


# IBM Blockchain

## Three introductory labs

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October 27, 2016



# Blockchain in Bluemix Catalog

 IBM Bluemix Catalog

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CatalogSupportAccount

All Categories (1) >

Infrastructure

Compute

Storage

Network

Security

Apps


Boilerplates

Cloud Foundry Runtimes

Containers

OpenWhisk

Mobile

 Blockchain


Filter

Showing 1 result for "Blockchain" in 1 category

Services


Application Services

Deliver new web and mobile apps.

 **Blockchain**

Utilize IBM's Blockchain Technology within

IBM

 IBM Bluemix Catalog

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< View All

Blockchain

Blockchain is a peer-to-peer distributed ledger technology for a new generation of transactional applications that establishes trust, accountability and transparency while streamlining business processes. Think of it as an operating system for interactions, with the potential to vastly reduce the cost and complexity of getting things done. The distributed ledger makes it easier to create cost-efficient business networks where virtually anything of value can be tracked and traded, without requiring a central point of control. This service is built on top of the Linux Foundation's

Service name:

Blockchain-p7

Credential name:

Credentials-1

Features

- **Spin up a test Blockchain Network in one click**  
Spend less time creating and managing a blockchain network and more time
- **Membership services**  
Take advantage of our first implementation of the membership services module, which encompasses many of the latest advances in

# Blockchain in Bluemix Catalog

## Blockchain

Blockchain is a peer-to-peer distributed ledger technology for a new generation of transactional applications that establishes trust, accountability and transparency while streamlining business processes. Think of it as an operating system for interactions, with the potential to vastly reduce the cost and complexity of getting things done. The distributed ledger makes it easier to create cost-efficient business networks where virtually anything of value can be tracked and traded, without requiring a central point of control. This service is built on top of the Linux Foundation's Hyperledger Project open source code. IBM has recently launched a new plan for High Security business networks which features a 4 node network running on dedicated infrastructure.

IBM

Connect to:

Leave unbound

[View Docs](#)

AUTHOR IBM  
PUBLISHED 10/20/2016  
TYPE Service  
LOCATION US South

Service name:

Blockchain-w9

Credential name:

Credentials 1

## Features

- **Spin up a test Blockchain Network in one click**

Spend less time creating and managing a blockchain network and more time focusing on writing your applications.

- **Create confidential digital assets**

Create digital transactions in your test applications that are processed quickly and securely over your permissioned network.

- **Membership services**

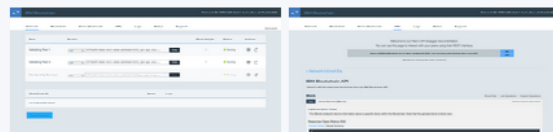
Take advantage of our first implementation of the membership services module, which encompasses many of the latest advances in cryptography.

- **Work with chaincode**

Smart contracts, written in chaincode, contain embedded business logic that allows you to define assets and write transaction instructions.

## Images

Click an image to enlarge and view screen captures, slides, or videos. Screen caps show the user interface for the service after it has been provisioned.



# Blockchain in Bluemix Catalog

[https://console.ng.bluemix.net/docs/services/blockchain/ibmblockchain\\_overview.html](https://console.ng.bluemix.net/docs/services/blockchain/ibmblockchain_overview.html)

## IBM Blockchain

Documentation

### About blockchain

*Last updated: 23 September 2016 | [Edit In GitHub](#)*

#### What is blockchain?

Blockchain is a technology for a new generation of transactional applications that establishes trust, accountability and transparency, while streamlining business processes. The blockchain network was first introduced by bitcoin, but its practical uses extend far beyond cryptocurrency exchanges. With blockchain, IBM is reimagining the most fundamental business exchanges, and opening the door to a new world of digital interactions.

Blockchain is projected to vastly reduce the cost and complexity of cross-enterprise business processes. Its distributed ledger makes it easier to create cost-efficient business networks, where virtually anything of value can be tracked and traded, without a centralized point of control.

Blockchain is already showing great promise across a broad range of business applications. As just one example, blockchain networks allow securities trades to be settled in minutes, rather than days. Blockchain is also helping companies streamline the flow of goods and payments, and enabling manufacturers to reduce product recalls by openly sharing production logs with OEMs and regulators.

Getting started

What you need to know

› [About blockchain](#)

› Network plans

› HFC SDK for Node.js

› Testing blockchain networks

› Dashboard monitor

› **Samples and tutorials**

Getting support

# Blockchain in Bluemix Catalog – sample apps the tutorials

[https://console.ng.bluemix.net/docs/services/blockchain/ibmblockchain\\_tutorials.html](https://console.ng.bluemix.net/docs/services/blockchain/ibmblockchain_tutorials.html)

## Sample apps and tutorials

*Last updated: 5 October 2016 | [Edit In GitHub](#)*

The following samples demonstrate how applications and chaincode function in an IBM Blockchain network. To learn more about the Hyperledger Fabric v0.5 code, which underpins your blockchain network, visit the [Fabric Docs](#) section of the Linux Foundation's Hyperledger Project.

To experience chaincode applications in action, you can immediately deploy the Marbles, Commercial Paper or Car Lease demo below (click a Deploy to Bluemix button). Or continue reading to explore the Hello Chaincode tutorial.

-  **Marbles**
-  **Commercial Paper**
-  **Car Lease**

## Using the Hello Chaincode tutorial

This tutorial guides you through using basic building blocks to code an elementary chaincode application. You will incrementally build a working chaincode that creates generic assets for exchanging on a network. Then you will interact with your chaincode through the network API. After completing this tutorial, you will be able to answer the following questions:

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Getting started

---

What you need to know

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› About blockchain

---

› Network plans

---

› HFC SDK for Node.js

---

› Testing blockchain network

---

› Dashboard monitor

---

▼ [Samples and tutorials](#)

Using the chaincode tutorial

Requirements for demos

Using Marbles demo

Using Commercial Paper demo

Using Car Lease demo

Non-deterministic chaincode

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Getting support

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# Lab 1 Marbles

[https://console.ng.bluemix.net/docs/services/blockchain/ibmblockchain\\_tutorials.html](https://console.ng.bluemix.net/docs/services/blockchain/ibmblockchain_tutorials.html)

View your app

## Sample apps and tutorials

*Last updated: 5 October 2016 | [Edit In GitHub](#)*


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-  **Marbles**
-  **Commercial Paper**
-  **Car Lease**

### Deploy this application to Bluemix

Deploying this app will create a private DevOps Services project for you. [Learn more.](#)



**MARBLES**  
GIT URL: <https://github.com/ibm-blockchain/marbles.git>  
GIT BRANCH: master

APP NAME  
**marbles-lennartf-1321**

REGION	ORGANIZATION	SPACE
IBM Bluemix US S...	all@us.ibm.com	dev

**DEPLOY**

📢 New! The toolchains beta feature is now available. [Deploy this example using toolchains!](#)


# Lab 1 Marbles – View Your App

[https://console.ng.bluemix.net/docs/services/blockchain/ibmblockchain\\_tutorials.html](https://console.ng.bluemix.net/docs/services/blockchain/ibmblockchain_tutorials.html)

View your app

Deploy this application to Bluemix

Deploying this app will create a private DevOps Services project for you. [Learn more](#)



**MARBLES**  
GIT URL: <https://github.com/ibm-blockchain/marbles.git>  
GIT BRANCH: master

- ✓ Created project successfully
- ✓ Cloned repository successfully
- ✓ Configured pipeline successfully
- ✓ Deployed to Bluemix successfully

**Success!**

You've added an instance of this app to your organization in Bluemix.

