BLOCKCHAIN ON LOCAL SETUP INSTRUCTIONS

Abstract

This document covers instructions for setting up Blockchain network on local Windows machine

Contents

Introduction

This document covers setting up a Blockchain Network (with one peer + membership service) on your local machine for various development and testing activities on Windows machine. It will list the instructions that simply leverages the Docker images that the Hyperledger Fabric project publishes to DockerHub.

Follow the instructions below to setup Blockchain network locally on Windows machine.

Note : Sections A. B and C are mandatory to setup Blockchain Network and get a sample application running. Section D can be referred when you want to develop chaincode and test it on the network

A. Install Docker Toolbox on Windows Machine

1. To run Docker, your machine must have a 64-bit operating system running Windows 7 or higher. Additionally, you must make sure that virtualization is enabled on your machine.

   Follow the steps mentioned on the link (https://docs.docker.com/toolbox/toolbox_install_windows/) to verify the requirements.

2. Go to the Docker Toolbox page.
3. Click the installer link to download.
4. Install Docker Toolbox by double-clicking the installer.

   The installer launches the “Setup - Docker Toolbox” dialog.

   If Windows security dialog prompts you to allow the program to make a change, choose **Yes**. The system displays the **Setup - Docker Toolbox for Windows** wizard.

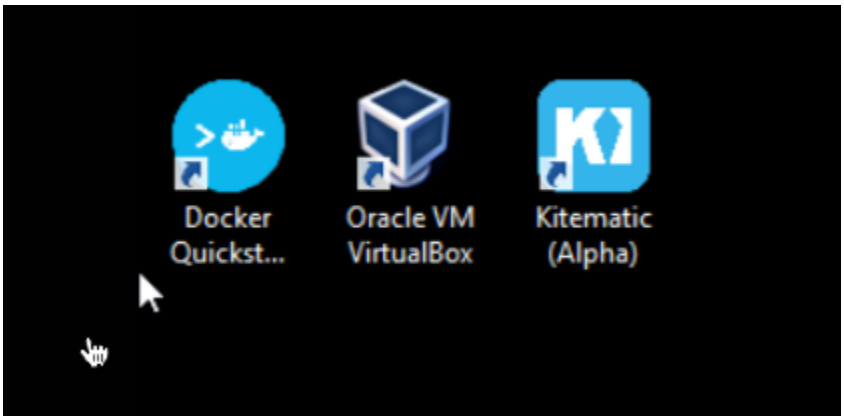
5. Press **Next** to accept all the defaults and then **Install**.

   Accept all the installer defaults. The installer takes a few minutes to install all the components:

6. When notified by Windows Security the installer will make changes, make sure you allow the installer to make the necessary changes.

   When it completes, the installer reports it was successful:

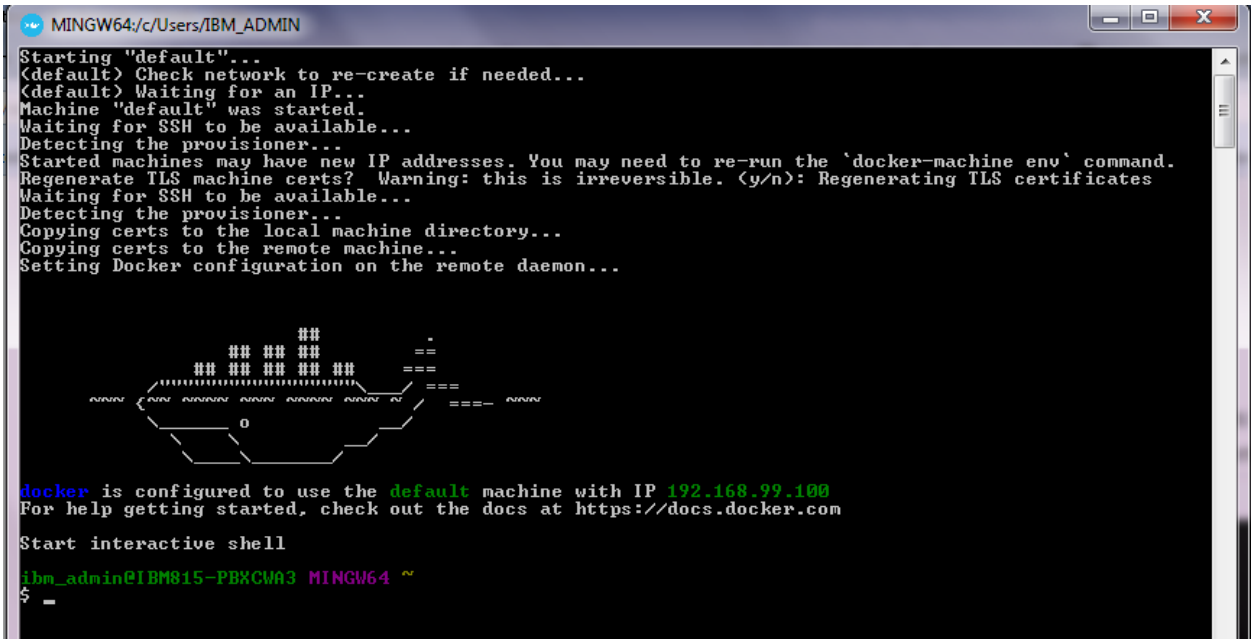
7. On your Desktop, find the Docker Toolbox icon.



