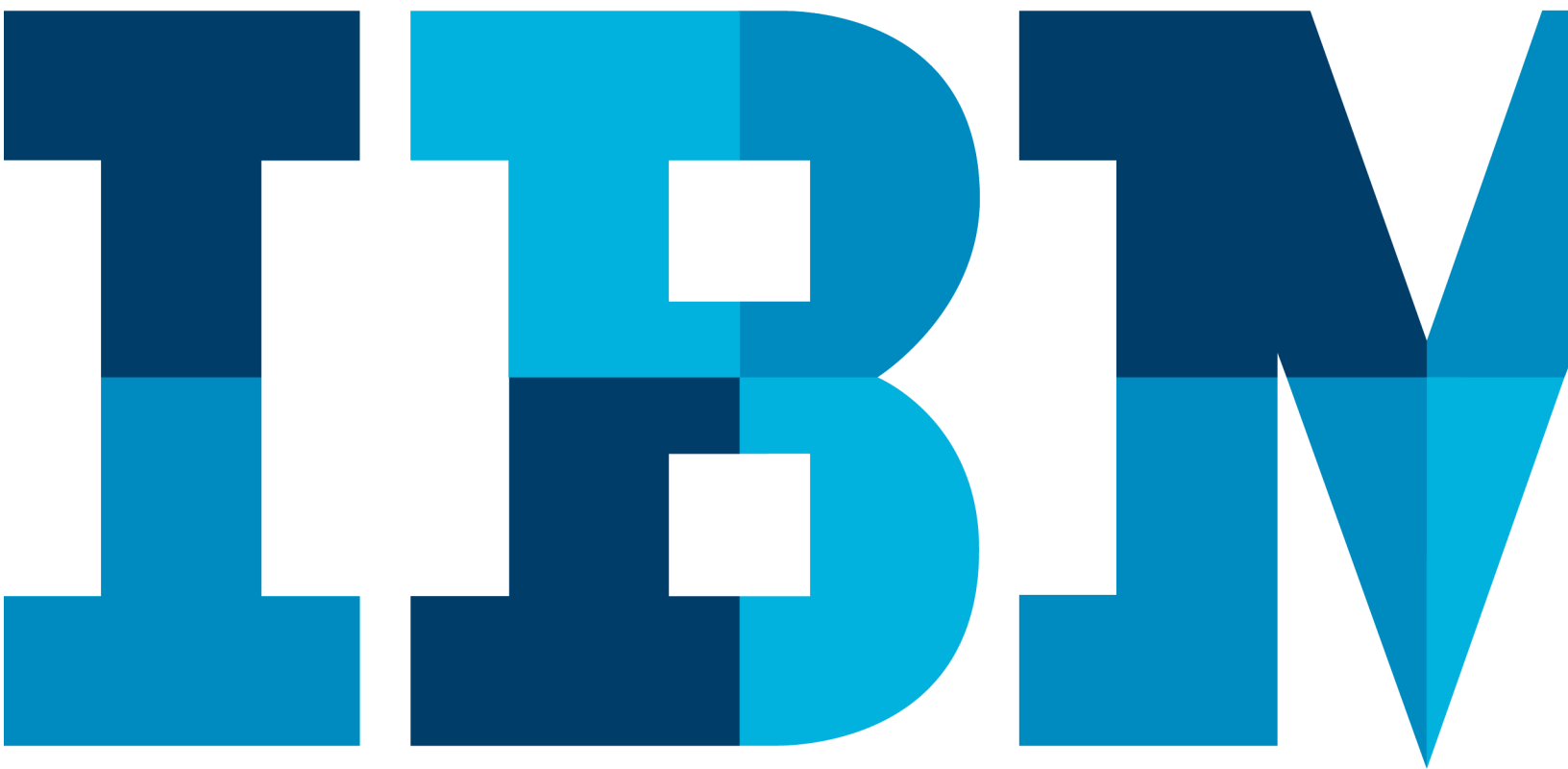


IBM Blockchain Hands-On Composer Development

Lab



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Overview

The aim of this lab is to get you familiar with developing Hyperledger Composer business networks. We will do this by exploring the Composer modelling language, how to write transaction processor functions in JavaScript and lastly examine how Access Control is managed in Composer.

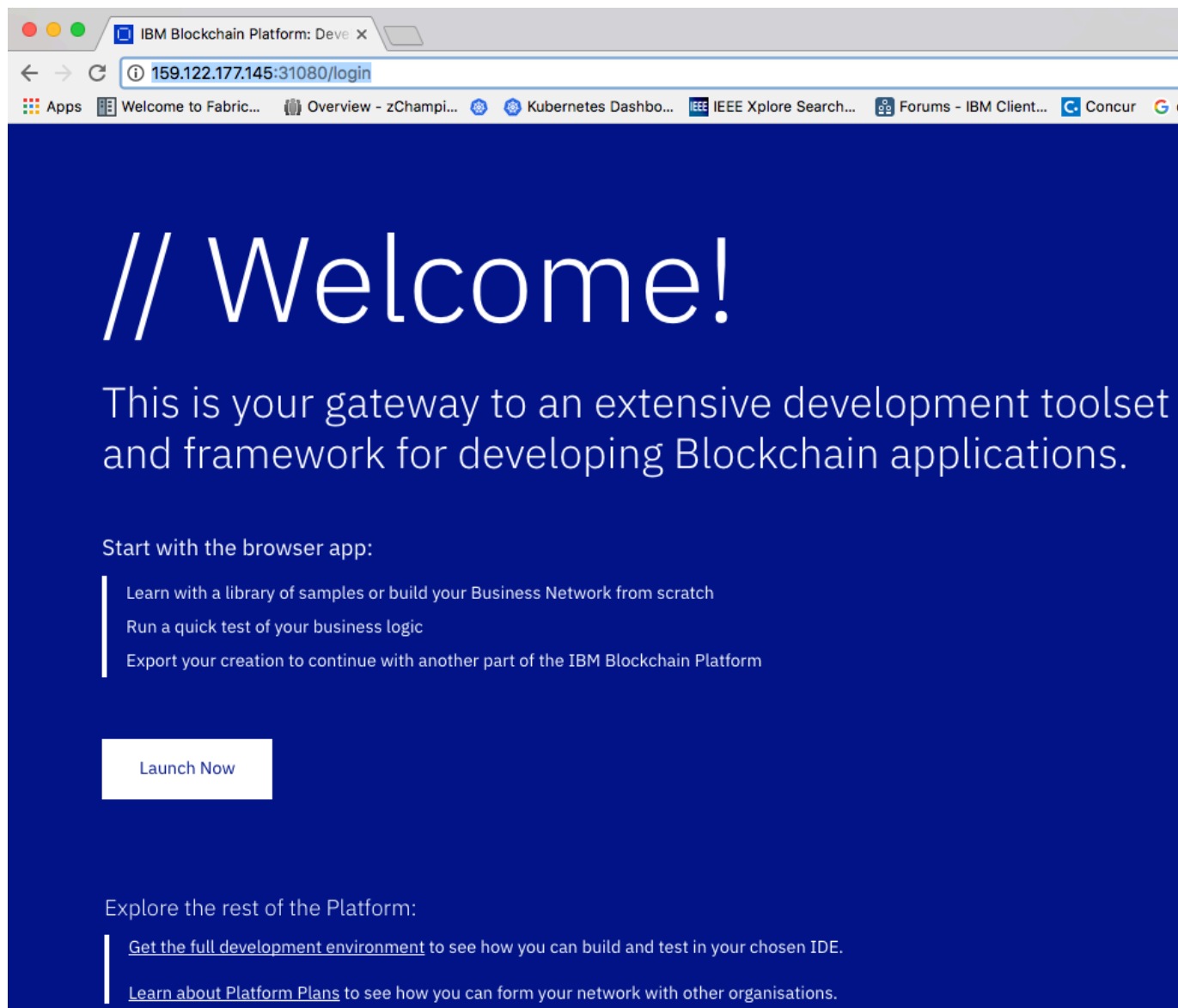
The lab will also familiarise you with the Composer Playground, a web-based tool that allows for rapid development and testing of Composer business networks.