[VIEW YOUR APP](#) [EDIT CODE](#)

MARBLES P1 HOME CREATE

# Marbles

TIME 10/27/2016 08:20PM UTC

Bob's Leroy's

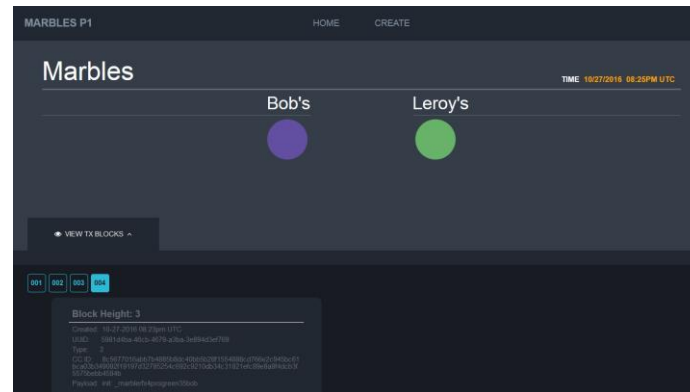
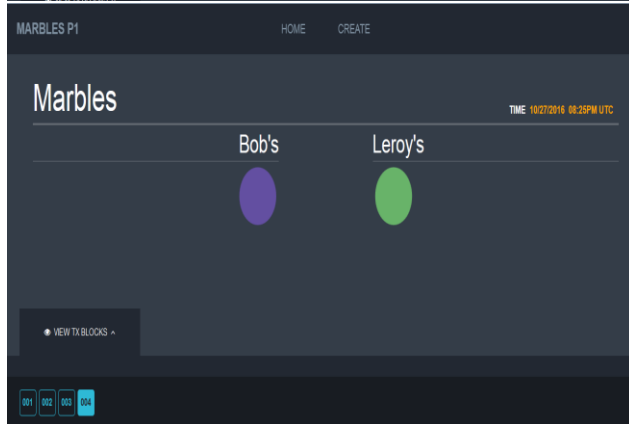
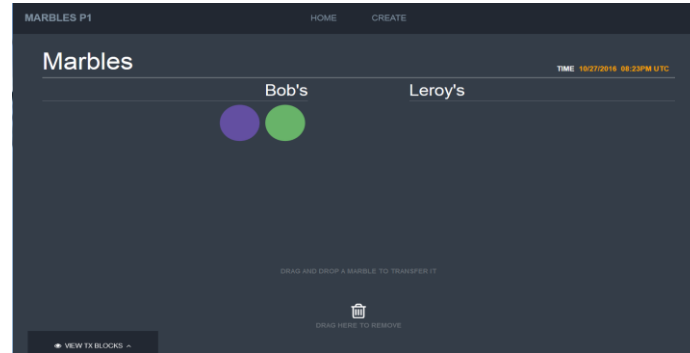
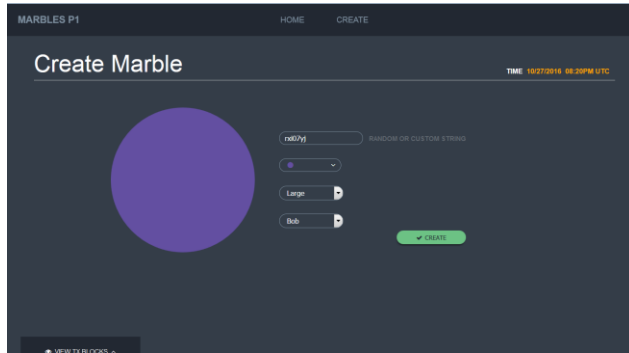
DRAG AND DROP A MARBLE TO TRANSFER IT

DRAG HERE TO REMOVE

# Lab 1 Marbles – View Your App

[https://console.ng.bluemix.net/docs/services/blockchain/ibmblockchain\\_tutorials.html](https://console.ng.bluemix.net/docs/services/blockchain/ibmblockchain_tutorials.html)

View your app





# Lab 1 Marbles – Edit Code

[https://console.ng.bluemix.net/docs/services/blockchain/ibmblockchain\\_tutorials.html](https://console.ng.bluemix.net/docs/services/blockchain/ibmblockchain_tutorials.html)

The screenshot displays the IBM Bluemix DevOps Services interface. The top navigation bar includes links for DASHBOARD, MY PROJECTS, EXPLORE, HELP, BLOG, and COMMUNITY. Below this, a toolbar shows options like File, Edit, View, Tools, and a status indicator for 'marbles-lennartf-1353 (running: normal)'. A green 'EDIT CODE' button is prominent. The left sidebar shows a file explorer for the 'lennartf | marbles-lennartf-1353' project, listing files such as .bluemix, .git, doc\_images, launchConfigurations, public, routes, scss, utils, views, .cfignore, .gitignore, .jshintignore, .jshintrc, app.js, busters\_css.json, busters\_js.json, gulpfile.js, i\_lost\_my\_marbles.md, LICENSE, manifest.yml, marbles\_demo\_notes.md, mycreds.json, package.json, README.md, setup.js, tutorial\_part1.md, and tutorial\_part2.md. The main editor area shows the 'README.md' file with the following content:

## Marbles Demo

[Deploy to Bluemix](#)

## Application Background

Hold on to your hats everyone, this application is going to demonstrate transferring marbles between two users leveraging IBM Blockchain. We are going to do this in Node.js and a bit of GoLang. The backend of this application will be the GoLang code running in our blockchain network. The chaincode itself will create a marble by storing it to the chaincode state. The chaincode itself is able to store data as a string in a key/value pair setup. Thus we will stringify JSON objects to store more complex structures.

Attributes of a marble:

```
1. name (unique string, will be used as key)
1. color (string, css color names)
1. size (int, size in mm)
1. user (string)
```

We are going to create a Web UI that can set these values and pass them to the chaincode. Interacting with the chaincode is done with a HTTP REST call to a peer on the network. The ibc-js SDK will abstract the details of the REST calls away. This allow us to use dot notation to call our GoLang functions (such as `chaincode.init_marble(args)`).

Start the tutorials below to have your own marbles blockchain demo!

