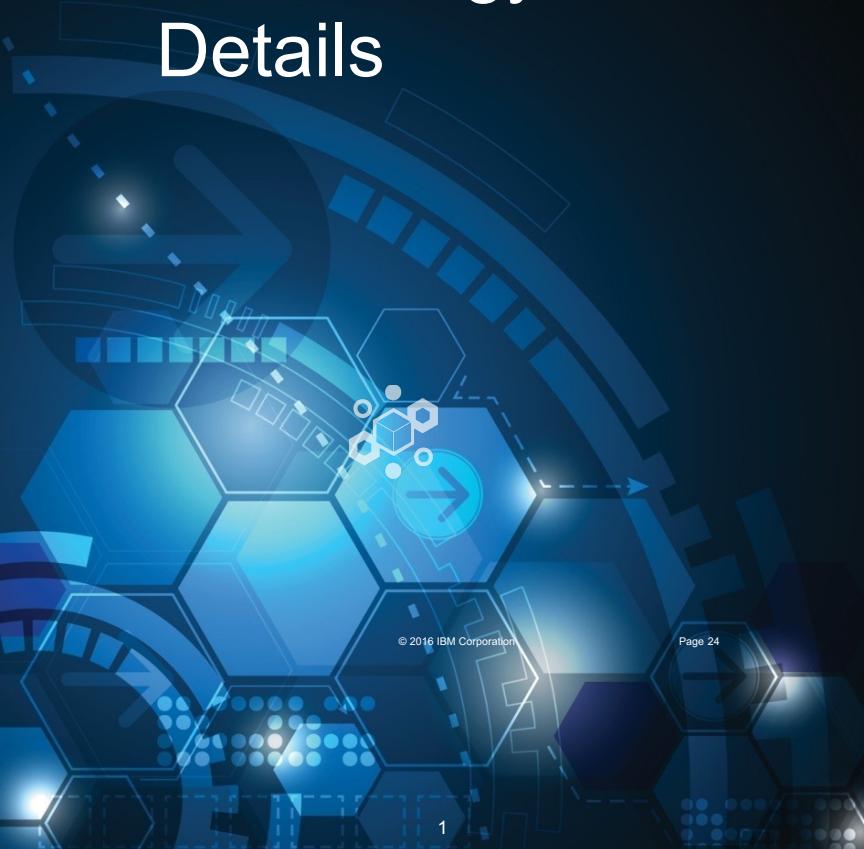


Blockchain Technology Details



Percival Lucena

IBM Research

github.com/plucena/smartcontracts

The Hyperledger Project

Open Source

Open Standard

Open Governance

PREMIER

accenture
High performance. Delivered.

CME Group

DEUTSCHE BÖRSE GROUP

Digital Asset

DTCC

FUJITSU

HITACHI
Inspire the Next

IBM

intel

J.P.Morgan

R[®]

GENERAL

ABN AMRO

ANZ

acqDigital

BLOCKCHAIN

Blockstream

bloq

BNY MELLON

Broadridge

Calastone

cisco

cloudsoft

CLS
Funderer in FX

coinplug

consenSys

CREDITS

Cuscal

EVUE
digital labs

Gem

guardtime

intelect[®]

