

Cryptocurrencies & Blockchain: A Recipe for Disruptive Innovation in Quality and Supply Chains



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Monday, May 14, 2018



The Global Voice of Quality®

goo.gl/7YmjT7



From <http://www.comcap.media/market-trends/economy/276-tulipmania-want-to-sell-a-bulb-for-land>

Bitcoin (USD) Price

Closing Price OHLC

1h 12h 1d 1w 1m 3m **1y** All

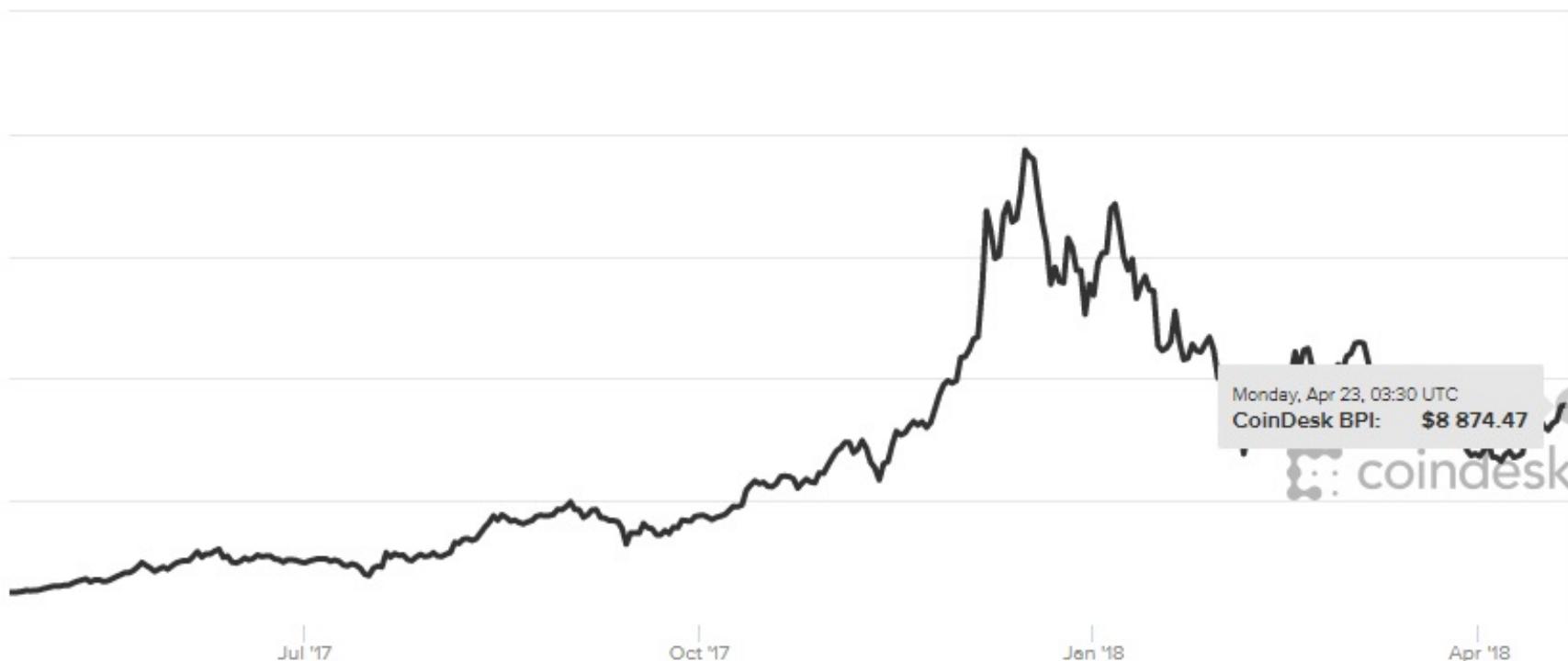
Apr 23, 2017 to Apr 23, 2018 [Export](#)

\$20000

\$15000

\$10000

\$5000



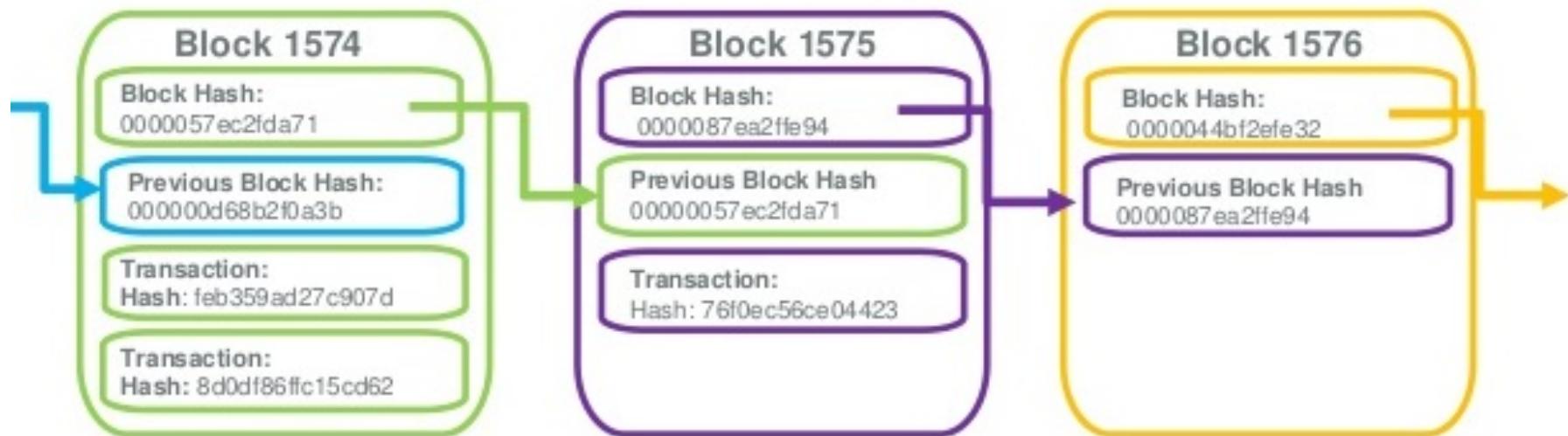
Monday, Apr 23, 03:30 UTC
CoinDesk BPI: **\$8 874.47**



\$8,874.47 ▲ 0.93%

Today's Open	\$8,792.83	Change	▲ \$81.64
Today's High	\$8,884.28	Market Cap	\$0.151T
Today's Low	\$8,775.10	Supply	16,993,850

Blockchain Data Structure



From <https://www.slideshare.net/IBMDevOpsforEnterpriseSystems/making-blockchain-real-for-business-at-the-z-systems-agile-enterprise-development-conference-2016>

Two Distinct Types of Blockchain

PERMISSIONLESS (PUBLIC):

- Bitcoin
- Ethereum

PERMISSIONED (PRIVATE):

- Hyperledger Fabric
- Hyperledger Sawtooth
- Hyperledger Iroha
- Hyperledger Indy
- Hyperledger Burrow
- R3 Corda

GDPR (General Data Protection Regulation)

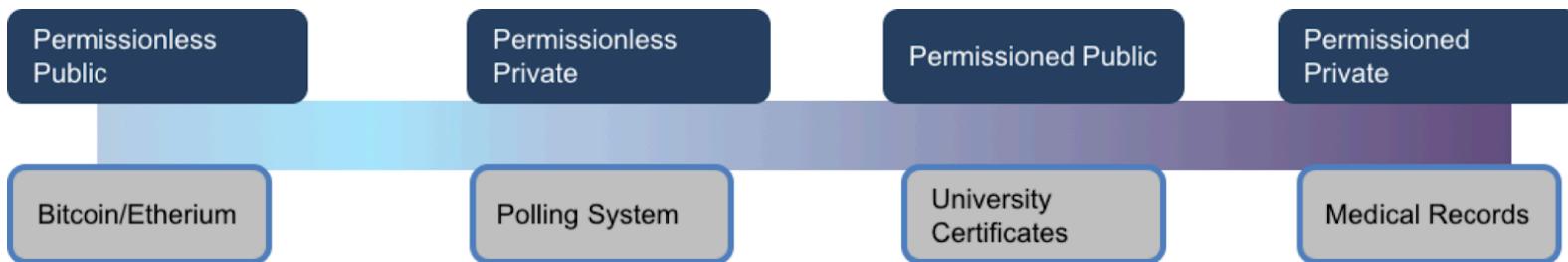
“The GDPR can in many cases apply to U.S. higher education institutions if those institutions control or process data about residents of the EU. Unlike prior laws, the GDPR takes the position that residents of the EU should not be deprived of security and privacy protections solely because a business or organization that targets those residents is located elsewhere.” -- <https://er.educause.edu/blogs/2017/8/gdpr-a-data-regulation-to-watch>