### Tutorial / Documentation

- Looking for chaincode documentation? Check out the [learn chaincode](#) repo - start here!
- Tutorial for Marbles [Part 1](#)
- Tutorial for Marbles [Part 2](#)
- Documentation for IBM Blockchain [IBC-JS SDK](#) (our REST based SDK)

### Projects Contents

If you run marbles on local host you will have these two urls:

- Marbles Part 1 - <http://localhost:3000/p1>
- Marbles Part 2 - <http://localhost:3000/p2>

### Privacy Notice

# Lab 1 Marbles – Bluemix console

[https://console.ng.bluemix.net/docs/services/blockchain/ibmblockchain\\_tutorials.html](https://console.ng.bluemix.net/docs/services/blockchain/ibmblockchain_tutorials.html)

manifesttest.yml		128	1	1	 Running		
marbles-lennartf-1317	<a href="https://marbles-lennartf-1317.mybluemix.net">marbles-lennartf-1317.mybluemix.net</a>	512	1	1	 Running	 	
MobileFoundation-r...	<a href="#">mobilefoundation-rk-fe-server.myblu...</a>	1024	1	1	 Running	 	
NodeRedNI	<a href="#">NodeRedNI.mybluemix.net</a>	512	1	1	 Running	 	
outthink	<a href="#">outthink.mybluemix.net</a>	128	1	1	 Running	 	

# Lab 1 Marbles – Bluemix console

[https://console.ng.bluemix.net/docs/services/blockchain/ibmblockchain\\_tutorials.html](https://console.ng.bluemix.net/docs/services/blockchain/ibmblockchain_tutorials.html)

The screenshot shows the Bluemix console interface for an application named 'marbles-lennartf-1317'. The status is 'your app is running'. The main dashboard includes four key metrics: Buildpack (SDK for Node.js™), Instances (1, All instances are running, Health is 100%), MBs per Instance (512), and Total MB Allocation (512, 640 MBs still available). Below these are sections for Connections (No services connected), Runtime Cost (\$0.49), Activity Log (showing an error and a start event), and Continuous Delivery (GIT URL and buttons for Configure and Edit Code).

**marbles-lennartf-1317** Status: ● your app is running [View App](#)

**Runtime**

- BUILDPACK**  
SDK for Node.js™
- INSTANCES**  
1  
All instances are running  
Health is 100%
- MBs PER INSTANCE**  
512
- TOTAL MB ALLOCATION**  
512  
640 MBs still available

**Connections**

No services are connected to this app  
You can create or bind a service:

[Connect New](#) [Connect Existing](#)

**Runtime Cost**

**\$0.49**  
Current Charges for Billing Period

**\$0.49**  
Estimated Total for Billing Period  
(10/01-10/31)

Current and estimated cost excludes [connected services](#).

[View Full Usage Details](#)

**Activity Log**

- an instance of the app crashed: out of memory  
exit status: 255, CRASHED  
10/28/2016 2:24 AM | marbles-lennartf-1317
- started marbles-lennartf-1317 app  
10/27/2016 1:19 PM | al@us.ibm.com
- updated module: lennartf-1317

**Continuous Delivery**

**GIT URL**  
<https://hub.jazz.net/git/lennartf/marbles-lennartf-1317>

[Configure](#) [Edit Code](#)

# Lab 1 Marbles – DevOps Services Build and Deploy

[https://console.ng.bluemix.net/docs/services/blockchain/ibmblockchain\\_tutorials.html](https://console.ng.bluemix.net/docs/services/blockchain/ibmblockchain_tutorials.html)

The screenshot displays the IBM Bluemix DevOps Services console interface. At the top, the navigation bar includes links for DASHBOARD, MY PROJECTS, EXPLORE, HELP, BLOG, and COMMUNITY. The main header shows the project name 'lennartf | marbles-lennartf-1317' and action buttons for EDIT CODE, TRACK & PLAN, and BUILD & DEPLOY. Below the header, a video player shows a 'Build & Deploy Pipeline Core Concepts' video. To the right of the video, a welcome message states: 'Welcome to the Build & Deploy Pipeline. If you want to automate your continuous deployments, set up stages to retrieve input and run jobs, such as builds, tests, and deployments. We've configured the first two stages and have deployed your sample app for you. Pushing changes to the repository automatically trigger a new build and then a deployment. To learn more about using IBM Bluemix with IBM Bluemix DevOps Services together for development and continuous integration, check out the Build & Deploy Docs'. Below this, the 'Pipeline: All Stages' section shows two stages: 'Empty Build Stage' and 'Deploy to Bluemix'. The 'Empty Build Stage' shows a 'STAGE PASSED' status, with 'LAST INPUT' being a 'Git URL' and 'JOBS' including 'Empty Build... Succeeded 14 hr ago'. The 'Deploy to Bluemix' stage also shows 'STAGE PASSED', with 'LAST INPUT' being 'Stage: Empty Build Stage' and 'JOBS' including 'Push to Clo... Succeeded 14 hr ago'. A '+ ADD STAGE' button is visible on the right.

IBM Bluemix DevOps Services

DASHBOARD MY PROJECTS EXPLORE HELP ▼ BLOG COMMUNITY

lennartf | marbles-lennartf-1317

EDIT CODE TRACK & PLAN BUILD & DEPLOY

Build & Deploy Pipeline Core Concepts 2:58

### Welcome to the Build & Deploy Pipeline

If you want to automate your continuous deployments, set up stages to retrieve input and run jobs, such as builds, tests, and deployments.

We've configured the first two stages and have deployed your sample app for you. Pushing changes to the repository automatically trigger a new build and then a deployment. To learn more about using [IBM Bluemix](#) with IBM Bluemix DevOps Services together for development and continuous integration, check out the [Build & Deploy Docs](#)

Pipeline: All Stages

#### Empty Build Stage

STAGE PASSED

LAST INPUT [Git URL](#)

Last commit by Lennart Fran... 14 hr ago  
[Imported from https://github.com/ibm-b...](#)

JOBS [View logs and history](#)

Empty Build... Succeeded 14 hr ago

LAST EXECUTION RESULT

Empty Build Job 1

#### Deploy to Bluemix

STAGE PASSED

LAST INPUT Stage: Empty Build Stage /...

Empty Build Job 1

JOBS [View logs and history](#)

Push to Clo... Succeeded 14 hr ago

LAST EXECUTION RESULT

marbles-lennartf-1317  
[marbles-lennartf-1317.mybluemix.net](#)  
[View runtime log](#)

+ ADD STAGE

# Lab 1 Marbles – DevOps Services Edit Code – Build and Deploy

[https://console.ng.bluemix.net/docs/services/blockchain/ibmblockchain\\_tutorials.html](https://console.ng.bluemix.net/docs/services/blockchain/ibmblockchain_tutorials.html)

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IBM Bluemix DevOps Services

DASHBOARD MY PROJECTS EXPLORE HELP BLOG COMMUNITY

File Edit View Tools marbles-lennartf-1317 (running: normal) Live Edit EDIT CODE TRACK & PLAN BUILD & DEPLOY

lennartf | marbles-lennartf-1317

▼ README.md

## Marbles Demo

[Deploy to Bluemix](#)

## Application Background

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We are going to create a Web UI that can set these values and pass them to the chaincode. Interacting with the chaincode is done with a HTTP REST call to a peer on the network. The ibc-js SDK will abstract the details of the REST calls away. This allows us to use dot notation to call our GoLang functions (such as `chaincode.init_marble(args)`).