itBit

Milligan Partners

ML

NEC
Visualizing a brighter world

NTT DATA

redhat

Ribbit

Skry

SORAMITSU

STATE STREET

SWIFT

symbiont

tequacreek

THOMSON REUTERS

vmware



Brian_Behlendorf
ASF founder
Executive Director

5

PROJECTS

100+

CONTRIBUTORS

95

MEMBERS

6

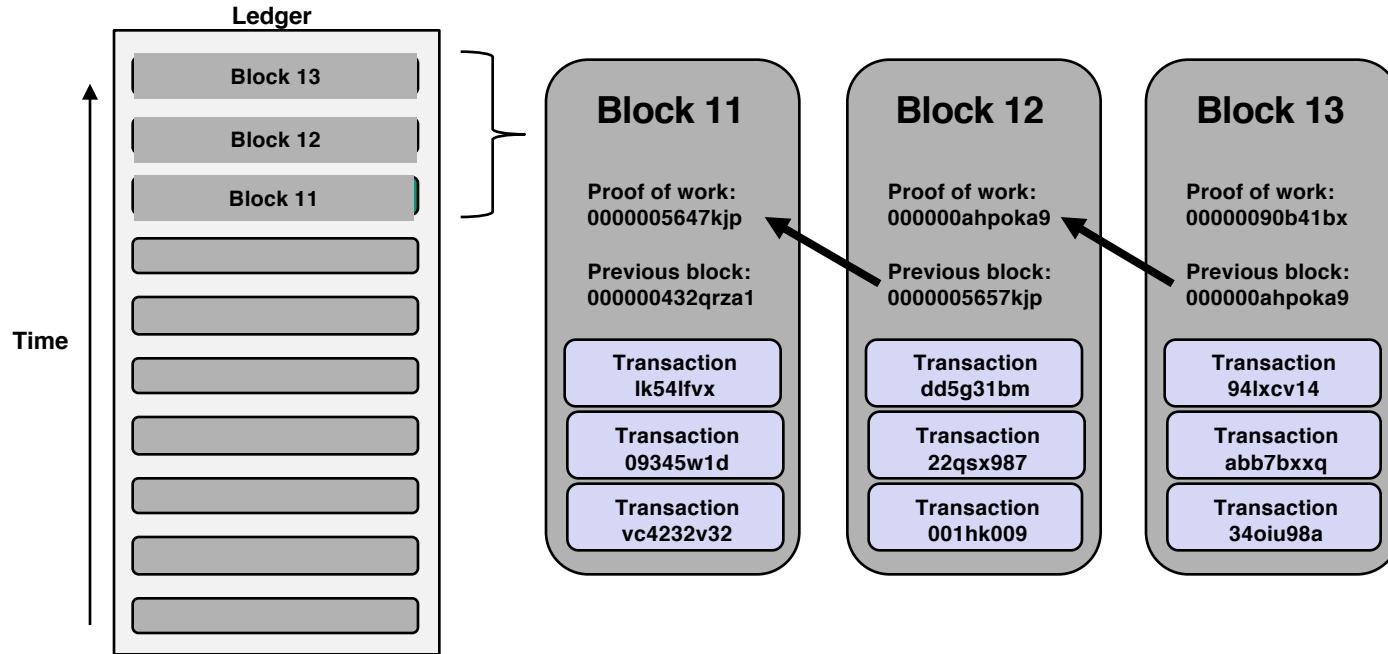
HACKFESTS

Fabric

R3 corda

Sawtooth Lake