- Established April 2016 but will be enforced beginning May 26, 2018
- The cornerstone of GDPR is **consent**
- Applies to any organization collecting or processing data on behalf of EU residents
- Places legal obligations onto those who control and process:
 - **Personal data** – email, physical address, online identifiers (e.g. home IP addresses)
 - **Sensitive personal data** – health/genetic information, biometrics

GDPR and Blockchain

Potential threats:

- Public, permissionless blockchains are the antithesis of GDPR!
- Smart contracts making decisions on your behalf when GDPR asks that citizens be informed of all decisions
- Enforcing the “right to be forgotten”



From Moeller et al. (2018) An overview of blockchain technology and the GDPR. Available at
https://static1.squarespace.com/static/59cb821618b27d9277121e21/t/59d37c7a51a584ef26bab480/1507032187643/BAI_DOC.pdf
https://static1.squarespace.com/static/59cb821618b27d9277121e21/t/59d37c7a51a584ef26bab480/1507032187643/BAI_DOC.pdf

Piekarska et al. (2018) When GDPR becomes real, and blockchain is no longer fairy dust. Available at
<https://docs.google.com/document/d/1wnRYOZrGZS6h-PnJRaq1pAc35GrfGUZcXh46sTHdFQ/edit#heading=h.xlkpssu5kfbq>

How a Blockchain Grows

- 1. Create a “Genesis Block” (One Time Only)**
- 2. Gather Transaction Data for New Block**
 - Includes looking up previous hash and adding it to the new block
- 3. Hash the New Block**
- 4. Add it to the Blockchain**

Hashing

- Convert an object to a sequence of letters and numbers *from which you can't recover the original object*
- Lots of hashing algorithms:
 - MD5, SHA1, CRC32, **SHA256**, **SHA512**, XXHASH32, XXHASH64, MURMUR32
- Goal is to “minimize collisions”



Hash a Phrase

```
> phrase <- "Here is my password"  
> digest(phrase, "crc32")  
[1] "61835063"  
  
> digest(phrase, "murmur32")  
[1] "611907fc"  
  
> digest(phrase, "md5")  
[1] "6303034c25d4e1763f2dd30341ddb0d5"
```



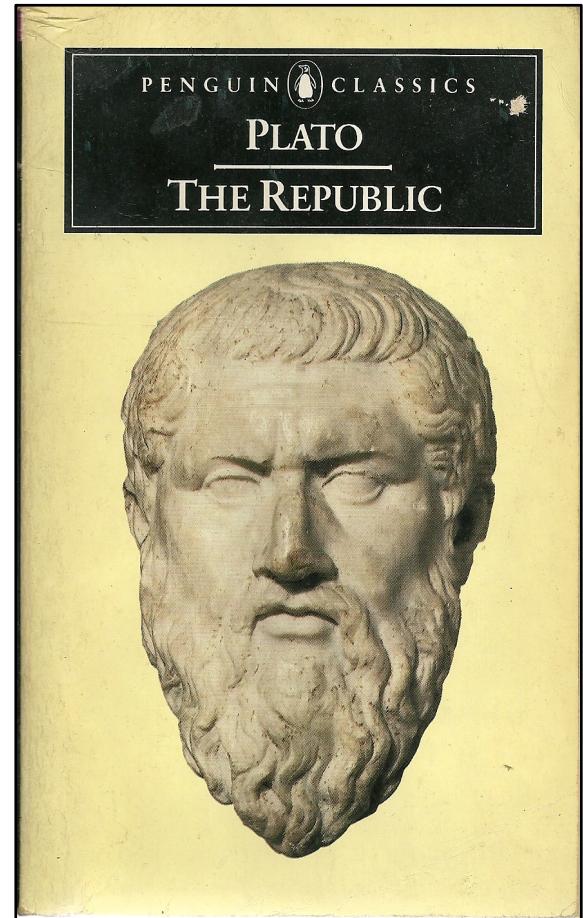
Hash a Phrase

```
> phrase <- "Here is my password"  
> digest(phrase, "sha256")  
[1]  
"6fc0926f03bc8a445fb498bd9d7adb017a3c57b95073f72fd25e8  
c04190ef2e5"  
  
> digest(phrase, "sha512")  
[1]  
"b0474e7cbb8e6a0847b47df20393f464c91c7825c358684eb2d4c  
87bb330dc60b3a95dee25b197e839934e1271825320b5cde05ea8  
e66246f1fee04275c3d30"
```



Hash Plato's Republic

```
> book <- gutenberg_download(150)
> digest(book, "sha256")
[1]
"6adc59638784ec62646f16b74f651315
e583666af9fefbe7d7f0b95a1ae998b8"
```



Hash My Cat

```
> kitty <-  
readJPEG("kitty.jpg")  
> digest(kitty, "sha256")  
[1]  
"dcd239ba6a09080eb61b7310  
a5428753f63d05ae2b282bf81  
dc0182f7552f60d"
```



Hash My Cat

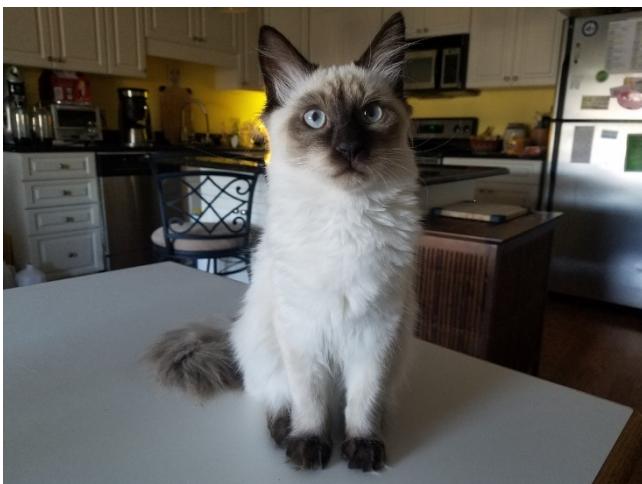
1



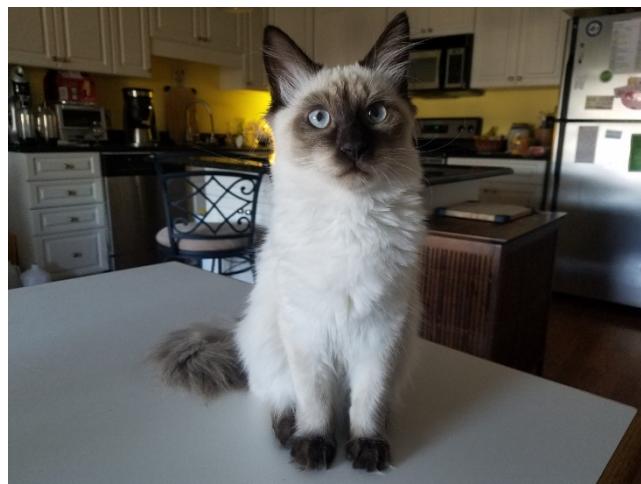
2



3



4



Hash My Cat

```
> digest(kitty, "sha256")
[1]
"dcd239ba6a09080eb61b7310a5428753
f63d05ae2b282bf81dc0182f7552f60d"
> digest(kitty2, "sha256")
[1]
"dcd239ba6a09080eb61b7310a5428753
f63d05ae2b282bf81dc0182f7552f60d"
> digest(kitty3, "sha256")
[1]
"fe5791ee490693d7d7b25379278b2374
c3afda25c76aec5f3aa17e7e8b184362"
> digest(kitty4, "sha256")
[1]
"dcd239ba6a09080eb61b7310a5428753
f63d05ae2b282bf81dc0182f7552f60d"
```



Small changes in an object →
Large change in a hash →
Break a blockchain

Blockchain Provides...

