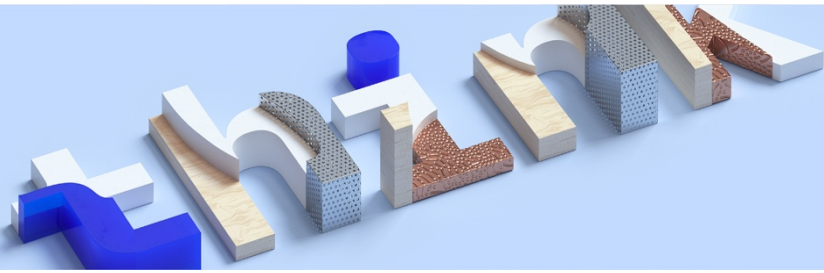# Lab Center – Hands-on Lab

Session **9603**

Session Title **Secure your Mobile Transactions End to End with IBM Mobile Foundation and Blockchain**

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Secure your Mobile Transactions End to End with IBM Mobile Foundation and Blockchain

Introduction

A block chain is defined as an open, distributed digital ledger of transactions. A blockchain is managed by a network of computers to validate and vet every transaction in the blockchain. Hyperledger is an open source effort spear-headed by the Linux Foundation for the development of blockchain technologies.

In this lab, you will see how you can setup an example blockchain network for the purpose of implementing a digital wallet and transfer virtual money among its peers. All transactions of the virtual wallet will be performed through a mobile app that is secured by IBM Mobile Foundation. Transactions from the mobile app will be submitted to the blockchain network through the use of MobileFirst adapters.

You will also see how you can automatically generate a full fledged MobileFirst adapter that can integrate with Hyperledger.

Getting started

The VM image of the lab has an instance of Hyperledger and the IBM Mobile Foundation Developer Kit pre-installed.

IBM Mobile Foundation is also available as a service on IBM Cloud where the IBM Mobile Foundation server is hosted on the cloud which mobile apps can connect to.

1. Clone the lab repository

Before getting started, clone the respository having the code for this lab.

Open a Terminal window and enter the following commands

```
cd /work
mkdir lab9603
cd lab9603
git clone https://github.com/Think18/Lab9603
```

Get your Hyperledger ready

2. Review the Hyperledger business network

The payment-network folder contains the definition of the business network for managing peer-to-peer payments.

The models/com.ibm.payments.cto file contains the model of the business. It contains definitions of the following
a. Assets
    a. An asset called 'Account' identified by an account ID, owned by an account holder and a property called balance which represents the balance in the account.
b. Participants
    a. A participant called 'AccountHolder' identified by an email who is the owner of the asset type called 'Account'.
c. Transactions
    a. A transaction called 'TransferMoney' which takes properties such as the source account and destination account and the amount to be transferred.

The lib/logic.js file contains the logic for defining the transactions.
Review this code.

3. Set up your Hyperledger instance

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The tools required for setting up a Hyperledger instance has already been installed on the VM. You will now set up the Hyperledger instance for making peer to peer payments.

First, start the Hyperledger Fabric instance

```
cd /work/fabric-tools
./startFabric.sh

cd ../lab9603/Lab9603/payment-network
```

Create an archive file for the business network in the current directory.

```
composer archive create —t dir —n .
```

The next step is to deploy the business network on to the hyperledger fabric.
a. Install the composer runtime

```
composer runtime install --card PeerAdmin@hlfv1 --
businessNetworkName payment-network
```

b. Deploy & start the business network

```
composer network start --card PeerAdmin@hlfv1 --networkAdmin
admin --networkAdminEnrollSecret adminpw --archiveFile payment-
network@0.0.1.bna --file networkadmin.card
```

c. Import the network's admin as a business network card

```
composer card import --file networkadmin.card
```

d. Verify if the business network has been deployed successfully

```
composer network ping --card admin@payment-network
```

e. Start the REST server for the hyperledger instance

```
composer-rest-server -c admin@payment-network -n never -w
true
```

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You have now setup your hyperledger instance successfully.

f. Download the Swagger JSON file of the Hyperledger REST APIs.
Open http://localhost:3000/explorer - you will see the REST APIs for the network you just deployed in Swagger UI
Visit http://localhost:3000/explorer/swagger.json to get the JSON format of the Swagger definition.
Copy paste the entire content into a text file named PaymentNetwork.json

We will use this file in a later step.