8. Click the icon to launch a Docker Toolbox terminal.

   If the system displays a **User Account Control** prompt to allow VirtualBox to make changes to your computer. Choose **Yes**.

   The terminal does several things to set up Docker Toolbox for you. When it is done, the terminal displays the $ prompt.

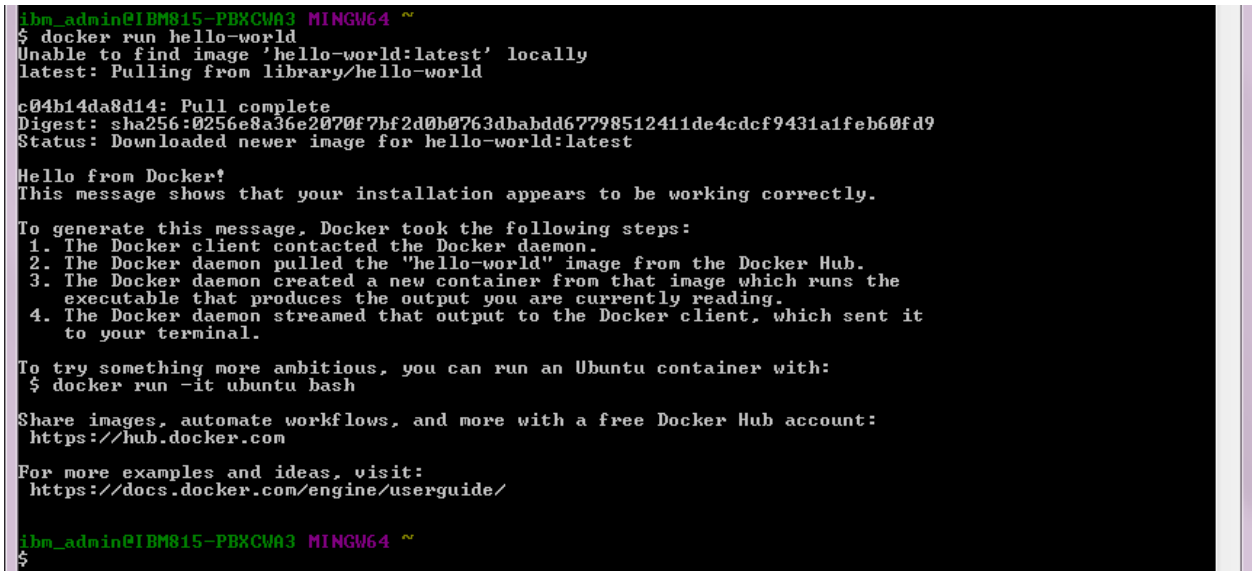


9. Note down IP address of the docker machine printed in the screen as above.

10. Verify docker installation

    Type the docker run hello-world command and press RETURN.

    The command does some work for you, if everything runs well, the command's output looks like this:


ibm_admin@IBM815-PBXCWA3 MINGW64 ~
$ docker run hello-world
Unable to find image 'hello-world:latest' locally
latest: Pulling from library/hello-world
c04b14da8d14: Pull complete
Digest: sha256:0256e8a36e2070f7bf2d0b0763dbabdd67798512411de4cdcf9431a1feb60fd9
Status: Downloaded newer image for hello-world:latest
Hello from Docker!
This message shows that your installation appears to be working correctly.
To generate this message, Docker took the following steps:
1. The Docker client contacted the Docker daemon.
2. The Docker daemon pulled the "hello-world" image from the Docker Hub.
3. The Docker daemon created a new container from that image which runs the
executable that produces the output you are currently reading.
4. The Docker daemon streamed that output to the Docker client, which sent it
to your terminal.
To try something more ambitious, you can run an Ubuntu container with:
$ docker run -it ubuntu bash
Share images, automate workflows, and more with a free Docker Hub account:
https://hub.docker.com
For more examples and ideas, visit:
https://docs.docker.com/engine/userguide/
ibm_admin@IBM815-PBXCWA3 MINGW64 ~
$