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### Tutorial / Documentation

- Looking for chaincode documentation? Check out the [learn chaincode](#) repo - start here!
- Tutorial for Marbles [Part 1](#)
- Tutorial for Marbles [Part 2](#)
- Documentation for IBM Blockchain [IBC-JS SDK](#) (our REST based SDK)

### Projects Contents









If you run marbles on local host you will have these two urls:

1. Marbles Part 1 - <http://localhost:3000/p1>
2. Marbles Part 2 - <http://localhost:3000/p2>

[Privacy Notice](#)

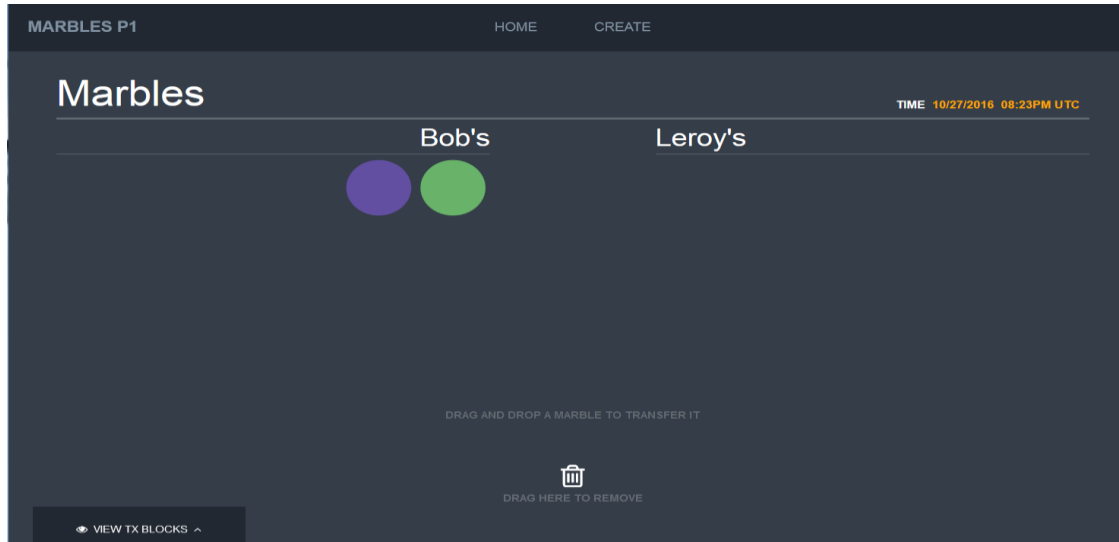
# Lab 1 Marbles – Console

[https://console.ng.bluemix.net/docs/services/blockchain/ibmblockchain\\_tutorials.html](https://console.ng.bluemix.net/docs/services/blockchain/ibmblockchain_tutorials.html)

manifesttest.yml		128	1	1	 Running		
marbles-lennartf...	<a href="https://marbles-lennartf-1317.mybluemix.net">marbles-lennartf-1317.mybluemix..</a>	512	1	1	 Running	 	
MobileFoundatio...	<a href="https://mobilefoundation-rk-fe-server.m...">mobilefoundation-rk-fe-server.m...</a>	1024	1	1	 Running	 	
NodeRedNI	<a href="https://NodeRedNI.mybluemix.net">NodeRedNI.mybluemix.net</a>	512	1	1	 Running	 	

# Lab 1 Marbles – View Your App

[https://console.ng.bluemix.net/docs/services/blockchain/ibmblockchain\\_tutorials.html](https://console.ng.bluemix.net/docs/services/blockchain/ibmblockchain_tutorials.html)




# Lab 2 Commercial Paper

[https://console.ng.bluemix.net/docs/services/blockchain/ibmblockchain\\_tutorials.html](https://console.ng.bluemix.net/docs/services/blockchain/ibmblockchain_tutorials.html)

View your app

### Deploy this application to Bluemix

Deploying this app will create a private DevOps Services project for you. [Learn more.](#)



**CP-WEB**  
GIT URL: <https://github.com/IBM-Blockchain/cp-web.git>  
GIT BRANCH: master

APP NAME

REGION

ORGANIZATION

SPACE

IBM Bluemix US S...

alf@us.ibm.com

dev


DEPLOY

**i** Now! The **toolchains** beta feature is now available. [Deploy this example using toolchains!](#)

You are logged in as [alf@us.ibm.com](#). [Log out.](#)  
[Terms of Use](#)

### Deploy this application to Bluemix

Deploying this app will create a private DevOps Services project for you. [Learn more.](#)



**CP-WEB**  
GIT URL: <https://github.com/IBM-Blockchain/cp-web.git>  
GIT BRANCH: master

✓ Created project successfully

✓ Cloned repository successfully

✓ Configured pipeline successfully

✓ Deployed to Bluemix successfully

**i** Now! The **toolchains** beta feature is now available. [Deploy this example using toolchains!](#)

### Success!

You've added an instance of this app to your organization in Bluemix.


[VIEW YOUR APP](#) [EDIT CODE](#)

You are logged in as [alf@us.ibm.com](#). [Log out.](#)  
[Terms of Use](#)



# Lab 2 Commercial Paper – View Your App

COMMERCIAL PAPER

 LOGIN ▾

## Login

---

Username

username

Password

Login

## Register

---

Username

username


Register

User roles are assigned through tags in the user name. Include the string 'auditor' in your user name to register as that user type. Everyone else is will be considered a regular user. Updates to the chaincode will remove this limitation in the future.

# Lab 2 Commercial Paper – View Your App – Trade Center

COMMERCIAL PAPER

AUDIT

 AUDITOR ▾


Trade Center

TIME 10/28/2016 09:02AM UTC

Account Balance:Loading from blockchain...