It should be noted that while the contents of this lab will predominantly occur within Composer Playground (for the sake of accelerating the learning and development process), the Lab can easily be completed offline and using a text editor such as Visual Studio Code or Atom. In this case please refer to the next Lab for instructions on how to use the command line tools available in Composer.

Section 1. Starting the Hyperledger Composer Playground

1.1. Accessing the environment

You can use the public Composer Playground: <https://blockchaindevelop.mybluemix.net/>
You should launch Firefox and open the playground web UI, and then press Launch Now:




Hyperledger Composer Playground

Get local version

My Business Networks

Connection: Web Browser

こんにちは



Hello, Composer

Get started with the sample-network, or [Playground tutorial](#)


BUSINESS NETWORK

basic-sample-network

Get Started

×

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 v0.20.0

Tutorial

Docs

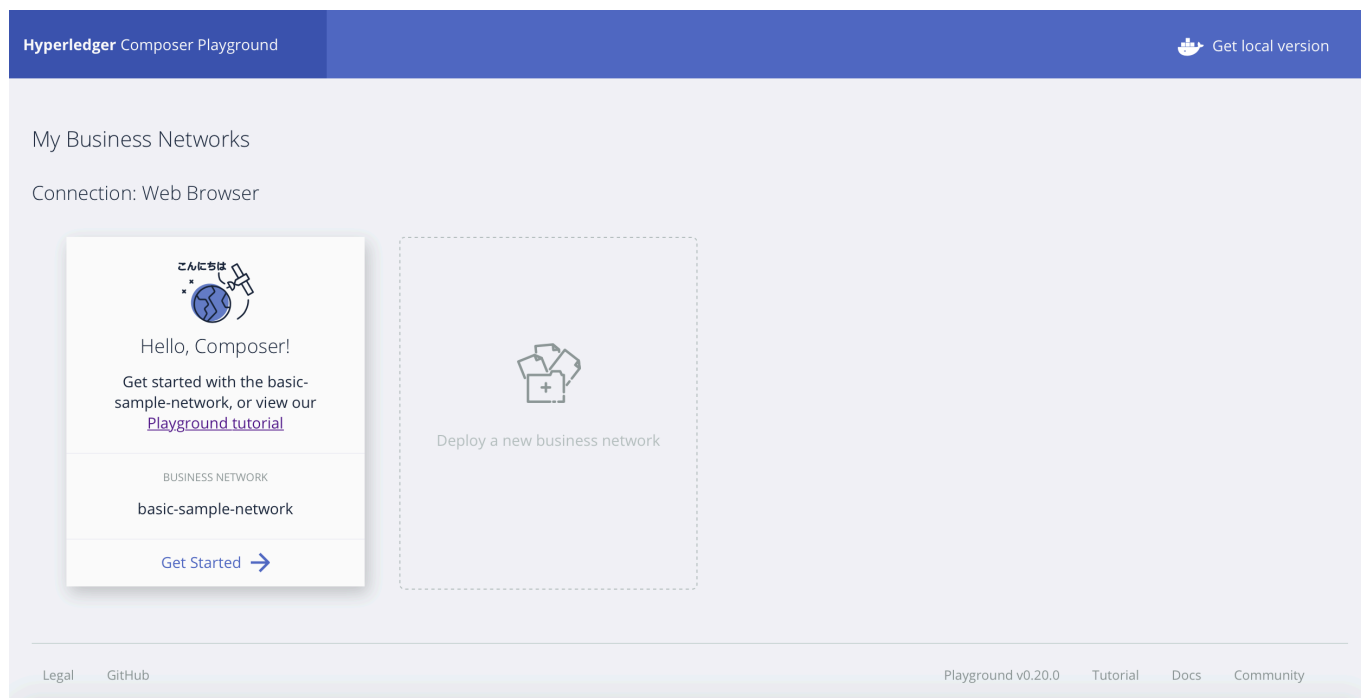
Community

Section 2. Composer's Modelling Language

In this section you will learn about the modelling language Hyperledger Composer uses to define resources in its business networks. You will define a basic business network that allows participants to exchange marbles with each other, using this as a base from which to explore the language's features.

2.1. Creating new business network

a. **Select Connection: Web Browser and then click Deploy a new business network:**



Enter the details – name of your new network, description and then the network admin card. Select **'Empty Business Network'** from the list and then click **Deploy**

Hyperledger Composer Playground [Get local version](#)

Deploy New Business Network

1. BASIC INFORMATION

Give your new Business Network a name:

mysample-network

Describe what your Business Network will be used for:

Start from scratch with a blank business network

Give the network admin card that will be created a name

admin@mysampl-network

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](#)

Samples on npm

mysample-network

Start from scratch with a blank business network

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

b. Connect to the network that has been created:

Hyperledger Composer Playground

My Business Networks

Connection: Web Browser

admin@mysampl-network

USER ID

admin

BUSINESS NETWORK

mysample-network

[Connect now](#) →

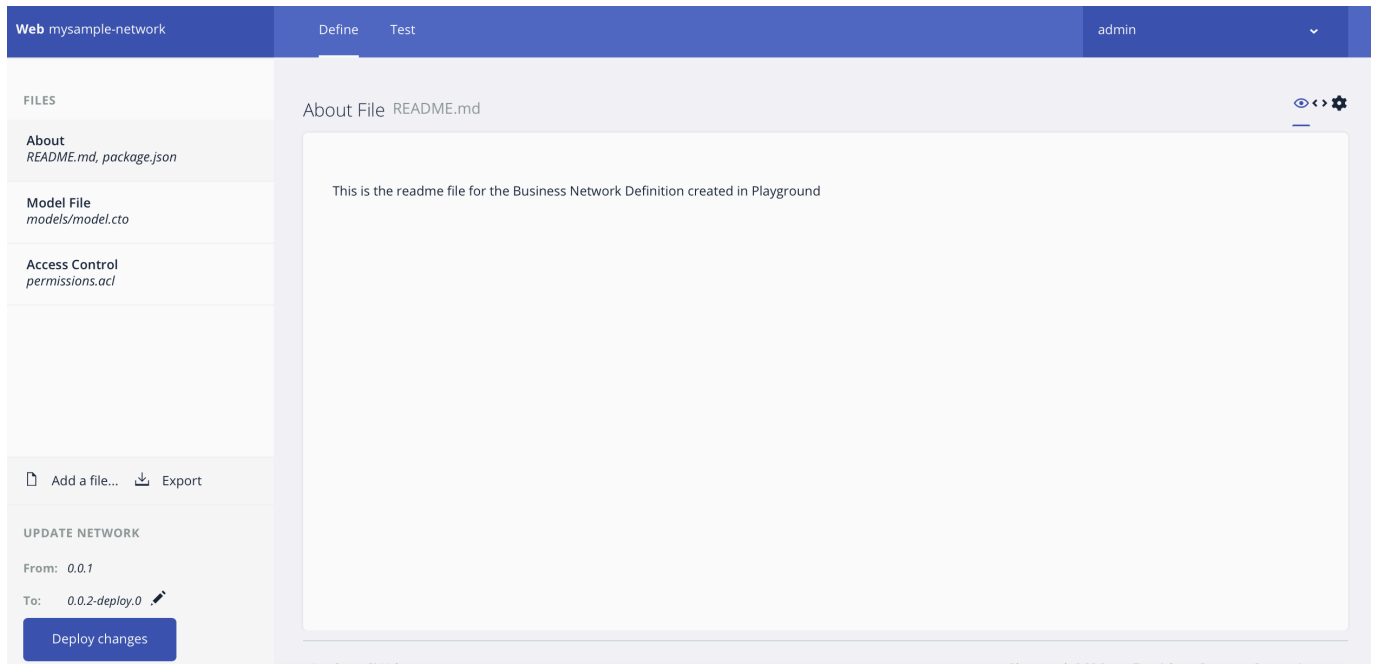
Deploy a new business network

Click on “Connect now ->”

You will access to the following window where 3 files are already accessibles:

- Readme.md : a text file to describe the content of the Business Network

- Models/model.cto : the file in which we will define the business network (participants, assets, transactions and events).
- Permissions.acl : provide the rules to access to the business network.



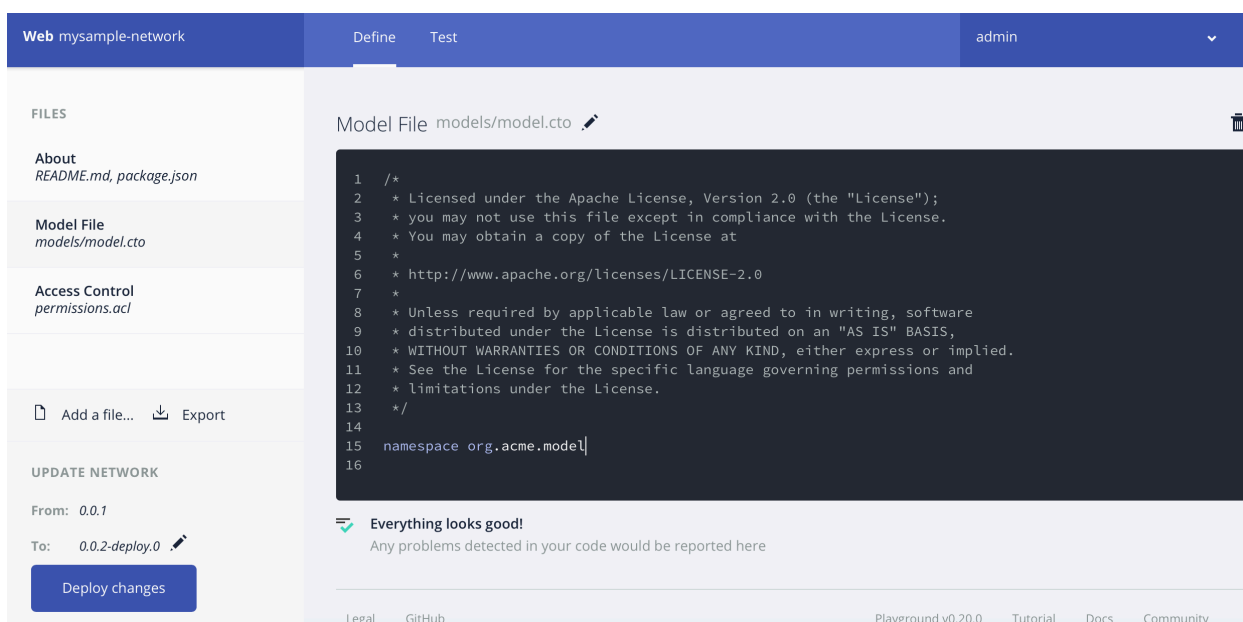
c. Define the business network

For this lab, you can find all the code on GitHub here : <https://github.com/ajolin/LabComposer>

In this section, we will work on the Model file. You can use the code from model.cto which is into models folder.

Click on Model File, then update the line with namespace :

namespace org.acme.model



We will now define the resources of the business network.

c.1. Resources

Composer's modelling language is first and foremost oriented around high level business concepts. As such, the **three top-level resources** that can be defined are as follows:

Assets	Participants	Transactions
<i>Digital representations of assets that are recorded on the ledger.</i>	<i>Individuals and Organisations that will contribute to and make use of the ledger.</i>	<i>Business logic governing the manipulation of assets.</i>

Additionally, each resource belongs to a namespace (a default namespace is at the top of the newly created file) which acts in a similar manner to how namespaces and packages work in other languages. In much the same way, resources can be imported from other namespaces. Namespace names can be any combination of letters and periods.

The modelling language describes these resources in a similar manner that you would describe a class in another language, this being an entity with attributes.

c.2. Writing an asset

Below is the **example** on how one can define an asset, participant and transaction. The lab's scenario will explain how files are structured.