Connect your Mobile app to the Blockchain through IBM Mobile Foundation

4. Setup your MobileFirst server

The MobileFirst server acts as a gateway between your mobile app and the blockchain network. Among other things, the MobileFirst server ensures

a. A secure connection between your mobile app and the blockchain
b. Lifecycle management of your app
c. Protecting your app & blockchain from unauthorized access by ensuring authenticity of the application, the device and the user. In other words, MobileFirst server prevents fake or malicious apps from accessing your blockchain, it can authenticate end users using methods that are unique to a mobile device (e.g. fingerprint)
d. It offers convenient offline storage such that transactions can be made when the device is offline and then submitted to the blockchain when the device gets online.

To set-up your MobileFirst server, first check if the server is already running.
a. Visit http://localhost:9080/mfpconsole from a browser
If you see a web page for the IBM MobileFirst Operations Console, you can skip the next step.

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b. Start the MobileFirst server

```
cd /work/MobileFirst-8.0.0.0
export JAVA_HOME=/usr/lib/jvm/java8-openjdk-amd64
./run.sh
```

c. Verify your server is running by visiting the MobileFirst Operations Console at
    http://localhost:9080/mfpconsole
d. Login with the default credentials of admin / admin

The MobileFirst server has an extension called Microservice Adapter Generator which will automatically generate a MobileFirst adapter for any Open API compatible REST service.

We will provide the Swagger file we saved in Step 3f to the Adapter Generator which will produce a MobileFirst adapter for the app to connect to.

e. Click on Extensions > Microservice Adapter Generator in the left pane
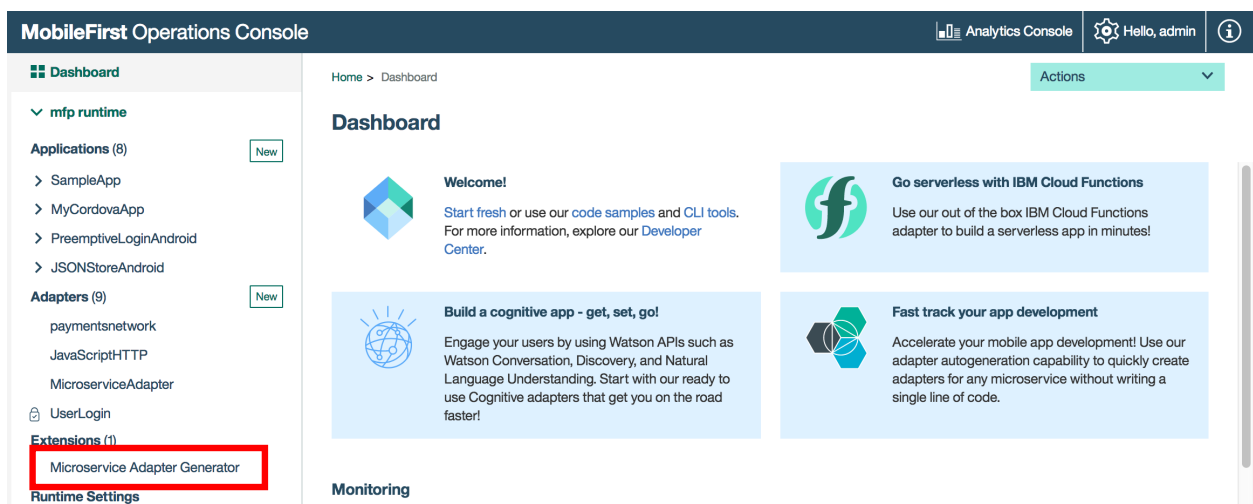
f. Select the PaymentNetwork.json file you saved in Step 3f. Select the "Include adapter source" check box. Click "Generate Adapter"
    This will take some time to generate the adapter and the adapter will be downloaded.

