Ex_1--(A)

Ex:No: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

\\Installation

student@CSE-RL-WS-01:~$ sudo apt-get update

[sudo] password for student:

//starting line

Hit:1 https://download.docker.com/linux/ubuntu jammy InRelease

Get:2 http://security.ubuntu.com/ubuntu jammy-security InRelease [129 kB]

//ending line

Get:15 http://in.archive.ubuntu.com/ubuntu jammy-updates/universe Translation-en [296 kB]

Fetched 10.6 MB in 6s (1,808 kB/s)

Reading package lists... Done

student@CSE-RL-WS-01:~$ sudo apt install -y nodejs npm

//starting line

linux-hwe-6.2-headers-6.2.0-26 linux-image-6.2.0-26-generic

linux-modules-6.2.0-26-generic linux-modules-extra-6.2.0-26-generic

//ending line

Reading package lists... Done

student@CSE-RL-WS-01:~$ sudo apt install -y openjdk-17-jdk

Reading package lists... Done

Building dependency tree... Done

Reading state information... Done

openjdk-17-jdk is already the newest version (17.0.14+7-1~22.04.1).

student@CSE-RL-WS-01:~$ sudo apt install -y python3 python3-pip

\\Starting line

Reading package lists... Done

Building dependency tree... Done

Reading state information... Done

python3 is already the newest version (3.10.6-1~22.04.1).

python3 set to manually installed.

student@CSE-RL-WS-01:~$ sudo apt install git

\\Starting line

Reading package lists... Done

Building dependency tree... Done

Reading state information... Done

git is already the newest version (1:2.34.1-1ubuntu1.12).

student@CSE-RL-WS-01:~$ sudo apt install -y curl

\\Starting line

Reading package lists... Done

Building dependency tree... Done

Reading state information... Done

curl is already the newest version (7.81.0-1ubuntu1.20).

student@CSE-RL-WS-01:~$ node -v

v12.22.9

student@CSE-RL-WS-01:~$ npm -v

8.5.1

student@CSE-RL-WS-01:~$ java -version

openjdk version "21.0.6" 2025-01-21

OpenJDK Runtime Environment (build 21.0.6+7-Ubuntu-122.04.1)

OpenJDK 64-Bit Server VM (build 21.0.6+7-Ubuntu-122.04.1, mixed mode, sharing)

student@CSE-RL-WS-01:~$ python3 --version

Python 3.10.12

student@CSE-RL-WS-01:~$ git --version

git version 2.34.1

student@CSE-RL-WS-01:~$ 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 smbs smtp smtps telnet tftp

student@CSE-RL-WS-01:~$ sudo apt install docker

\\Starting line

Reading package lists... Done

Building dependency tree... Done

Reading state information... Done

docker is already the newest version (1.5-2).

student@CSE-RL-WS-01:~$ sudo apt install docker-compose

\\Starting line

Reading package lists... Done

Building dependency tree... Done

Reading state information... Done

docker-compose is already the newest version (1.29.2-1).

student@CSE-RL-WS-01:~$ sudo apt install docker-ce

\\Starting line

Reading package lists... Done

Building dependency tree... Done

Reading state information... Done

docker-ce is already the newest version (5:28.0.4-1~ubuntu.22.04~jammy).

student@CSE-RL-WS-01:~$ sudo usermod -aG docker student

student@CSE-RL-WS-01:~$ docker --version

Docker version 28.0.4, build b8034c0

student@CSE-RL-WS-01:~$ docker-compose --version

docker-compose version 1.29.2, build unknown

student@CSE-RL-WS-01:~$ sudo systemctl start docker

student@CSE-RL-WS-01:~$ sudo systemctl status docker

\\Starting line

● docker.service - Docker Application Container Engine

Loaded: loaded (/lib/systemd/system/docker.service; enabled; vendor preset>

Active: active (running) since Wed 2025-04-09 10:34:51 IST; 46min ago

TriggeredBy: ● docker.socket

Docs: https://docs.docker.com

student@CSE-RL-WS-01:~$ sudo docker pull hello-world

Using default tag: latest

latest: Pulling from library/hello-world

Digest: sha256:424f1f86cdf501deb591ace8d14d2f40272617b51b374915a87a2886b2025ece

Status: Image is up to date for hello-world:latest

docker.io/library/hello-world:latest

student@CSE-RL-WS-01:~$ sudo docker run hello-world

\\Starting line

Hello from Docker!