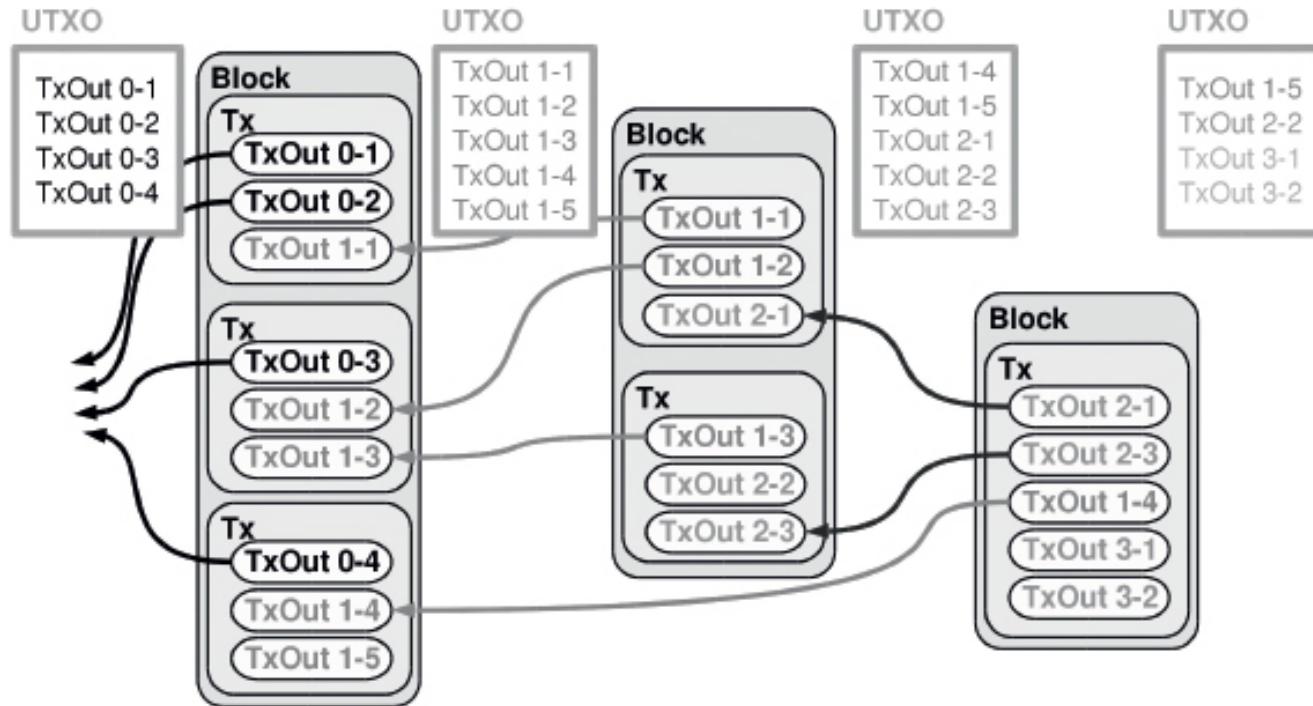
BLOCKCHAIN - LEDGER



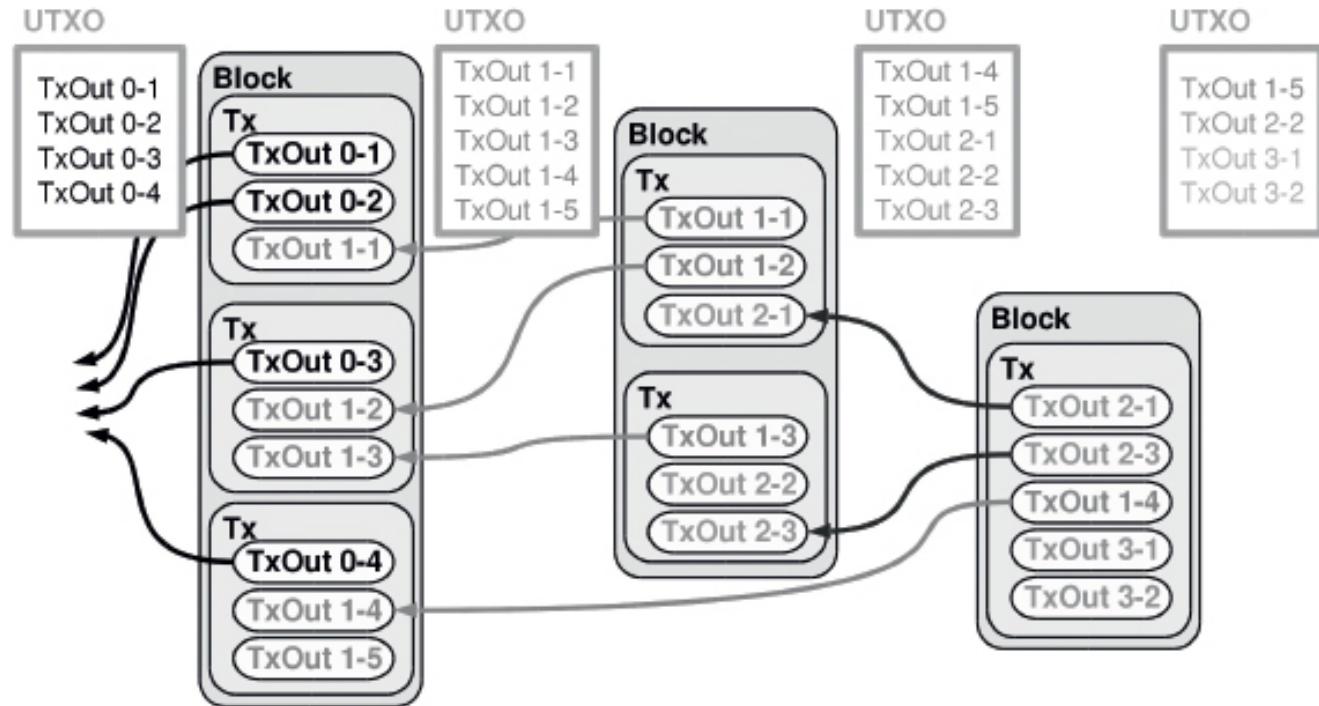
localhost:7050/chain

```
{"height": 3,  
"currentBlockHash": "2ZxYpUihdP5JrFj0rChl2S1511Yr4nuKrkfe8yb67ld1Lduuhv8Kqwp2Iyl7WnDquM0CCA5xR0tpc/9KRUP1hw==",  
"previousBlockHash": "cfpqmWDZ3XW/tThfgeklXK7DoezskR6iA4aOt/AncSp7zUp1wme2cphcBaE3N1Ajs6RWtNSvogAf4haGVlpJgw=="}
```