B. Setup Blockchain (Hyperledger) network using docker images

1. Execute following commands to pull docker images required to run Blockchain locally

   docker pull hyperledger/fabric-peer

   docker pull hyperledger/fabric-membersrvc

   docker pull hyperledger/fabric-baseimage:x86_64-0.2.1

2. Change tag of fabric-baseimage to latest.

   This is required due to the issue https://jira.hyperledger.org/browse/FAB-300 as a workaround

   docker tag <image-id> hyperledger/fabric-baseimage:latest

   image-id : image id of baseimage can be found by running command “docker images”

3. Create a directory

   e.g mkdir blockchain-compose

   cd blockchain-compose

4. Create docker-compose.yml file with the below contents

```
membersrvc:
  image: hyperledger/fabric-membersrvc
  ports:
    - "7054:7054"
  command: membersrvc
vp0:
  image: hyperledger/fabric-peer
  ports:
    - "7050:7050"
    - "7051:7051"
```

```
  - "7053:7053"
 environment:
  - CORE_PEER_ADDRESSAUTODETECT=true
  - CORE_VM_ENDPOINT=unix:///var/run/docker.sock
  - CORE_LOGGING_LEVEL=DEBUG
  - CORE_PEER_ID=vp0
  - CORE_PEER_PKI_ECA_PADDR=membersrvc:7054
  - CORE_PEER_PKI_TCA_PADDR=membersrvc:7054
  - CORE_PEER_PKI_TLSCA_PADDR=membersrvc:7054
  - CORE_SECURITY_ENABLED=true
  - CORE_SECURITY_ENROLLID=test_vp0
  - CORE_SECURITY_ENROLLSECRET=MwYpmSRjupbT
 volumes:
  - /var/run/docker.sock:/var/run/docker.sock
 links:
  - membersrvc
 command: sh -c "sleep 5; peer node start"
```

5. Run following command to start the Blockchain network with the images

   (More information about docker compose can be found at : https://docs.docker.com/compose/)

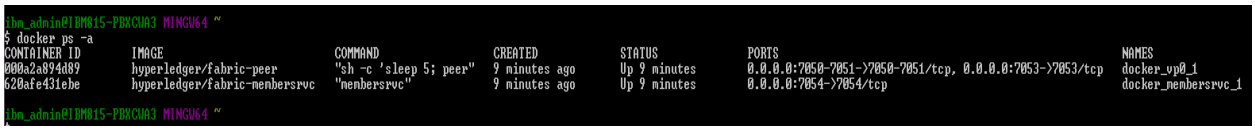
   Docker-compose up

   Make sure that to errors or failed messages displayed on the screen.

6. You can check running container by executing following command

   docker ps -a

   Example output :



C. Run a Sample Application – Marbles Application

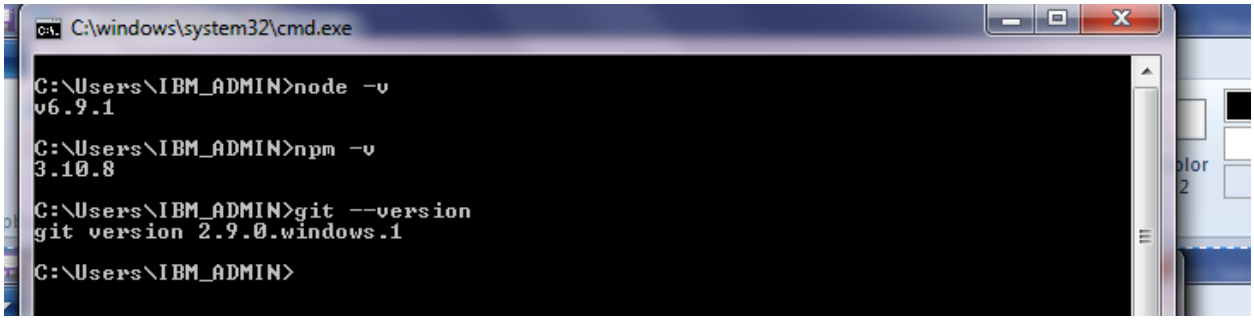
Refer: https://github.com/spansare/marbles

This is a nodejs based application which has been written using Nodejs SDK for Blockchain. This application demonstrates transferring marbles between two users leveraging IBM Blockchain