- Immutable record of peer-to-peer transactions
- Relief from a central authority
- Transparent recordkeeping
- Private channels to protect data privacy
- Immediately auditable



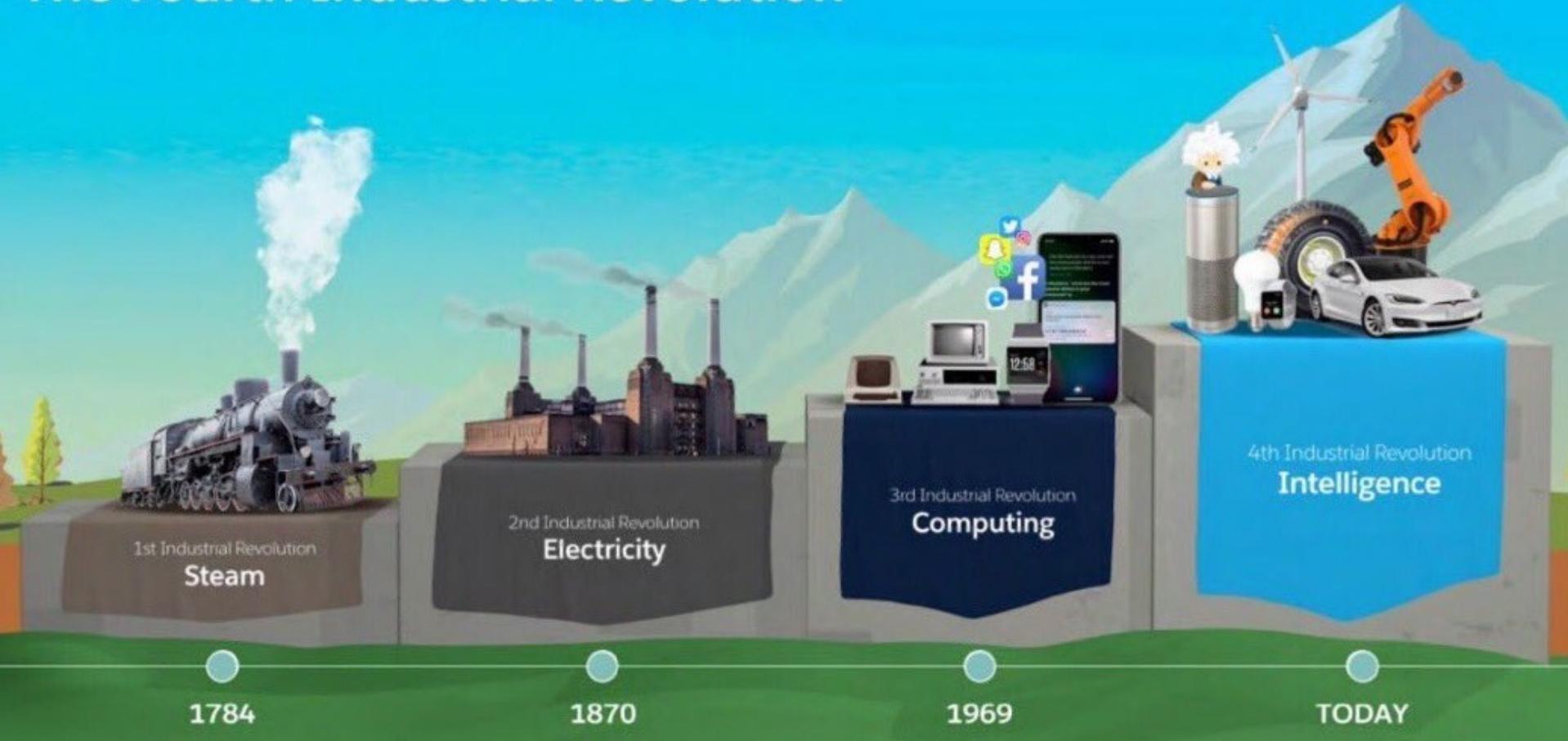
Blockchain-Based Business Systems

- Participants
- Assets
- Transactions
- Conditions for Transactions (“Smart Contracts”)



HYPERLEDGER

The Fourth Industrial Revolution



From Vala Afshar, @valaaafshar

Blockchain is Suited For...

Tracking **transactions** of **assets** and **information**:

- Supply chain management
- QA based on smart contracts
- Peer-to-peer exchanges
- New business models (e.g. energy markets)
- Information or identity verification (e.g. IoT)
- Consensus mechanism

Roles for Auditors

- **Quality Assurance for Smart Contracts** - make sure right factors are in place
- **Blockchain Architect** - ensure compliance between design and intentions
- **Blockchain Administrator** – add users, grant permissions, add new business processes
- **Arbitrator** – resolve disputes

*Contracts are still agreements between multiple entities
and require INTERPRETATION*



Hyperledger Demo

Hyperledger members

IBM Blockchain

Premier



General



Associate

Source: <https://www.hyperledger.org/members>
Updated 4 October 2017

Full list of current members available at <https://www.hyperledger.org/members>

Hyperledger Demo

Hyperledger Composer

Secure | https://composer-playground.mybluemix.net/login

Hyperledger Composer Playground

Get local version

My Business Networks

Connection: Web Browser

Welcome to Hyperledger Composer Playground!

Hello, Composer!

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

BUSINESS NETWORKS

basic-sample-network

Get Started

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](#).

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Playground v0.19.5 Tutorial Docs Community

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Get local version

My Business Networks

Connection: Web Browser

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BUSINESS NETWORK

basic-sample-network

Get Started →

Deploy a new business network

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A screenshot of a web browser displaying the Hyperledger Composer Playground. The page has a blue header bar with the title 'Hyperledger Composer Playground' and a 'Get local version' button. Below the header, the text 'My Business Networks' and 'Connection: Web Browser' is displayed. On the left, there's a card for the 'basic-sample-network' with a globe icon, the text 'Hello, Composer!', and a 'Get Started' button. To the right, there's a dashed box containing a plus sign icon and the text 'Deploy a new business network'. At the bottom, there are links for Legal, GitHub, and playground versions (v0.19.5), along with links for Tutorial, Docs, and Community.

Hyperledger Composer

Secure | https://composer-playground.mybluemix.net/login

Hyperledger Composer Playground

Get local version

My Wallet

Not sure where to start? View our Playground tutorial.

Deploy New Business Network

1. BASIC INFORMATION

Give your new Business Network a name:

banana-supply-chain-network

Describe what your Business Network will be used for:

An overly simplified example of a minimal blockchain network

Give the network admin card that will be created a name

admin@banana-supply-chain-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

Deploy

banana-supply-chain-network

An overly simplified example of a minimal blockchain network

CONNECTION PROFILE

BASED ON basic-sample-network

The Hello World of Hyperledger Composer samples

Contains: 1 Participant Type, 1 Asset Type, and 1 Transaction Type

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Hyperledger Composer

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Samples on npm

Deploy

banana-supply-chain-network

An overly simplified example of a minimal blockchain network

CONNECTION PROFILE

BASED ON [perishable-network](#)

Shipping Perishable Goods Business Network

Contains: 4 Participant Types, 2 Asset Types, and 4 Transaction Types

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Hyperledger Composer

Secure | https://composer-playground.mybluemix.net/login

Hyperledger Composer Playground

Get local version

Shipping Perishable Goods Business Network

Contains: 4 Participant Types, 2 Asset Types, and 4 Transaction Types

Drop here to upload or [browse](#)

Samples on npm

Deploy

 basic-sample-network	 empty-business-network	 Drop here to upload or browse
 animaltracking-network	 bond-network	 carauction-network
 digitalproperty-network	 marbles-network	 perishable-network
 pii-network	 trade-network	 vehicle-lifecycle-network

