



**HYPERLEDGER**



# Developing Business Blockchain Applications on Hyperledger

**May 2018**

Dr.Thanachart Numnonda

IMC Institute  
[thanachart@imcinstitute.com](mailto:thanachart@imcinstitute.com)



## Launch an Ubuntu virtual server Using Google Cloud Platform

---

(You can skip this part if you already have an Ubuntu server)

# Launch Google Cloud Virtual Server

In this lab, we will use a GCP's compute engine as our server v

- Ubuntu Server 14.04 LTS
- 2 vCPU, 7.5 GB memory
- 50 GB SSD



**HYPERLEDGER**

# cloud.google.com

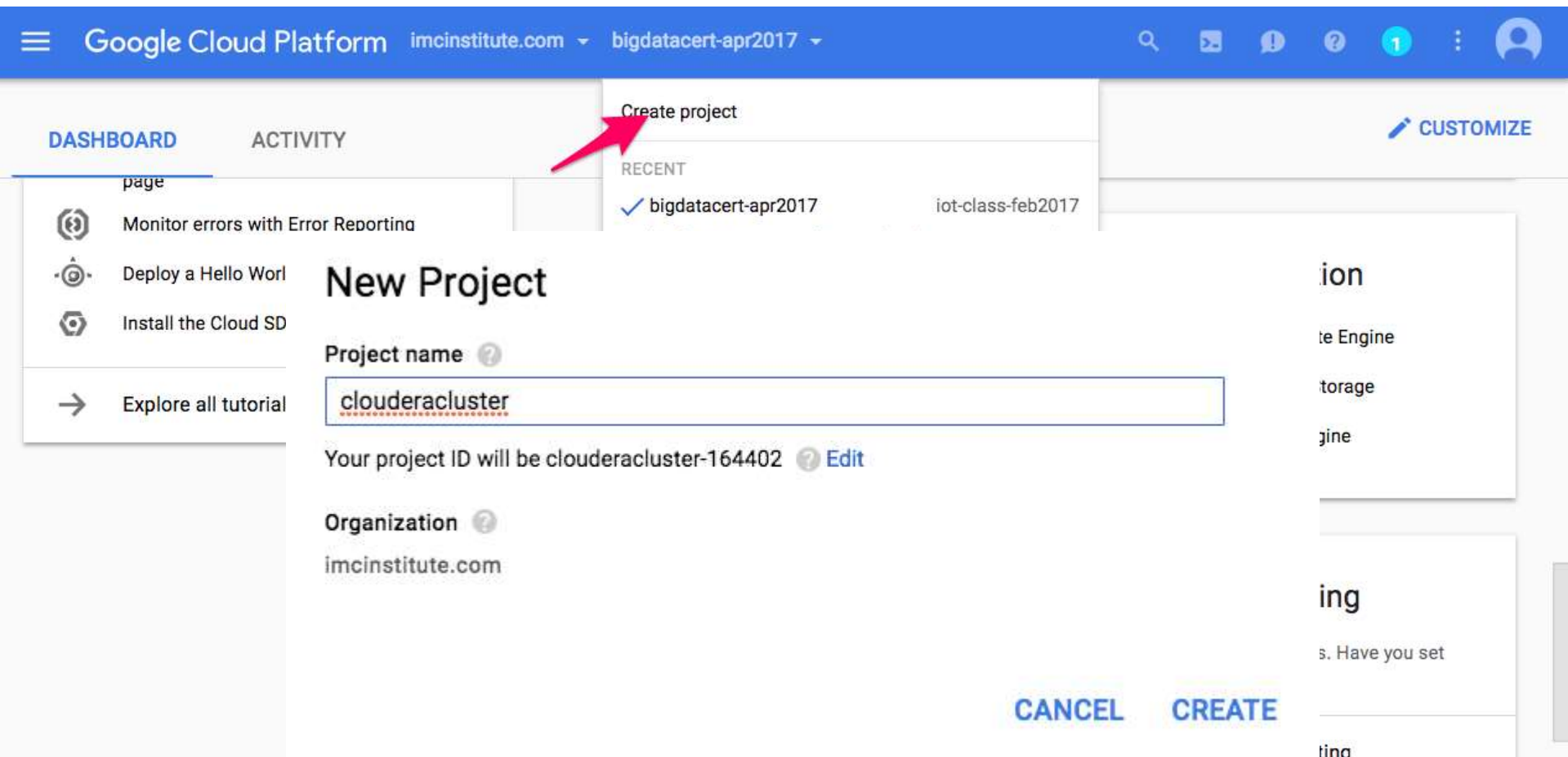
## Build What's Next Better software. Faster.

- ✓ Use Google's core infrastructure, data analytics and machine learning.
- ✓ Secure and fully featured for all enterprises.
- ✓ Committed to open source and industry leading price-performance.

[GO TO CONSOLE](#)

[CONTACT SALES](#)

# Create Google Cloud Project



Google Cloud Platform imcinstitute.com bigdatacert-apr2017

**DASHBOARD** ACTIVITY

page

- Monitor errors with Error Reporting
- Deploy a Hello World
- Install the Cloud SDK
- Explore all tutorials

**Create project**

RECENT

- ✓ bigdatacert-apr2017
- iot-class-feb2017

**ion**

te Engine

storage

gine

**New Project**

Project name ?

clouderacluster

Your project ID will be clouderacluster-164402 ? Edit

Organization ?

imcinstitute.com

**CANCEL CREATE**

**ing**

s. Have you set

tina

DASHBOARD

ACTIVITY

 CUSTOMIZE



## Project info

clouderacluster

Project ID: clouderacluster-164402  
#984926510584



Manage project settings

## Resources

API

## APIs

Requests (requests/sec)

There is no data for this chart



Go to APIs overview

## Google Cloud Platform status

All services normal



Go to Cloud status dashboard



## Error Reporting

No sign of any errors. Have you set up Error Reporting?

# Select Compute Engine

You have \$300.00 in credit and 55 days left in your free trial.

DISMISS

UPGRADE

Google Cloud Platform

Filter products & services

Home

API Manager

Billing

Cloud Launcher

Support

IAM & Admin

COMPUTE

App Engine

Compute Engine

Container Engine

Networking

board

Try Compute Engine

Create a Linux virtual machine instance in Compute Engine in this guided walkthrough.



Get started

Learn to use Cloud Storage

Cloud Storage is a powerful and simple storage service. In this tutorial you'll learn the basics by creating a storage bucket, and then uploading and sharing a sample file as a public URL link.



Get started

Try App Engine

Create and deploy a Hello World app



Get started

Use Google APIs

Enable APIs, create credentials, and track your usage

API

Enable and manage APIs


Learn Google Cloud Platform

Take an interactive tutorial now and learn how to deploy and build simple applications.

Create a Cloud SQL instance

Cloud SQL is a MySQL database that runs

# Select Create Instance







 You have \$300.00 in credit and 55 days left in your free trial.


DISMISS


UPGRADE


Google Cloud Platform Hadoop Project


Search


     


 Compute Engine


 VM instances


 Instance groups


 Instance templates


 Disks


 Snapshots


 Images


 Metadata

 Health checks

 Zones

 Operations

 Quotas


 Settings

Compute Engine

VM instances

Compute Engine lets you use virtual machines that run on Google's infrastructure. You can choose from micro-VMs to large instances running Debian, Windows, or other standard images. Create your first VM instance or try the quickstart to build a sample app.

Create Instance or Take the quickstart



Blockchain App on Hyperledger

Thanachart Numnonda, [thanachart@imcinstitute.com](mailto:thanachart@imcinstitute.com)




# Create an instance with the following configuration

Name ?  
imc-hyperledger

Zone ?  
us-central1-c

Machine type  
Customise to select cores, memory and GPUs.  
2 vCPUs 7.5 GB memory [Customise](#)

Container ?  
☐ Deploy a container image to this VM instance. [Learn more](#)

Boot disk ?  
 New 50 GB standard persistent disk  
Image  
Ubuntu 14.04 LTS [Change](#)

Identity and API access ?  
Service account ?  
Compute Engine default service account  
Access scopes ?  
☒ Allow default access  
☐ Allow full access to all Cloud APIs  
☐ Set access for each API

Firewall ?  
Add tags and firewall rules to allow specific network traffic from the Internet  
☒ Allow HTTP traffic  
☒ Allow HTTPS traffic  
[Management, disk, networking, SSH keys](#)

You will be billed for this instance. [Learn more](#)

[Create](#) [Cancel](#)

# Select boot disk as Ubuntu 14.04 and 50 GB

## Boot disk

Select an image or snapshot to create a boot disk, or attach an existing disk

OS images   Application images   Custom images   Snapshots   Existing disks

- ☐ CentOS 6  
x86\_64 built on 20180401
- ☐ CentOS 7  
x86\_64 built on 20180401
- ☐ CoreOS alpha 1758.0.0  
amd64-usr published on 2018-04-25
- ☐ CoreOS beta 1745.1.0  
amd64-usr published on 2018-04-25
- ☐ CoreOS stable 1688.5.3  
amd64-usr published on 2018-04-03
- ☒ Ubuntu 14.04 LTS  
amd64 trusty image built on 2018-04-23
- ☐ Ubuntu 16.04 LTS  
amd64 xenial image built on 2018-04-24
- ☐ Ubuntu 17.10

Can't find what you're looking for? Explore hundreds of VM solutions in [Cloud Launcher](#)

Boot disk type ?