Follow the Steps below to run the application

1. Install Nodejs Runtime
    a. Download the Windows installer from the **Nodes.js® web site**
    b. Run the installer (the .msi file you downloaded in the previous step.)
    c. Follow the prompts in the installer (Accept the license agreement, click the NEXT button a bunch of times and accept the default installation settings).
    d. Restart your computer**.** You won't be able to run Node.js® until you restart your computer.
    e. Test Node**.** To see if Node is installed, open the Windows Command Prompt, Powershell or a similar command line tool, and type node -v

2. Install git for windows
    a. Download the Windows installer from **https://git-for-windows.github.io/**
    b. Run the exe
    c. Verify the installation



3. Clone the Sample Marbles application on the local Windows machine
    a. Open command prompt and create a directory to clone the application

mkdir local-marbles

cd local-marbles

b. Run below command to clone the application code from github

git clone https://github.com/spansare/marbles

4. Run the application – Execute command below

a. Change to marbles directory – cd marbles

b. Open mycreds.json file. This is the file which will contain all the details about your blockchain network.

Verify the IP Address. It should be the one noted in Section A Step 9.

If not, change it accordingly.

c. npm install gulp -g

d. npm install

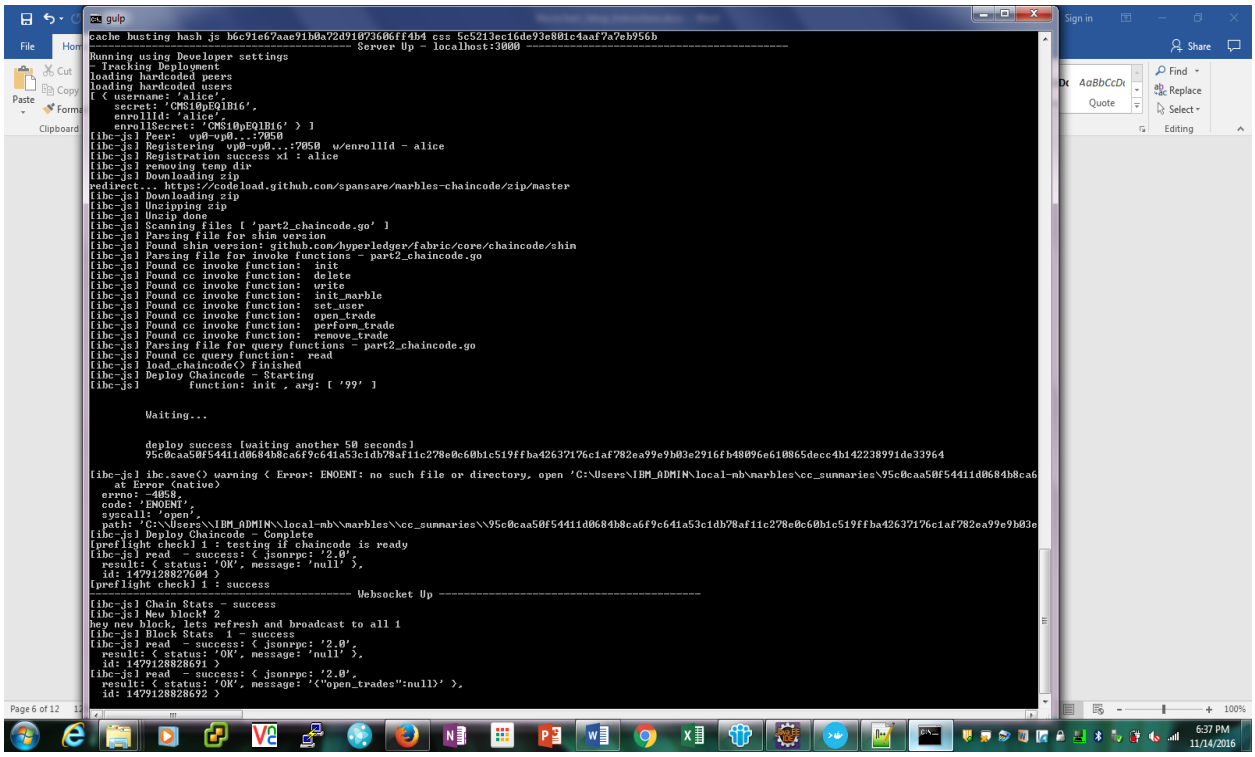
e. gulp

f. If all goes well you should see this message in the console:

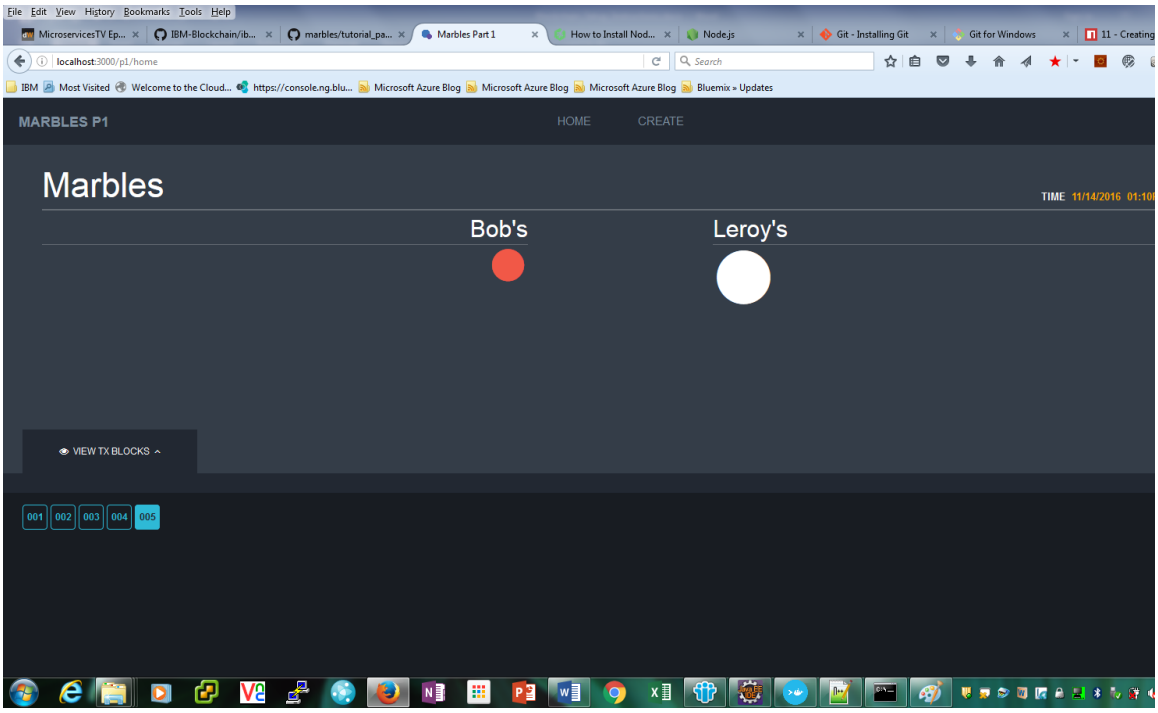
---------- Server Up - localhost:3000 ----------

g. The app is already coded to auto deploy the chaincode. You should see further message about it deploying. **[IMPORTANT]** You will need to wait about 60 seconds for the cc to fully deploy. The SDK will do the waiting for us by stalling our callback.

h. Once you see this message you are good to go:
[ibc-js] Deploying Chaincode - Complete
---------- Websocket Up ----------



5. Use the application
    a. Open up your browser and browse to http://localhost:3000
    b. Click the "Create" link on the top navigation bar
    c. Fill out all the fields, then click the "Create" button
    d. It should have flipped you back to "Home" and you should see that a new marble has been created
    e. Next let's trade a marble. Click and drag one marble from one person's list to another. It should temporary disappear and then auto reload the marbles in their new state.
    f. You can view all the transactions at the bottom of the application page



You have the sample application ready to use.

Note : Next Section is optional. If you have developed your own chaincode and want to test that on the network, you can refer next section, else it can be skipped

D. Test Blockchain Network – If you want to test your chaincode

There are 2 ways to test the network as listed below. You can use either of them

Through CLI

a. Open another Quickstart Docker Terminal.

Login to peer container

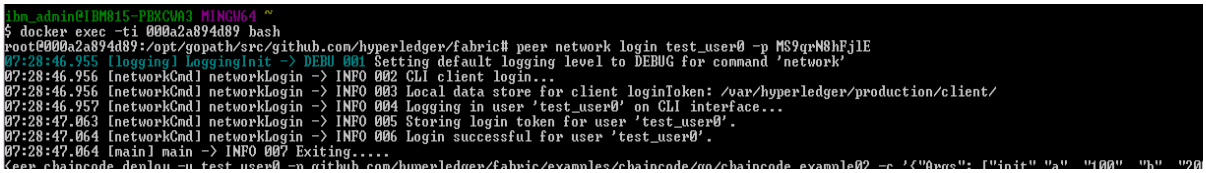
Docker exec -ti <container-id> bash

container-id : container id of the peer can be found by running “docker ps -a” command.

b. Execute following command to login into the network with user ‘test_user0’

Note : Users are pre-created for the network and their details can be found in file membersrvc.yaml in membersrvc container.

peer network login test_user0 -p MS9qrN8hFjlE



c. Execute following command to deploy chaincode

peer chaincode deploy -u test_user0 -p github.com/hyperledger/fabric/examples/chaincode/go/chaincode_example02 -c '{"Args": ["init","a", "100", "b", "200"]}'

github.com/hyperledger/fabric/examples/chaincode/go/chaincode_example02 : Sample chaincode which can be used to test the blockchain network

It will return hashcode for the deployed chaicode.