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empty-business-network

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Samples on npm

Deploy

banana-supply-chain-network

An overly simplified example of a minimal blockchain network

CONNECTION PROFILE

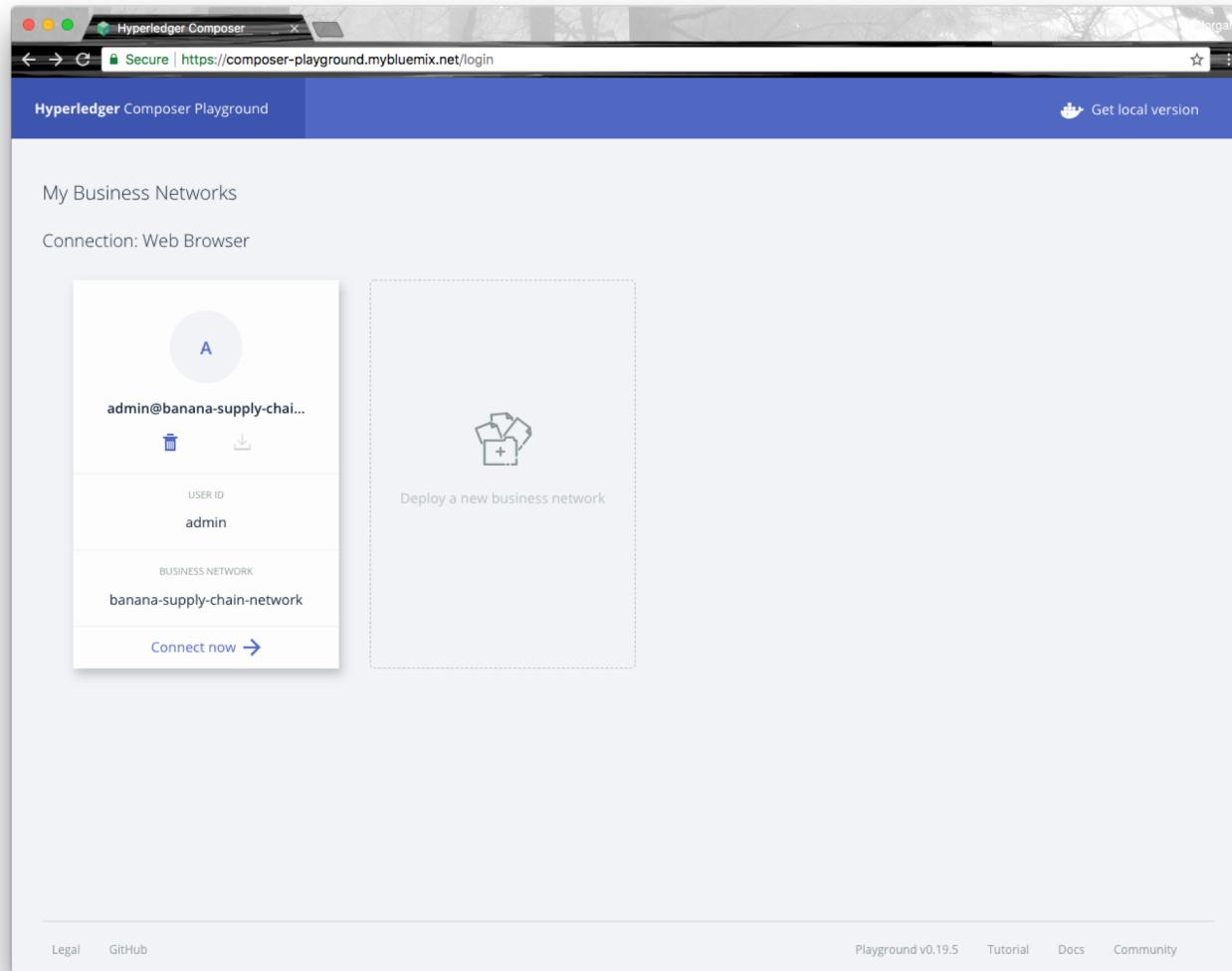
BASED ON [perishable-network](#)

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Hyperledger Composer

Secure | https://composer-playground.mybluemix.net/editor

Web banana-supply-chain-network

Define Test admin

FILES

About README.md, package.json

Model File models/perishable.cto

Script File lib/logic.js

Access Control permissions.acl

Add a file... Export

UPDATE NETWORK

From: 0.2.4-20180509083608

To: 0.2.4-deploy.0

Deploy changes

About File README.md

Perishable Goods Network

Example business network that shows growers, shippers and importers defining contracts for the price of perishable goods, based on temperature readings received for shipping containers.

The business network defines a contract between growers and importers. The contract stipulates that: On receipt of the shipment the importer pays the grower the unit price x the number of units in the shipment. Shipments that arrive late are free. Shipments that have breached the low temperate threshold have a penalty applied proportional to the magnitude of the breach x a penalty factor. Shipments that have breached the high temperate threshold have a penalty applied proportional to the magnitude of the breach x a penalty factor.

This business network defines:

Participants Grower Importer Shipper

Assets Contract Shipment

Transactions TemperatureReading ShipmentReceived SetupDemo

To test this Business Network Definition in the **Test** tab:

Submit a `SetupDemo` transaction:

```
{ "$class": "org.acme.shipping.perishable.SetupDemo" }
```

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About File README.md

To test this Business Network Definition in the **Test** tab:

Submit a `SetupDemo` transaction:

```
{ "$class": "org.acme.shipping.perishable.SetupDemo" }
```

This transaction populates the Participant Registries with a `Grower`, an `Importer` and a `Shipper`. The Asset Registries will have a `Contract` asset and a `Shipment` asset.

Submit a `TemperatureReading` transaction:

```
{ "$class": "org.acme.shipping.perishable.TemperatureReading", "centigrade": 8, "shipment": "resource:org.acme.shipping.perishable.Shipment#SHIP_001" }
```

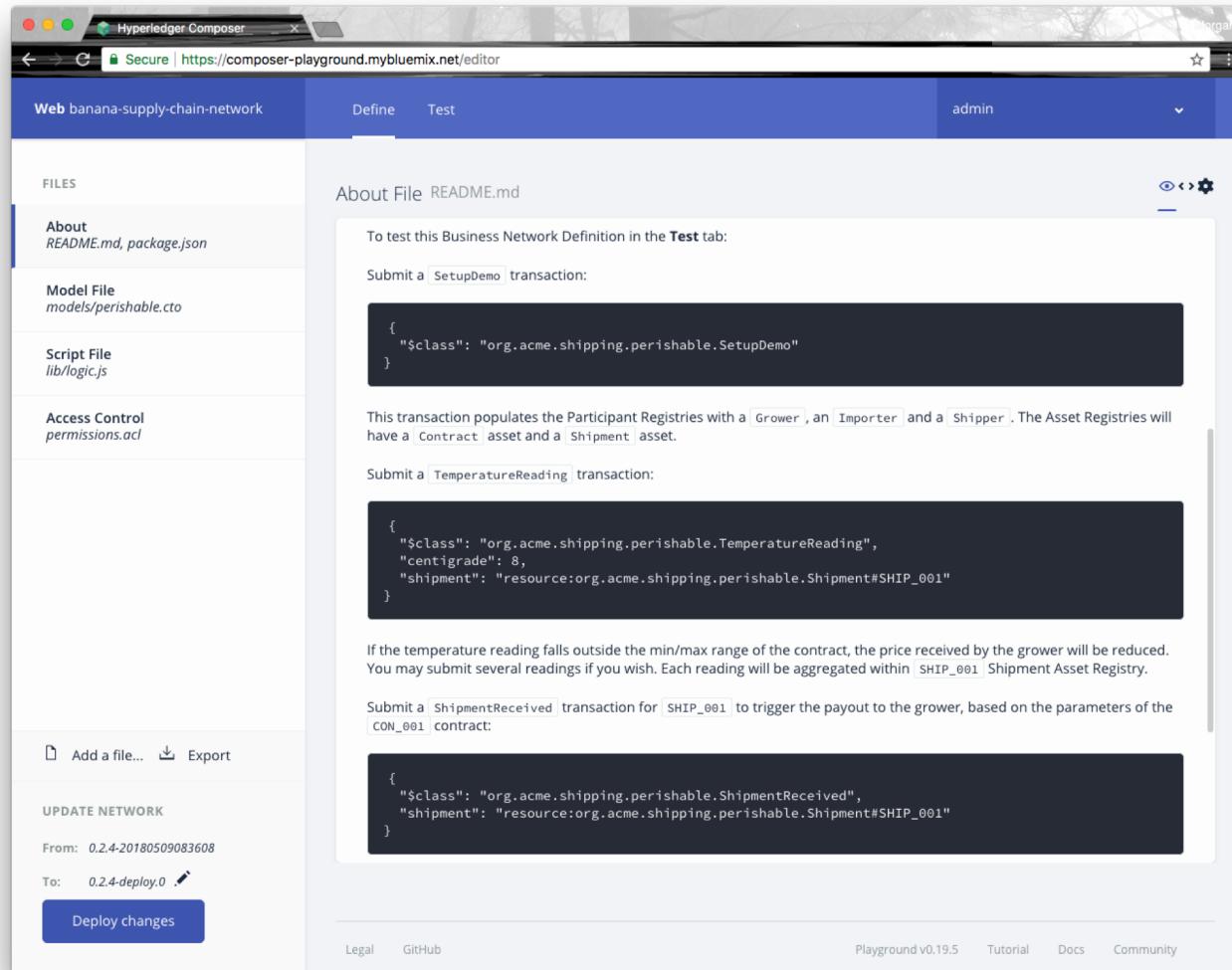
If the temperature reading falls outside the min/max range of the contract, the price received by the grower will be reduced. You may submit several readings if you wish. Each reading will be aggregated within `SHIP_001` Shipment Asset Registry.