BLOCKCHAIN - UTXO

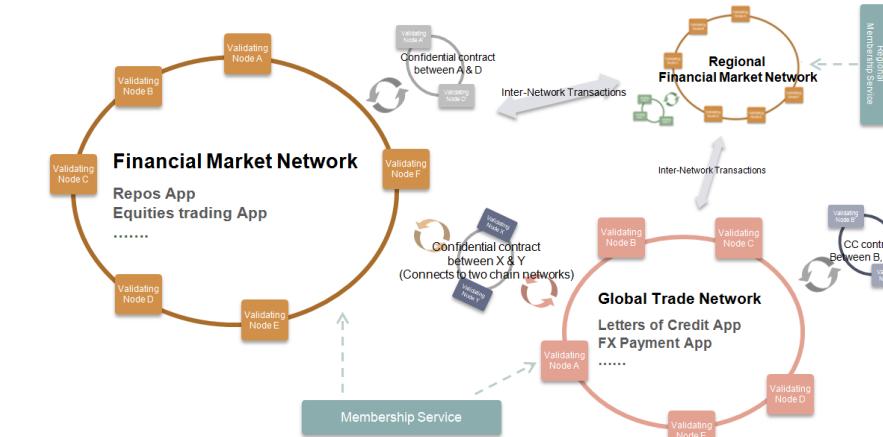


BLOCKCHAIN HYO- UXTO

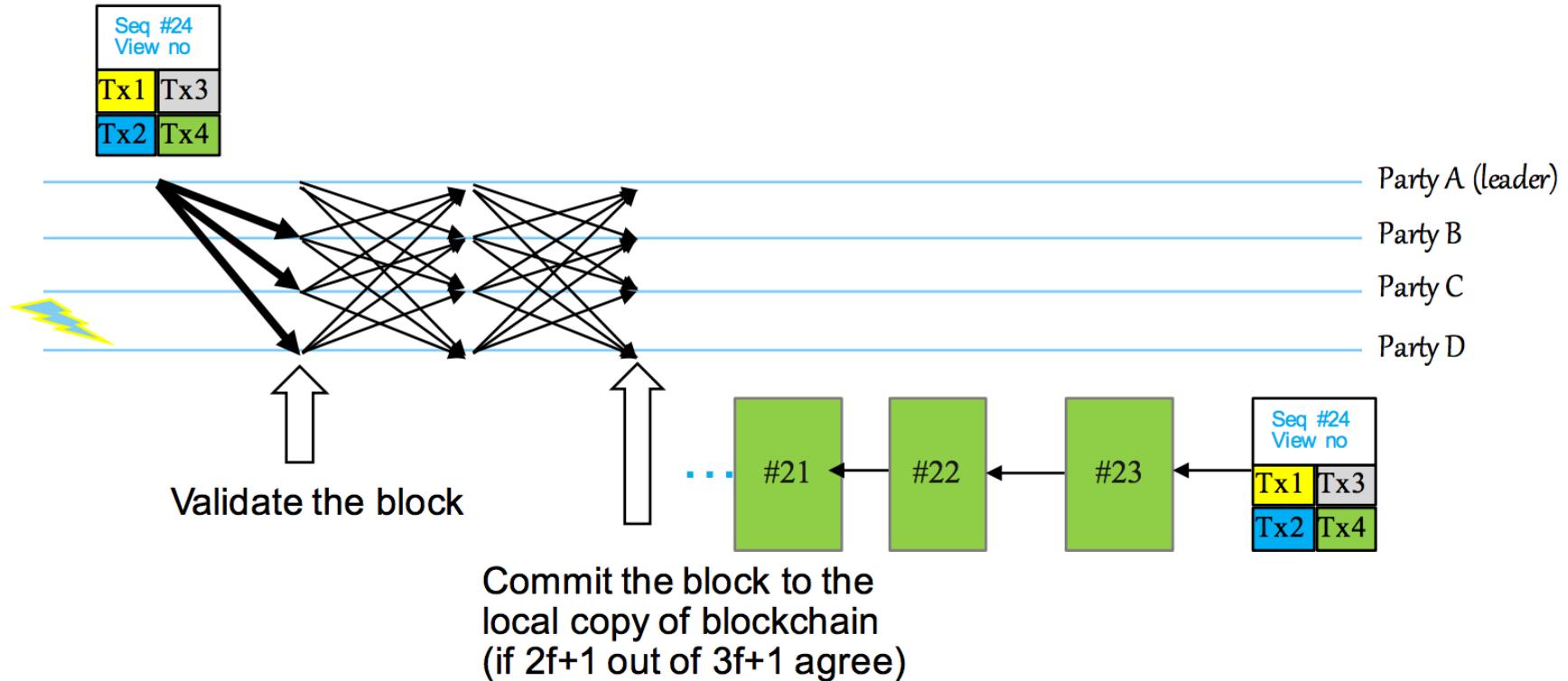


HYPERLEDGER – SMART CONTRACTS

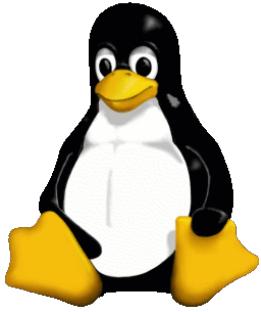
- NO CRIPTO CURRENCY
- PERMISSIONED ACCESS
- MULTIPLE NETWORKS
- SMARTCONTRACTS GO/JAVA:
- - GENERATE TRANSACTION LOGS – BLOCKS ON BLOCKCHAIN
- - UPDATE STATE – UXTO
- - REGISTER/CONSUME EVENTS



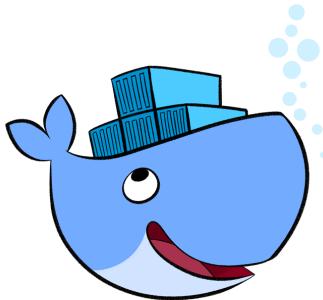
BLOCKCHAIN – CONSENSUS - PBFT



Hyperledger Fabric



LINUX
INSTALL



HYPELEDGER
DOCKER



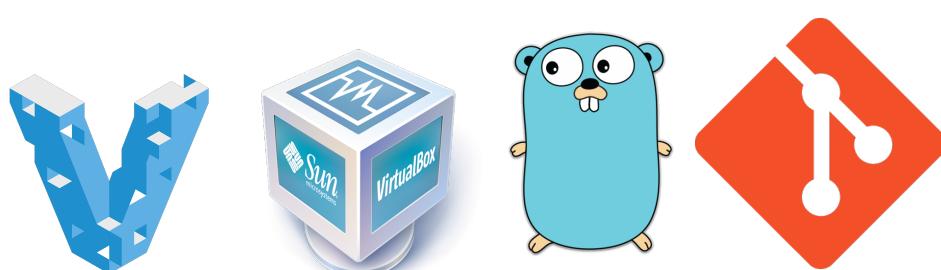
BLUEMIX
SERVICE



LINUX INSTALL – 0.61 BRANCH



1. git clone -b v0.61 <http://github.com/hyperledger/fabric/>
2. cd fabric/devenv
3. vagrant up
4. vagrant ssh
5. cd /hyperledger
6. make
7. peer node start --peer-chaincodedev



LINUX INSTALL – 0.61 BRANCH



× peer (vagrant)

```
19:40:27.394 [buckettree] newBucketCache -> INFO 00e Constructing bucket-cache with max bucket cache size = [100] MBs
19:40:27.406 [buckettree] loadAllBucketNodesFromDB -> INFO 00f Loaded buckets data in cache. Total buckets in DB = [36]. Total cache size:=6720
19:40:27.449 [consensus/controller] NewConsenter -> INFO 010 Creating default consensus plugin (noops)
19:40:27.481 [consensus/noops] newNoops -> INFO 011 NOOPS consensus type = *noops.Noops
19:40:27.512 [consensus/noops] newNoops -> INFO 012 NOOPS block size = 500
19:40:27.512 [consensus/noops] newNoops -> INFO 013 NOOPS block wait = 1s
19:40:27.540 [rest] StartOpenchainRESTServer -> INFO 015 Initializing the REST service on 0.0.0.0:7050, TLS is disabled.
19:40:27.529 [nodeCmd] serve -> INFO 014 Starting peer with ID=name:"jdoe" , network ID=dev, address=0.0.0.0:7051, rootnodes=, validator=true
19:40:27.560 [consensus/statetransfer] blockThread -> INFO 016 Validated blockchain to the genesis block
20:05:13.968 [devops] invokeOrQuery -> INFO 017 Transaction ID: a02a4e60-fbc3-4843-88f5-e6612d5ffc48
```

[]