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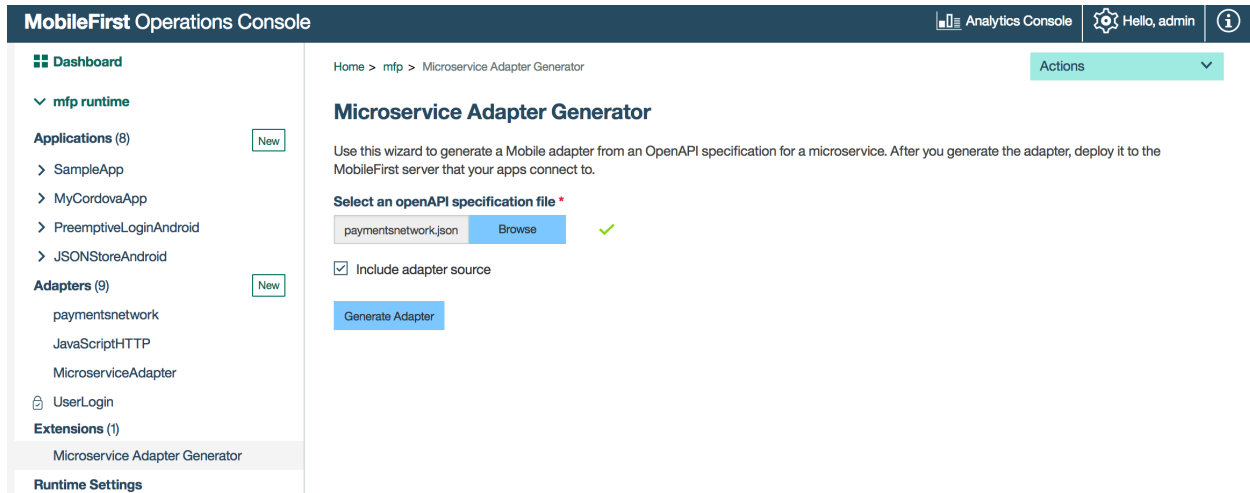
g. Now, we have an auto-generated adapter for the Hyperledger network we created. Time to deploy it
Click on the New button next to Adapters on the left pane
Click on Deploy Adapter button
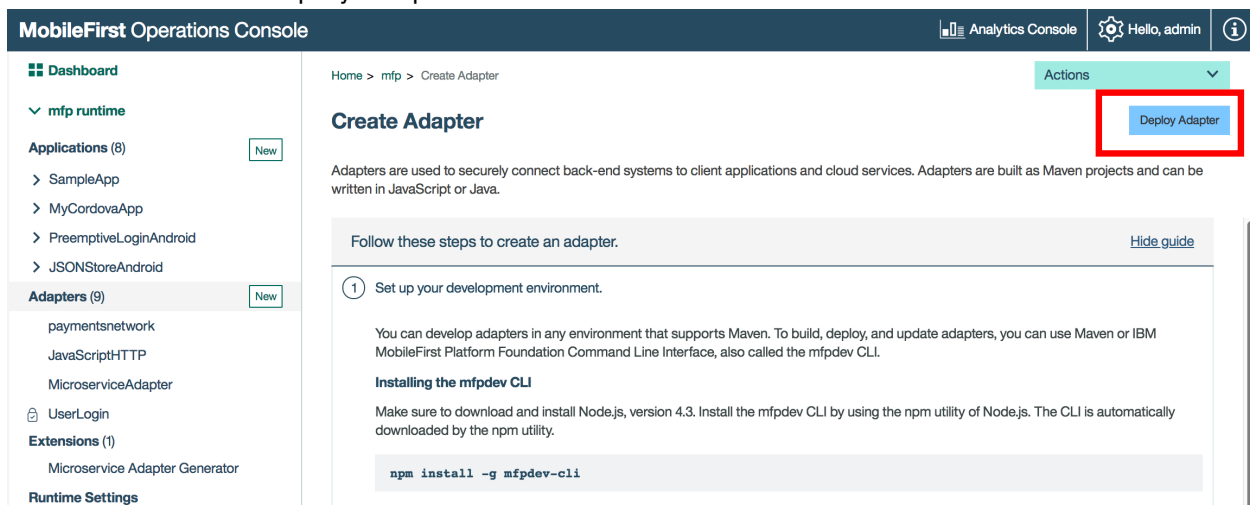
h. Navigate to the PaymentNetwork/generatedAdapter/adapter/target folder. Choose the PaymentNetwork.adapter file to deploy it.

i. Click on New Application. Register an application with the following information
Application Name – PaymentsApp
Platform – Android
Package – com.ibm.paymentssample
Version – 1.0

Your MobileFirst server configuration is ready !