Creating the asset Marble:

```
asset Marble identified by Id {
    o String Id
}
```

This defines a Marble asset and gives it an identifier to be referred to by (similar to the keys used in Fabric). Let's add the attributes:

```
asset Marble identified by Id {
    o String Id
    --> Collector owner
    o Integer diameter
    o String colour
}
```

You'll have noticed that the attributes in this do not all have the same prefix. The owner attribute is preceded by a --> instead of a o.

The o attributes are 'named fields' – they belong to the resource, for example the Marble will have a size and colour property.

The --> attributes are 'relationships' – while they make up the information that describes the resource they are not part of it, for example a Marble will have an owner but the owner is not part of the Marble.

The currently supported attribute types are as follows:

String, Boolean, DateTime, Integer, Double, Long

c.3. Writing a participant

Let's see how participants are defined:

```
participant Collector identified by email {  
  o String email  
}
```

Attributes for participants work in an identical manner to those of Marbles. As such, expand the Collector class:

```
participant Collector identified by email {  
  o String email  
  o String firstname  
  o String surname  
}
```

2.2. Writing a transaction

Transactions are also declared in the modelling file using the same syntax as with Assets and Participants, add the following to your modelling file:

```
transaction ChangeOwner {  
  
  --> Marble marble  
  --> Collector newOwner  
}
```

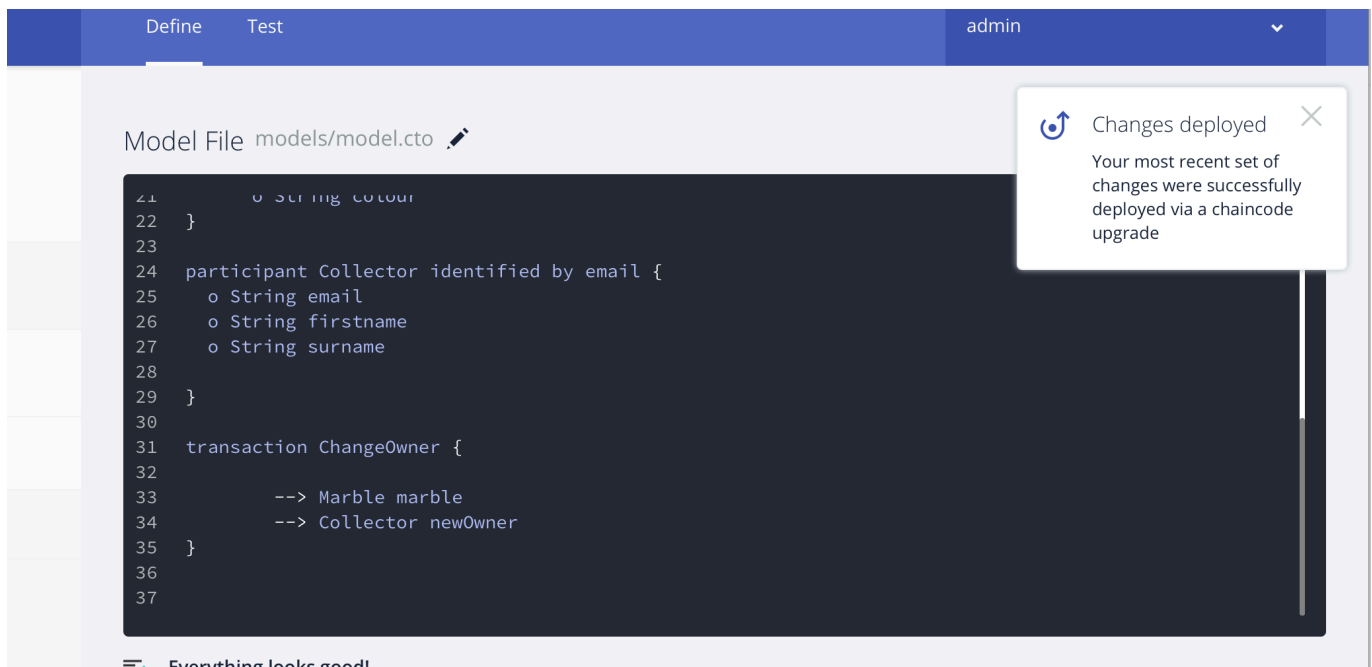
Instead of denoting attributes, the variables within the body of a transaction denote the arguments that the transaction logic function will take (this will be covered in more detail in the next section).

2.3. Deploy and create some test assets

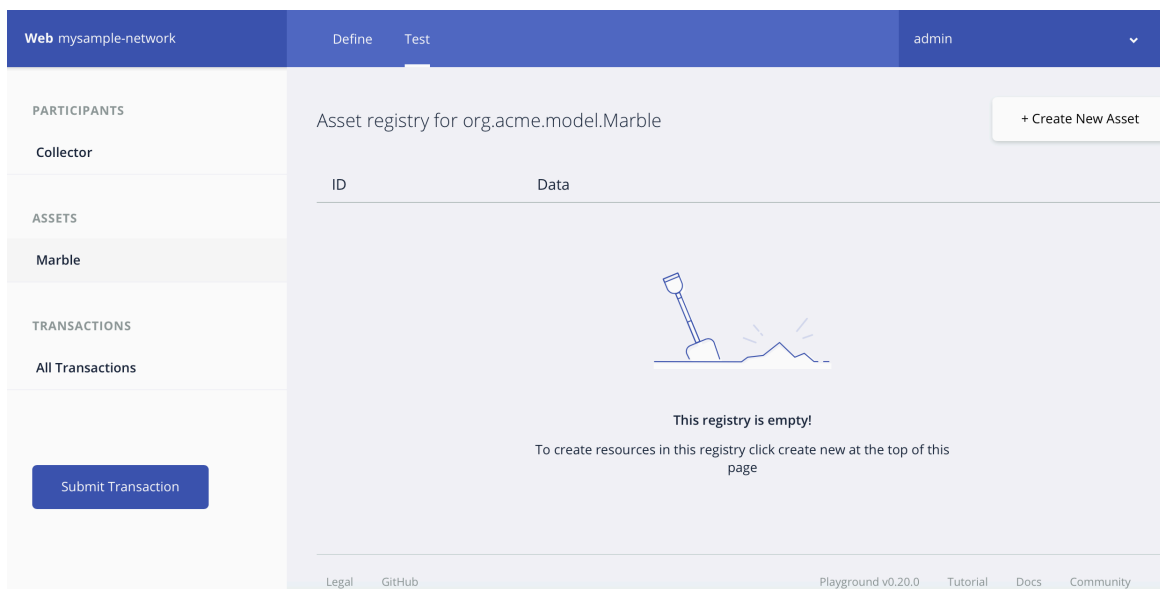
Now let's make sure that there were no syntax errors and let's update the business network with new definitions:

a. Update the business network

Now we have some asset definitions, Click on the **Deploy changes** button on the left side of the screen. On success a small pop-up should appear.