Standard persistent disk ▼

Size (GB) ?

50

Select

Cancel




# Connect via SSH in browser window

Google Cloud Platform clouderacluster

Compute Engine

VM instances

Filter VM instances

<input type="checkbox"/>	Name ^	Zone	Recommendation	Internal IP	External IP	Connect
<input type="checkbox"/>	 imc-hyperledger	us-central1-c		10.128.0.2	35.192.54.6 	SSH 

- Open in browser window
- Open in browser window on custom port
- View gcloud command
- Use another SSH client

# Connect to the instance

```
Connected, host fingerprint: ssh-rsa 2048 FC:E9:36:F1:43:FC:E6:D7:70:55:2E:3C:7F:C0:22:49:20:77:CD:8D
Welcome to Ubuntu 14.04.5 LTS (GNU/Linux 4.4.0-121-generic x86_64)
```

```
* Documentation:  https://help.ubuntu.com/
```

```
System information as of Sat May  5 09:08:27 UTC 2018
```

```
System load: 0.0           Memory usage: 1%    Processes:      66
Usage of /:  11.4% of 9.81GB Swap usage:   0%    Users logged in: 0
```

```
Graph this data and manage this system at:
https://landscape.canonical.com/
```

```
Get cloud support with Ubuntu Advantage Cloud Guest:
http://www.ubuntu.com/business/services/cloud
```

```
0 packages can be updated.
0 updates are security updates.
```

```
Your Hardware Enablement Stack (HWE) is supported until April 2019.
```

```
The programs included with the Ubuntu system are free software;
the exact distribution terms for each program are described in the
individual files in /usr/share/doc/*/copyright.
```

```
Ubuntu comes with ABSOLUTELY NO WARRANTY, to the extent permitted by
applicable law.
```

```
thanachart@imc-hyperledger:~$ █
```

# Installing Hyperledger development environment

---

# Installing prerequisites

```
$ curl -O https://hyperledger.github.io/composer/latest/prereqs-ubuntu.sh
$ chmod u+x prereqs-ubuntu.sh
$ ./prereqs-ubuntu.sh
```

```
thanachart@imc-hyperledger:~$ curl -O https://hyperledger.github.io/composer/latest/prereqs-ubuntu.sh
  % Total    % Received % Xferd  Average Speed   Time    Time     Time  Current
                                 Dload  Upload   Total   Spent    Left   Speed
100  4151  100  4151    0     0  29972      0 --:--:-- --:--:-- --:--:-- 30079
thanachart@imc-hyperledger:~$ chmod u+x prereqs-ubuntu.sh
thanachart@imc-hyperledger:~$ ./prereqs-ubuntu.sh
Installing Hyperledger Composer prereqs for Ubuntu trusty
# Updating package lists
gpg: keyring `/tmp/tmp8mglxygq/secring.gpg' created
gpg: keyring `/tmp/tmp8mglxygq/pubring.gpg' created
gpg: requesting key E1DF1F24 from hkp server keyserver.ubuntu.com
gpg: /tmp/tmp8mglxygq/trustdb.gpg: trustdb created
gpg: key E1DF1F24: public key "Launchpad PPA for Ubuntu Git Maintainers" imported
gpg: Total number processed: 1
```

# Installing the Hyperledger Composer tools

```
$ npm install -g composer-cli
$ npm install -g composer-rest-server
$ npm install -g generator-hyperledger-composer
$ npm install -g yo
$ npm install -g composer-playground
```

```
> grpc@1.10.1 install /home/thanachart/.nvm/versions/node/v8.11.1/lib/node_modules/composer-playground/node_modules/
pc
> node-pre-gyp install --fallback-to-build --library=static_library

[grpc] Success: "/home/thanachart/.nvm/versions/node/v8.11.1/lib/node_modules/composer-playground/node_modules/grpc/
c/node/extension_binary/node-v57-linux-x64-glibc/grpc_node.node" is installed via remote
npm WARN composer-wallet-inmemory@0.19.4 requires a peer of composer-common@0.19.3 but none is installed. You must i
tall peer dependencies yourself.
npm WARN composer-wallet-filesystem@0.19.4 requires a peer of composer-common@0.19.3 but none is installed. You must
install peer dependencies yourself.

+ composer-playground@0.19.4
added 599 packages from 473 contributors in 34.224s
thanachart@imc-hyperledger:~$
```



# Installing Hyperledger Fabric

```
$ mkdir ~/fabric-dev-servers && cd ~/fabric-dev-servers
$ curl -O https://raw.githubusercontent.com/hyperledger/composer-tools/master/packages/fabric-dev-servers/fabric-dev-servers.tar.gz
$ tar -xvf fabric-dev-servers.tar.gz
$ ./downloadFabric.sh
```

```
thanachart@imc-hyperledger:~$ mkdir ~/fabric-dev-servers && cd ~/fabric-dev-servers
thanachart@imc-hyperledger:~/fabric-dev-servers$ curl -O https://raw.githubusercontent.com/hyperledger/composer-tools/master/packages/fabric-dev-servers/fabric-dev-servers.tar.gz
  % Total    % Received % Xferd  Average Speed   Time    Time     Time  Current
                                 Dload  Upload   Total   Spent    Left   Speed
100 23416  100 23416    0     0  128k      0  --:--:-- --:--:-- --:--:--  129k
thanachart@imc-hyperledger:~/fabric-dev-servers$ tar -xvf fabric-dev-servers.tar.gz
package.json
_loader.sh
createComposerProfile.sh
createPeerAdminCard.sh
downloadFabric.sh
startFabric.sh
stopFabric.sh
```



# Starting Hyperledger-Fabric & Hyperledger composer playground

---

# Starting Hyperledger-Fabric

```
$ ./startFabric.sh
```

```
$ ./createPeerAdminCard.sh
```

```
chanachart@imc-hyperledger:~/fabric-dev-servers$ ./createPeerAdminCard.sh
Development only script for Hyperledger Fabric control
Running 'createPeerAdminCard.sh'
FABRIC_VERSION is unset, assuming hlfv1.1
FABRIC_START_TIMEOUT is unset, assuming 15 (seconds)
```

```
Using composer-cli at v0.19.4
```

```
Successfully created business network card file to
  Output file: /tmp/PeerAdmin@hlfv1.1.card
```

```
Command succeeded
```

```
Successfully imported business network card
  Card file: /tmp/PeerAdmin@hlfv1.1.card
  Card name: PeerAdmin@hlfv1
```

```
Command succeeded
```

```
The following Business Network Cards are available:
```

```
Connection Profile: hlfv1
```

Card Name	UserId	Business Network
PeerAdmin@hlfv1	PeerAdmin	

# Viewing running process

\$ docker ps -a

```
thanachart@imc-hyperledger:~/fabric-dev-servers$ docker ps -a
```

CONTAINER ID	IMAGE	COMMAND	CREATED	STATUS
PORTS		NAMES		
43afe08cebff	hyperledger/fabric-peer:x86_64-1.1.0	"peer node start"	About a minute ago	Up About a
minute 0.0.0.0:7051->7051/tcp, 0.0.0.0:7053->7053/tcp		peer0.org1.example.com		
fa066327c38a	hyperledger/fabric-couchdb:x86_64-0.4.6	"tini -- /docker-ent..."	About a minute ago	Up About a
minute 4369/tcp, 9100/tcp, 0.0.0.0:5984->5984/tcp		couchdb		
d3914b516484	hyperledger/fabric-orderer:x86_64-1.1.0	"orderer"	About a minute ago	Up About a
minute 0.0.0.0:7050->7050/tcp		orderer.example.com		
a321e0e313bc	hyperledger/fabric-ca:x86_64-1.1.0	"sh -c 'fabric-ca-se..."	About a minute ago	Up About a
minute 0.0.0.0:7054->7054/tcp		ca.org1.example.com		

# Starting composer-playground

\$ composer-playground

```
thanachart@imc-hyperledger:~/fabric-dev-servers$ composer-playground
info: [Hyperledger-Composer] :LoadModule                :loadModule()           Loading composer-wallet-filesystem f
rom /home/thanachart/.nvm/versions/node/v8.11.1/lib/node_modules/composer-playground/node_modules/composer-wallet-file
system
info: [Hyperledger-Composer] :PlaygroundAPI             :createServer()           Playground API started on port 8080
```

# Obtain a server's external IP

Google Cloud Platform clouderacluster

Compute Engine

VM instances

Filter VM instances

<input type="checkbox"/>	Name ^	Zone	Recommendation	Internal IP	External IP	Connect
<input type="checkbox"/>	imc-hyperledger	us-central1-c		10.128.0.2	35.192.54.6	SSH

SHOW INFO PANEL

Columns

# Launch web-playground (http://ip-address:8080)

Browser address bar: 35.192.54.6:8080/login

Hyperledger Composer Playground

My Business Networks

Connection: hlfv1

PeerAdmin@h

USER ID

PeerAdmin


BUSINESS NETWORK

none

Connect Now

Create Business Network Card

Welcome to Hyperledger Composer Playground!