This message shows that your installation appears to be working correctly.

student@CSE-RL-WS-01:~$ docker images

hello-world	latest	74cc54e27dc4	2 months ago	10.1kB
hyperledger/fabric-nodeenv	2.5	9450edc1d320	4 months ago	405MB
couchdb	3.3.3	65340ff2a419	5 months ago	222

student@CSE-RL-WS-01:~$ docker search Ubuntu

NAME	DESCRIPTION	STARS	OFFICIAL
ubuntu	Ubuntu is a Debian-based Linux operating sys…	17535	[OK]
ubuntu/squid	Squid is a caching proxy for the Web. Long-t…	108	

student@CSE-RL-WS-01:~$ docker run -it ubuntu

\\Starting line

Unable to find image 'ubuntu:latest' locally

latest: Pulling from library/ubuntu

2726e237d1a3: Pull complete

Digest: sha256:45243615f4992816784f678ce6c31b34bd07ba09279f740d8d014a9b855c531d

Status: Downloaded newer image for ubuntu:latest

root@b7f5eee13ca7:/#

student@CSE-RL-WS-01:~$ docker pull nginx

\\Starting line

Using default tag: latest

latest: Pulling from library/nginx

8a628cdd7ccc: Pull complete

75b642592991: Pull complete

553c8756fd66: Pull complete

10fe6d2248e3: Pull complete

3b6e18ae4ce6: Pull complete

3dce86e3b082: Pull complete

e81a6b82cf64: Pull complete

Digest: sha256:09369da6b10306312cd908661320086bf87fbae1b6b0c49a1f50ba531fef2eab

Status: Downloaded newer image for nginx:latest

docker.io/library/nginx:latest

student@CSE-RL-WS-01:~$ docker run --name my-nginx -p 8080:80 -d nginx

28ef1b253bc6a31f4844b4e22b62fdb80c37f0ca0da53ca65cdb1a585a56765b

student@CSE-RL-WS-01:~$ sudo docker ps -a

[sudo] password for student:

CONTAINER ID IMAGE COMMAND CREATED STATUS PORTS NAMES

28ef1b253bc6 nginx "/docker-entrypoint.…" About a minute ago Up About a minute 0.0.0.0:8080->80/tcp, [::]:8080->80/tcp my-nginx

b7f5eee13ca7 ubuntu "/bin/bash" 7 minutes ago Exited (0) 2 minutes ago unruffled_golick

3bf06505a31c hello-world "/hello" 16 minutes ago Exited (0) 16 minutes ago musing_shtern

student@CSE-RL-WS-01:~$ sudo apt-get autoremove -y

//starting line

After this operation, 851 MB disk space will be freed.

(Reading database ... 390434 files and directories currently installed.)

Removing docker-ce-rootless-extras (5:28.0.4-1~ubuntu.22.04~jammy) ...

Removing slirp4netns (1.0.1-2) ...

Removing libslirp0:amd64 (4.6.1-1build1) ...

EX:No:1B

Develop a Simple Calculator Program using JAVA Programming Language and run it in Docker Container

using gedit create the Calculator.java Program (gedit Calculator.java)

```
import java.util.Scanner;
public class Calculator {
    public static void main(String[] args) {
        Scanner scanner = new Scanner(System.in);

        System.out.println("Simple Calculator");
        System.out.print("Enter first number: ");
        double num1 = scanner.nextDouble();

        System.out.print("Enter operation (+, -, *, /): ");
        char op = scanner.next().charAt(0);

        System.out.print("Enter second number: ");
        double num2 = scanner.nextDouble();

        double result;
        switch (op) {
            case '+': result = num1 + num2; break;
            case '-': result = num1 - num2; break;
```

```
            case '*': result = num1 * num2; break;
            case '/':
                if (num2 == 0) {
                    System.out.println("Error: Division by zero");
                    return;
                }
                result = num1 / num2;
                break;
            default:
                System.out.println("Invalid operation.");
                return;
        }

        System.out.println("Result: " + result);
    }
}
```

using gedit create the Dockerfile Program (gedit Dockerfile)

```
# Use an official OpenJDK image
FROM openjdk:17-slim

# Set the working directory
WORKDIR /app
```

```
# Copy the Java file into the container
COPY Calculator.java .

# Compile the Java file
RUN javac Calculator.java

# Run the program
CMD ["java", "Calculator"]
```

// OUTPUT & EXECUTION STEPS

```
student@CSE-RL-WS-01:~$ docker build -t java-calculator .

//Execution Process:
[+] Building 28.0s (9/9) FINISHED                    docker:default
=> => transferring context: 1.14kB                        0.0s
 => [2/4] WORKDIR /app                                    0.1s
 => [3/4] COPY Calculator.java .                          0.0s
 => [4/4] RUN javac Calculator.java                       0.4s
 => exporting to image                                    0.0s
 => => exporting layers                                   0.0s
 => => writing image sha256:37b121da1a0b8790ff7319c0e66d32bf01e449f4ff578  0.0s
 => => naming to docker.io/library/java-calculator
```

student@CSE-RL-WS-01:~$ docker run -it java-calculator

Simple Calculator

Enter first number: 4

Enter operation (+, -, *, /):