This process takes sometime even though command is completed.

Note : To verify chaincode deploy was successful, execute “docker ps -a” command (from Quickstart Docker terminal) and check if one more container is added to the list and is in running state.

Also, make sure there are no errors thrown on the terminal where “docker-compose up” command was initiated.

d. Execute following command to invoke chaincode

peer chaincode invoke -u test_user0 -n ee5b24a1f17c356dd5f6e37307922e39ddba12e5d2e203ed93401d7d05eb0dd194fb9070549c5dc31eb63f4e654dbd5a1d86cbb30c48e3ab1812590cd0f78539 -c '{"Args": ["invoke", "a", "b", "10"]}'

e. Execute following command to query chaincode

peer chaincode query -u test_user0 -n ee5b24a1f17c356dd5f6e37307922e39ddba12e5d2e203ed93401d7d05eb0dd194fb9070549c5dc31eb63f4e654dbd5a1d86cbb30c48e3ab1812590cd0f78539 -c '{"Args": ["query", "a"]}'

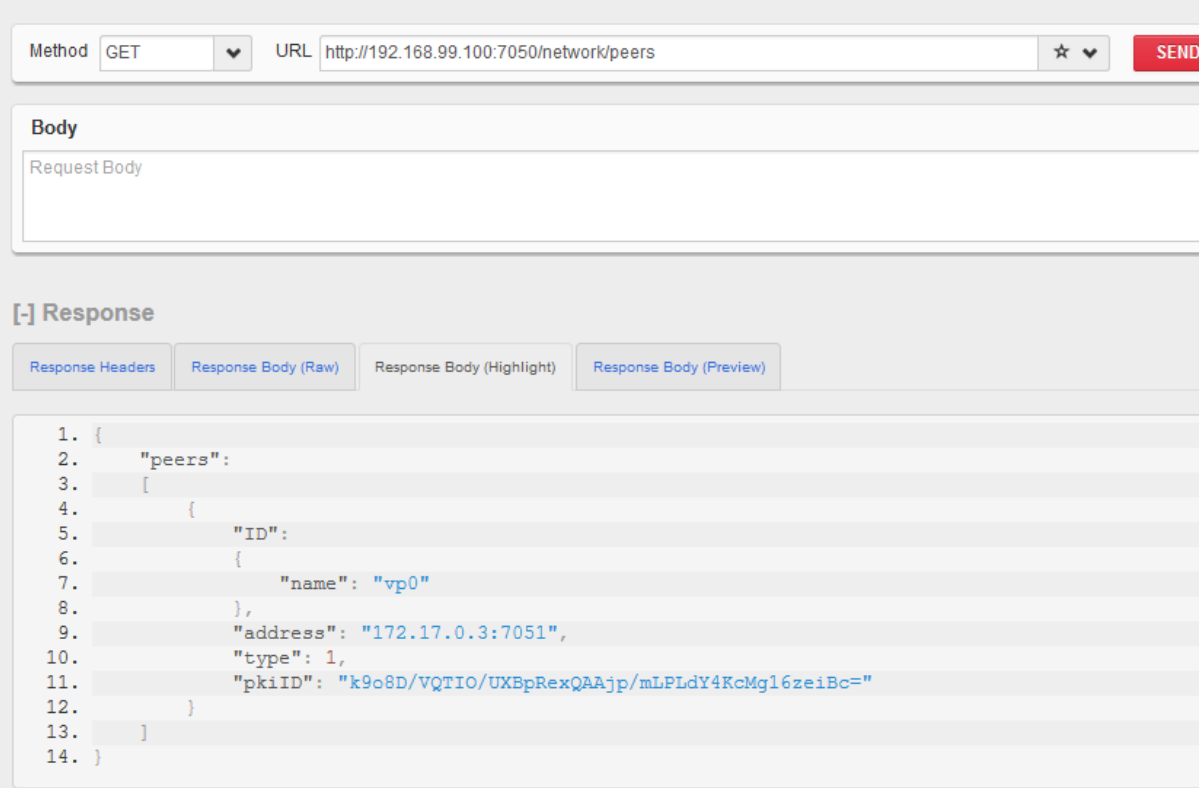
Through REST API

a. Use the IP address printed on Quickstart Docker Terminal (as mentioned in Section A Step 9) as REST API Endpoint for REST API invocation.