Go to the **Test** tab at the top:



Here you can see the assets and participants we've made.

b. Create the assets and participants

Click on **+ Create New Participant** on the top right. A dialogue box will appear prompting you to enter details of the new participant:

Create New Participant ✕In registry: **org.acme.model.Collector**

```

1  {
2    "$class": "org.acme.model.Collector",
3    "email": "8709",
4    "firstname": "",
5    "surname": ""
6  }

```

☐ Optional PropertiesJust need quick test data? [Generate Random Data](#)

Cancel

Create New

Enter the following:

```

{
  "$class": "org.acme.model.Collector",
  "email": "louis@yahoo.com",
  "firstname": "Louis",
  "surname": "Funes"
}

```

Fill this in and select **Create New**, you will see the new participant appear:

PARTICIPANTS	
Collector	Participant registry for org.acme.model.Collector
ASSETS	
Marble	
TRANSACTIONS	
All Transactions	

ID	Data
louis@yahoo.com	<pre> { "\$class": "org.acme.model.Collector", "email": "louis@yahoo.com", "firstname": "Louis", "surname": "Funes" } </pre>

Create a second Collector with the following:

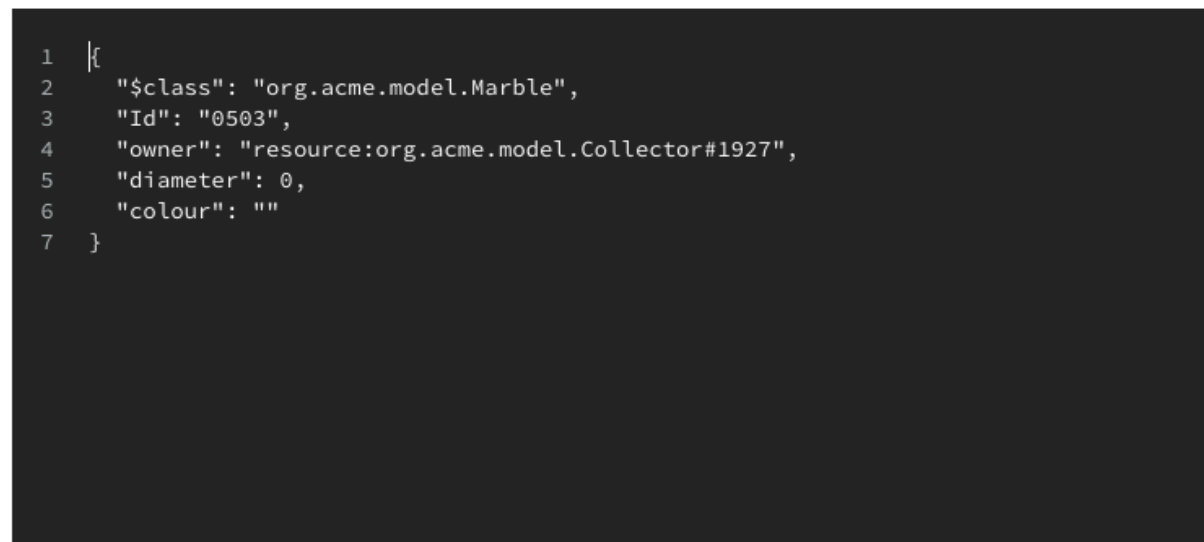
```
{
  "$class": "org.acme.model.Collector",
  "email": "jean@fr.com",
  "firstname": "Jean",
  "surname": "Marais"
}
```

Press **Create New**.

If you swap to the Marble asset and select **+ Create New Asset** you will see a similar dialogue box:



In registry: **org.acme.model.Marble**



☐ Optional Properties

Enter the following. Note that when **filling out relationships**, you must supply a **fully qualified identifier** – this being as follows:

resource:<namespace>.<resource name>#identifier

```
{
  "$class": "org.acme.model.Marble",
  "Id": "1",
  "owner": "resource:org.acme.model.Collector#jean@fr.com",
  "diameter": 10,
  "colour": "red"
}
```

Then click on the **Create new** button.
You will see the new asset appear.

The screenshot shows a web interface for managing assets. On the left is a sidebar with three sections: PARTICIPANTS (with a 'Collector' link), ASSETS (with a 'Marble' link), and TRANSACTIONS (with an 'All Transactions' link). The main area is titled 'Asset registry for org.acme.model.Marble' and contains a table with two columns: 'ID' and 'Data'. The table has one row with ID '1' and a JSON object in the 'Data' column: `{ "$class": "org.acme.model.Marble", "Id": "1", "owner": "resource:org.acme.model.Collector#jean@fr.com", "diameter": 10, "colour": "red" }`. A 'Collapse' button is located below the JSON object. In the top right corner of the main area, there is a '+ Create New Asset' button.

If you select **Submit Transaction** at the bottom left you will see a similar dialogue box:

The 'Submit Transaction' dialog box has a dark header with a close button (X). Below the header, there is a 'Transaction Type' dropdown menu currently set to 'ChangeOwner'. A large text area contains a JSON object for a transaction:

```
1 {
2   "$class": "org.acme.model.ChangeOwner",
3   "txId": "",
4   "marble": "resource:org.acme.model.Marble#5989",
5   "newOwner": "resource:org.acme.model.Collector#6678"
6 }
```

 Below the text area is a checkbox labeled 'Optional Properties'. At the bottom of the dialog, there is a light-colored bar containing the text 'Just need quick test data? [Generate Random Data](#)', a 'Cancel' button, and a blue 'Submit' button.