+

Enter second number: 5

Result: 9.0

student@CSE-RL-WS-01:~$ docker run -it java-calculator

Simple Calculator

Enter first number: 8

Enter operation (+, -, *, /): *

Enter second number: 5

Result: 40.0

Ex:No:1C

Implementation of basic Blockchain Program using JAVA Programming Language

//Create a file Blockchain.java

import java.util.ArrayList;

```
import com.google.gson.GsonBuilder;

public class Blockchain {

	public static ArrayList<Block> blockchain = new ArrayList<Block>();

	public static int difficulty = 3;

	public static void main(String[] args) {

		//add our blocks to the blockchain ArrayList:


		blockchain.add(new Block("Hi im the first block", "0"));

		System.out.println("Trying to Mine block 1... ");

		blockchain.get(0).mineBlock(difficulty);


		blockchain.add(new Block("Yo im the second block",blockchain.get(blockchain.size()-
1).hash));

		System.out.println("Trying to Mine block 2... ");

		blockchain.get(1).mineBlock(difficulty);


		blockchain.add(new Block("Hey im the third block",blockchain.get(blockchain.size()-
1).hash));

		System.out.println("Trying to Mine block 3... ");

		blockchain.get(2).mineBlock(difficulty);


		System.out.println("\nBlockchain is Valid: " + isChainValid());


		String blockchainJson = new
GsonBuilder().setPrettyPrinting().create().toJson(blockchain);

		System.out.println("\nThe block chain: ");

		System.out.println(blockchainJson);
```

```
}

public static Boolean isChainValid() {
	Block currentBlock;
	Block previousBlock;
	String hashTarget = new String(new char[difficulty]).replace('\0', '0');
	System.out.println(hashTarget);
	//loop through blockchain to check hashes:
	for(int i=1; i < blockchain.size(); i++) {
		currentBlock = blockchain.get(i);
		previousBlock = blockchain.get(i-1);
		//compare registered hash and calculated hash:
		if(!currentBlock.hash.equals(currentBlock.calculateHash()) ){
			System.out.println("Current Hashes not equal");
			return false;
		}
		//compare previous hash and registered previous hash
		if(!previousBlock.hash.equals(currentBlock.previousHash) ) {
			System.out.println("Previous Hashes not equal");
			return false;
		}
		//check if hash is solved
		if(!currentBlock.hash.substring( 0, difficulty).equals(hashTarget)) {
			System.out.println("This block hasn't been mined");
			return false;
```

```
                }
            }
            return true;
        }
}
```

Create a file - Block.java

```
import java.util.Date;

public class Block {

    public String hash;
    public String previousHash;
    private String data; //our data will be a simple message.
    private long timeStamp; //as number of milliseconds since 1/1/1970.
    private int nonce;

    //Block Constructor.
    public Block(String data,String previousHash ) {
        this.data = data;
        this.previousHash = previousHash;
        this.timeStamp = new Date().getTime();
```

```
		this.hash = calculateHash(); //Making sure we do this after we set the other values.
	}

	//Calculate new hash based on blocks contents
	public String calculateHash() {
		String calculatedhash = StringUtil.applySha256(
				previousHash +
				Long.toString(timeStamp) +
				Integer.toString(nonce) +
				data
				);
		return calculatedhash;
	}

	public void mineBlock(int difficulty) {
		String target = new String(new char[difficulty]).replace('\0', '0'); //Create a string with difficulty * "0"
		while(!hash.substring( 0, difficulty).equals(target)) {
			nonce ++;
			hash = calculateHash();
		}
		System.out.println("Block Mined!!! : " + hash);
	}
}
```

Create a file StringUtil.java

```
public class StringUtil {
	//Applies Sha256 to a string and returns the result.
	public static String applySha256(String input){
		try {
			MessageDigest digest = MessageDigest.getInstance("SHA-256");
			//Applies sha256 to our input,
			byte[] hash = digest.digest(input.getBytes("UTF-8"));
			StringBuffer hexString = new StringBuffer(); // This will contain hash as hexidecimal
			for (int i = 0; i < hash.length; i++) {
				String hex = Integer.toHexString(0xff & hash[i]);
				if(hex.length() == 1) hexString.append('0');
				hexString.append(hex);
			}
			return hexString.toString();
		}
		catch(Exception e) {
			throw new RuntimeException(e);
		}
	}
}
```

//Before Compilation download the Gson Builder from the http://www.java2s.com/Code/JarDownload/gson/gson-2.2.2.jar.zip and extract the jar file in the specified location

// Output

student@CSE-RL-WS-01:~/Downloads$ javac Blockchain.java

student@CSE-RL-WS-01:~/Downloads$ java Blockchain

Trying to Mine block 1...

Block Mined!!! : 000dfdff63d8424a3a0a294d012336c3ebf9721a1bc2c634e0b5d050bce77839

Trying to Mine block 2...

Block Mined!!! : 000a4b4591c70ca57abb7f4ba4993de0fe99b0e68542fdd1ebc1b2e6ad7c45db

Trying to Mine block 3...

Block Mined!!! : 000db9dd267e915d7da15c82abbf15e94b0232829d06b840e3e21e2e5a3af6c8

000

Blockchain is Valid: true

The block chain:


```
[
  {
    "hash": "000dfdff63d8424a3a0a294d012336c3ebf9721a1bc2c634e0b5d050bce77839",
    "previousHash": "0",
    "data": "Hi im the first block",
    "timeStamp": 1744347470355,
```

```
  "nonce": 7145
 },
 {
  "hash": "000a4b4591c70ca57abb7f4ba4993de0fe99b0e68542fdd1ebc1b2e6ad7c45db",
  "previousHash": "000dfdff63d8424a3a0a294d012336c3ebf9721a1bc2c634e0b5d050bce77839",
  "data": "Yo im the second block",
  "timeStamp": 1744347470418,
  "nonce": 224
 },
 {
  "hash": "000db9dd267e915d7da15c82abbf15e94b0232829d06b840e3e21e2e5a3af6c8",
  "previousHash": "000a4b4591c70ca57abb7f4ba4993de0fe99b0e68542fdd1ebc1b2e6ad7c45db",
  "data": "Hey im the third block",
  "timeStamp": 1744347470420,
  "nonce": 3966
 }
]
```

Ex:no:2

Create and deploy a blockchain network using Hyperledger Fabric SDK for Java Set up and initialize the channel, install and instantiate chain code, and perform invoke and query on your blockchain network.