Filter Trades

DATE↑	CUSIP	TICKER	PAR	QTY	DISCOUNT	MATURITY	ISSUER	OWNER	ACTION
-------	-------	--------	-----	-----	----------	----------	--------	-------	--------

 VIEW TX BLOCKS ^

## Lab 2 Commercial Paper in Bluemix Dashboard

bluemixintro1	<a href="http://bluemixintro1.mybluemix.net">bluemixintro1.mybluemix.net</a>	128	1	1	 Running	  
bluemixintroiot	<a href="http://bluemixintroiot.mybluemix.net">bluemixintroiot.mybluemix.net</a>	512	1	1	 Running	  
cp-web-lennartf...	<a href="http://cp-web-lennartf-1415.mybluemix.net">cp-web-lennartf-1415.mybluemix...</a>	512	1	1	 Running	  
falkenberg	<a href="http://falkenberg.mybluemix.net">falkenberg.mybluemix.net</a>	128	1	0	 Stopped	 
IndiaHackathon...	<a href="http://IndiaHackathonMFSS.mybluemix.net">IndiaHackathonMFSS.mybluemix...</a>	512	1	1	 Running	  
manifesttest.yml		128	1	1	 Running	 

# Lab 2 Commercial Paper in Bluemix Dashboard

The screenshot displays the IBM Bluemix Cloud Foundry Applications dashboard for the application **cp-web-lennartf-1415**. The status is "Your app is running".

**Runtime Metrics:**

- BUILDPACK:** SDK for Node.js™
- INSTANCES:** 1 (All instances are running, Health is 100%)
- MBs PER INSTANCE:** 512
- TOTAL MB ALLOCATION:** 512 (640 MBs still available)

**Connections (1):** cpblockchain

**Runtime Cost:**

- Current Charges for Billing Period:** \$0.41
- Estimated Total for Billing Period (10/01-10/31):** \$0.41
- Current and estimated cost excludes connected services.
- [View Full Usage Details](#)

**Activity Log:**

- started cp-web-lennartf-1415 app  
10/27/2016 2:25 PM | all@us.ibm.com
- updated cp-web-lennartf-1415 app  
changed routes  
10/27/2016 2:25 PM | all@us.ibm.com

**Continuous Delivery:**

- GIT URL:** <https://github.com/jazz.net/gf/lennartf/cp-web-lennartf-1415>
- [Configure](#)
- [Edit Code](#)

# Lab 2 Commercial Paper – DevOps Services – Configure - Build and Deploy

IBM Bluemix DevOps Services

DASHBOARD MY PROJECTS EXPLORE HELP ▾ BLOG COMMUNITY

lennartf | cp-web-lennartf-1415

EDIT CODE TRACK & PLAN BUILD & DEPLOY

Pipeline: All Stages

### Empty Build Stage

STAGE PASSED

LAST INPUT [Git URL](#)

Last commit by Lennart Fran... 12 hr ago  
[Imported from https://github.com/IBM-B...](#)

JOBS [View logs and history](#)

✓ Empty Build... Succeeded 12 hr ago

LAST EXECUTION RESULT

Empty Build Job 1

### Deploy to Bluemix

STAGE PASSED

LAST INPUT Stage: Empty Build Stage /...

Empty Build Job 1

JOBS [View logs and history](#)

✓ Push to Clo... Succeeded 12 hr ago

LAST EXECUTION RESULT

Loading...






















+ ADD STAGE

# Lab 2 Commercial Paper – Devops Services – Edit Code – Build and Deploy

The screenshot displays a web-based IDE interface. The top bar shows the project name 'cp-web-lennartf-1415 (running: normal)' and buttons for 'EDIT CODE', 'TRACK & PLAN', and 'BUILD & DEPLOY'. The left sidebar contains a file explorer for the project 'lennartf | cp-web-lennartf-1415'. The file 'cp\_cc.go' is selected and highlighted in green. The main editor area shows the code for 'cp\_cc.go'.

```
1 /*
2 Copyright 2016 IBM
3
4 Licensed under the Apache License, Version 2.0 (the "License")
5 you may not use this file except in compliance with the License.
6 You may obtain a copy of the License at
7
8     http://www.apache.org/licenses/LICENSE-2.0
9
10 Unless required by applicable law or agreed to in writing, software
11 distributed under the license is distributed on an "AS IS" BASIS,
12 WITHOUT WARRANTIES OR CONDITIONS OF ANY KIND, either express or implied.
13 See the License for the specific language governing permissions and
14 limitations under the license.
15
16 Licensed Materials - Property of IBM
17 © Copyright IBM Corp. 2016
18 */
19 package main
20
21 import (
22     "encoding/json"
23     "errors"
24     "fmt"
25     "strconv"
26     "time"
27     "strings"
28
29     "github.com/hyperledger/fabric/core/chaincode/shim"
30 )
31
32 var cpPrefix = "cp:"
33 var accountPrefix = "acct:"
34 var accountsKey = "accounts"
35
36 var recentLeapYear = 2016
37
38 // SimpleChaincode example simple Chaincode implementation
39 type SimpleChaincode struct {
40     }
```


## Lab 2 Commercial Paper in Bluemix Dashboard – View App

bluemixintro1	<a href="https://bluemixintro1.mybluemix.net">bluemixintro1.mybluemix.net</a>	128	1	1	 Running	  
bluemixintroiot	<a href="https://bluemixintroiot.mybluemix.net">bluemixintroiot.mybluemix.net</a>	512	1	1	 Running	  
cp-web-lennartf...	<a href="https://cp-web-lennartf-1415.mybluemix.net">cp-web-lennartf-1415.mybluemix...</a>	512	1	1	 Running	  
falkenberg	<a href="https://falkenberg.mybluemix.net">falkenberg.mybluemix.net</a>	128	1	0	 Stopped	 
IndiaHackathon...	<a href="https://IndiaHackathonMFSS.mybluemix.net">IndiaHackathonMFSS.mybluemix...</a>	512	1	1	 Running	  
manifesttest.yml		128	1	1	 Running	 

# Lab 2 Commercial Paper – View Your App – Trade Center

COMMERCIAL PAPER

AUDIT

 AUDITOR ▾


# Trade Center

TIME 10/28/2016 09:02AM UTC

Account Balance:Loading from blockchain...

Filter Trades

DATE↑	CUSIP	TICKER	PAR	QTY	DISCOUNT	MATURITY	ISSUER	OWNER	ACTION
-------	-------	--------	-----	-----	----------	----------	--------	-------	--------

 VIEW TX BLOCKS ^



# Lab 3 Car Lease

[https://console.ng.bluemix.net/docs/services/blockchain/ibmblockchain\\_tutorials.html](https://console.ng.bluemix.net/docs/services/blockchain/ibmblockchain_tutorials.html)

## Deploy this application to Bluemix

Deploying this app will create a private DevOps Services project for you. [Learn more.](#)



### CAR-LEASE-DEMO

GIT URL: <https://github.com/IBM-Blockchain/car-lease-demo.git>  
GIT BRANCH: master

APP NAME

car-lease-demo-lennartf-1339

REGION

IBM Bluemix US S...

ORGANIZATION

alf@us.ibm.com

SPACE

dev

DEPLOY

New! The **toolchains** beta feature is now available. [Deploy this example using toolchains!](#)

You are logged in as [alf@us.ibm.com](#). [Log out](#)  
[Terms of Use](#)



### CAR-LEASE-DEMO

GIT URL: <https://github.com/IBM-Blockchain/car-lease-demo.git>  
GIT BRANCH: master

- Created project successfully
- Cloned repository successfully
- Configured pipeline successfully
- Deployed to Bluemix successfully

New! The **toolchains** beta feature is now available. [Deploy this example using toolchains!](#)

## Success!

You've added an instance of this app to your organization in Bluemix.