Submit a `ShipmentReceived` transaction for `SHIP_001` to trigger the payout to the grower, based on the parameters of the `CON_001` contract:

```
{ "$class": "org.acme.shipping.perishable.ShipmentReceived", "shipment": "resource:org.acme.shipping.perishable.Shipment#SHIP_001" }
```

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Hyperledger Composer

Secure | https://composer-playground.mybluemix.net/test

Web banana-supply-chain-network

admin

PARTICIPANTS

Grower

Importer

Shipper

ASSETS

Contract

Shipment

TRANSACTIONS

All Transactions

+ Create New Participant

ID Data



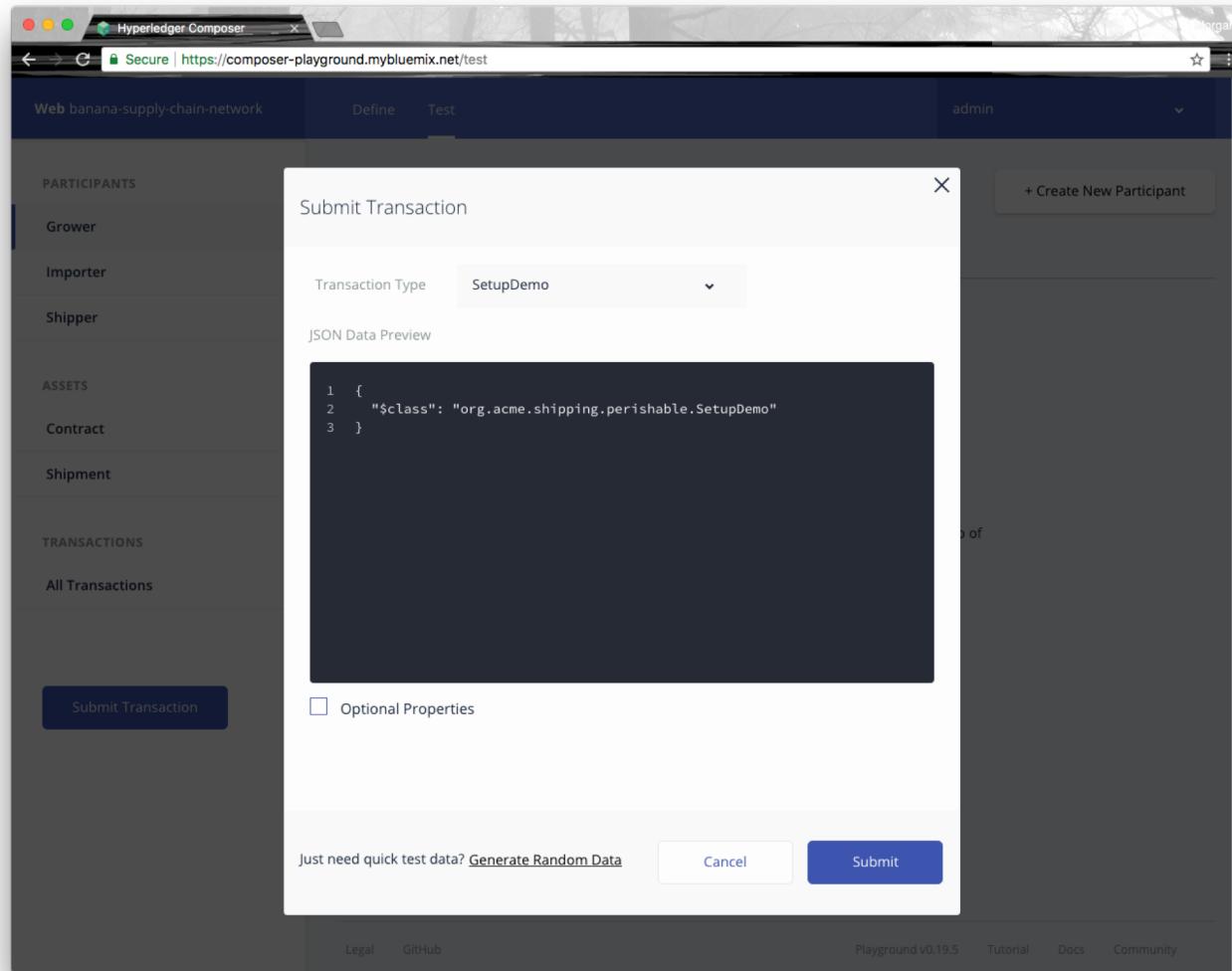
This registry is empty!

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

Submit Transaction

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Deploy changes

Model File models/perishable.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  * A business network for shipping perishable goods
16  * The cargo is temperature controlled and contracts
17  * can be negotiated based on the temperature
18  * readings received for the cargo
19  */
20
21 namespace org.acme.shipping.perishable
22 /**
23  * The type of perishable product being shipped
24  */
25 enum ProductType {
26     o BANANAS
27     o APPLES
28     o PEARLS
29     o PEACHES
30     o COFFEE
31 }
```

Everything looks good!

Any problems detected in your code would be reported here

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Deploy changes

Model File models/perishable.cto

```
24 /**
25 * The type of perishable product being shipped
26 */
27 enum ProductType {
28   o BANANAS
29   o APPLES
30   o PEARs
31   o PEACHES
32   o COFFEE
33 }
34 /**
35 * The status of a shipment
36 */
37 enum ShipmentStatus {
38   o CREATED
39   o IN_TRANSIT
40   o ARRIVED
41 }
42 /**
43 * An abstract transaction that is related to a Shipment
44 */
45 abstract transaction ShipmentTransaction {
46   --> Shipment shipment
47 }
48 /**
49 * An temperature reading for a shipment. E.g. received from a
50 * device within a temperature controlled shipping container
51 */
52 transaction TemperatureReading extends ShipmentTransaction {
```

Everything looks good!

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Deploy changes

Model File models/perishable.cto

```
51 /**
52 * An temperature reading for a shipment. E.g. received from a
53 * device within a temperature controlled shipping container
54 */
55 transaction TemperatureReading extends ShipmentTransaction {
56     o Double centigrade
57 }
58 /**
59 * A notification that a shipment has been received by the
60 * importer and that funds should be transferred from the importer
61 * to the grower to pay for the shipment.
62 */
63 transaction ShipmentReceived extends ShipmentTransaction {
64 }
65 /**
66 * A shipment being tracked as an asset on the ledger
67 */
68 asset Shipment identified by shipmentId {
69     o String shipmentId
70     o ProductType type
71     o ShipmentStatus status
72     o Long unitCount
73     o TemperatureReading[] temperatureReadings optional
74     --> Contract contract
75 }
76 /**
77 * Defines a contract between a Grower and an Importer to ship using
78 * a Shipper, paying a set unit price. The unit price is multiplied by
79 * a penalty factor proportional to the deviation from the min and max
80 */
81 
```

Everything looks good!

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Deploy changes

Model File models/perishable.cto

```
79  /**
80   * Defines a contract between a Grower and an Importer to ship using
81   * a Shipper, paying a set unit price. The unit price is multiplied by
82   * a penalty factor proportional to the deviation from the min and max
83   * negotiated temperatures for the shipment.
84  */
85 asset Contract identified by contractId {
86   o String contractId
87   --> Grower grower
88   --> Shipper shipper
89   --> Importer importer
90   o DateTime arrivalDateTime
91   o Double unitPrice
92   o Double minTemperature
93   o Double maxTemperature
94   o Double minPenaltyFactor
95   o Double maxPenaltyFactor
96 }
97 /**
98  * A concept for a simple street address
99 */
100
101 concept Address {
102   o String city optional
103   o String country
104   o String street optional
105   o String zip optional
106 }
107
108 /**
109  * An abstract participant type in this business network
110 */

```

Everything looks good!

Any problems detected in your code would be reported here

Legal GitHub

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Add a file... Export

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Deploy changes

Model File models/perishable.cto

```
108  /**
109   * An abstract participant type in this business network
110  */
111 participant Business identified by email {
112   o String email
113   o Address address
114   o Double accountBalance
115 }
116
117 /**
118  * A Grower is a type of participant in the network
119 */
120 participant Grower extends Business {
121 }
122
123 /**
124  * A Shipper is a type of participant in the network
125 */
126 participant Shipper extends Business {
127 }
128
129 /**
130  * An Importer is a type of participant in the network
131 */
132 participant Importer extends Business {
133 }
134
135 /**
136  * JUST FOR INITIALIZING A DEMO
137 */
138 transaction SetupDemo {
139 }
```

Everything looks good!

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Script File lib/logic.js