\\ Prerequisites - Install the required dependencies:

```
student@CSE-RL-WS-01:~$ sudo apt update

Hit:1 https://dl.google.com/linux/chrome/deb stable InRelease
Hit:2 http://in.archive.ubuntu.com/ubuntu jammy InRelease
Hit:3 https://repo.mongodb.org/apt/ubuntu jammy/mongodb-org/6.0 InRelease
Hit:4 http://in.archive.ubuntu.com/ubuntu jammy-updates InRelease

student@CSE-RL-WS-01:~$ sudo apt install git

// starting line
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
git is already the newest version (1:2.34.1-1ubuntu1.12).
The following packages were automatically installed and are no longer required:
  libwpe-1.0-1 libwpebackend-fdo-1.0-1
Use 'sudo apt autoremove' to remove them.
0 upgraded, 0 newly installed, 0 to remove and 24 not upgraded.

student@CSE-RL-WS-01:~$ sudo apt install curl

// starting line
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
```

curl is already the newest version (7.81.0-1ubuntu1.20).

The following packages were automatically installed and are no longer required:

libwpe-1.0-1 libwpebackend-fdo-1.0-1

Use 'sudo apt autoremove' to remove them.

0 upgraded, 0 newly installed, 0 to remove and 24 not upgraded.

student@CSE-RL-WS-01:~$ wget https://golang.org/dl/go1.17.3.linux-amd64.tar.gz

--2025-04-08 12:07:47-- https://golang.org/dl/go1.17.3.linux-amd64.tar.gz

Resolving golang.org (golang.org)... 142.250.182.113, 2404:6800:4007:81c::2011

Connecting to golang.org (golang.org)|142.250.182.113|:443... connected.

go1.17.3.linux-amd6 100%[==========>] 128.56M 10.7MB/s in 12s

2025-04-08 12:08:01 (10.7 MB/s) - ‘go1.17.3.linux-amd64.tar.gz’ saved [134804820/134804820]

student@CSE-RL-WS-01:~$sudo rm -rf /usr/local/go

student@CSE-RL-WS-01:~$sudo tar -C /usr/local -xzvf go1.17.3.linux-amd64.tar.gz

student@CSE-RL-WS-01:~$ sudo apt install jq

// starting line

Reading package lists... Done

Building dependency tree... Done

Reading state information... Done

jq is already the newest version (1.6-2.1ubuntu3).

The following packages were automatically installed and are no longer required:

libwpe-1.0-1 libwpebackend-fdo-1.0-1

Use 'sudo apt autoremove' to remove them.

0 upgraded, 0 newly installed, 0 to remove and 24 not upgraded.

student@CSE-RL-WS-01:~$ sudo apt install docker*

// starting line

Reading package lists... Done

Building dependency tree... Done

Reading state information... Done

Note, selecting 'docker-compose' for glob 'docker*'

docker is already the newest version (1.5-2).

docker-clean is already the newest version (2.0.4-4).

docker-compose is already the newest version (1.29.2-1).

docker-compose-v2 is already the newest version (2.27.1+ds1-0ubuntu1~22.04.1).

docker-doc is already the newest version (26.1.3-0ubuntu1~22.04.1).

docker.io is already the newest version (26.1.3-0ubuntu1~22.04.1).

The following packages were automatically installed and are no longer required:

libwpe-1.0-1 libwpebackend-fdo-1.0-1

Use 'sudo apt autoremove' to remove them.

0 upgraded, 0 newly installed, 0 to remove and 24 not upgraded.

student@CSE-RL-WS-01:~$ sudo apt install docker-compose

// starting line

Reading package lists... Done

Building dependency tree... Done

Reading state information... Done

docker-compose is already the newest version (1.29.2-1).