× vagrant

```
20:04:54.410 [shim] DEBU : [gg]Init succeeded. Sending COMPLETED
20:04:54.410 [shim] DEBU : [gg]Move state message COMPLETED
20:04:54.410 [shim] DEBU : [gg]Handling ChaincodeMessage of type: COMPLETED(state:init)
20:04:54.410 [shim] DEBU : [gg]send state message COMPLETED
20:05:13.969 [shim] DEBU : [a02a4e60]Received message QUERY from shim
20:05:13.969 [shim] DEBU : [a02a4e60]Handling ChaincodeMessage of type: QUERY(state:ready)
20:05:13.972 [shim] DEBU : [a02a4e60]Sending GET_STATE
20:05:13.987 [shim] DEBU : [a02a4e60]Received message RESPONSE from shim
20:05:13.987 [shim] DEBU : [a02a4e60]Handling ChaincodeMessage of type: RESPONSE(state:ready)
20:05:13.988 [shim] DEBU : [a02a4e60]before send
```

× vagrant

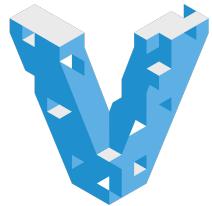
```
vagrant@hyperledger-devenv:v0.1.0-0fa60ba:~/blockchain-sdk$ ls
basic-chaincode cli index.js LICENSE package.json temp
chaincode docker lib node_modules README.md test
vagrant@hyperledger-devenv:v0.1.0-0fa60ba:~/blockchain-sdk$ peer chaincode deploy -n gg -c '{"function":"init", "args":["a", "100", "b", "200"]}'
Deploy chaincode: gg
vagrant@hyperledger-devenv:v0.1.0-0fa60ba:~/blockchain-sdk$ peer chaincode query -l golang -n gg -c '{"function":"query", "args":["b"]}'
Query Result: 200
vagrant@hyperledger-devenv:v0.1.0-0fa60ba:~/blockchain-sdk$ []
```

Hyperledger CLI

× bash

```
percivals-mbp:devenv percivalslucena$ []
```

VAGRANT CLI – 0.61 BRANCH



membersrv (0.6.1) – controle de acesso

orderer (0.7)

peer node start --peer-chaincodedev

**peer chaincode deploy -l java/go -n \$ContractName -c
'{"Args": ["init", "arg1", "arg2", ...]}'**

**peer chaincode invoke -l java/go -n \$ContractName -c
'{"Args": ["\$functionname", "arg1", "arg2" ..."]}'**

**peer chaincode query -l java/go -n \$ContractName -c
'{"Args": ["query", "b"]}'**



DOCKER INSTALL – 0.61 BRANCH

VERSION 0.6.1 WITH JAVA SUPPORT

**IN CASE YOU HAVE OTHER HYPERLEGER DOCKER IMAGES, YOU
SHOULD REMOVE THEM FIRST**

1.docker pull hyperledger/fabric-peer:x86_64-0.6.1-preview

2.docker pull hyperledger/fabric-javaenv:x86_64-0.6.1-preview

3. docker run --name vp0 -it -e CORE_VM_ENDPOINT=unix:///var/run/docker.sock
-v /var/run/docker.sock:/var/run/docker.sock -p 7050:7050 -e
CORE_LOGGING_LEVEL=DEBUG -e CORE_PEER_ID=vp0 -e
CORE_PEER_ADDRESSAUTODETECT=true hyperledger/fabric-javaenv:x86_64-
0.6.1-preview peer node start



POST ▾ http://localhost:7050/chaincode Params Send ▾ Save ▾

```
1 {  
2   "jsonrpc": "2.0",  
3   "method": "deploy",  
4   "params": {  
5     "type": 4,  
6     "chaincodeID": {  
7       "path": "http://github.com/zamrokk/JavaCDD"  
8     },  
9     "ctorMsg": {  
10       "args": ["init", "farmer", "10", "42"]  
11     },  
12     "secureContext": "jim"  
13   },  
14   "id": 1  
15 }
```

Body Cookies Headers (5) Tests Status: 200 OK Time: 55967 ms

Pretty Raw Preview JSON ▾ Save Response

```
1 {  
2   "jsonrpc": "2.0",  
3   "result": {  
4     "status": "OK",  
5     "message": "799e747df41701ddf5e44937819df39c715410a55c96369c6a6677e8ae592a2d84496ebfef13802286e6b02e7a12f93c998aa3e4fd  
f54fed71f207b691d5cd69"  
6   },  
7   "id": 1  
8 }
```



POST <http://localhost:7050/chaincode> Params Send Save

```
1 {  
2   "jsonrpc": "2.0",  
3   "method": "invoke",  
4   "params": {  
5     "type": 1,  
6     "chaincodeID": {  
7       "name": "799e747df41701ddf5e44937819df39c715410a55c96369c6a6677e8ae592a2d84496ebfef13802286e6b02e7a12f93c998aa3e4fdf5  
8         4fed71f207b691d5cd69"  
9     },  
10    "ctorMsg": {  
11      "args": ["executeContract", "farmer", "99701", "US"]  
12    },  
13    "id": 2  
14  }  
}
```

Body Cookies Headers (5) Tests Status: 200 OK Time: 50 ms

Pretty Raw Preview JSON Save Response

```
1 {  
2   "jsonrpc": "2.0",  
3   "result": {  
4     "status": "OK",  
5     "message": "d436b5cb-24f2-4be6-9d30-3e12f5a2d8f2"  
6   },  
7   "id": 2  
8 }  
© 2015 IE
```

DOCKER REST INTERFACE – 0.61 BUNCH

POST <http://localhost:7050/chaincode> Params Send Save

form-data x-www-form-urlencoded raw binary **JSON (application/json)**

```
1 {  
2     "jsonrpc": "2.0",  
3     "method": "query",  
4     "params": {  
5         "type": 1,  
6         "chaincodeID": {  
7             "name": "799e747df41701ddf5e44937819df39c715410a55c96369c6a6677e8ae592a2d84496ebfef13802286e6b02e7a12f93c998aa3e4fdf5  
8                 4fed71f207b691d5cd69"  
9         },  
10        "ctorMsg": {  
11            "args": ["query", "farmer"]  
12        }  
13    },  
14    "id": 2  
}
```