In this web sandbox, you can deploy, edit and test business network definitions. Have a play and learn what Hyperledger Composer Playground is all about.

[Let's Blockchain!](#)

[? Not sure where to start? View our Playground tutorial.](#)

Legal GitHub Playground v0.19.4 Tutorial Docs Community

# Running an example business network

---

# Business network definition

## Business network definition

```
1 {  
2   "name": "digitalproperty-network",  
3   "version": "0.0.10",  
4   "description": "Digital Property Network"  
5 }
```

Model files

Access control rules

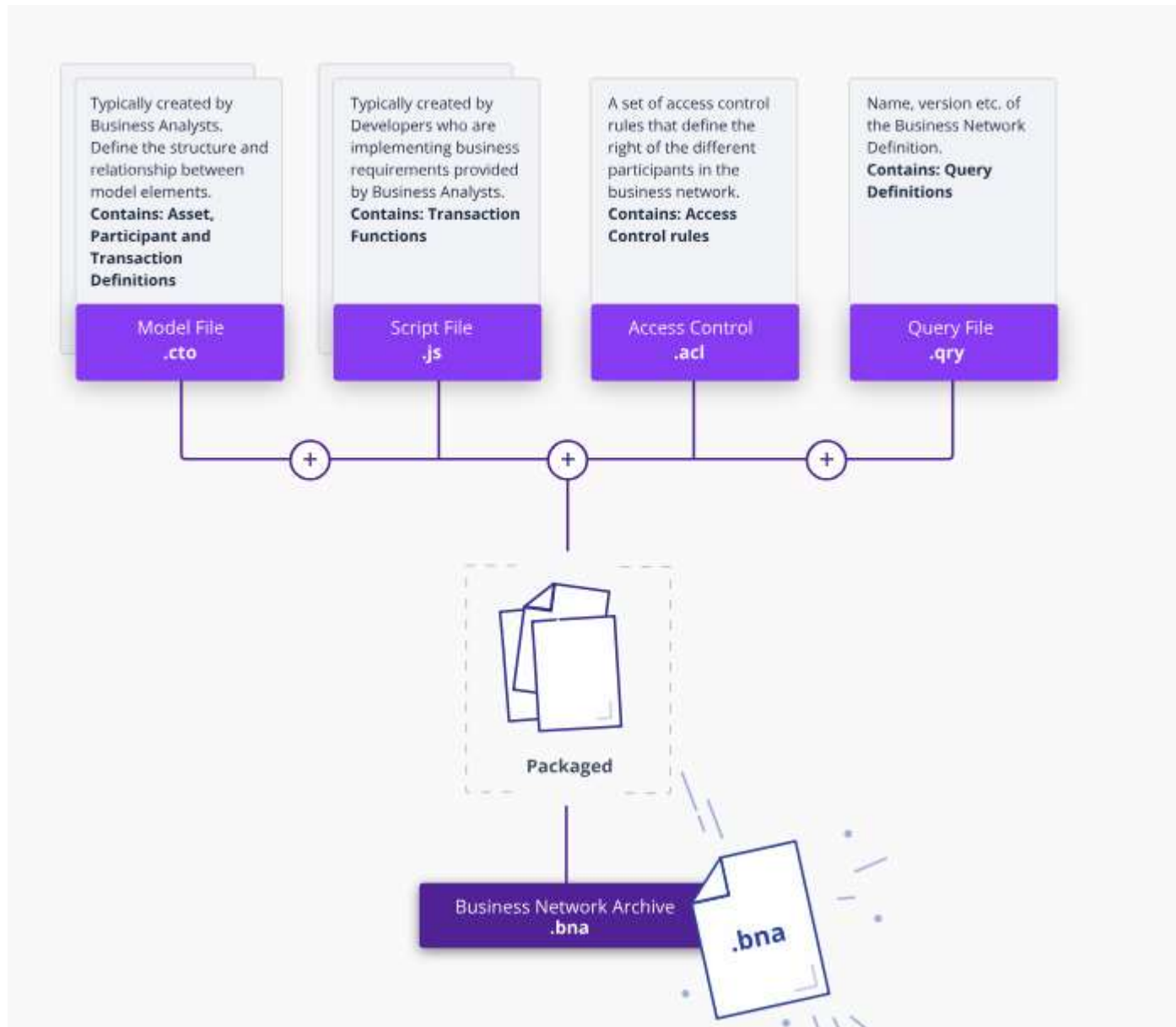
Transaction processor functions

Each business network definition has metadata associated with it – at least a name and version.

The metadata is stored in a package.json file.  
Each business network definition is a npm module.

The business network definition contains all of the model files, access control rules, and transaction processor functions for a business network.





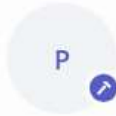
# Click Deploy a new business network

My Business Networks



[Import Business Network Card](#)

[Create Business Network Card](#)

Connection: hlfv1



**PeerAdmin@hlfv1**





USER ID

**PeerAdmin**

BUSINESS NETWORK

none

Connect now →



Deploy a new business network

# Provide basic information and select **basic-sample-network** (provide the network admin as **Admin@hlfv1** )

## Hyperledger Composer Playground

### Deploy New Business Network

#### 1. BASIC INFORMATION

Give your new Business Network a name:

basic-sample-network

Describe what your Business Network will be used for:

The Hello World of Hyperledger Composer samples

Give the network admin card that will be created a name

Admin@hlfv1

#### 2. MODEL NETWORK STARTER TEMPLATE

Choose a Business Network Definition to start with:

Choose a sample to play with, start a new project, or import your previous work



basic-sample-network



empty-business-network



Drop here to  
upload or browse

# Provide credentials information

(Assign the Enrolment id: **admin** Enrolment secret : **adminpw**)

## 3. CREDENTIALS FOR NETWORK ADMINISTRATOR

You must provide credentials in one of the following formats before you deploy this business network

The credentials will be used to access the business network once it is deployed

- ☐ **Certificates**  
Required here are certificate and private key files.
- ☒ **ID and Secret**  
These can be created when accessing a business network.

An Enrollment ID and Secret must be created by someone who already has access to the Business Network you are connecting to.

Enrollment ID

admin



Enrollment Secret

\*\*\*\*\*



# Now the network is defined, click **Deploy**.

Hyperledger Composer Playground

Deploy New Business Network

1. BASIC INFORMATION

Give your new Business Network a name:

imc-demo

Describe what your Business Network will be used for:

Banking demo


Give the network admin card that will be created a name

Admin@org1.example.com


2. MODEL NETWORK STARTER TEMPLATE

Choose a Business Network Definition to start with:


Choose a sample to play with, start a new project, or import your previous work




basic-sample-network



empty-business-network



Drop here to upload or [browse](#)




imc-demo  
Banking demo

CONNECTION PROFILE

BASED ON  
empty-business-network

Start from scratch with a blank business network

Contains: 0 Participant Types, 0 Asset Types, and 0 Transaction Types



Deploy

# The new business network will be shown, click **Connect now**

**Hyperledger** Composer Playground

My Business Networks

Connection: hlfv1

P

PeerAdmin@hlfv1

USER ID

PeerAdmin

BUSINESS NETWORK

none

Connect now →

A

Admin2@hlfv1

USER ID

admin

BUSINESS NETWORK

basic-sample-network2

Connect now →

Deploy a new business network

Legal

GitHub

Playground v0.19.4

Tutorial

Docs

Community

Open another terminal console,  
Type command **docker ps -a**,  
You will see another container is running

```

thanachart@imchyperledger:~$ docker ps -a
CONTAINER ID        IMAGE                                     COMMAND                  CREATED            STATUS              PORTS
0f8cb042c530        dev-peer0.org1.example.com-basic-sample-network-0.2.4-20180426144018-f192bdbf3887f510d7498828d7e20 NAMES
23ad9494488b37e8c98465841b0e2982e06   "/bin/sh -c 'cd /usr..." About a minute ago Up About a minute
dev-peer0.org1.example.com-basic-sample-network-0.2.4-20180426144018
9ac9c739068d        hyperledger/fabric-peer:x86_64-1.1.0   "peer node start"      18 minutes ago    Up 18 minutes      0.0.0.0:7051->
7051/tcp, 0.0.0.0:7053->7053/tcp peer0.org1.example.com
610fdf23f222        hyperledger/fabric-couchdb:x86_64-0.4.6 "tini -- /docker-ent..." 18 minutes ago    Up 18 minutes      4369/tcp, 9100
/tcp, 0.0.0.0:5984->5984/tcp couchdb
f61e54c98552        hyperledger/fabric-ca:x86_64-1.1.0     "sh -c 'fabric-ca-se..." 18 minutes ago    Up 18 minutes      0.0.0.0:7054->
7054/tcp ca.org1.example.com
e681d774d6c1        hyperledger/fabric-orderer:x86_64-1.1.0 "orderer"              18 minutes ago    Up 18 minutes      0.0.0.0:7050->
5050/tcp

```



hlfv1 basic-sample-network2

Define

Test

admin

FILES

About

README.md, package.json

Model File

models/sample.cto

Script File

lib/sample.js

Access Control

permissions.acl

Add a file...

Export

UPDATE NETWORK

From: 0.2.4-20180426144018

To: 0.2.4-deploy.0

Deploy changes

About File README.md

Basic Sample Business Network

*This is the "Hello World" of Hyperledger Composer samples, which demonstrates the core functionality of Hyperledger Composer by changing the value of an asset.*

This business network defines:

**Participant** SampleParticipant

**Asset** SampleAsset

**Transaction** SampleTransaction

**Event** SampleEvent

SampleAssets are owned by a SampleParticipant, and the value property on a SampleAsset can be modified by submitting a SampleTransaction. The SampleTransaction emits a SampleEvent that notifies applications of the old and new values for each modified SampleAsset.

Legal

GitHub

Playground v0.19.4

Tutorial

Docs

Community



# Exploring a business network

Viewing the following files:

- Model
- Script
- Access control

The screenshot displays the IMC Institute web interface for a business network. The top navigation bar includes the project name 'hlfr1 basic-sample-network2', tabs for 'Define' and 'Test', and a user profile 'admin'. The left sidebar contains a 'FILES' section with links to 'About' (README.md, package.json), 'Model File' (models/sample.cto), 'Script File' (lib/sample.js), and 'Access Control' (permissions.acl). Below this is an 'UPDATE NETWORK' section showing a deployment from version 0.2.4-20180426144018 to 0.2.4-deploy.0, with a 'Deploy changes' button. The main area shows the 'Model File models/sample.cto' with a code editor containing the following code:

```
23   o String value
24 }
25
26 participant SampleParticipant identified by participantId {
27   o String participantId
28   o String firstName
29   o String lastName
30 }
31
32 transaction SampleTransaction {
33   --> SampleAsset asset
34   o String newValue
35 }
36
37 event SampleEvent {
38   --> SampleAsset asset
39   o String oldValue
40   o String newValue
41 }
```

Below the code editor, a green checkmark icon and the text 'Everything looks good!' indicate that the code is valid. A message below states 'Any problems detected in your code would be reported here'.

# Basic-sample-network

## Definition

- Asset
  - SampleAsset
- Participant
  - SampleParticipant
- Transaction
  - SampleTransaction
- Event
  - SampleEvent

# Testing the business network definition, Click **Test** tab

The screenshot displays the IMC Institute business network interface. The top navigation bar is dark blue with the text 'hlfv1 basic-sample-network2' on the left, 'Define' and 'Test' tabs in the center, and 'admin' with a dropdown arrow on the right. A red arrow points to the 'Test' tab. The left sidebar is light blue and contains three sections: 'PARTICIPANTS' with 'SampleParticipant', 'ASSETS' with 'SampleAsset', and 'TRANSACTIONS' with 'All Transactions'. A blue button labeled 'Submit Transaction' is at the bottom of the sidebar. The main content area has a light blue background. At the top, it says 'Participant registry for org.example.basic.SampleParticipant' with a '+ Create New Participant' button on the right. Below this is a table with two columns: 'ID' and 'Data'. The table is empty. In the center of the table area is an illustration of a hand holding a pencil, with a line graph showing a peak and a dip. Below the illustration, the text reads: 'This registry is empty!' and 'To create resources in this registry click create new at the top of this page'.

hlfv1 basic-sample-network2

Define Test

admin

PARTICIPANTS

SampleParticipant

ASSETS

SampleAsset

TRANSACTIONS

All Transactions

Submit Transaction

Participant registry for org.example.basic.SampleParticipant

+ Create New Participant

ID	Data
----	------

This registry is empty!

To create resources in this registry click create new at the top of this page

# Click Create New Participant

hlfv1 basic-sample-network2

Define Test

admin

PARTICIPANTS

SampleParticipant

ASSETS

SampleAsset


TRANSACTIONS

All Transactions

Submit Transaction

Participant registry for org.example.basic.SampleParticipant

+ Create New Participant

ID	Data
	

This registry is empty!

To create resources in this registry click create new at the top of this page

# Enter the first participant, then click **Create New**

Create New Participant

In registry: **org.example.basic.SampleParticipant**

JSON Data Preview

```
1 {  
2   "$class": "org.example.basic.SampleParticipant",  
3   "participantId": "001",  
4   "firstName": "Thanachart",  
5   "lastName": "Numnonda"  
6 }
```

☐ Optional Properties

Just need quick test data? [Generate Random Data](#)

[Cancel](#) [Create New](#)

# Enter the second participant, then click **Create New**

## Create New Participant

In registry: **org.example.basic.SampleParticipant**

JSON Data Preview

```
1 {  
2   "$class": "org.example.basic.SampleParticipant",  
3   "participantId": "002",  
4   "firstName": "IMCinstitute",  
5   "lastName": "Test"  
6 }
```

☐ Optional Properties

Just need quick test data? [Generate Random Data](#)

Cancel

Create New

# A list of participants will be shown

hlfv1 basic-sample-network2

Define Test

admin

PARTICIPANTS

SampleParticipant

ASSETS

SampleAsset





TRANSACTIONS

All Transactions

Submit Transaction

Participant registry for org.example.basic.SampleParticipant

+ Create New Participant

ID	Data	
001	<pre>{   "\$class": "org.example.basic.SampleParticipant",   "participantId": "001",   "firstName": "Thanachart",   "lastName": "Numnonda" }</pre>	 
002	<pre>{   "\$class": "org.example.basic.SampleParticipant",   "participantId": "002",   "firstName": "IMCinstitute",   "lastName": "Test" }</pre>	 