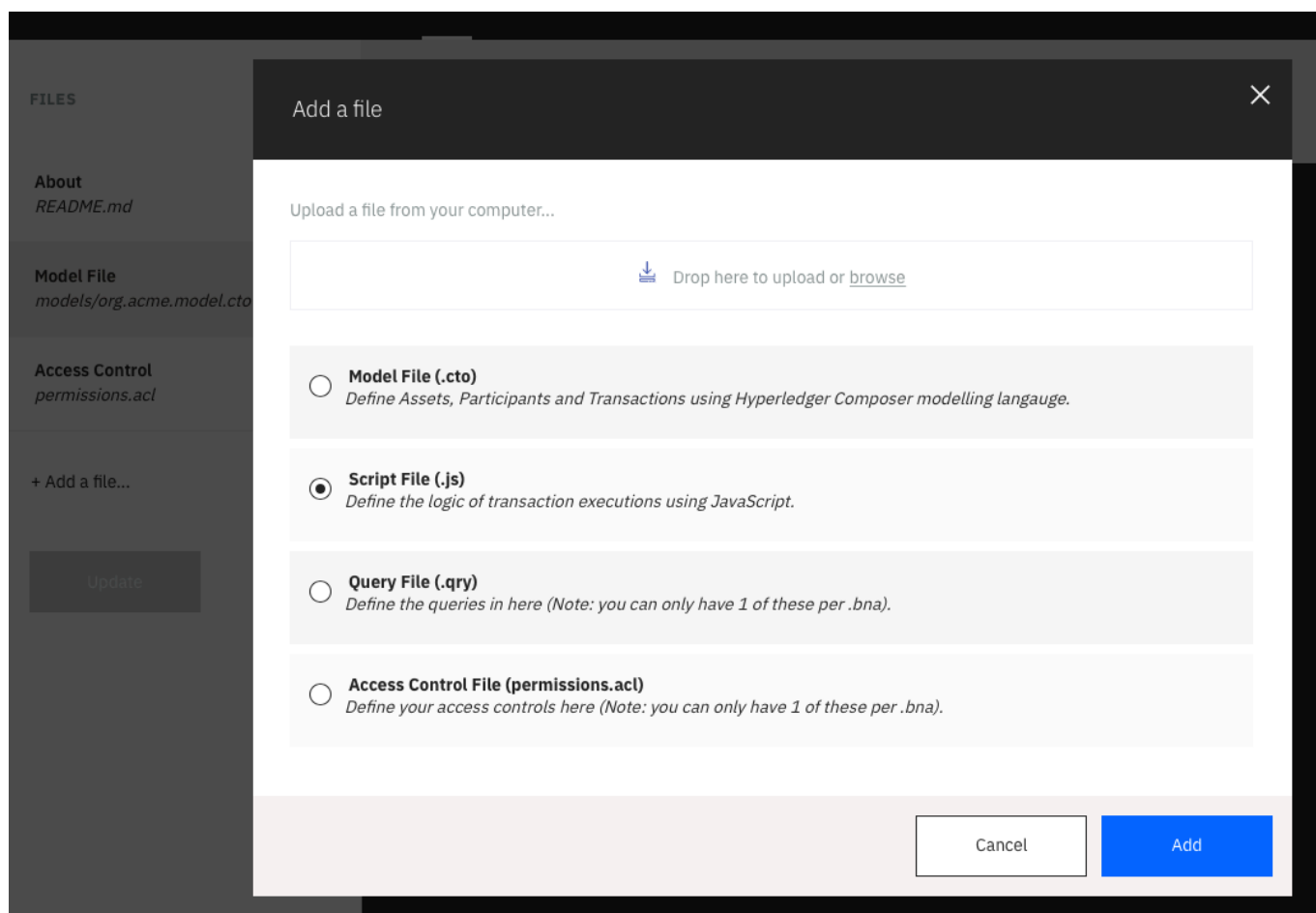
However if you submit this transaction, nothing will happen. We need to define some logic to associate with it. Before moving on to the next section, try creating another participant and an asset.

Section 3.Transaction Logic

In this section we will explore how to write transaction processor functions, these being the business logic that is executed when a transaction is invoked in Hyperledger Composer. Please note, while transaction processor functions are analogous to chaincode in their purpose we are not writing chaincode in this lab. Composer transaction logic, while achieving the same results, is not handled in the same way as chaincode is.

3.1. Create the logic file

Go back to the tab **Define** and select **+ Add a file...** from the left hand side and select **Script File (.js)** from the dialogue:



3.2. Add the changeOwner function

You will find the code for the logic file into script.js which is into Lib folder onto Github. Within script file you'll find the following:

```
/**
 * @param {org.acme.model.ChangeOwner} args - the changeOwner transaction arguments
 * @transaction
 */
```

```
function changeOwner(args) {
}
```

Transaction processor functions are defined by writing a function with a JS Doc decorator that maps the first argument to the transaction's model definition. The args argument represents the incoming transaction, in particular the data packaged in it.

Recall the transaction's definition:

```
transaction ChangeOwner {
  --> Marble marble
  --> Collector newOwner
}
```

Args is an object where the keys are each of the attributes and the values are what has been attached to them during the transaction invocation.

args will have a marble and a newOwner attribute that are accessed the same way attributes are accessed in JS objects: args.marble or args.newOwner.

Transaction processor functions do not return anything, much like Invoke functions in Fabric, they simply execute and finish.

3.3. Add changeOwner's body

The scenario of the lab is to change the owner of a marble.

When the update has been made to the asset, we need to update the assets record in the world state. Uncomment the following in the body of the changeOwner function:

```
args.marble.owner = args.newOwner;
return getAssetRegistry('org.acme.model.Marble').then(function(marbleRegistry) {
  return marbleRegistry.update(args.marble);
});
```

Registries are indexes used by composer to store resources ; they store a reference to every instance of that particular resource. To update a resource, we get the registry (getAssetRegistry(...)) from its type and call the update function with the new version of the resources we want to update (composer will find it within the registry and update it for us).

Participants also have registries and are updated in the same way (although with getParticipantRegistry).

Notice that, while the language composer (used for its transaction process functions) is JavaScript, it only supports up to ES5, as such features like () => {} functions are not permitted. This is due to the Otto JavaScript engine that is currently used by composer. Otto is set to be replaced by an embedded version of node.js in a future release.

3.4. Test changeOwner

a. Create the assets and participants

Deploy the code and go to the Test tab. We are going to transfer a Marble between two Collectors. If you don't have 2 Collectors or a Marble follow the steps in 2.3 to create them:

Asset

ID	Data
1	<pre>{ "\$class": "org.acme.model.Marble", "Id": "1", "owner": "resource:org.acme.model.Collector#jean@fr.com", "diameter": 10, "colour": "red" }</pre> <div>Collapse</div>

Participants

Define	Test	admin	▼
Participant registry for org.acme.model.Collector		+ Create New Participant	
ID	Data		
jean@fr.com	<pre>{ "\$class": "org.acme.model.Collector", "email": "jean@fr.com", "firstname": "Jean", "surname": "Marre" }</pre>		
louis@yahoo.com	<pre>{ "\$class": "org.acme.model.Collector", "email": "louis@yahoo.com", "firstname": "Louis", "surname": "Funes" }</pre>		

b. Submit the transaction

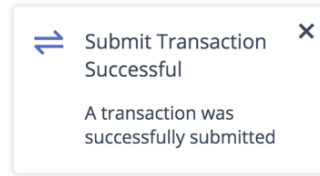
Select **Submit Transaction** from the sidebar and fill in the fields accordingly to select your marble and the Collector who is not the owner:

```
{
```

```
"$class": "org.acme.model.ChangeOwner",  
"marble": "resource:org.acme.model.Marble#1",  
"newOwner": "resource:org.acme.model.Collector#louis@fr.com"  
}
```

Select **Submit** to issue the transaction.