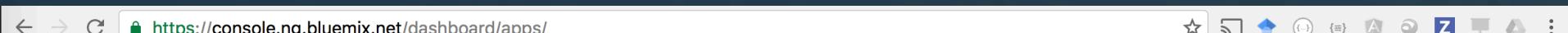
Body Cookies Headers (5) Tests Status: 200 OK Time: 50 ms

Pretty Raw Preview JSON  Save Response

```
1 {  
2     "jsonrpc": "2.0",  
3     "result": {  
4         "status": "OK",  
5         "message": "42"  
6     },  
7     "id": 2  
8 }
```

© 2017

IBM Bluemix Hyperledger Service



Docs

265 Trial Days Remaining ▾

Percival Lucena's Account | US South : percival@unasp.net : dev



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Create Service +

All Categories (1) >

🔍 Blockchain



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Containers

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Services

Application Services

Deliver new web and mobile apps.



Blockchain

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Technology within Bluemix

IBM

IBM Bluemix Hyperledger Service

Docs

265 Trial Days Remaining ▾

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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

Service name:

Blockchain-pv

Credential name:

Credentials-1

IBM Bluemix Hyperledger Service

Pricing Plans

Monthly prices shown are for country or region: [Brazil](#)

PLAN	FEATURES	PRICING
 Starter Developer plan (beta)	<ul style="list-style-type: none">- 4 peers and a Cert Authority- Deploy and test chaincode- Dashboard with logs, controls, and APIs- Sample apps with source code	Free
<p>Get started using IBM Blockchain! Monitor your network and view health status. Leverage the REST API to deploy and invoke chaincode transactions.</p>		
High Security Business Network plan	<ul style="list-style-type: none">- 4 peers and a Cert Authority on IBM LinuxOne™- All of the capabilities in Starter- Isolated environment on dedicated compute- Optimized performance and high speed network- Advanced Security: HSM, Secure Service Container and more	R\$41,206.80 BRL/MONTHLY

[Terms](#)

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[Contact Bluemix Sales](#)

Estimate Monthly Cost

[Cost Calculator](#)

Create

IBM Bluemix Hyperledger Service

IBM Blockchain

Starter Network ID
b20d828038124c06b200c36d49738e7d [Copy](#) Refresh In 02:37/ 3:00 [Tips](#)

Peer	Routes	Discovery	Block Height	Status	Actions
Membership Services	gRPC Copy	-	-	Running	Stop Start
Validating Peer 0	HTTP Copy	4 / 4	9	Running	Stop Start
Validating Peer 1	HTTP Copy	4 / 4	9	Running	Stop Start
Validating Peer 2	HTTP Copy	4 / 4	9	Running	Stop Start
Validating Peer 3	HTTP Copy	4 / 4	9	Running	Stop Start

IBM Bluemix Hyperledger Service



IBM Blockchain

Network

Blockchain

Demo Chaincode

APIs

Logs

Service Status

Support

Starter Network ID

b20d828038124c06b200c36d49738e7d

Copy



Blockchain Overview

[Connected to Validating Peer 0]

7



BLOCKS

0.3



BLOCKS SPEED

1.0



TRANSACTION
ACTIVITY

1



DEPLOYMENTS

1



INVOCATIONS

Block Activity

Time	Block #	Deployments	Invocations	Date	Type	UUID	Chaincode ID	Payload
1 days ago	8	0	0			3aeb97		
1 days ago	7	0	0			93d679		
						68f966f		
						2b093c		

Chaincode

POST /chaincode

Implementation Notes

The `/chaincode` endpoint receives requests to deploy, invoke, and query a target chaincode. This service endpoint implements the JSON RPC 2.0 specification with the payload identifying the desired Chaincode operation within the 'method' field. Pick one body spec from the 3 below that matches your request type.

