D35Dfa017977C14
> block number: 2
> block timestamp: 1755626189
> account: 0xf5dE1Cb1F817E7E225f14416c0fbC5b445FE9f40
> balance: 99.998150562084914112
> gas used: 411208 (0x64648)
> gas price: 3.270490336 gwei
> value sent: 0 ETH
> total cost: 0.001344851790085888 ETH

> Saving artifacts
-----
> Total cost: 0.001849437915085888 ETH

Summary
=====
> Total deployments: 2
> Final cost: 0.001849437915085888 ETH
```

Step 17: Open truffle-config.js in a text editor. Replace the content with the following, ensuring your port number is correct

```
module.exports = {

  // Other configuration settings...
  networks: {

    development: {
      host: "127.0.0.1",

      port: 7545,
      network_id: "*"
    }
  }
}
```

```
},  
  
comp  
ilers  
:{  
solc  
:{  
  
version: "0.8.21", // Fetch exact version from solc-bin (default: truffle's version)  
  
}  
}  
};
```

## Step 18: in terminal type migrate

```
truffle(develop)> migrate  
  
Compiling your contracts...  
=====  
> Compiling .\contracts\ConvertLib.sol  
> Compiling .\contracts\MetaCoin.sol  
> Artifacts written to E:\truffle\build\contracts  
> Compiled successfully using:  
- solc: 0.8.21+commit.d9974bed.Emscripten.clang
```

```
Starting migrations...  
=====  
> Network name: 'develop'  
> Network id: 5777  
> Block gas limit: 6721975 (0x6691b7)  
  
1_deploy_contracts.js  
=====  
  
Replacing 'ConvertLib'  
-----  
  
> transaction hash: 0x90b7c83de1aec1c1c4c4f3b41b6cb79a5800f9951b484426e07e98221f7c3ea2  
> Blocks: 0 Seconds: 0  
> contract address: 0x8F6F07EA3a16c217c9f32de7097FF94909cadAd0  
> block number: 3  
> block timestamp: 1755626532  
> account: 0xf5d1Cb1F817E7E225f14416c0fbC5b445FF9f40  
> balance: 99.997674238392416752  
> gas used: 149507 (0x24803)  
> gas price: 3.18596248 gwei  
> value sent: 0 ETH  
> total cost: 0.00047632369249736 ETH  
  
Linking  
-----  
* Contract: MetaCoin <--> Library: ConvertLib (at address: 0x8F6F07EA3a16c217c9f32de7097FF94909cadAd0)
```

```
Replacing 'MetaCoin'
-----
> transaction hash: 0x1a0e081644364e2170dcb2765ca02ca0f374588431e4869babcf032cf382fdb
> Blocks: 0 Seconds: 0
> contract address: 0x038e7BA4305063Ee4767dF59c1D570B729692bCb
> block number: 4
> block timestamp: 1755626532
> account: 0xf5dE1Cb1F817E7E225f14416c0fbC5b445FE9f40
> balance: 99.996397835854653672
> gas used: 411208 (0x64648)
> gas price: 3.104031385 gwei
> value sent: 0 ETH
> total cost: 0.00127640253776308 ETH

> Saving artifacts
-----
> Total cost: 0.00175272623026044 ETH

Summary
=====
> Total deployments: 2
> Final cost: 0.00175272623026044 ETH
```

## Step 19: simpler interactions with the contract using async/ waits

establishing both the deployed MetaCoin contract instance and the accounts created by either Truffle's built-in blockchain or Ganache

```
truffle(develop)> let instance = await MetaCoin.deployed
undefined
truffle(develop)> let accounts = await web3.eth.getAccounts
undefined
truffle(develop)>
undefined
truffle(develop)>
undefined
truffle(develop)>
undefined
truffle(develop)>
undefined
truffle(develop)> let accounts = await web3.eth.getAccounts()
Uncaught SyntaxError: Identifier 'accounts' has already been declared
truffle(develop)> accounts = await web3.eth.getAccounts()
[
  '0xf5dE1Cb1F817E7E225f14416c0fbC5b445FE9f40',
  '0x0E5353e5CD94F1426b21d4c89C095d3B6fE96453',
  '0xF7020b20E714Ce930d4C1c87614B6EA3004b6479',
  '0xF7c30CF9B8cE43c571662Ed0c8818c1436817E25',
  '0x1B2F1746Bf56f244e56059C0CbEeE4f398b87dab',
  '0x154c13caA1C7EAcd011fB28220fF5d4d9b1befB5',
  '0x8f676F877C993Eb3908644ba347d7Dd1e02D2E5',
  '0xD69048273E3417c0A19C7A350De11ffd384D844e',
  '0xFD8d1C4A581D2e13bfA8201F32530edCd9b06cA1',
  '0x90B15bb9b20aC5ffFbF3CfAc015794e06695fc64'
]
truffle(develop)> var accounts = await web3.eth.getAccounts()
Uncaught SyntaxError: Identifier 'accounts' has already been declared
truffle(develop)> let balance = await instance.getBalance(accounts[0])
Uncaught TypeError: instance.getBalance is not a function
    at evalmachine.<anonymous>:1:26
truffle(develop)> instance = await MetaCoin.deployed()
TruffleContract {
```

Step 20: Check the metacoin balance of the account that deployed the contract

```
}
```

```
truffle(develop)> let balance = await instance.getBalance(accounts[0])
```

```
undefined
```

```
truffle(develop)> |
```

```
undefined
truffle(develop)> balance.toNumber()
10000
truffle(develop)> |
```

Step 21: See how much ether that balance is worth (and note that the contract defines a metacoin to be worth 2 ether)

```
10000
truffle(develop)> let ether = await instance.getBalanceInEth(accounts[0])
undefined
truffle(develop)> ether.toNumber()
20000
truffle(develop)> |
```

Step 22: Transfer some metacoin from one account to another:

Step 23: Check the balance of the account that received the metacoin:

```
truffle(develop)> let received = await instance.getBalanceInEth(accounts[1])
undefined
truffle(develop)> received.toNumber()
1000
truffle(develop)>
```

Step 24: Check the balance of the account that sent the metacoin

```
truffle(develop)> let newBalance = await instance.getBalanceInEth(accounts[0])
undefined
truffle(develop)> newBalance.toNumber()
19000
truffle(develop)>
```