b. Use any REST Client (e.g. REST Client for Firefox or Postman for Chrome)

c. Use the GET call below to make sure REST API endpoint is configured correctly.

http://<IP Address>:7050/network/peers



d. Use POST call to register the User

http://<IP Address>:7050/registrar

with Body as:

{

"enrollId":"test_user0",

"enrollSecret":"MS9qrN8hFjlE"

}

e. Deploy Chaincode with REST API

http://<IP Address>:7050/chaincode

With Body as:

{

"jsonrpc": "2.0",

"method": "deploy",

"params": {

"type": 1,

"chaincodeID": {

"path":
"github.com/hyperledger/fabric/examples/chaincode/go/chaincode_example02"

},

"ctorMsg": {

"function": "init",

"args": [

"a",

"100",

"b",

"200"

]

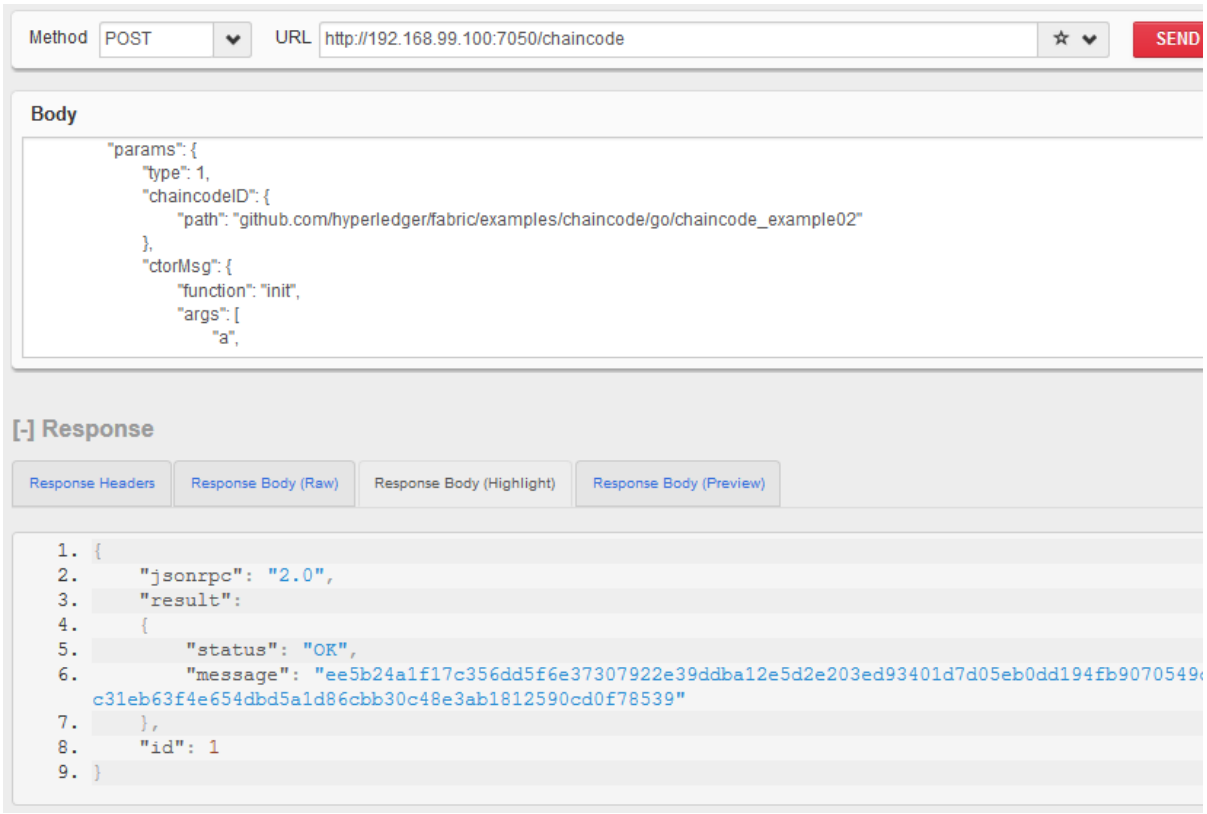
},

"secureContext": "test_user0"

},

"id": 1

}



f. Invoke Chaincode with REST API

http://<IP Address>:7050/chaincode

With Body as :