If successful, the following dialogue will appear:



A transaction entry will also appear: click on **All Transactions** menu, then click on **view record** in front of the first record of the list, which **Entry type** should be **ChangeOwner**. Then you will see the following window.

Historian Record

Transaction

Events (0)

```
1  {  
2    "$class": "org.acme.model.ChangeOwner",  
3    "marble": "resource:org.acme.model.Marble#1",  
4    "newOwner": "resource:org.acme.model.Collector#louis@fr.com",  
5    "transactionId": "15fd0ae5-11fb-46f0-b796-b7027ad53848",  
6    "timestamp": "2018-01-29T16:43:47.733Z"  
7  }
```

If you go back to the Marble, you will find its record has also been updated:

ID	Data
1	<pre>{ "\$class": "org.acme.model.Marble", "Id": "1", "owner": "resource:org.acme.model.Collector#louis@fr.com", "diameter": 10, "colour": "red" }</pre>

Collapse

3.5. Add an event triggered by the transaction

Go to the model file and update it uncommenting at the end the declaration of an event :

```
event ownerChanged {
    --> Marble marble
}
```

The screenshot shows the IBM Blockchain Playground interface. On the left, there's a sidebar with 'FILES' including 'About', 'Model File', 'Script File', and 'Access Control'. The 'Model File' is selected, showing the file 'models/model.cto'. Below the sidebar, there's a 'UPDATE NETWORK' section with 'From: 0.0.2-deploy.4' and 'To: 0.0.2-deploy.5', and a 'Deploy changes' button. The main area shows the 'Model File models/model.cto' with the following code:

```
24 participant Collector identified by email {
25   o String email
26   o String firstname
27   o String surname
28 }
29 }
30 }
31 transaction ChangeOwner {
32   --> Marble marble
33   --> Collector newOwner
34 }
35 }
36 }
37 event ownerChanged {
38   --> Marble marble
39 }
```

Below the code, there's a green checkmark and the text 'Everything looks good! Any problems detected in your code would be reported here'.

Click on Deploy Changes, to update the business network.

Now go to the logic file in order to uncomment the code to trigger the event in the transaction:

```
let ownerChangedNotification = getFactory().newEvent('org.acme.model', 'ownerChanged');
ownerChangedNotification.marble = args.marble;
emit(ownerChangedNotification);
```

Put the code just before the update of the marble.

The screenshot shows the IBM Blockchain Composer interface. The top bar has 'Web mysample-network', 'Define', 'Test', and 'admin' tabs. The left sidebar contains a 'FILES' section with links to 'About', 'Model File', 'Script File', and 'Access Control'. The main area is titled 'Script File lib/script.js' and displays a JavaScript function for changing a marble's owner. Below the code editor, a green checkmark indicates 'Everything looks good!'. At the bottom, there are links for 'Legal', 'GitHub', 'Plavround v0.20.0', 'Tutorial', 'Docs', and 'Community'.

```

1  /**
2   * @param {org.acme.model.ChangeOwner} args - the changeOwner transaction arguments
3   * @transaction
4   */
5  function changeOwner(args) {
6      args.marble.owner = args.newOwner
7
8      return getAssetRegistry('org.acme.model.Marble').then(function(marbleRegistry) {
9
10         let ownerChangedNotification = getFactory().newEvent('org.acme.mynetwork', 'ownerChanged');
11         ownerChangedNotification.marble = marble;
12         emit(ownerChangedNotification);
13
14         return marbleRegistry.update(args.marble);
15     });
16
17

```

Everything looks good!
Any problems detected in your code would be reported here

Legal GitHub Plavround v0.20.0 Tutorial Docs Community

Click on **Deploy changes** then test a new transaction.

Then click on **All transactions**

Web mysample-network	Define	Test	admin
PARTICIPANTS			
Collector			
ASSETS			
Marble	2018-09-10, 16:34:07	ChangeOwner	admin (NetworkAdmin) view record
TRANSACTIONS	2018-09-10, 16:01:28	ChangeOwner	admin (NetworkAdmin) view record
All Transactions	2018-09-10, 15:43:35	AddAsset	admin (NetworkAdmin) view record
	2018-09-10, 15:41:06	AddParticipant	admin (NetworkAdmin) view record
Submit Transaction			

and click on the **view record** link of the last transaction you did. You will get a panel with 2 tabs: on the tab Events, you can see the event that was sent:

The screenshot shows a web application interface for viewing blockchain events. At the top, there are tabs for 'Define', 'Test', and 'admin'. A modal window titled 'Historian Record' is open, featuring a close button (X) in the top right corner. Inside the modal, there are two tabs: 'Transaction' and 'Events (1)'. The 'Events (1)' tab is selected and underlined. Below the tabs, a light gray box displays the event ID: 'org.acme.model.ownerChanged#70af2bbe-7a9e-4191-9cbf-cd1cac1b6e8b#0'. To the right of the event ID is a small icon consisting of a horizontal line above an upward-pointing chevron. Below this box, a dark gray code editor shows a JSON object with the following content:

```
1 {
2   "$class": "org.acme.model.ownerChanged",
3   "marble": "resource:org.acme.model.Marble#1",
4   "eventId": "70af2bbe-7a9e-4191-9cbf-cd1cac1b6e8b#0",
5   "timestamp": "2018-09-10T14:34:07.008Z"
6 }
```

On the right side of the modal, there is a vertical list of text entries, each followed by '(Admin)':

- Admin)
- Admin)
- Admin)
- Admin)

Section 4. Access Control

In this section, we will explore how Hyperledger Composer restricts access to the resources on the network and the ability to modify them.

4.1 Access Control Lists (ACL) - Grammar

We now have some digital assets defined and the ability to move them between users. However, in a real system, it would likely be the case that the Marble objects would not be available for all to see and if they were they would not be available for just anyone to change the ownership of.

ACL Rules are of the following format:

```
rule <Rule Name> {  
  description: <description of the rule>  
  participant(p): <namespace and name of the participant performing the action>  
  operation: <operation the participant wishes to perform>  
  resource(r): <resources the operation is being performed on>  
  condition: (<condition under which this rule applies>)  
  action: <does this rule allow an operation or deny it>  
}
```

In more detail:

Participant is the person or entity that has submitted the transaction.

Operation is what they wish to do to this resource, supported operations are CREATE, READ, UPDATE, DELETE, ALL

Resource is the asset that the transaction is being applied to. Resources (and indeed Participants) can simply be namespaces in which case they apply to all participants/resources in that namespace.