Legal

GitHub

Playground v0.19.4

Tutorial

Docs

Community

# All transactions show events

hlfv1 basic-sample-network2

Define Test

admin

PARTICIPANTS

SampleParticipant

ASSETS

SampleAsset

TRANSACTIONS

All Transactions

Submit Transaction

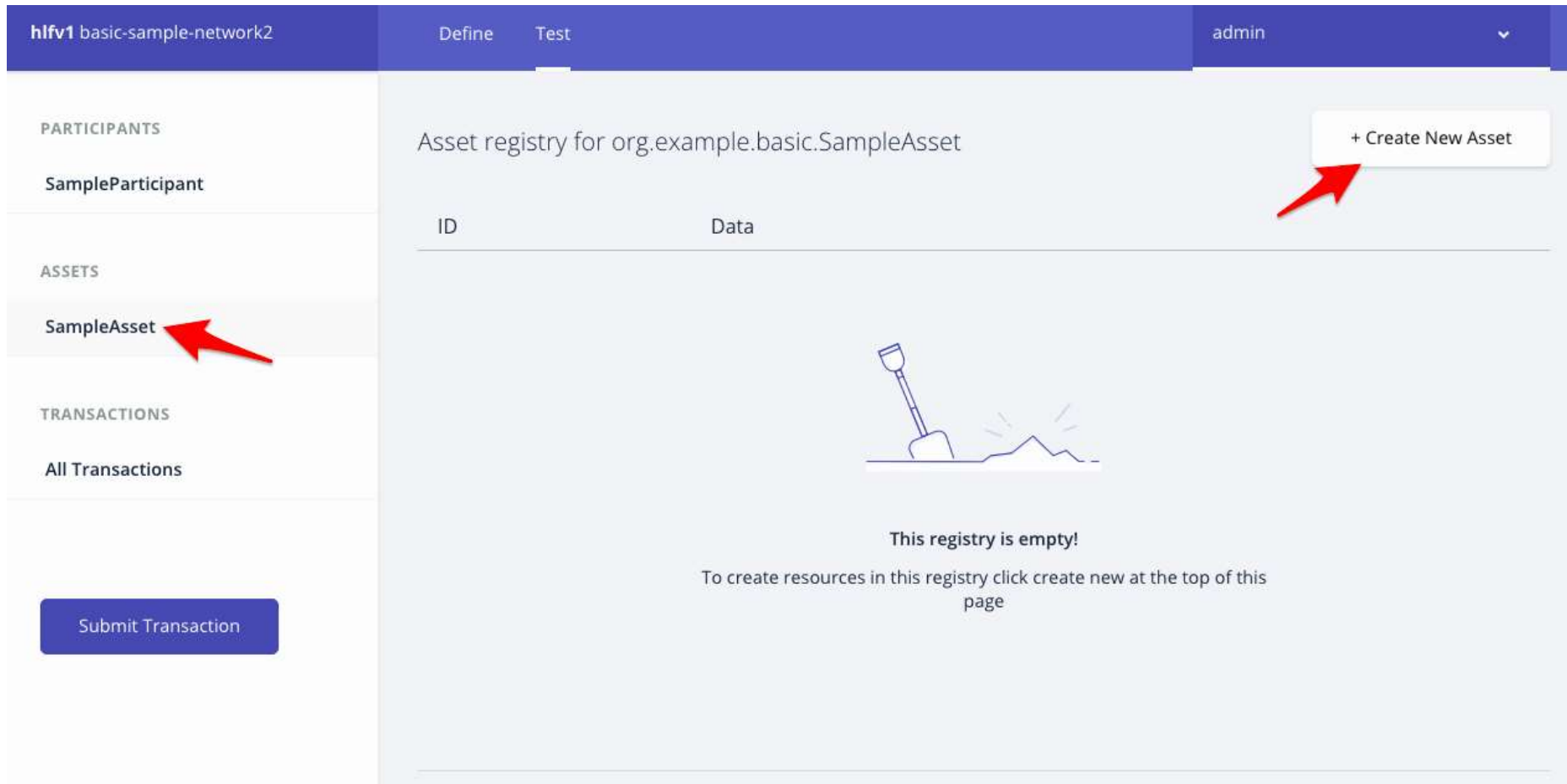
Date, Time	Entry Type	Participant	
2018-05-06, 11:26:49	AddParticipant	admin (NetworkAdmin)	<a href="#">view record</a>
2018-05-06, 11:25:18	AddParticipant	admin (NetworkAdmin)	<a href="#">view record</a>
2018-05-06, 11:10:15	ActivateCurrentIdentity	none	<a href="#">view record</a>
2018-05-06, 11:06:13	StartBusinessNetwork	none	<a href="#">view record</a>
2018-05-06, 11:06:13	IssueIdentity	none	<a href="#">view record</a>

Legal GitHub

Playground v0.19.4 Tutorial Docs Community



# Select **SampleAsset**, then click **Create New Asset**



The screenshot displays the IMC Institute web application interface. The top navigation bar includes the text "hlfv1 basic-sample-network2", tabs for "Define" and "Test", and a user profile "admin" with a dropdown arrow. The left sidebar contains a menu with sections: "PARTICIPANTS" (with "SampleParticipant"), "ASSETS" (with "SampleAsset" highlighted by a red arrow), and "TRANSACTIONS" (with "All Transactions"). A "Submit Transaction" button is located at the bottom of the sidebar. The main content area is titled "Asset registry for org.example.basic.SampleAsset" and features a table with headers "ID" and "Data". A red arrow points to a "+ Create New Asset" button in the top right corner of the main area. Below the table, there is an illustration of a shovel digging into the ground, followed by the text "This registry is empty!" and "To create resources in this registry click create new at the top of this page".

# Enter the new asset, then click **Create New**

Create New Asset

In registry: **org.example.basic.SampleAsset**

JSON Data Preview

```
1 {  
2   "$class": "org.example.basic.SampleAsset",  
3   "assetId": "A01",  
4   "owner": "001",  
5   "value": "1000"  
6 }
```

☐ Optional Properties

Just need quick test data? [Generate Random Data](#)

Cancel

Create New

# A list of assets will be shown

hlfv1 basic-sample-network2

DefineTest

admin

PARTICIPANTS

SampleParticipant

ASSETS

SampleAsset



TRANSACTIONS

All Transactions

Submit Transaction

Asset registry for org.example.basic.SampleAsset

+ Create New Asset

ID	Data
A01	<div><pre>{   "\$class": "org.example.basic.SampleAsset",   "assetId": "A01",   "owner": "resource:org.example.basic.SampleParticipant#001",   "value": "1000" }</pre></div> <div></div>

# Click **Submit Transaction**

hlfv1 basic-sample-network2

Define Test

admin

PARTICIPANTS

SampleParticipant

ASSETS

SampleAsset



TRANSACTIONS

All Transactions

Submit Transaction

Asset registry for org.example.basic.SampleAsset

+ Create New Asset

ID	Data
A01	<div><pre>{   "\$class": "org.example.basic.SampleAsset",   "assetId": "A01",   "owner": "resource:org.example.basic.SampleParticipant#001",   "value": "1000" }</pre></div> <div></div>

Enter the transaction information, then click **Submit**

Submit Transaction

Transaction Type SampleTransaction

JSON Data Preview

```
1 {  
2   "$class": "org.example.basic.SampleTransaction",  
3   "asset": "A01",  
4   "newValue": "550"  
5 }
```

☐ Optional Properties

Just need quick test data? [Generate Random Data](#)

Cancel

Submit

# The asset value is now changed

hlfv1 basic-sample-network2

Define Test

admin

PARTICIPANTS

SampleParticipant

ASSETS

SampleAsset



TRANSACTIONS

All Transactions

Submit Transaction

Asset registry for org.example.basic.SampleAsset

+ Create New Asset

ID	Data
A01	<div><pre>{   "\$class": "org.example.basic.SampleAsset",   "assetId": "A01",   "owner": "resource:org.example.basic.SampleParticipant#001",   "value": "550" }</pre></div> <div></div>

# Developing a new business network

---

# my-bank-network

## Definition

- Asset
  - Account
- Participant
  - Customer
- Transaction
  - AccountTransfer



# Click Deploy a new business network


Hyperledger Composer Playground

My Business Networks



Connection: hlfv1

Import Business Network Card

Create Business Network Card



**PeerAdmin@hlfv1**




USER ID

PeerAdmin



BUSINESS NETWORK

none

Connect now →



**Admin2@hlfv1**




USER ID

admin

BUSINESS NETWORK

basic-sample-network2

Connect now →



Deploy a new business network

# Provide basic information and select **empty-business-network** (provide the network admin as **Admin@hlfv1** )

## Hyperledger Composer Playground

### Deploy New Business Network

#### 1. BASIC INFORMATION

Give your new Business Network a name:

my-bank-network

Describe what your Business Network will be used for:

Banking demo

Give the network admin card that will be created a name

Admin@hlfv1

#### 2. MODEL NETWORK STARTER TEMPLATE

Choose a Business Network Definition to start with:

Choose a sample to play with, start a new project, or import your previous work



basic-sample-network



empty-business-network



Drop here to upload or [browse](#)

# Provide credentials information

(Assign the Enrolment id: **admin** Enrolment secret : **adminpw**)

## 3. CREDENTIALS FOR NETWORK ADMINISTRATOR

You must provide credentials in one of the following formats before you deploy this business network

The credentials will be used to access the business network once it is deployed

- ☐ **Certificates**  
Required here are certificate and private key files.
- ☒ **ID and Secret**  
These can be created when accessing a business network.

An Enrollment ID and Secret must be created by someone who already has access to the Business Network you are connecting to.