\\Check all the dependencies version using a command

student@CSE-RL-WS-01:~$ git --version

git version 2.34.1

student@CSE-RL-WS-01:~$ 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

student@CSE-RL-WS-01:~$ go version

go version go1.18.1 linux/amd64

student@CSE-RL-WS-01:~$ docker --version

Docker version 26.1.3, build 26.1.3-0ubuntu1~22.04.1

student@CSE-RL-WS-01:~$ docker-compose --version

docker-compose version 1.29.2, build unknown

student@CSE-RL-WS-01:~$ jq --version

jq-1.6

```
student@CSE-RL-WS-01:~$ java --version
openjdk 17.0.14 2025-01-21
OpenJDK Runtime Environment (build 17.0.14+7-Ubuntu-122.04.1)
OpenJDK 64-Bit Server VM (build 17.0.14+7-Ubuntu-122.04.1, mixed mode, sharing)

student@CSE-RL-WS-01:~$ mkdir Fabric4

student@CSE-RL-WS-01:~$ cd Fabric4

student@CSE-RL-WS-01:~/Fabric4$ sudo systemctl status docker

docker.service - Docker Application Container Engine
    Loaded: loaded (/lib/systemd/system/docker.service; enabled; vendor preset>
    Active: active (running) since Tue 2025-04-08 11:02:45 IST; 1h 14min ago
    ( Terminair from Docker application press ( Ctrl+c)

student@CSE-RL-WS-01:~/Fabric4$ sudo usermod -aG docker student

student@CSE-RL-WS-01:~/Fabric4$ newgrp docker

student@CSE-RL-WS-01:~/Fabric4$ curl -sSL https://bit.ly/2ysbOFE | bash -s

// starting line
Clone hyperledger/fabric-samples repo
===> Cloning hyperledger/fabric-samples repo
```

Cloning into 'fabric-samples'...

remote: Enumerating objects: 14778, done.

hyperledger/fabric-orderer 2.5 fa56384e2773 4 weeks ago 118MB

hyperledger/fabric-peer 2.5 6f5d5d210c59 4 weeks ago 151MB

hyperledger/fabric-ccenv latest b30e9cc39553 4 weeks ago 676MB

hyperledger/fabric-baseos latest 133ecaf78b3e 4 weeks ago 142MB

hyperledger/fabric-ca 1.5.15 09cb0b50ebdb 8 weeks ago 225MB

hyperledger/fabric-orderer 2.5.11 2a64615f0271 2 months ago 118MB

student@CSE-RL-WS-01:~/Fabric4$ export PATH=/home/student/fabric/fabric-samples/bin:$PATH

student@CSE-RL-WS-01:~/Fabric4$ cd fabric-samples

student@CSE-RL-WS-01:~/Fabric4/fabric-samples/test-network$ ./network.sh up

// starting line

Using docker and docker-compose

Starting nodes with CLI timeout of '5' tries and CLI delay of '3' seconds and using database 'leveldb' with crypto from 'cryptogen'

LOCAL_VERSION=v2.5.12

DOCKER_IMAGE_VERSION=v2.5.12

reating orderer.example.com ... done

Creating peer0.org1.example.com ... done

Creating peer0.org2.example.com ... done

CONTAINER ID IMAGE COMMAND CREATED STATUS PORTS
NAMES

a5908bc65c49 hyperledger/fabric-peer:latest "peer node start" 1 second ago Up Less than a second 0.0.0.0:7051->7051/tcp, :::7051->7051/tcp, 0.0.0.0:9444->9444/tcp, :::9444->9444/tcp
peer0.org1.example.com

student@CSE-RL-WS-01:~/Fabric4/fabric-samples/test-network$ docker ps -a

CONTAINER ID IMAGE COMMAND CREATED STATUS PORTS NAMES

a5908bc65c49 hyperledger/fabric-peer:latest "peer node start" 2 minutes ago Up 2 minutes 0.0.0.0:7051->7051/tcp, :::7051->7051/tcp, 0.0.0.0:9444->9444/tcp, :::9444->9444/tcp peer0.org1.example.com

student@CSE-RL-WS-01:~/Fabric4/fabric-samples/test-network$ ./network.sh createChannel

//starting line

Using docker and docker-compose

Creating channel 'mychannel'.

//ending line

025-04-08 12:34:45.184 IST 0001 INFO [channelCmd] InitCmdFactory -> Endorser and orderer connections initialized

2025-04-08 12:34:45.190 IST 0002 INFO [channelCmd] update -> Successfully submitted channel update

Anchor peer set for org 'Org2MSP' on channel 'mychannel'

Channel 'mychannel' joined

student@CSE-RL-WS-01:~/Fabric4/fabric-samples/test-network$ ./network.sh deployCC -ccn basic -ccp ../asset-transfer-basic/chaincode-go -ccl go

\\starting line

Using docker and docker-compose

deploying chaincode on channel 'mychannel'

\\ending line

Committed chaincode definition for chaincode 'basic' on channel 'mychannel':

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

student@CSE-RL-WS-01:~/Fabric4/fabric-samples/test-network$ gedit ~/.bashrc

In bashrc file type the command at the end of file

#export GOROOT=/usr/local/go

#export PATH=$GOPATH/bin:$GOROOT/bin:$PATH

export PATH=/home/student/Fabric4/fabric-samples/bin:$PATH

export PATH=$PATH:/home/student/Fabric4/fabric-samples/bin

export FABRIC_CFG_PATH=/home/student/Fabric4/fabric-samples/config

export JAVA_HOME=/usr/lib/jvm/java-17-openjdk-amd64

#Set environment variables for Org1

export CORE_PEER_TLS_ENABLED=true

export CORE_PEER_LOCALMSPID="Org1MSP"

export CORE_PEER_TLS_ROOTCERT_FILE=/home/student/Fabric4/fabric-samples/test-network/organizations/peerOrganizations/org1.example.com/peers/peer0.org1.example.com/tls/ca.crt