```
17  /**
18   * A shipment has been received by an importer
19   * @param {org.acme.shipping.perishable.ShipmentReceived} shipmentReceived - the ShipmentReceived
20   * @transaction
21   */
22 async function payout(shipmentReceived) { // eslint-disable-line no-unused-vars
23
24   const contract = shipmentReceived.shipment.contract;
25   const shipment = shipmentReceived.shipment;
26   let payout = contract.unitPrice * shipment.unitCount;
27
28   console.log('Received at: ' + shipmentReceived.timestamp);
29   console.log('Contract arrivalDateTime: ' + contract.arrivalDateTime);
30
31   // set the status of the shipment
32   shipment.status = 'ARRIVED';
33
34   // if the shipment did not arrive on time the payout is zero
35   if (shipmentReceived.timestamp > contract.arrivalDateTime) {
36     payout = 0;
37     console.log('Late shipment');
38   } else {
39     // find the lowest temperature reading
40     if (shipment.temperatureReadings) {
41       // sort the temperatureReadings by centigrade
42       shipment.temperatureReadings.sort(function (a, b) {
43         return (a.centigrade - b.centigrade);
44       });
45       const lowestReading = shipment.temperatureReadings[0];
46       const highestReading =
47         shipment.temperatureReadings[shipment.temperatureReadings.length - 1];
48     }
49   }
50 }
```

Everything looks good!

Any problems detected in your code would be reported here

Legal GitHub

Playground v0.19.5 Tutorial Docs Community

Hyperledger Composer

Secure | https://composer-playground.mybluemix.net/editor

Web banana-supply-chain-network

Define Test admin

FILES

About README.md, package.json

Model File models/perishable.cto

Script File lib/logic.js

Access Control permissions.acl

Add a file... Export

UPDATE NETWORK

From: 0.2.4-20180509083608

To: 0.2.4-deploy.0

Deploy changes

Script File lib/logic.js

```
47     let penalty = 0;
48     console.log('Lowest temp reading: ' + lowestReading.centigrade);
49     console.log('Highest temp reading: ' + highestReading.centigrade);
50
51     // does the lowest temperature violate the contract?
52     if (lowestReading.centigrade < contract.minTemperature) {
53         penalty += (contract.minTemperature - lowestReading.centigrade) *
54             contract.minPenaltyFactor;
55         console.log('Min temp penalty: ' + penalty);
56     }
57
58     // does the highest temperature violate the contract?
59     if (highestReading.centigrade > contract.maxTemperature) {
60         penalty += (highestReading.centigrade - contract.maxTemperature) *
61             contract.maxPenaltyFactor;
62         console.log('Max temp penalty: ' + penalty);
63
64         // apply any penalties
65         payout -= (penalty * shipment.unitCount);
66
67         if (payout < 0) {
68             payout = 0;
69         }
70     }
71
72     console.log('Payout: ' + payout);
73     contract.grower.accountBalance += payout;
74     contract.importer.accountBalance -= payout;
75
76     console.log('Grower: ' + contract.grower.$identifier + ' new balance: ' +
```

Everything looks good!

Any problems detected in your code would be reported here

Legal GitHub Playground v0.19.5 Tutorial Docs Community

Hyperledger Composer

Secure | https://composer-playground.mybluemix.net/editor

Web banana-supply-chain-network

Define Test admin

FILES

About README.md, package.json

Model File models/perishable.cto

Script File lib/logic.js

Access Control permissions.acl

Add a file... Export

UPDATE NETWORK

From: 0.2.4-20180509083608

To: 0.2.4-deploy.o

Deploy changes

Script File lib/logic.js

```
63         // apply any penalties
64         payout -= (penalty * shipment.unitCount);
65
66         if (payout < 0) {
67             payout = 0;
68         }
69     }
70 }
71
72 console.log('Payout: ' + payout);
73 contract.grower.accountBalance += payout;
74 contract.importer.accountBalance -= payout;
75
76 console.log('Grower: ' + contract.grower.$identifier + ' new balance: ' +
77 contract.grower.accountBalance);
77 console.log('Importer: ' + contract.importer.$identifier + ' new balance: ' +
78 contract.importer.accountBalance);
79
80 // update the grower's balance
81 const growerRegistry = await getParticipantRegistry('org.acme.shipping.perishable.Grower');
81 await growerRegistry.update(contract.grower);
82
83 // update the importer's balance
84 const importerRegistry = await
84 getParticipantRegistry('org.acme.shipping.perishable.Importer');
85 await importerRegistry.update(contract.importer);
86
87 // update the state of the shipment
88 const shipmentRegistry = await getAssetRegistry('org.acme.shipping.perishable.Shipment');
89 await shipmentRegistry.update(shipment);
90 }
91
```

Everything looks good!

Any problems detected in your code would be reported here

Legal GitHub Playground v0.19.5 Tutorial Docs Community

Hyperledger Composer

Secure | https://composer-playground.mybluemix.net/editor

Web banana-supply-chain-network

Define Test admin

FILES

About README.md, package.json

Model File models/perishable.cto

Script File lib/logic.js

Access Control permissions.acl

Add a file... Export

UPDATE NETWORK

From: 0.2.4-20180509083608

To: 0.2.4-deploy.0

Deploy changes

Script File lib/logic.js

```
91 /**
92  * A temperature reading has been received for a shipment
93  * @param {org.acme.shipping.perishable.TemperatureReading} temperatureReading - the
94  * TemperatureReading transaction
95  * @transaction
96  */
97 async function temperatureReading(temperatureReading) { // eslint-disable-line no-unused-vars
98
99     const shipment = temperatureReading.shipment;
100
101     console.log('Adding temperature ' + temperatureReading.centigrade + ' to shipment ' +
102         shipment.$identifier);
103
104     if (shipment.temperatureReadings) {
105         shipment.temperatureReadings.push(temperatureReading);
106     } else {
107         shipment.temperatureReadings = [temperatureReading];
108     }
109
110     // add the temp reading to the shipment
111     const shipmentRegistry = await getAssetRegistry('org.acme.shipping.perishable.Shipment');
112     await shipmentRegistry.update(shipment);
113
114 /**
115  * Initialize some test assets and participants useful for running a demo.
116  * @param {org.acme.shipping.perishable.SetupDemo} setupDemo - the SetupDemo transaction
117  * @transaction
118  */
119 async function setupDemo(setupDemo) { // eslint-disable-line no-unused-vars
120
121     // ...
122 }
```

Everything looks good!

Any problems detected in your code would be reported here

Legal GitHub

Playground v0.19.5 Tutorial Docs Community

Hyperledger Composer

Secure | https://composer-playground.mybluemix.net/editor

Web banana-supply-chain-network

Define Test admin

FILES

About README.md, package.json

Model File models/perishable.cto

Script File lib/logic.js

Access Control permissions.acl

ACL File permissions.acl