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5. Run the app

   The next step is to build and run a mobile app that can participate in the Blockchain network

   a. Open Android Studio

      ```
      cd /work/android-studio/bin
      ./studio.sh
      ```

   b. Close open projects, if any
   c. Click "Import Project (Eclipse ADT, Gradle etc.)"
   d. Navigate to /work/lab9603/Think-Lab9603/mobile-app and open the project PaymentsSample
   e. Run the project. You will see the screen as seen below

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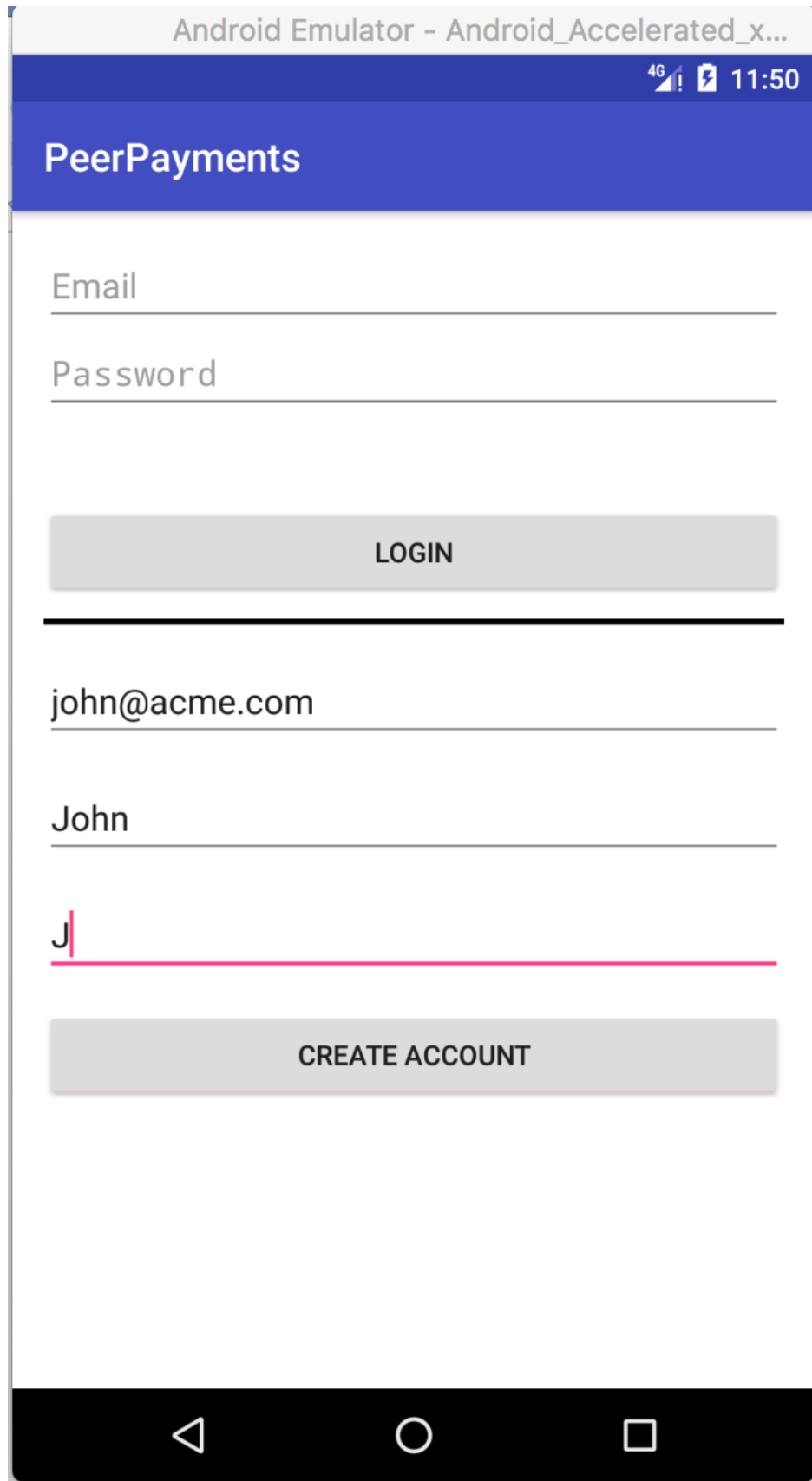
f. Register a new user. You will see the wallet is pre-loaded with $100 credit. Since there are no other users on the network, you will not be able to transfer money.

g. Close the app. Run it again from Android Studio.
Register as another user.
This time you will see the option to transfer money. Provide an amount and click on "Transfer Money"
You will see the balance being updated. You can verify the transfer by closing the app and again login as the user to whom money was transferred.

The transfer of money is initiated as a transaction to the blockchain from a Mobile device.

Next Steps

a. Explore the various security & application management features of IBM Mobile Foundation such as

a. Remote disabling of an app
b. Blocking of specific devices
c. Application authenticity (to prevent fake apps / malware from accessing the Hyperledger backend)
d. Protecting each operation by security checks

And many more...

See https://mobilefirstplatform.ibmcloud.com/features/

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