{

"jsonrpc": "2.0",

"method": "invoke",

"params": {

"type": 1,

"chaincodeID": {

"name":
"ee5b24a1f17c356dd5f6e37307922e39ddba12e5d2e203ed93401d7d05eb0dd19
4fb9070549c5dc31eb63f4e654dbd5a1d86cbb30c48e3ab1812590cd0f78539"

},

"ctorMsg": {

"function": "invoke",

"args": [

"a",

"b",

"10"

]

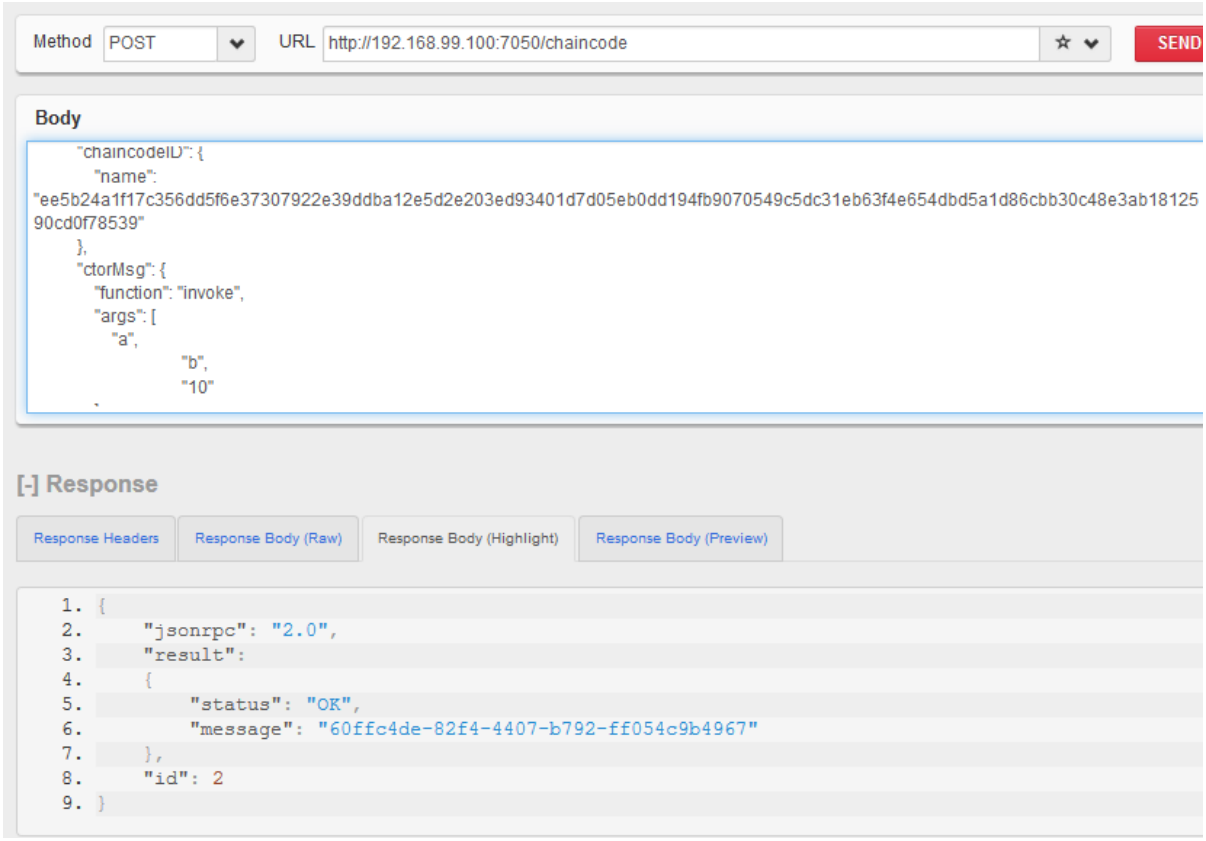
},

"secureContext": "test_user0"

},

"id": 2

}



g. Query Chaincode with REST API

http://192.168.99.100:7050/chaincode

With Body as:

{

"jsonrpc": "2.0",

"method": "query",

"params": {

"type": 1,

"chaincodeID": {

"name":
"ee5b24a1f17c356dd5f6e37307922e39ddba12e5d2e203ed93401d7d05eb0dd19
4fb9070549c5dc31eb63f4e654dbd5a1d86cbb30c48e3ab1812590cd0f78539"

},

"ctorMsg": {

"function": "read",

"args": [

"a"

]

},

"secureContext": "test_user0"

},

"id": 2

}