export CORE_PEER_MSPCONFIGPATH=/home/student/Fabric4/fabric-samples/test-network/organizations/peerOrganizations/org1.example.com/users/Admin@org1.example.com/msp

export CORE_PEER_ADDRESS=localhost:7051

and press the save button

```
student@CSE-RL-WS-01:~/Fabric4/fabric-samples/test-network$ source  ~/.bashrc

student@CSE-RL-WS-01:~/Fabric4/fabric-samples/test-network$ peer node start

// starting line
2025-04-08 12:47:20.443 IST 0001 INFO [nodeCmd] serve -> Starting peer:
 Version: v2.5.12
 Commit SHA: af0b647
 Go version: go1.23.5
 OS/Arch: linux/amd64
 Chaincode:
  Base Docker Label: org.hyperledger.fabric
  Docker Namespace: hyperledger
//ending line
main.main()
        /home/runner/work/fabric/fabric/cmd/peer/main.go:56 +0x33b

student@CSE-RL-WS-01:~/Fabric4/fabric-samples/test-network$ peer node status
Operate a peer node: start|reset|rollback|pause|resume|rebuild-dbs|unjoin|upgrade-dbs.

Usage:
  peer node [command]

student@CSE-RL-WS-01:~/Fabric4/fabric-samples/test-network$ docker ps | grep peer
```

58936f26533b dev-peer0.org1.example.com-basic_1.0-18acccca2fe08dcdc5e4f3bafb51486a6f18eb594590ccf1fd7bdffc29a9b286-326f54924f1707c2356e147494d1a983ee5175f0d79b7647d21e6968321ac568 "chaincode -peer.add..." 12 minutes ago Up 12 minutes

student@CSE-RL-WS-01:~/Fabric4/fabric-samples/test-network$ peer chaincode invoke -o localhost:7050 --ordererTLSHostnameOverride orderer.example.com --tls --cafile /home/student/Fabric4/fabric-samples/test-network/organizations/ordererOrganizations/example.com/orderers/orderer.example.com/msp/tlscacerts/tlsca.example.com-cert.pem -C mychannel -n basic --peerAddresses localhost:7051 --tlsRootCertFiles /home/student/Fabric4/fabric-samples/test-network/organizations/peerOrganizations/org1.example.com/peers/peer0.org1.example.com/tls/ca.crt --peerAddresses localhost:9051 --tlsRootCertFiles /home/student/Fabric4/fabric-samples/test-network/organizations/peerOrganizations/org2.example.com/peers/peer0.org2.example.com/tls/ca.crt -c '{"function":"InitLedger","Args":[]}'

2025-04-08 12:51:31.157 IST 0001 INFO [chaincodeCmd] chaincodeInvokeOrQuery -> Chaincode invoke successful. result: status:200

student@CSE-RL-WS-01:~/Fabric4/fabric-samples/test-network$ peer chaincode query -C mychannel -n basic -c '{"Args":["GetAllAssets"]}'

[{"AppraisedValue":300,"Color":"blue","ID":"asset1","Owner":"Tomoko","Size":5},{"AppraisedValue":400,"Color":"red","ID":"asset2","Owner":"Brad","Size":5},{"AppraisedValue":500,"Color":"green","ID":"asset3","Owner":"Jin Soo","Size":10},{"AppraisedValue":600,"Color":"yellow","ID":"asset4","Owner":"Max","Size":10},{"AppraisedValue":700,"Color":"black","ID":"asset5","Owner":"Adriana","Size":15},{"AppraisedValue":800,"Color":"white","ID":"asset6","Owner":"Michel","Size":15}]

student@CSE-RL-WS-01:~/Fabric4/fabric-samples/test-network$ peer chaincode query -C mychannel -n basic -c '{"Args":["ReadAsset","asset6"]}'

{"AppraisedValue":800,"Color":"white","ID":"asset6","Owner":"Michel","Size":15}

student@CSE-RL-WS-01:~/Fabric4/fabric-samples/test-network$ peer chaincode invoke -o localhost:7050 --ordererTLSHostnameOverride orderer.example.com --tls --cafile /home/student/Fabric4/fabric-samples/test-network/organizations/ordererOrganizations/example.com/orderers/orderer.example.com/msp/tlscacerts/tlsca.example.com-cert.pem -C mychannel -n basic --peerAddresses localhost:7051 --tlsRootCertFiles /home/student/Fabric4/fabric-samples/test-network/organizations/peerOrganizations/org1.example.com/peers/peer0.org1.example.com/tls/ca.crt --peerAddresses localhost:9051 --tlsRootCertFiles /home/student/Fabric4/fabric-samples/test-network/organizations/peerOrganizations/org2.example.com/peers/peer0.org2.example.com/tls/ca.crt -c '{"function":"TransferAsset","Args":["asset6","priya"]}'

2025-04-08 12:54:05.121 IST 0001 INFO [chaincodeCmd] chaincodeInvokeOrQuery -> Chaincode invoke successful. result: status:200 payload:"Michel"

student@CSE-RL-WS-01:~/Fabric4/fabric-samples/test-network$ peer chaincode query -C mychannel -n basic -c '{"Args":["ReadAsset","asset6"]}'