Enrollment ID	<input type="text" value="admin"/>	
Enrollment Secret	<input type="password" value="*****"/>	

# Now the network is defined, click **Deploy**.

Hyperledger Composer Playground

Deploy New Business Network

1. BASIC INFORMATION

Give your new Business Network a name:

imc-demo

Describe what your Business Network will be used for:

Banking demo


Give the network admin card that will be created a name

Admin@org1.example.com


2. MODEL NETWORK STARTER TEMPLATE

Choose a Business Network Definition to start with:


Choose a sample to play with, start a new project, or import your previous work




basic-sample-network



empty-business-network



Drop here to upload or [browse](#)




imc-demo  
Banking demo

CONNECTION PROFILE

BASED ON  
empty-business-network

Start from scratch with a blank business network

Contains: 0 Participant Types, 0 Asset Types, and 0 Transaction Types



Deploy

# The new business network will be shown, click **Connect now**


Hyperledger Composer Playground

My Business Networks



Import Business Network Card

Create Business Network Card

Connection: hlfv1



**PeerAdmin@hlfv1**


USER ID

PeerAdmin



BUSINESS NETWORK

none

Connect now →



**Admin2@hlfv1**


USER ID

admin



BUSINESS NETWORK

basic-sample-network2

Connect now →



**Admin@hlfv1**


USER ID

admin

BUSINESS NETWORK

my-bank-network

Connect now →



Deploy a new business network

hlfv1 my-bank-network

DefineTest

admin

FILES

About  
README.md, package.json

Model File  
models/model.cto

Access Control  
permissions.acl

Add a file... Export

UPDATE NETWORK

From: 0.0.1

To: 0.0.2-deploy.0

Deploy changes

About File README.md

This is the readme file for the Business Network Definition created in Playground

LegalGitHub

Playground v0.19.4TutorialDocsCommunity

# Edit a model file

- `/**`
- `* Sample business network definition.`
- `*/`
- `namespace org.imc.basic`
  
- `asset Account identified by accountId {`
- `o String accountId`
- `--> Customer owner`
- `o Double balance`
- `}`
  
- `participant Customer identified by customerId {`
- `o String customerId`
- `o String firstName`
- `o String lastName`
- `}`
  
- `transaction AccountTransfer {`
- `--> Account from`
- `--> Account to`
- `o Double amount`
- `}`

# Select **Model file**, click **edit icon**

hlfv1 my-bank-network

Define Test

admin

FILES

About  
*README.md, package.json*

**Model File**  
*models/model.cto*

Access Control  
*permissions.acl*

Add a file... Export

UPDATE NETWORK

From: 0.0.1

To: 0.0.2-deploy.0

Deploy changes

Model File models/model.cto

```
1  /*
2   * Licensed under the Apache License, Version 2.0 (the "License");
3   * you may not use this file except in compliance with the License.
4   * You may obtain a copy of the License at
5   *
6   * http://www.apache.org/licenses/LICENSE-2.0
7   *
8   * Unless required by applicable law or agreed to in writing, software
9   * distributed under the License is distributed on an "AS IS" BASIS,
10  * WITHOUT WARRANTIES OR CONDITIONS OF ANY KIND, either express or implied.
11  * See the License for the specific language governing permissions and
12  * limitations under the License.
13  */
14
15  namespace org.acme.empty
16
```

Everything looks good!

Any problems detected in your code would be reported here.

Legal GitHub

Playground v0.19.4 Tutorial Docs Community



hlfv1 my-bank-network

Define Test

admin

FILES

About

README.md, package.json

Model File

models/model.cto

Access Control

permissions.acl

Add a file...

Export

UPDATE NETWORK

From: 0.0.1

To: 0.0.2-deploy.0

Deploy changes

Model File models/model.cto

```

1  /**
2   * Sample business network definition.
3   */
4   namespace org.imc.basic
5
6   asset Account identified by accountId {
7     o String accountId
8     --> Customer owner
9     o Double balance
10  }
11
12  participant Customer identified by customerId {
13    o String customerId
14    o String firstName
15    o String lastName
16  }
17
18  transaction AccountTransfer {
19    --> Account from
20    --> Account to
21    o Double amount
22  }

```

Everything looks good!

Any problems detected in your code would be reported here

Legal GitHub

Playground v0.19.4 Tutorial Docs Community

# Edit a script file

- `/**`
- `* Place a transaction for transferring money`
- `* @param {org.imc.basic.AccountTransfer} AccountTransfer`
- `* @transaction`
- `*/`
- `function accountTransfer(accountTransfer) {`
- `if (accountTransfer.from.balance < accountTransfer.amount) {`
- `throw new Error('Insufficient fund');`
- `}`
- 
- `accountTransfer.from.balance -= accountTransfer.amount;`
- `accountTransfer.to.balance += accountTransfer.amount;`
- 
- `return getAssetRegistry('org.imc.basic.Account')`
- `.then(function(assetRegistry) {`
- `return assetRegistry.update(accountTransfer.from);`
- `})`
-

# Edit a script file (cont.)

- .then(function() {
- return getAssetRegistry('org.imc.basic.Account');
- })
- .then(function(assetRegistry) {
- return assetRegistry.update(accountTransfer.to);
- });
- }

# Select **Add a file**

hlfv1 my-bank-network

Define Test


admin


FILES

About  
*README.md, package.json*

Model File  
*models/model.cto*

Access Control  
*permissions.acl*

 Add a file...

 Export

UPDATE NETWORK


From: 0.0.1

To: 0.0.2-deploy.0

Deploy changes

Model File models/model.cto

```
1  /**
2   * Sample business network definition.
3   */
4   namespace org.imc.basic
5
6   asset Account identified by accountId {
7     o String accountId
8     --> Customer owner
9     o Double balance
10  }
11
12  participant Customer identified by customerId {
13    o String customerId
14    o String firstName
15    o String lastName
16  }
17
18  transaction AccountTransfer {
19    --> Account from
20    --> Account to
21    o Double amount
22  }
```

 Everything looks good!

Any problems detected in your code would be reported here

Legal

GitHub

Playground v0.19.4

Tutorial


Docs

Community

# Choose **Script File(.js)**, the click **Add**

Add a file

Upload a file from your computer...

 Drop here to upload or [browse](#)

☐ **Model File (.cto)**  
*Define Assets, Participants and Transactions using Hyperledger Composer modelling language.*

☒ **Script File (.js)**  
*Define the logic of transaction executions using JavaScript.*

☐ **Query File (.qry)**  
*Define the queries in here (Note: you can only have 1 of these per .bna).*

☐ **Access Control File (permissions.acl)**  
*Define your access controls here (Note: you can only have 1 of these per .bna).*

Cancel

Add

# Deploying the updated business network, Click **Deploy change**

hlfv1 my-bank-network

Define Test

admin

FILES

About  
README.md, package.json

Model File  
models/model.cto

Script File  
lib/script.js

Access Control  
permissions.acl

Add a file... Export

UPDATE NETWORK

From: 0.0.1

To: 0.0.2-deploy.0

Deploy changes

Script File lib/script.js

```
4  * @transaction
5  */
6
7  function accountTransfer(accountTransfer) {
8
9      if (accountTransfer.from.balance < accountTransfer.amount) {
10         throw new Error('Insufficient fund');
11     }
12
13     accountTransfer.from.balance -= accountTransfer.amount;
14     accountTransfer.to.balance += accountTransfer.amount;
15
16     return getAssetRegistry('org.imc.basic.Account')
17         .then(function(assetRegistry) {
18             return assetRegistry.update(accountTransfer.from);
19         })
20         .then(function() {
21             return getAssetRegistry('org.imc.basic.Account');
22         })
23         .then(function(assetRegistry) {
24             return assetRegistry.update(accountTransfer.to);
25         });
26 }
```

Everything looks good!

Any problems detected in your code would be reported here

Legal GitHub Playground v0.19.4 Tutorial Docs Community

# Click Upgrade

Upgrade business network ×

Please select the business network cards with the correct permissions for installing and upgrading the business network.

Installation card	PeerAdmin@hlfv1	▼
Upgrade card	PeerAdmin@hlfv1	▼

Upgrading a business network may take several minutes, ensure you've included all the intended changes.