```
16 * Sample access control list.
17 */
18 rule Default {
19   description: "Allow all participants access to all resources"
20   participant: "ANY"
21   operation: ALL
22   resource: "org.acme.shipping.perishable.*"
23   action: ALLOW
24 }
25
26 rule SystemACL {
27   description: "System ACL to permit all access"
28   participant: "org.hyperledger.composer.system.Participant"
29   operation: ALL
30   resource: "org.hyperledger.composer.system.**"
31   action: ALLOW
32 }
33
34 rule NetworkAdminUser {
35   description: "Grant business network administrators full access to user resources"
36   participant: "org.hyperledger.composer.system.NetworkAdmin"
37   operation: ALL
38   resource: "***"
39   action: ALLOW
40 }
41
42 rule NetworkAdminSystem {
43   description: "Grant business network administrators full access to system resources"
44   participant: "org.hyperledger.composer.system.NetworkAdmin"
45   operation: ALL
46   resource: "org.hyperledger.composer.system.**"
47   action: ALLOW
}
```

Add a file... Export

UPDATE NETWORK

From: 0.2.4-20180509083608

To: 0.2.4-deploy.0

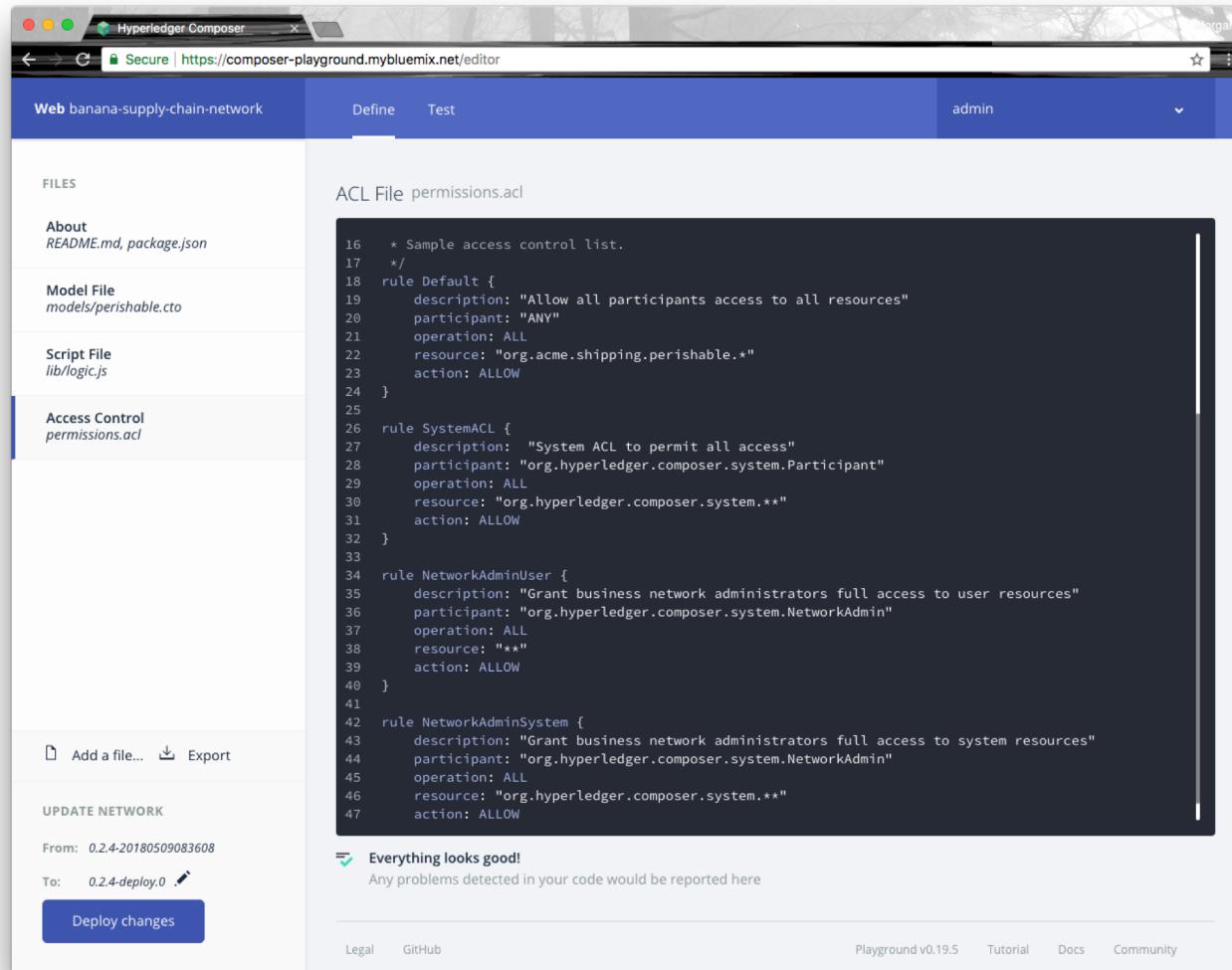
Deploy changes

Everything looks good!

Any problems detected in your code would be reported here

Legal GitHub

Playground v0.19.5 Tutorial Docs Community



Hyperledger Composer

Secure | https://composer-playground.mybluemix.net/test

Web banana-supply-chain-network

Define Test admin

PARTICIPANTS

Grower

Importer

Shipper

ASSETS

Contract

Shipment

TRANSACTIONS

All Transactions

+ Create New Participant

ID Data

farmer@email.com {
 "\$class": "org.acme.shipping.perishable.Grower",
 "email": "farmer@email.com",
 "address": {
 "\$class": "org.acme.shipping.perishable.Address",
 "country": "USA"
 },
 "accountBalance": 0
}

Collapse

Submit Transaction

Legal GitHub

Playground v0.19.5 Tutorial Docs Community

The screenshot shows the Hyperledger Composer playground interface. The main title bar says "Hyperledger Composer" and the URL is "Secure | https://composer-playground.mybluemix.net/test". The top navigation bar has tabs for "Define" and "Test", and a dropdown for "admin". On the left, there's a sidebar with sections for "PARTICIPANTS" (listing "Grower", "Importer", and "Shipper"), "ASSETS" (listing "Contract" and "Shipment"), and "TRANSACTIONS" (listing "All Transactions"). The "Grower" participant is currently selected. The main content area shows a "Participant registry for org.acme.shipping.perishable.Grower" with a table. The table has columns "ID" and "Data". There is one entry: "farmer@email.com" with the corresponding JSON data. The JSON data includes the participant's class (\$class: org.acme.shipping.perishable.Grower), email (farmer@email.com), address (with \$class: org.acme.shipping.perishable.Address and country: USA), and account balance (0). A "Collapse" button is visible next to the JSON data. At the bottom left, there is a blue "Submit Transaction" button. At the bottom right, there are links for "Legal" and "GitHub", and a footer with "Playground v0.19.5", "Tutorial", "Docs", and "Community".

Hyperledger Composer

Secure | https://composer-playground.mybluemix.net/test

Web banana-supply-chain-network

Define Test admin

PARTICIPANTS

Grower

Importer

Shipper

ASSETS

Contract

Shipment

IMPORTER

Participant registry for org.acme.shipping.perishable.Importer

+ Create New Participant

ID Data

supermarket@email.com {
 "\$class": "org.acme.shipping.perishable.Importer",
 "email": "supermarket@email.com",
 "address": {
 "\$class": "org.acme.shipping.perishable.Address",
 "country": "UK"
 },
 "accountBalance": 0
}

Collapse

Submit Transaction

Legal GitHub

Playground v0.19.5 Tutorial Docs Community

The screenshot shows the Hyperledger Composer playground interface. The top navigation bar includes 'Hyperledger Composer', a secure connection indicator, the URL 'https://composer-playground.mybluemix.net/test', and a user dropdown set to 'admin'. The main header 'Web banana-supply-chain-network' is followed by tabs 'Define' and 'Test'. On the left, a sidebar lists 'PARTICIPANTS' (Grower, Importer, Shipper), 'ASSETS' (Contract, Shipment), and 'IMPORTER'. The 'Importers' section is active, titled 'Participant registry for org.acme.shipping.perishable.Importer'. It features a button '+ Create New Participant' and a table with columns 'ID' and 'Data'. A single entry for 'supermarket@email.com' is shown, displaying its JSON schema. Below the table is a 'Collapse' button. At the bottom of the page are links for 'Legal' and 'GitHub', and a footer navigation bar with 'Playground v0.19.5', 'Tutorial', 'Docs', and 'Community'.

Hyperledger Composer

Secure | https://composer-playground.mybluemix.net/test

Web banana-supply-chain-network

Define Test admin

PARTICIPANTS

Grower

Importer

Shipper

ASSETS

Contract

Shipment

TRANSACTIONS

All Transactions

+ Create New Participant

ID Data

shipper@email.com {
 "\$class": "org.acme.shipping.perishable.Shipper",
 "email": "shipper@email.com",
 "address": {
 "\$class": "org.acme.shipping.perishable.Address",
 "country": "Panama"
 },
 "accountBalance": 0
}

Collapse

Submit Transaction

Legal GitHub

Playground v0.19.5 Tutorial Docs Community

The screenshot shows the Hyperledger Composer web interface for a 'banana-supply-chain-network'. The left sidebar lists participants ('Grower', 'Importer', 'Shipper') and assets ('Contract', 'Shipment'). The 'Shipper' participant is currently selected. The main panel displays the 'Participant registry for org.acme.shipping.perishable.Shipper'. It shows a single entry for 'shipper@email.com' with a detailed JSON representation of the participant's state. The JSON includes fields for class (\$class: 'org.acme.shipping.perishable.Shipper'), email, address (with a nested Address object containing a country field set to 'Panama'), and account balance (set to 0). A 'Collapse' button is present to hide the JSON view. At the bottom of the main panel is a large blue 'Submit Transaction' button.

Hyperledger Composer

Secure | https://composer-playground.mybluemix.net/test

Web banana-supply-chain-network

admin

PARTICIPANTS

Grower

Importer

Shipper

ASSETS

Contract

Shipment

TRANSACTIONS

All Transactions

+ Create New Asset

ID Data

CON_001 {
 "\$class": "org.acme.shipping.perishable.Contract",
 "contractId": "CON_001",
 "grower": "resource:org.acme.shipping.perishable.Grower#farmer@email.com",
 "shipper": "resource:org.acme.shipping.perishable.Shipper#shipper@email.com",
 "importer": "resource:org.acme.shipping.perishable.Importer#supermarket@email.com",
 "arrivalDateTime": "2018-05-11T18:20:15.121Z",
 "unitPrice": 0.5,
 "minTemperature": 2,
 "maxTemperature": 10,
 "minPenaltyFactor": 0.2,
 "maxPenaltyFactor": 0.1
}

Collapse

Submit Transaction

Legal GitHub

Playground v0.19.5 Tutorial Docs Community

The screenshot displays the Hyperledger Composer playground interface. On the left, a sidebar lists participants (Grower, Importer, Shipper) and assets (Contract, Shipment). The main area shows an asset registry for the 'Contract' asset type. An asset named 'CON_001' is selected, displaying its ID and detailed JSON data. The data includes fields such as contractId, grower, shipper, importer, arrivalDateTime, unitPrice, minTemperature, maxTemperature, minPenaltyFactor, and maxPenaltyFactor. A 'Collapse' button is visible below the asset details. At the bottom of the page, there are links for Legal and GitHub, and a navigation bar with links for Playground v0.19.5, Tutorial, Docs, and Community.

Hyperledger Composer

Secure | https://composer-playground.mybluemix.net/test

Web banana-supply-chain-network

admin

Define Test

PARTICIPANTS

Grower

Importer

Shipper

ASSETS

Contract

Shipment

TRANSACTIONS

All Transactions

+ Create New Asset

ID Data

SHIP_001 {
 "\$class": "org.acme.shipping.perishable.Shipment",
 "shipmentId": "SHIP_001",
 "type": "BANANAS",
 "status": "IN TRANSIT",
 "unitCount": 5000,
 "contract": "resource:org.acme.shipping.perishable.Contract#CON_001"
}

Collapse

Submit Transaction

Legal GitHub

Playground v0.19.5 Tutorial Docs Community

The screenshot shows the Hyperledger Composer playground interface. The left sidebar lists participants (Grower, Importer, Shipper) and assets (Contract, Shipment). The 'Shipment' tab is selected. The main area displays an asset registry for org.acme.shipping.perishable.Shipment. A single asset entry is shown with ID SHIP_001 and the following JSON data:

```
{  
  "$class": "org.acme.shipping.perishable.Shipment",  
  "shipmentId": "SHIP_001",  
  "type": "BANANAS",  
  "status": "IN TRANSIT",  
  "unitCount": 5000,  
  "contract": "resource:org.acme.shipping.perishable.Contract#CON_001"  
}
```

Below the asset entry is a 'Collapse' button. At the bottom of the page, there is a 'Submit Transaction' button.

Hyperledger Composer

Secure | https://composer-playground.mybluemix.net/test

Web banana-supply-chain-network

Define Test admin

PARTICIPANTS

- Grower
- Importer
- Shipper

ASSETS

- Contract
- Shipment

TRANSACTIONS

- All Transactions

+ Create New Asset

Create New Asset

In registry: org.acme.shipping.perishable.Shipment

JSON Data Preview

```
3   "shipmentId": "1505",
4   "type": "BANANAS",
5   "status": "CREATED",
6   "unitCount": 100,
7   "temperatureReadings": [
8     {
9       "$class": "org.acme.shipping.perishable.TemperatureReading",
10      "centigrade": 90.985,
11      "shipment":
12        "resource:org.acme.shipping.perishable.Shipment#4101",
13        "transactionId": "6966",
14        "timestamp": "2018-05-10T18:27:44.895Z"
15      ],
16      "contract":
17        "resource:org.acme.shipping.perishable.Contract#7626"
```

Optional Properties

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

Cancel Create New

Submit Transaction

Legal GitHub

Playground v0.19.5 Tutorial Docs Community

The screenshot displays the Hyperledger Composer playground interface. The left sidebar shows the network structure with participants (Grower, Importer, Shipper), assets (Contract, Shipment), and transactions (All Transactions). The main area is titled 'Create New Asset' for the 'Shipment' asset type in the 'org.acme.shipping.perishable' registry. A large text box shows the JSON data preview for a new shipment, including its ID, type, status, unit count, temperature reading, and associated resources. Below the preview is an optional properties section with a checkbox. At the bottom, there's a note about generating random data, and buttons for 'Cancel' and 'Create New'. A 'Submit Transaction' button is located at the bottom left of the main panel.

Hyperledger Composer

Secure | https://composer-playground.mybluemix.net/test

Web banana-supply-chain-network

admin

PARTICIPANTS

Grower

Importer

Shipper

ASSETS

Contract

Shipment

TRANSACTIONS

All Transactions

Submit Transaction

Define Test

Asset registry for org.acme.shipping.perishable.Shipment

+ Create New Asset

ID Data

1505 {
 "\$class": "org.acme.shipping.perishable.Shipment",
 "shipmentId": "1505",
 "type": "BANANAS",
 "status": "CREATED",
 "unitCount": 100,
 "temperatureReadings": [
 {
 "\$class": "org.acme.shipping.perishable.TemperatureReading",
 "centigrade": 90.985,
 "shipment": "resource:org.acme.shipping.perishable.Shipment#4101",
 "transactionId": "6966",
 "timestamp": "2018-05-10T18:27:44.895Z"
 }
],
 "contract": "resource:org.acme.shipping.perishable.Contract#7626"
}

SHIP_001 {
 "\$class": "org.acme.shipping.perishable.Shipment",
 "shipmentId": "SHIP_001",
 "type": "BANANAS",
 "status": "IN_TRANSIT",
 "unitCount": 500
}

Collapse Show All

Hyperledger Composer

Secure | https://composer-playground.mybluemix.net/test#

Web banana-supply-chain-network

Define Test admin

PARTICIPANTS

	Date, Time	Entry Type	Participant	
Grower				
Importer				
Shipper	2018-05-11, 14:20:15	SetupDemo	admin (NetworkAdmin)	view record

ASSETS

	Date, Time	Entry Type	Participant	
Contract	2018-05-10, 14:28:14	AddAsset	admin (NetworkAdmin)	view record

SHIPMENT

	Date, Time	Entry Type	Participant	
Shipment	2018-05-10, 14:16:56	ActivateCurrentIdentity	none	view record

TRANSACTIONS

	Date, Time	Entry Type	Participant	
All Transactions	2018-05-10, 14:16:40	StartBusinessNetwork	none	view record
	2018-05-10, 14:16:40	IssueIdentity	none	view record
	2018-05-10, 14:16:40	AddParticipant	none	view record

Submit Transaction

Legal GitHub

Playground v0.19.5 Tutorial Docs Community

Hyperledger Composer

Secure | https://composer-playground.mybluemix.net/editor

Web banana-supply-chain-network

Define Test admin

FILES

About README.md, package.json

Model File models/perishable.cto

Script File lib/logic.js

Access Control permissions.acl

Add a file... Export

UPDATE NETWORK

From: 0.2.4-20180509083608

To: 0.2.4-deploy.0

Deploy changes

About File package.json

```
[{"engines": {"composer": "0.19.0"}, "name": "banana-supply-chain-network", "version": "0.2.4-deploy.0", "description": "An overly simplified example of a minimal blockchain network", "networkImage": "https://hyperledger.github.io/composer-sample-networks/packages/perishable-network/networkimage.svg", "networkImageanimated": "https://hyperledger.github.io/composer-sample-networks/packages/perishable-network/networkimageanimated.svg", "scripts": {"prepublish": "mkdirp ./dist && composer archive create --sourceType dir --sourceName . -a ./dist/perishable-network.bna", "pretest": "npm run lint", "lint": "eslint .", "postlint": "npm run licchk", "licchk": "license-check-and-add", "postlicchk": "npm run doc", "doc": "jsdoc --pedantic --recurse -c jsdoc.json", "test": "mocha -t 0 --recursive", "deploy": "./scripts/deploy.sh"}, "repository": {"type": "git", "url": "https://github.com/hyperledger/composer-sample-networks.git"}, "keywords": ["shipping", "goods", "perishable", "composer"]}
```

Everything looks good!

Any problems detected in your code would be reported here

Legal GitHub

Playground v0.19.5 Tutorial Docs Community

YOUR PHONE TOLD YOUR FITBIT THAT
TOLD YOUR NEST THAT TOLD YOUR
SONOS THAT TOLD ME THAT YOU
OWE YOUR WIFE AN APOLOGY.

TWO DOZEN RED ROSES ARE ONLY
\$29.99 FOR A LIMITED TIME.



THAT'S NOT
WHAT I SAID...
just ask the
blockchain





Questions?

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