[VIEW YOUR APP](#)

[EDIT CODE](#)

# Lab 3 Car Lease - View App



BLOCKCHAIN CAR LEASING DEMO

## Main Menu:

Welcome to the Car Leasing Demo.

To get a scenario set up click on the link to the admin console then use one of the Create Scenario buttons. This will create cars and move them to their locations.

Otherwise you can create your own cars by clicking on Create Asset.

### Regulator

[Live Stats](#)

[Regulator View](#)

[Create Asset](#)

### Transfer Asset

[Regulator → Manufacturer](#)

[Manufacturer → Dealership](#)

[Dealership → Lease Company](#)

[Lease Company → Lessee](#)

[Lessee → Scrap Merchant](#)

### Update Asset

[Manufacturer Update](#)

### Dispose Asset

[Scrap Merchant → Scrap](#)

### Admin

[Admin Console](#)

# Lab 3 Car Lease - View App

## Admin Console

Demo setup:

Create Simple Scenario

Create Full Scenario

### Creating Scenario

*Creating vehicles ✓*

*Transferring vehicles to manufacturers ✓*


*Updating vehicles' details ✓*

*Transferring vehicles to private owners ✓*

*Demo setup ✓*

OK

## Lab 3 Car Lease - View App

	<b>Scenario Creation Complete</b>
Scenario	Scenario creation complete
	

# Lab 3 Car Lease - Edit Code – Build and Deploy

IBM Bluemix DevOps Services

DASHBOARD MY PROJECTS EXPLORE HELP BLOG COMMUNITY

File Edit View Tools car-lease-demo-lenn... (running: normal) Live Edit: EDIT CODE TRACK & PLAN BUILD & DEPLOY

lennartf | car-lease-demo-lennartf-1339

lennartf | car-lease-demo-lennartf-1339

▼ README.md

## Car Lease Demo

### Deploying the demo

To deploy to Bluemix simply use the button below then follow the instructions. This will generate the NodeJS server and the Blockchain service for you.

Deploy to Bluemix

To deploy the demo locally follow the instructions [here](#)

### Application overview

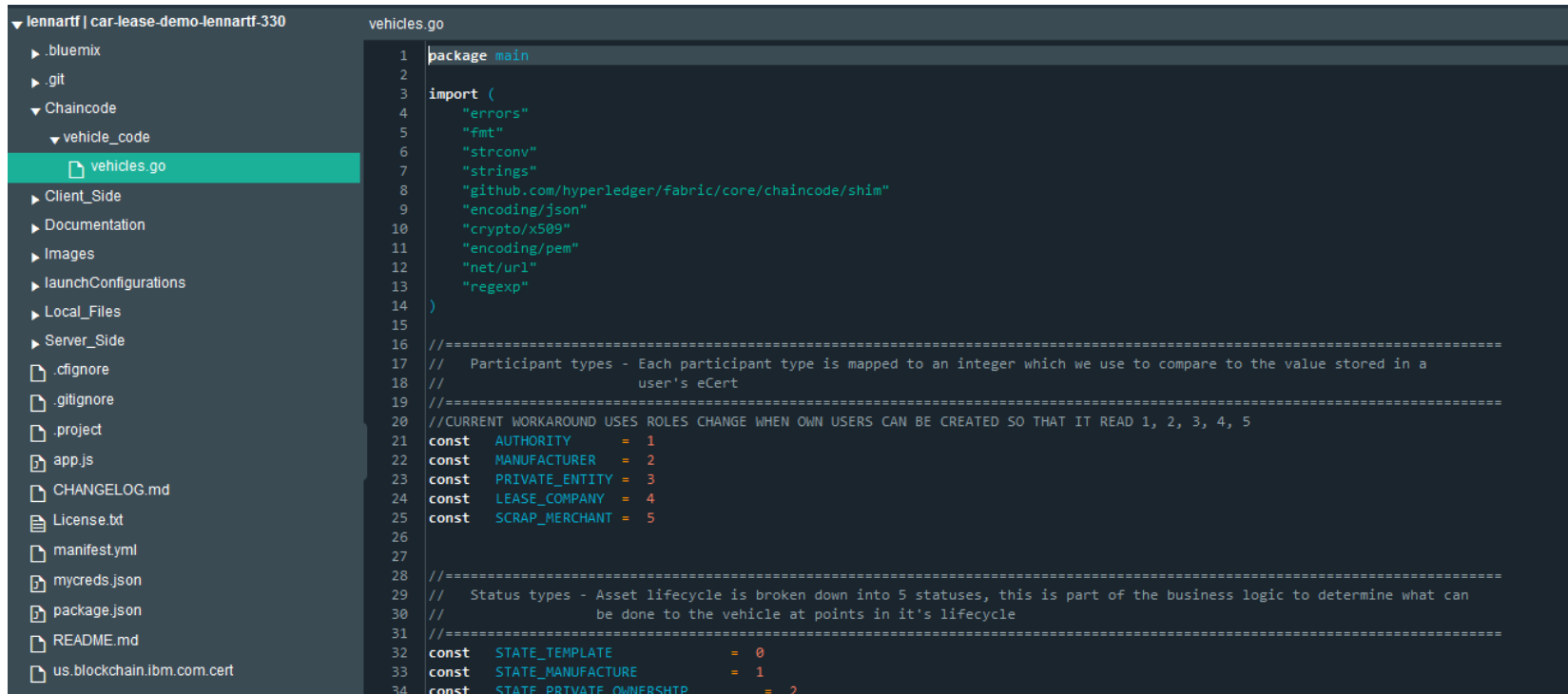
This application is designed to demonstrate how assets can be modeled on the Blockchain using a car leasing scenario. In the scenario vehicles are modeled using Blockchain technology with the following attributes:

Attribute	Type
V5clD	Unique string formed of two chars followed by a 7 digit int, used as the key to identify the vehicle
VIN	15 digit int
Make	String
Model	String
Colour	String
Reg	String
Owner	Identity of participant
Scrapped	Boolean
Status	Int between 0 and 4

LeaseContractID ChaincodeID, currently unused but will store the ID of the lease contract for the vehicle

The application is designed to allow participants to interact with the vehicle assets creating, updating and transferring them as their permissions allow. The participants included in the application are as follows:

# Lab 3 Car Lease - Edit Code – Build and Deploy – Chain Code















The screenshot shows a code editor interface. On the left is a file explorer for a project named 'lennartf | car-lease-demo-lennartf-330'. The 'Chaincode' folder is expanded, showing 'vehicle\_code' and 'vehicles.go' (which is selected). Other files in the explorer include 'Client\_Side', 'Documentation', 'Images', 'launchConfigurations', 'Local\_Files', 'Server\_Side', '.cignore', '.gitignore', '.project', 'app.js', 'CHANGELOG.md', 'License.txt', 'manifest.yml', 'mycreds.json', 'package.json', 'README.md', and 'us.blockchain.ibm.com.cert'.