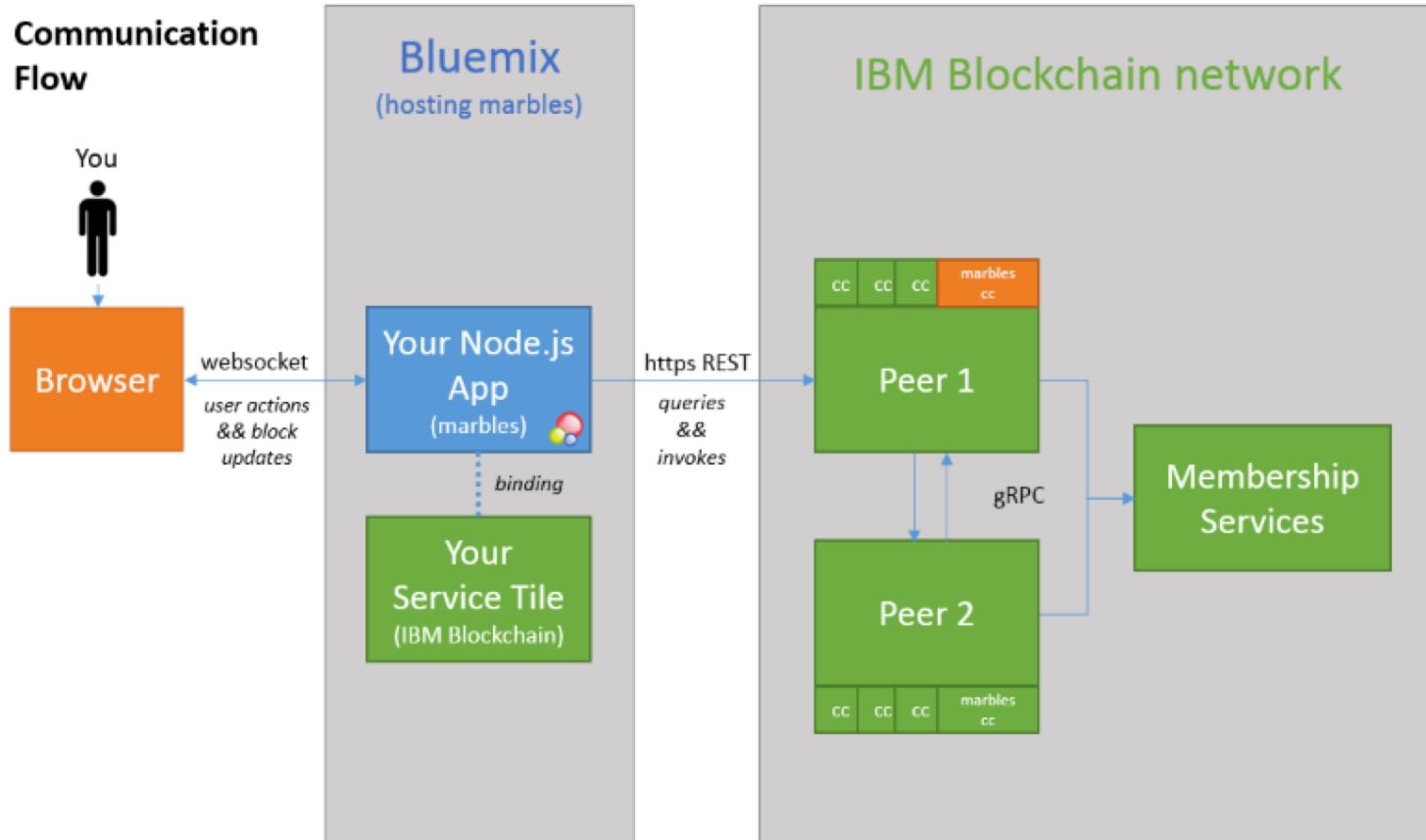
Response Class (Status 200)

```
{  
  "jsonrpc": "2.0",  
  "result": {  
    "Status": "OK",  
    "Message": "500"  
  },  
  "id": 123  
}
```