Cancel Upgrade



# Testing the business network definition, Click **Test** tab

hlfv1 my-bank-network

Define Test

admin

PARTICIPANTS

Customer

ASSETS

Account


TRANSACTIONS

All Transactions

Submit Transaction

Participant registry for org.imc.basic.Customer

+ Create New Participant

ID	Data
	
<p>This registry is empty!</p> <p>To create resources in this registry click create new at the top of this page</p>	



# Click Create New Participant

hlfv1 my-bank-network

Define Test

admin

PARTICIPANTS

Customer

ASSETS

Account


TRANSACTIONS

All Transactions

Submit Transaction

Participant registry for org.imc.basic.Customer

+ Create New Participant

ID	Data
<div><p>This registry is empty!</p><p>To create resources in this registry click create new at the top of this page</p></div>	

# Enter the first participant, then click **Create New**

Create New Participant

In registry: **org.imc.basic.Customer**

JSON Data Preview

```
1 {
2   "$class": "org.imc.basic.Customer",
3   "customerId": "thana",
4   "firstName": "Thanachart",
5   "lastName": "Numnonda"
6 }
```

☐ Optional Properties

Just need quick test data? [Generate Random Data](#)

Cancel

Create New

# Enter the second participant, then click **Create New**

Create New Participant

In registry: **org.imc.basic.Customer**

JSON Data Preview

```
1 {
2   "$class": "org.imc.basic.Customer",
3   "customerId": "imc",
4   "firstName": "IMC Institute",
5   "lastName": "co.ltd."
6 }
```

☐ Optional Properties

Just need quick test data? [Generate Random Data](#)

Cancel

Create New

# A list of participants will be shown

hlfv1 my-bank-network

Define Test

admin

PARTICIPANTS

Customer

ASSETS

Account





TRANSACTIONS

All Transactions

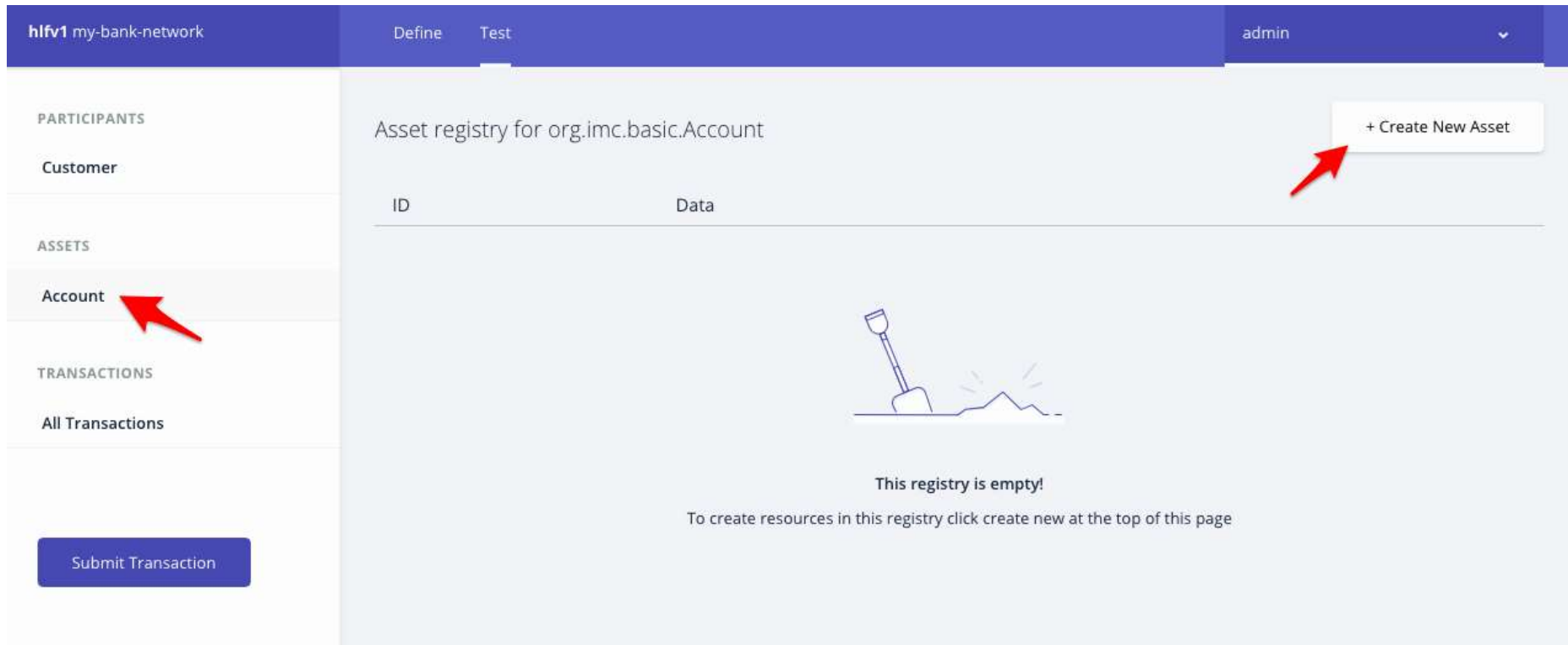
Submit Transaction

Participant registry for org.imc.basic.Customer

+ Create New Participant

ID	Data	
imc	<pre>{   "\$class": "org.imc.basic.Customer",   "customerId": "imc",   "firstName": "IMC Institute",   "lastName": "co.ltd." }</pre>	 
thana	<pre>{   "\$class": "org.imc.basic.Customer",   "customerId": "thana",   "firstName": "Thanachart",   "lastName": "Numnonda" }</pre>	 

# Select **Account**, then click **Create New Asset**



The screenshot displays the IMC Institute web application interface. The top navigation bar includes the network name 'hlfv1 my-bank-network', tabs for 'Define' and 'Test', and a user profile 'admin'. The left sidebar contains a menu with sections: 'PARTICIPANTS' (with a 'Customer' link), 'ASSETS' (with an 'Account' link highlighted by a red arrow), and 'TRANSACTIONS' (with an 'All Transactions' link). A 'Submit Transaction' button is located at the bottom of the sidebar. The main content area is titled 'Asset registry for org.imc.basic.Account' and features a table with columns 'ID' and 'Data'. The table is empty, and a red arrow points to a '+ Create New Asset' button in the top right corner. Below the table, there is an illustration of a shovel digging into the ground, followed by the text 'This registry is empty!' and a message: 'To create resources in this registry click create new at the top of this page'.

# Enter the first account, then click **Create New**

Create New Asset

In registry: **org.imc.basic.Account**

JSON Data Preview

```
1 {
2   "$class": "org.imc.basic.Account",
3   "accountId": "thanaacct",
4   "owner": "thana",
5   "balance": 1000
6 }
```

☐ Optional Properties

Just need quick test data? [Generate Random Data](#)

Cancel

Create New

# Enter the second account, then click **Create New**

Create New Asset

In registry: **org.imc.basic.Account**

JSON Data Preview

```
1 {
2   "$class": "org.imc.basic.Account",
3   "accountId": "imcacct",
4   "owner": "imc",
5   "balance": 50000
6 }
```

☐ Optional Properties

Just need quick test data? [Generate Random Data](#)

Cancel

Create New

# A list of accounts will be shown

The screenshot displays the IMC Institute Asset Registry interface. The top navigation bar includes the network name 'hlfr1 my-bank-network', tabs for 'Define' and 'Test', and a user profile 'admin'. The left sidebar contains a menu with 'PARTICIPANTS' (Customer), 'ASSETS' (Account), and 'TRANSACTIONS' (All Transactions). A 'Submit Transaction' button is located at the bottom of the sidebar. The main content area is titled 'Asset registry for org.imc.basic.Account' and features a '+ Create New Asset' button. It displays a table with two accounts: 'imcacct' and 'thanaacct'. Each account entry shows its ID, a JSON object representing its data, and edit/delete icons.

ID	Data
imcacct	<pre>{  "\$class": "org.imc.basic.Account",  "accountId": "imcacct",  "owner": "resource:org.imc.basic.Customer#imc",  "balance": 50000}</pre>
thanaacct	<pre>{  "\$class": "org.imc.basic.Account",  "accountId": "thanaacct",  "owner": "resource:org.imc.basic.Customer#thana",  "balance": 1000}</pre>



# Click Submit Transaction

hlfv1 my-bank-network

Define Test

admin

PARTICIPANTS

Customer

ASSETS

Account

TRANSACTIONS

All Transactions

Submit Transaction

Asset registry for org.imc.basic.Account

+ Create New Asset

ID	Data
imcacct	<pre>{   "\$class": "org.imc.basic.Account",   "accountId": "imcacct",   "owner": "resource:org.imc.basic.Customer#imc",   "balance": 50000 }</pre>
thanaacct	<pre>{   "\$class": "org.imc.basic.Account",   "accountId": "thanaacct",   "owner": "resource:org.imc.basic.Customer#thana",   "balance": 1000 }</pre>

# Enter the transaction information, then click **Submit**

### Submit Transaction

Transaction Type

AccountTransfer

▼

JSON Data Preview

```
1 {
2   "$class": "org.imc.basic.AccountTransfer",
3   "from": "imcacct",
4   "to": "thanaacct",
5   "amount": 7000
6 }
```

☐ Optional Properties

Just need quick test data? [Generate Random Data](#)