{"AppraisedValue":800,"Color":"white","ID":"asset6","Owner":"priya","Size":15}

Ex--5---

//exno5:ccs339- blockchain

Dicegame.sol:

// SPDX-License-Identifier: MIT

pragma solidity ^0.5.0;

```
contract Dice {
    struct Bet {
        uint8 currentBet;
        bool isBetSet;
        uint8 destiny;
    }

    mapping(address => Bet) private bets;
    uint8 private randomFactor;

    event NewBetIsSet(address indexed bidder, uint8 currentBet);
    event GameResult(address indexed bidder, uint8 currentBet, uint8 destiny, bool won);


    function placeBet(uint8 _bet) public {
        require(_bet >= 1 && _bet <= 6, "Bet must be between 1 and 6");
        require(!bets[msg.sender].isBetSet, "Previous bet not resolved");

        bets[msg.sender] = Bet({
            currentBet: _bet,
            isBetSet: true,
            destiny: 0
        });
```

```
    randomFactor += _bet;

    emit NewBetIsSet(msg.sender, _bet);
}



function roll() public returns (address, uint8, uint8, bool) {
    require(bets[msg.sender].isBetSet, "No active bet");

    uint8 destiny = random();
    bets[msg.sender].destiny = destiny;
    randomFactor += destiny;

    bool won = false;
    if (destiny == bets[msg.sender].currentBet) {
        uint256 reward = 0.01 ether;
        require(address(this).balance >= reward, "Not enough balance");
        _transferReward(msg.sender, reward);
        won = true;
    }

    emit GameResult(msg.sender, bets[msg.sender].currentBet, destiny, won);



    bets[msg.sender].isBetSet = false;
```

```
        return (msg.sender, bets[msg.sender].currentBet, destiny, won);
    }

    function isBetSet() public view returns (bool) {
        return bets[msg.sender].isBetSet;
    }

    function random() private view returns (uint8) {
        uint256 blockValue = uint256(blockhash(block.number - 1)) + now + randomFactor;
        return uint8((blockValue % 6) + 1);
    }

    function _transferReward(address winner, uint256 amount) private {
        address(uint160(winner)).transfer(amount);
    }

    function() external payable {}

    function getContractBalance() public view returns (uint256) {
        return address(this).balance;
    }
}
```

2_deploy_contracts.js:

```
const Dice = artifacts.require("Dice");

module.exports = function (deployer) {
  deployer.deploy(Dice);
};
```

---

migration.sol:

```
// SPDX-License-Identifier: MIT
pragma solidity >=0.4.22 <0.9.0;

contract Migrations {
   address public owner = msg.sender;
   uint public last_completed_migration;

   modifier restricted() {
      require(
         msg.sender == owner,
         "This function is restricted to the contract's owner"
      );
      _;
   }
```

```
    function setCompleted(uint completed) public restricted {
        last_completed_migration = completed;
    }
}
```

1_initial_migrate:

```
const Migrations = artifacts.require("Migrations");

module.exports = function (deployer) {
  deployer.deploy(Migrations);
};
```

---

commands:

```
const accounts = await web3.eth.getAccounts()
const dice = await Dice.deployed()

// Fund the contract
await web3.eth.sendTransaction({ from: accounts[0], to: dice.address, value: web3.utils.toWei("1", "ether") })

// Show contract balance
```

```
let balance = await dice.getContractBalance()
console.log("Contract Balance:", web3.utils.fromWei(balance, "ether"), "ETH")

// User manually chooses number 5
await dice.placeBet(5, { from: accounts[1] })

// Confirm bet
let isSet = await dice.isBetSet({ from: accounts[1] })
console.log("Bet set?", isSet)

// Roll the dice
let tx = await dice.roll({ from: accounts[1] })
let result = tx.logs[0].args
console.log("Bet:", result.currentBet.toString())
console.log("Rolled:", result.destiny.toString())
console.log("Won?", result.won)

// Show contract balance again
balance = await dice.getContractBalance()
console.log("Contract Balance after roll:", web3.utils.fromWei(balance, "ether"), "ETH")
```

Output:

```
student@rv-ml2:/home/soft$ mkdir dice1

student@rv-ml2:/home/soft$ cd dice1

student@rv-ml2:/home/soft/dice1$ code .

student@rv-ml2:/home/soft$ sudo truffle init

student@rv-ml2:/home/soft/dice1$ sudo truffle compile

[sudo] password for student:

student@rv-ml2:/home/soft/dice1$ sudo truffle migrate
```

□□ Important □□

If you're using an HDWalletProvider, it must be Web3 1.0 enabled or your migration will hang.

```
Starting migrations...

======================

> Network name:    'ganache'

> Network id:      5777

> Block gas limit: 6721975



1_initial_migration.js

======================


  Deploying 'Migrations'

  ----------------------

  > transaction hash:    0x792d6646c073d735a8d4400236bcff729083c8f691148fc9e36431d75fcc9636

  > Blocks: 0            Seconds: 0
```