The main editor area displays the code for 'vehicles.go'. The code is as follows:

```
1 package main
2
3 import (
4     "errors"
5     "fmt"
6     "strconv"
7     "strings"
8     "github.com/hyperledger/fabric/core/chaincode/shim"
9     "encoding/json"
10    "crypto/x509"
11    "encoding/pem"
12    "net/url"
13    "regexp"
14 )
15
16 //=====
17 // Participant types - Each participant type is mapped to an integer which we use to compare to the value stored in a
18 //                      user's eCert
19 //=====
20 //CURRENT WORKAROUND USES ROLES CHANGE WHEN OWN USERS CAN BE CREATED SO THAT IT READ 1, 2, 3, 4, 5
21 const AUTHORITY = 1
22 const MANUFACTURER = 2
23 const PRIVATE_ENTITY = 3
24 const LEASE_COMPANY = 4
25 const SCRAP_MERCHANT = 5
26
27
28 //=====
29 // Status types - Asset lifecycle is broken down into 5 statuses, this is part of the business logic to determine what can
30 //                  be done to the vehicle at points in it's lifecycle
31 //=====
32 const STATE_TEMPLATE = 0
33 const STATE_MANUFACTURE = 1
34 const STATE_PRIVATE_OWNERSHIP = 2
```


# Bluemix Console

bluemixintroiot	<a href="https://bluemixintroiot.mybluemix.net">bluemixintroiot.mybluemix.net</a>	512	1	1	 Running	  
car-lease-demo-	<a href="https://car-lease-demo-lennartf-330.mybluemix.net">car-lease-demo-lennartf-330.mybluemix.net</a>	512	1	1	 Running	  
cp-web-lennartf	<a href="https://cp-web-lennartf-1415.mybluemix.net">cp-web-lennartf-1415.mybluemix.net</a>	512	1	1	 Running	  


# Bluemix Catalog

 car-lease-demo-lennartf-330 Status: ● Your app is running View App   


### Runtime




**BUILDPACK**  
SDK for Node.js™



**INSTANCES**  
All instances are running  
Health is 100%




**MBS PER INSTANCE**





**TOTAL MB ALLOCATION**  
128 MBs still available ⓘ

### Connections (1)

 car\_lease\_blockchain

### Activity Log

-  started car-lease-demo-lennartf-330 app  
10/28/2016 3:32 AM | alf@us.ibm.com
-  updated car-lease-demo-lennartf-330 app  
changed routes  
10/28/2016 3:31 AM | alf@us.ibm.com

### Runtime Cost


**\$0.00**  
Current Charges for Billing Period

**\$0.00**  
Estimated Total for Billing Period  
(10/01-10/31)

Current and estimated cost excludes connected services.

View Full Usage Details

### Continuous Delivery













 **GIT URL**  
<https://hub.jazz.net/git/lennartf/car-lease-demo-lennartf-330>

Configure

Edit Code



# Bluemix Catalog

bluemixintroiot	<a href="http://bluemixintroiot.mybluemix.net">bluemixintroiot.mybluemix.net</a>	512	1	1	 Running			
car-lease-demo-...	<a href="http://car-lease-demo-lennartf-330.mybluemix.net">car-lease-demo-lennartf-330.mybluemix.net</a>	512	1	1	 Running			
cp-web-lennartf	<a href="http://cp-web-lennartf-1415.mybluemix.net">cp-web-lennartf-1415.mybluemix.net</a>	512	1	1	 Running			

# Bluemix Catalog

IBM Bluemix Catalog

Categories (1) >

Structure


ES

ndry Runtimes

S

sk

(4)


 **Blockchain**

Showing 1 result for "Blockchain" in 1 category

**Services**

**Application Services**

Deliver new web and mobile apps.



**Blockchain**  
Utilize IBM's Blockchain Technology within Bluemix  
IBM

# Bluemix Catalog

Service name:

Blockchain-kl

Credential name:

Credentials-1

## Features

- **Spin up a test Blockchain Network in one click**

Spend less time creating and managing a blockchain network and more time focusing on writing your applications.

- **Create confidential digital assets**

Create digital transactions in your test applications that are processed quickly and securely over your permissioned network.

- **Membership services**

Take advantage of our first implementation of the membership services module, which encompasses many of the latest advances in cryptography.

- **Work with chaincode**

Smart contracts, written in chaincode, contain embedded business logic that allows you to define assets and write transaction instructions.

ate Monthly Cost

[Calculator](#)

Create

← Application Services

## Blockchain-kl

Manage

Service Credentials

Connections


## Welcome to the Starter Developer Network on IBM Blockchain!

LAUNCH 

Welcome, alfi@us.ibm.com!

This service is intended for developers who consider themselves early adopters and want to get involved with IBM's approach to business networks that maintain, secure and share a replicated ledger using blockchain technology.

# Bluemix Catalog

 IBM Blockchain

Network ID: 3c945fd9b0e645648ef133fd9f8f88d9

NetworkBlockchainDemo ChaincodeAPIsLogsStatusSupport

Peer

Members

Validation

Validation

Validation

Validation

Getting started

Getting Started

Welcome to your blockchain network's console page. From here you can do many things.  
If this is your first time using IBM Blockchain you should deploy some chaincode. Our Demo Chaincode tab can help with that!

Network

Blockchain

Demo Chaincode

APIs

Logs

Deploy your first chaincode!

1) Go to "Demo Chaincode" and select a chaincode template. Then hit deploy.

2) Click the pre-built query/invoke buttons.

3) Take the sample to the next level by creating API calls in the "APIs" tab. You can get the chaincode ID from the networks tab.

# Blockchain, Demo Chaincode

Network

Blockchain

Demo Chaincode

APIs

Logs

Status

Support

Not sure how to get started? Pick a demo and deploy its chaincode right from this page!

(Deploying will submit chaincode to your network. You will then be able to interact with the chaincode.)

Application

Description

Links

Interact

**Example02**

1/5 difficulty

Store two integers named A and B.  
Subtract from one and add to the other.

[Chaincode](#)

[Show Actions](#)

Deploy

**Marbles**

2/5 difficulty

Create marble assets and trade them with  
your friend Leroy.

[GitHub](#), [Chaincode](#), [Docs](#)

[Show Actions](#)

Deploy

**Commercial  
Paper**

3/5 difficulty

Buy and sell business to business  
monetary loans.

[GitHub](#), [Chaincode](#), [Docs](#)

[Show Actions](#)

Deploy

# Bluemix chaincode samples

[Network](#)[Blockchain](#)[Demo Chaincode](#)[APIs](#)[Logs](#)[Status](#)[Support](#)

Not sure how to get started? Pick a demo and deploy its chaincode right from this page!