Cancel

Submit

# The account balances are now changed

hlfv1 my-bank-network

Define Test

admin

PARTICIPANTS

Customer

ASSETS

Account

TRANSACTIONS

All Transactions

Submit Transaction

Asset registry for org.imc.basic.Account

+ Create New Asset

ID	Data
imcacct	<pre>{   "\$class": "org.imc.basic.Account",   "accountId": "imcacct",   "owner": "resource:org.imc.basic.Customer#imc",   "balance": 43000 }</pre>
thanaacct	<pre>{   "\$class": "org.imc.basic.Account",   "accountId": "thanaacct",   "owner": "resource:org.imc.basic.Customer#thana",   "balance": 8000 }</pre>

# All transactions show events

hlfv1 my-bank-network

DefineTest

admin

PARTICIPANTS

Customer

ASSETS

Account

TRANSACTIONS

All Transactions

Submit Transaction

Date, Time	Entry Type	Participant	
2018-05-06, 12:17:45	AccountTransfer	admin (NetworkAdmin)	<a href="#">view record</a>
2018-05-06, 12:15:53	AddAsset	admin (NetworkAdmin)	<a href="#">view record</a>
2018-05-06, 12:14:37	AddAsset	admin (NetworkAdmin)	<a href="#">view record</a>
2018-05-06, 12:11:33	AddParticipant	admin (NetworkAdmin)	<a href="#">view record</a>
2018-05-06, 12:10:38	AddParticipant	admin (NetworkAdmin)	<a href="#">view record</a>
2018-05-06, 11:54:00	ActivateCurrentIdentity	none	<a href="#">view record</a>

# Generate REST APIs

---

# List all of the business cards

## \$ composer card list

```
thanachart@imchyperledger:~$ composer card list  
The following Business Network Cards are available:
```

```
Connection Profile: hlfv1
```

Card Name	UserId	Business Network
Admin@hlfv1	admin	my-bank-network
Admin2@hlfv1	admin	basic-sample-network2
PeerAdmin@hlfv1	PeerAdmin	

```
Issue composer card list --card <Card Name> to get details a specific card
```

```
Command succeeded
```

# Start the REST server & generate the API

\$ composer-rest-server

Enter the name of the business network card to use: **Admin@hlfv1**

Specify if you want namespaces in the generated REST API: **never use namespaces**

Specify if you want to use an API key to secure the REST API: **No**

Specify if you want to enable authentication for the REST API using Passport: **No**

Specify if you want to enable event publication over WebSockets: **Yes**

Specify if you want to enable TLS security for the REST API: **No**

```
thanachart@imchyperledger:~$ composer-rest-server
? Enter the name of the business network card to use: Admin@hlfv1
? Specify if you want namespaces in the generated REST API: never use namespaces
? Specify if you want to use an API key to secure the REST API: No
? Specify if you want to enable authentication for the REST API using Passport: No
? Specify if you want to enable event publication over WebSockets: Yes
? Specify if you want to enable TLS security for the REST API: No
```

To restart the REST server using the same options, issue the following command:  
`composer-rest-server -c Admin@hlfv1 -n never -w true`

```
Discovering types from business network definition ...
Discovered types from business network definition
Generating schemas for all types in business network definition ...
Generated schemas for all types in business network definition
Adding schemas for all types to Loopback ...
Added schemas for all types to Loopback
Web server listening at: http://localhost:3000
Browse your REST API at http://localhost:3000/explorer
```



# Browse REST APIs (http://ip-address::3000/explorer)

Hyperledger Composer REST server

**Account : An asset named Account**

[Show/Hide](#) | [List Operations](#) | [Expand Operations](#)

**AccountTransfer : A transaction named AccountTransfer**

[Show/Hide](#) | [List Operations](#) | [Expand Operations](#)

**Customer : A participant named Customer**

[Show/Hide](#) | [List Operations](#) | [Expand Operations](#)

**System : General business network methods**

[Show/Hide](#) | [List Operations](#) | [Expand Operations](#)

[ BASE URL: /api , API VERSION: 1.0.0 ]

# Test the REST APIs

Hyperledger Composer REST server

## Account : An asset named Account

[Show/Hide](#) | [List Operations](#) | [Expand Operations](#)

GET	/Account	Find all instances of the model matched by filter from the data source.
POST	/Account	Create a new instance of the model and persist it into the data source.
GET	/Account/{id}	Find a model instance by {{id}} from the data source.
HEAD	/Account/{id}	Check whether a model instance exists in the data source.
PUT	/Account/{id}	Replace attributes for a model instance and persist it into the data source.
DELETE	/Account/{id}	Delete a model instance by {{id}} from the data source.

## AccountTransfer : A transaction named AccountTransfer

[Show/Hide](#) | [List Operations](#) | [Expand Operations](#)

## Customer : A participant named Customer

[Show/Hide](#) | [List Operations](#) | [Expand Operations](#)

## System : General business network methods

[Show/Hide](#) | [List Operations](#) | [Expand Operations](#)

[ BASE URL: /api , API VERSION: 1.0.0 ]

**Account : An asset named Account**[Show/Hide](#) | [List Operations](#) | [Expand Operations](#)**GET** /Account

Find all instances of the model matched by filter from the data source.

**Response Class (Status 200)**

Request was successful

**Model** Example Value

```
[
  {
    "$class": "org.imc.basic.Account",
    "accountId": "string",
    "owner": {},
    "balance": 0
  }
]
```

**Response Content Type** application/json**Parameters**

Parameter	Value	Description	Parameter Type	Data Type
filter	<input type="text"/>	Filter defining fields, where, include, order, offset, and limit - must be a JSON-encoded string ({"something":"value"})	query	string

[Try it out!](#) [Hide Response](#)

## Curl

```
curl -X GET --header 'Accept: application/json' 'http://35.226.204.101:3000/api/Account'
```

## Request URL

```
http://35.226.204.101:3000/api/Account
```

## Response Body

```
[
  {
    "$class": "org.imc.basic.Account",
    "accountId": "imcacct",
    "owner": "resource:org.imc.basic.Customer#imc",
    "balance": 43000
  },
  {
    "$class": "org.imc.basic.Account",
    "accountId": "thanaacct",
    "owner": "resource:org.imc.basic.Customer#thana",
    "balance": 8000
  }
]
```

## Response Code

```
200
```

## Response Headers

```
{
  "date": "Sun, 06 May 2018 07:05:46 GMT"
```



[www.facebook.com/imcinstitute](http://www.facebook.com/imcinstitute)



### Sming Framework IoT Device (ESP8266) (C++)

4 - 6 June 2018  
Instructor: Mr. Sittipong Jansorn

[Read More](#)



### Big Data Analytics as a Services for Developer

5 - 7 June 2018  
Instructor: Assoc. Prof. Dr. Thanachart Numnonda and Mr. Aekarun Thongtae

[Read More](#)



### Basic Software Testing

12 - 13 June 2018  
Instructor: Ms. Chetapa Wannatuk  
Special Registration 3 persons pay only 2 persons

[Read More](#)



### MicroService on Java Platform

13 - 14 June 2018  
Instructor: Mr. Passapong Thaitatagoon

[Read More](#)



### Test-Driven Development on Java

18 - 19 June 2018  
Instructor: Mr. Somkiat Pitsungnoen and Mr. Thawatchai Jongsuwanpisai

[Read More](#)



### Machine Learning for Data Science

20 - 22 June 2018  
Instructor: Assoc. Prof. Dr. Thanachart Numnonda and Mr. Aekarun Thongtae

[Read More](#)



### Introduction to IoT Analytics using Hadoop

26 - 28 June 2018  
Instructor: Assoc. Prof. Dr. Thanachart Numnonda and Mr. Aekarun Thongtae

[Read More](#)



# **Big Data Analytics as a Services for Developer**

**5 - 7 June 2018**

[www.imcinstitute.com/bigdata-java](http://www.imcinstitute.com/bigdata-java)

# Reference:

<https://hyperledger.github.io/composer/latest/installing/installing-index.html>

## Hyperledger Composer

Tutorials Docs Community

Select version ▾



### Installing

### Introduction

### Installing

### Tutorials

### Using Playground

### Developing Business Networks

## Installing Hyperledger Composer

### Try Composer in the online Playground

Try before you install - requires a modern version of Chrome, Firefox or Safari.



**Start here!**

### Install Development Environment

Command line and IDE tools for blockchain application development.



### Installing pre-requisites

Make sure you have the required pre-requisites by following [Installing pre-requisites](#).

### Installing the development environment

To install the full development environment click [Installing the development environment](#) here or in the table of contents on the left.

### Installing the development environment



# Thank you

[www.imcinstitute.com](http://www.imcinstitute.com)

[www.facebook.com/imcinstitute](https://www.facebook.com/imcinstitute)