> contract address: 0x22b0ab608D503424A70abF14aE5A727bD1A508Bc

> account: 0xa5f9636B2A3e166d57a78F6Cb1B54dEe4Ee15e53

> balance: 99.99584198

> gas used: 207901

> gas price: 20 gwei

> value sent: 0 ETH

> total cost: 0.00415802 ETH

> Saving artifacts

> Total cost: 0.00415802 ETH

2_deploy_contracts.js

==========

Replacing 'Dice'

> transaction hash: 0x33b55b064067b1faf041e36e5a4ae3be22d89b9b6694025467c79d1da31362f1

> Blocks: 0 Seconds: 0

> contract address: 0x8ED9700fa75Ed30915E3036945756c58524630b1

> account: 0xa5f9636B2A3e166d57a78F6Cb1B54dEe4Ee15e53

> balance: 99.98474584

> gas used: 554807

> gas price: 20 gwei

> value sent: 0 ETH

> total cost: 0.01109614 ETH

> Saving artifacts

> Total cost: 0.01109614 ETH

Summary

=======

> Total deployments: 2

> Final cost: 0.01525416 ETH

student@rv-ml2:/home/soft/dice1$ sudo truffle console

truffle(ganache)> const accounts = await web3.eth.getAccounts()

undefined

truffle(ganache)> const dice = await Dice.deployed()

undefined

truffle(ganache)> await web3.eth.sendTransaction({ from: accounts[0], to: dice.address, value: web3.utils.toWei("1", "ether") })

{

transactionHash: '0xe0477210bf4020cbd4890280f4f8a0baec3356ec09480121ed4a55dfc034de05',

transactionIndex: 0,

blockNumber: 4,

blockHash: '0x33ad2f3194a6f2cb7a6cf618a0451869d34fa6d4dd243890e3819e55f85e9b54',

from: '0xa5f9636b2a3e166d57a78f6cb1b54dee4ee15e53',

```
  to: '0x8ed9700fa75ed30915e3036945756c58524630b1',
  cumulativeGasUsed: 21040,
  gasUsed: 21040,
  contractAddress: null,
  logs: [],
  logsBloom: '0x00000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000',
  status: true,
  effectiveGasPrice: '0x4a817c800',
  type: '0x0'
}
truffle(ganache)> let balance = await dice.getContractBalance()
undefined
truffle(ganache)> console.log("Contract Balance:", web3.utils.fromWei(balance, "ether"), "ETH")
Contract Balance: 1 ETH
undefined
truffle(ganache)> await dice.placeBet(5, { from: accounts[1] })
{
  tx: '0x2137f85c0a8b841da905304fd3ce1d0c92a934a6be3388f7f0ae2d2067ec5712',
  receipt: {
    transactionHash: '0x2137f85c0a8b841da905304fd3ce1d0c92a934a6be3388f7f0ae2d2067ec5712',
    transactionIndex: 0,
```

blockNumber: 5,

blockHash: '0xa47d74382d69716f83499823143eff3415968f28e0db69498be3e50abf0cff22',

from: '0xd674e429ef8e5f5cb90f6742c14607e0daa4389f',

to: '0x8ed9700fa75ed30915e3036945756c58524630b1',

cumulativeGasUsed: 68653,

gasUsed: 68653,

contractAddress: null,

logs: [[Object]],

logsBloom:
'0x000000000000000000000001000000000000000000000000000000000000000000000000000000000
00000000000000000000000000000000000000000000000000000200000000000000000000000000000
00000000000000000000000000000000000000000000000000000000000002000000000000000000000
00000000000000000000000000000000000000000000000000000400000000000400000000000000000
00000000000000000000000000000000000000000000000000000000000000000000040001000000000
00000000000000000000000000000000000000000000080000000400000000000000000000000000000
0000000000000000',

status: true,

effectiveGasPrice: '0x4a817c800',

type: '0x0',

rawLogs: [[Object]]

},

logs: [

{

address: '0x8ED9700fa75Ed30915E3036945756c58524630b1',

blockHash: '0xa47d74382d69716f83499823143eff3415968f28e0db69498be3e50abf0cff22',

blockNumber: 5,

logIndex: 0,

removed: false,

```
    transactionHash: '0x2137f85c0a8b841da905304fd3ce1d0c92a934a6be3388f7f0ae2d2067ec5712',
    transactionIndex: 0,
    id: 'log_734254bc',
    event: 'NewBetIsSet',
    args: [Result]
   }
 ]
}
truffle(ganache)> let isSet = await dice.isBetSet({ from: accounts[1] })
undefined
truffle(ganache)> console.log("Bet set?", isSet)
Bet set? true
undefined
truffle(ganache)> let tx = await dice.roll({ from: accounts[1] })
undefined
truffle(ganache)> let result = tx.logs[0].args
undefined
truffle(ganache)> console.log("Bet:", result.currentBet.toString())
Bet: 5
undefined
truffle(ganache)> console.log("Rolled:", result.destiny.toString())
Rolled: 1
undefined
truffle(ganache)> console.log("Won?", result.won)
Won? false
```

```
undefined

truffle(ganache)> balance = await dice.getContractBalance()

undefined

truffle(ganache)> console.log("Contract Balance after roll:", web3.utils.fromWei(balance, "ether"), "ETH")

Contract Balance after roll: 1 ETH

undefined

truffle(ganache)> .exit
```