(Deploying will submit chaincode to your network. You will then be able to interact with the chaincode.)

Application	Description	Links	Interact
<b>Example02</b> 1/5 difficulty	Store two integers named A and B. Subtract from one and add to the other.	<a href="#">Chaincode</a>	<a href="#">Show Actions</a>
<b>Marbles</b> 2/5 difficulty	Create marble assets and trade them with your friend Leroy.	<a href="#">GitHub</a> , <a href="#">Chaincode</a> , <a href="#">Docs</a>	<a href="#">Show Actions</a>
<b>Commercial Paper</b> 3/5 difficulty	Buy and sell business to business monetary loans.	<a href="#">GitHub</a> , <a href="#">Chaincode</a> , <a href="#">Docs</a>	<a href="#">Show Actions</a>

# Bluemix Example02 sample

Application	Description	Links	Interact
<b>Example02</b> 1/5 difficulty	Store two integers named A and B. Subtract from one and add to the other.	<a href="#">Chaincode</a>	<a href="#">Show Actions</a> <div>Deploy</div>
Select the correct chaincode		<div>example02: 72c3c395...</div>	<div>Transfer from A to B</div> <div>Transfer from B to A</div> <div>Query A</div> <div>Query B</div>

# Chaincode: Marbles

## Marbles

2/5 difficulty

Create marble assets and trade them with your friend Leroy.

[GitHub](#), [Chaincode](#), [Docs](#)

[Show Actions](#)

Deploy



## Commercial

## Paper

3/5 difficulty

Buy and sell business to business monetary loans.

[GitHub](#), [Chaincode](#), [Docs](#)

[Show Actions](#)


Deploy



### Demo Chaincode successfully deployed:

Now you can hit an action button below "Actions" to invoke a chaincode function.



Show API details 



# Blockchain Marbles

## Marbles

2/5 difficulty

Create marble assets and trade them with your friend Leroy.

[GitHub](#), [Chaincode](#), [Docs](#)

[Show Actions](#)

Deploy

Select the correct chaincode

marbles: d827db00...



Create marble

Trade away  
marble

Delete marble

Query marble

# Bluemix Commercial Paper

Commercial  
Paper

3/5 difficulty

Buy and sell business to business  
monetary loans.

[GitHub](#), [Chaincode](#), [Docs](#)

[Show Actions](#)

Deploy



Commercial  
Paper

3/5 difficulty

Buy and sell business to business  
monetary loans.

[GitHub](#), [Chaincode](#), [Docs](#)

[Show Actions](#)

Deploy

Select the correct chaincode

cp: bc25e428... ▼

Register Accounts

Seed paper

Buy paper

Query account

# Welcome to the Starter Developer Network on IBM Blockchain!

← Application Services

Blockchain-yk

Manage

Service Credentials

Connections

Welcome to the Starter Developer Network  
on IBM Blockchain!

LAUNCH 

Welcome, alf@us.ibm.com!

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# Welcome to the Starter Developer Network on IBM Blockchain!

## Getting Started

Welcome to your blockchain network's console page. From here you can do many things.  
If this is your first time using IBM Blockchain you should [deploy some chaincode](#). Our Demo Chaincode tab can help with that!

<h3>Network</h3> <p>View the status of your network peers and deployed chain code</p>	<h3>Blockchain</h3> <p>Explore transactions written to the network</p>	<h3>Demo Chaincode</h3> <p>Deploy sample chain code templates in one-click</p>	<h3>APIs</h3> <p>Learn and interact with API docs</p>
---	--	--	---

### Logs

View peer or membership service logs

[Deploy your first chaincode!](#)

- 1) Go to "Demo Chaincode" and select a chaincode template. Then hit deploy.
- 2) Click the pre-built query/invoke buttons.
- 3) Take the sample to the next level by creating API calls in the "APIs" tab. You can get the chaincode ID from the networks tab.

# Welcome to the Starter Developer Network on IBM Blockchain!

Welcome to our Peer's API Swagger documentation.

You can use this page to interact with your peers using their REST interface.

`https://7aae381e93524252b7f0cc05a3d9455c-vp1.us.blockchain.ibm.com:444`

VP0

VP1

VP2

VP3

(feel free to change the peer url above)

[+ Network's Enroll IDs](#)

## IBM Blockchain API

Interact with the enterprise blockchain through IBM Blockchain API

**Block**

[Show/Hide](#)

[List Operations](#)

[Expand Operations](#)

**Blockchain**

[Show/Hide](#)

[List Operations](#)

[Expand Operations](#)

**Chaincode**

[Show/Hide](#)

[List Operations](#)

[Expand Operations](#)

**Network**

[Show/Hide](#)

[List Operations](#)

[Expand Operations](#)

**Registrar**

[Show/Hide](#)

[List Operations](#)

[Expand Operations](#)

**Transactions**

[Show/Hide](#)

[List Operations](#)

[Expand Operations](#)

# Welcome to the Starter Developer Network on IBM Blockchain!

## IBM Blockchain API

Interact with the enterprise blockchain through IBM Blockchain API

### Block

Show/Hide | List Operations | Expand Operations

GET

/chain/blocks/{Block}

Individual block information

#### Implementation Notes

The {Block} endpoint returns information about a specific block within the Blockchain. Note that the genesis block is block zero.

#### Response Class (Status 200)

[Model Details](#) | [Model Schema](#)

```
{
  "proposerID": "string",
  "timestamp": {
    "seconds": 0,
    "nanos": 0
  },
  "transactions": [
    {
      "type": "UNDEFINED",
      "chaincodeID": "string",
```

Response Content Type

application/json



---

## Using the Hello Chaincode tutorial

This tutorial guides you through using basic building blocks to code an elementary chaincode application.

- What is chaincode?
- How do I implement chaincode?
- What dependencies exist?
- What are the major functions?
- How do I pass different values to my arguments?
- How do I securely enroll a user on my network?
- How do I compile my chaincode?
- How do I interact with my chaincode through the REST API?

[https://console.ng.bluemix.net/docs/services/blockchain/ibmblockchain\\_tutorials.html#hellocc](https://console.ng.bluemix.net/docs/services/blockchain/ibmblockchain_tutorials.html#hellocc)

# Learn Chaincode

---

A tutorial to get you started with writing smart contracts for Hyperledger.

## Deployment

---

In order to support multiple versions of the Hyperledger fabric, this repository uses branches in combination with gopkg.in URLs. What does this mean for beginners? Just pick the branch below and use the instructions for that branch to complete the tutorial

<https://github.com/IBM-Blockchain/learn-chaincode/blob/master/README.md>



# Educate Yourself!

- Everything is available through the web:

- <http://hyperledger.org>
- <https://github.com/hyperledger>
- <http://ibm.com/blockchain>