Condition is a JavaScript statement that can examine the participant and resource to check for certain conditions. Anything valid for use in an `if` statement is valid here.

Action is a simple ALLOW or DENY, as the name suggests this allows or denies the transaction.

4.2 Adding rules

Go to the **Define** tab, and select the **Access Control (permission.acl)** file:
All the Access rules can be found in permissions.acl on GitHub.

The screenshot shows the IBM Blockchain Playground interface. At the top, there's a navigation bar with 'Web tutorial-network', 'Define', 'Test', and a user profile 'admin'. The left sidebar has a 'FILES' section with 'Script File lib/script.js' and 'Access Control permissions.acl'. The main area displays the 'ACL File permissions.acl' with two rules: 'NetworkAdminUser' and 'NetworkAdminSystem'. Below the code, a status message says 'Everything looks good!'. At the bottom, there are links for 'Legal', 'Playground v0.16.2', 'Tutorial', and 'Docs'.

```

1 rule NetworkAdminUser {
2   description: "Grant business network administrators full access to user resources"
3   participant: "org.hyperledger.composer.system.NetworkAdmin"
4   operation: ALL
5   resource: "**"
6   action: ALLOW
7 }
8
9 rule NetworkAdminSystem {
10  description: "Grant business network administrators full access to system resources"
11  participant: "org.hyperledger.composer.system.NetworkAdmin"
12  operation: ALL
13  resource: "org.hyperledger.composer.system.**"
14  action: ALLOW
15 }

```

Everything looks good!
Any problems detected in your code would be reported here

Legal Playground v0.16.2 Tutorial Docs

```

rule OnlyOwnerCanUpdateAMarble {
  description: "Only an owner can edit a marble"
  participant(p): "org.acme.model.Collector"
  operation: UPDATE
  resource(r): "org.acme.model.Marble"
  condition: (r.owner.getIdentifier() == p.getIdentifier())
  action: ALLOW
}

```

This rule ensures that only the owners of Marble resources are able to edit them. It does this by ALLOWing an UPDATE to org.acme.model.Marble resources only when the identifier of the participant and the resource's owner are the same.

By default, all action is restricted unless explicitly permitted. As such while we do have a rule allowing updates of a Marble resource even the owner would be unable to read it.

```

rule AnyoneCanReadMarbles {
  description: "All the participants can read the marble"
  participant(p): "org.acme.model.Collector"
  operation: READ
  resource(r): "org.acme.model.Marble"
  condition: (true)
  action: ALLOW
}

```

This rule allows all Collector participants to READ all Marbles.

We'll also need a rule to let Collectors read each other. The ChangeOwner transaction requires a submission of the identifier of a new owner which will not be possible if Collectors cannot read each other:

```
rule AnyoneCanReadCollectors {
    description: "Only an owner can edit a marble"
    participant(p): "org.acme.model.Collector"
    operation: READ
    resource(r): "org.acme.model.Collector"
    condition: (true)
    action: ALLOW
}
```

To update the Marble through the ChangeOwner transaction, another rule is needed. In particular we need to allow participants to create change owner transactions:

```
rule AnyoneCanIssueChangeOwner {
    description: "The participants can use the ChangeOwner transaction to update the marble"
    participant(p): "org.acme.model.Collector"
    operation: CREATE
    resource(r): "org.acme.model.ChangeOwner"
    condition: (true)
    action: ALLOW
}
```

Even with this rule, the transaction could be created by a non-owner but would still be rejected as they lack update access.

And finally, we are adding a rule in order to let the participants access to the objects through the composer for the purpose of the coming test :

```
rule ParticipantCanReadNetwork {
    description: "Participant can read the business network"
    participant(p): "org.acme.model.Collector"
    operation: ALL
    resource(r): "org.hyperledger.composer.system.*)"
    condition: (true)
    action: ALLOW
}
```

Now, you have completed the ACL changes.
Click on the **Update** button to take into account the ACL.

4.3 Testing the rules

Now, we will create a new user for the coming test: click on the top right menu (beside the user "admin"), then click on the **Id Registry** menu.

Create a new user clicking on the top right button : **Issue New ID**

On the Issue New Identity window, fill in

ID Name : jean

Participant : jean@fr.com

Issue New Identity

Issue a new ID to a participant in your business network

ID Name*

jean

Participant*

j

jean@fr.com Collector

☐ Allow this ID to issue new IDs (Admins only)

Issuing an identity generates a one-time secret. You can choose to send this to somebody or use it yourself when it has been issued.

Cancel

Create New

Then click on **Create New** button. The user jean is created as shown on the following screen.

Web tutorial-network

Define Test

admin

My IDs for tutorial-network

Issue New ID

ID Name	Status
admin	In Use
jean	In my wallet

Use now Remove

All IDs for tutorial-network

ID Name	Issued to	Status
admin	admin (NetworkAdmin)	ACTIVATED
jean	jean@fr.com (Collector)	ACTIVATED

Revoke

Then click on the line “jean” in the “My IDs...” list. It will select **jean** as the new user (**jean** is displayed instead of **admin** in the top right).

Go to the test window (Click on Test) then click on the **Submit Transaction** button.
Fill in the following info then click on submit :

```
{
  "$class": "org.acme.model.ChangeOwner",
  "marble": "resource:org.acme.model.Marble#1",
}
```

```
"newOwner": "resource:org.acme.model.Collector#jean@fr.com"
}
```

You should get an error since the Marble #1 is owned by louis@fr.com and there is a rule which restricts the update of Marble to the owner.

So change from **jean** to **admin** user :

- click on the top right menu (beside the user "jean"), then click on the **Id Registry** menu,
- Then click on the line "admin" in the "My IDs..." list. It will select **admin** as the new user (**admin** is displayed instead of **jean** in the top right).

Go to the test window (Click on Test) then click on the **Submit Transaction** button.

Fill in the following info then click on submit :

```
{
  "$class": "org.acme.model.ChangeOwner",
  "marble": "resource:org.acme.model.Marble#1",
  "newOwner": "resource:org.acme.model.Collector#jean@fr.com"
}
```

The transaction is successful and the marble #1 is now owned by jean.

So switch back from admin to jean :

- click on the top right menu (beside the user "jean"), then click on the **Id Registry** menu,
- Then click on the line "jean" in the "My IDs..." list. It will select **jean** as the new user (**jean** is displayed instead of **admin** in the top right).

Go to the test window (Click on Test) then click on the **Submit Transaction** button.

Fill in the following info then click on submit :

```
{
  "$class": "org.acme.model.ChangeOwner",
  "marble": "resource:org.acme.model.Marble#1",
  "newOwner": "resource:org.acme.model.Collector#louis@fr.com"
}
```

The transaction is successful and the marble #1 is now owned by louis.

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