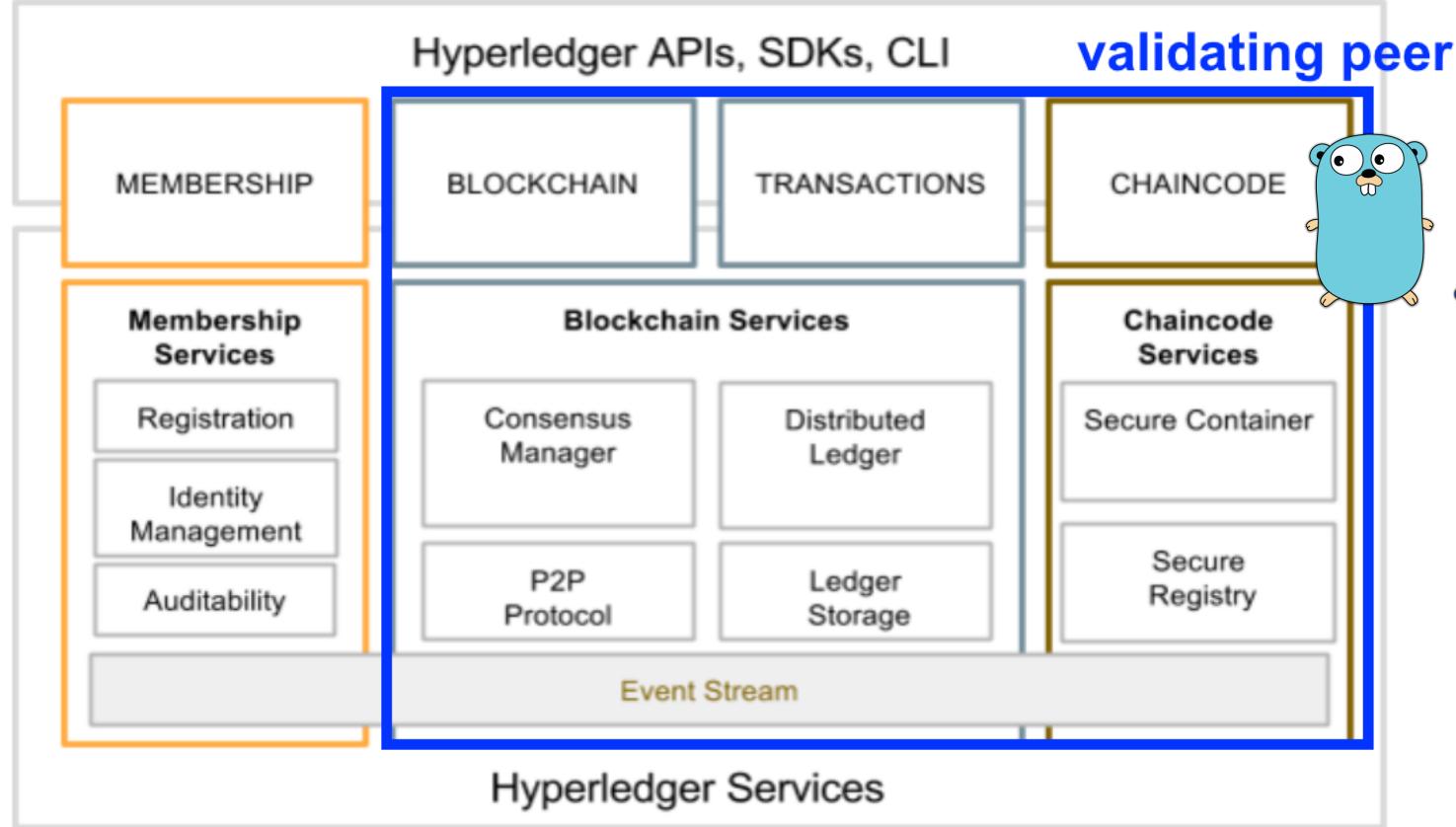
Parameters

Parameter	Value	Description	Parameter Type	Data Type
QuerySpec	<input type="text"/>	body spec for query	body	<pre>{ "jsonrpc": "2.0", "method": "query", "params": { "type": 1, "chaincodeID": { "name": "mycc" } } }</pre>

IBM Bluemix Hyperledger Service



Hyperledger – Architecture 0.6



Where do I start? —> SAMPLE APPS

GitHub, Inc. [US] | <https://github.com/IBM-Blockchain>

This organization Search Pull requests Issues Gist ToDo

IBM Blockchain <http://www.ibm.com/blockchain>

Repositories People 0

Search repositories... Type: All Language: All

car-lease-demo
A demonstration using IBM Blockchain to show how the lifecycle of vehicles can be recorded on a blockchain

JavaScript 27 stars 87 forks Updated 5 hours ago

marbles
IBM Blockchain - Marbles Demo

JavaScript 139 stars 210 forks Updated 7 hours ago

Top languages

JavaScript Go Shell

People 0 >

This organization has no public members. You must be a member to see who's a part of this organization.

Where do I start? —> TUTORIALS



GitHub, Inc. [US] <https://github.com/plucena/smartcontracts>

This repository Search Pull requests Issues Gist ToDo

plucena / smartcontracts ≡ Unwatch 1 Star 1 Fork 2

Code Issues 0 Pull requests 0 Boards Reports Projects 0 Wiki

No description or website provided. — Edit

125 commits 1 branch 0 releases 1 contributor

Branch: master New pull request Create new file Upload files Find file Clone or download

plucena committed on GitHub Create README.md Latest commit d3b48bc 7 hours ago

api	refactoring	3 days ago
cli	test	4 days ago
docker	Update README.md	a day ago

Hyperledger 0.7, 1.0

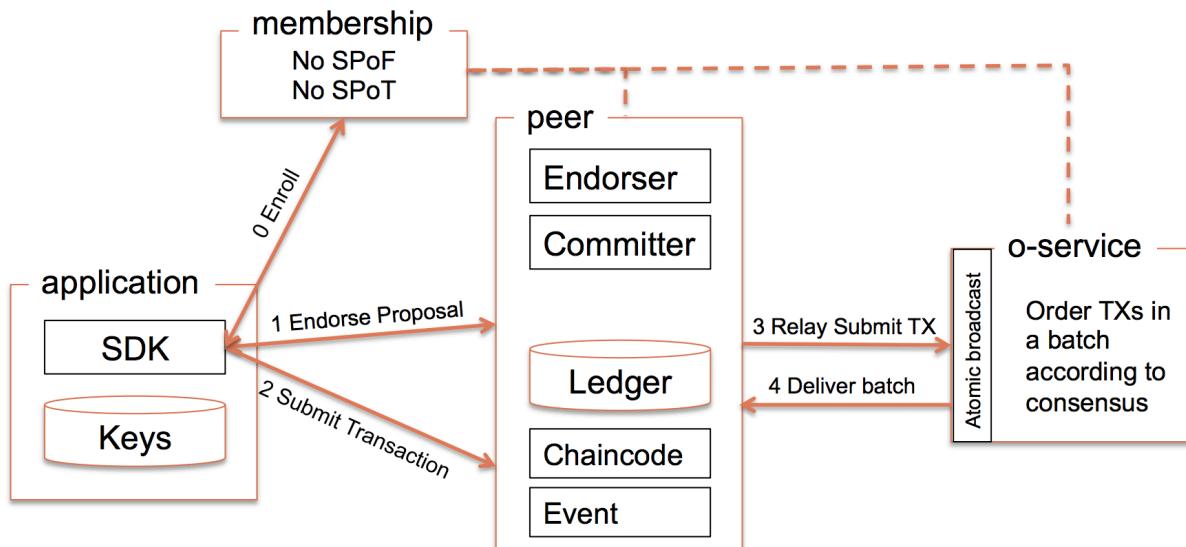


1. Point in time queries - The ability to query chaincode state at previous blocks and easily trace lineage **without** replaying transactions
2. SQL like query language
3. Privacy - The complete ledger may not reside on all committers
4. Cryptographically secure ledger - Data integrity without consulting other nodes
5. Support for consensus algorithms that provides immediate finality like PBFT
6. Support consensus algorithms that require stochastic convergence like PoW, PoET
7. Pruning - Ability to remove old transaction data as needed.
8. Support separation of endorsement from consensus as described in the [Next Consensus Architecture Proposal](#).
This implies that some peers may apply endorsed results to their ledger **without** executing transactions or viewing chaincode logic.
9. API / Engineer separation. The ability to plug in different storage engines as needed.

Hyperledger 0.7, 1.0



- Client SDK: Assists application security and transacting on blockchain
- Peer: Responsible for endorsing, validating, and committing transactions
 - Maintaining the ledger and aware of other peers via gossip network
 - Peer is stateless (no memory between transactions)
- Consenter: Runs consensus to provide atomic broadcast

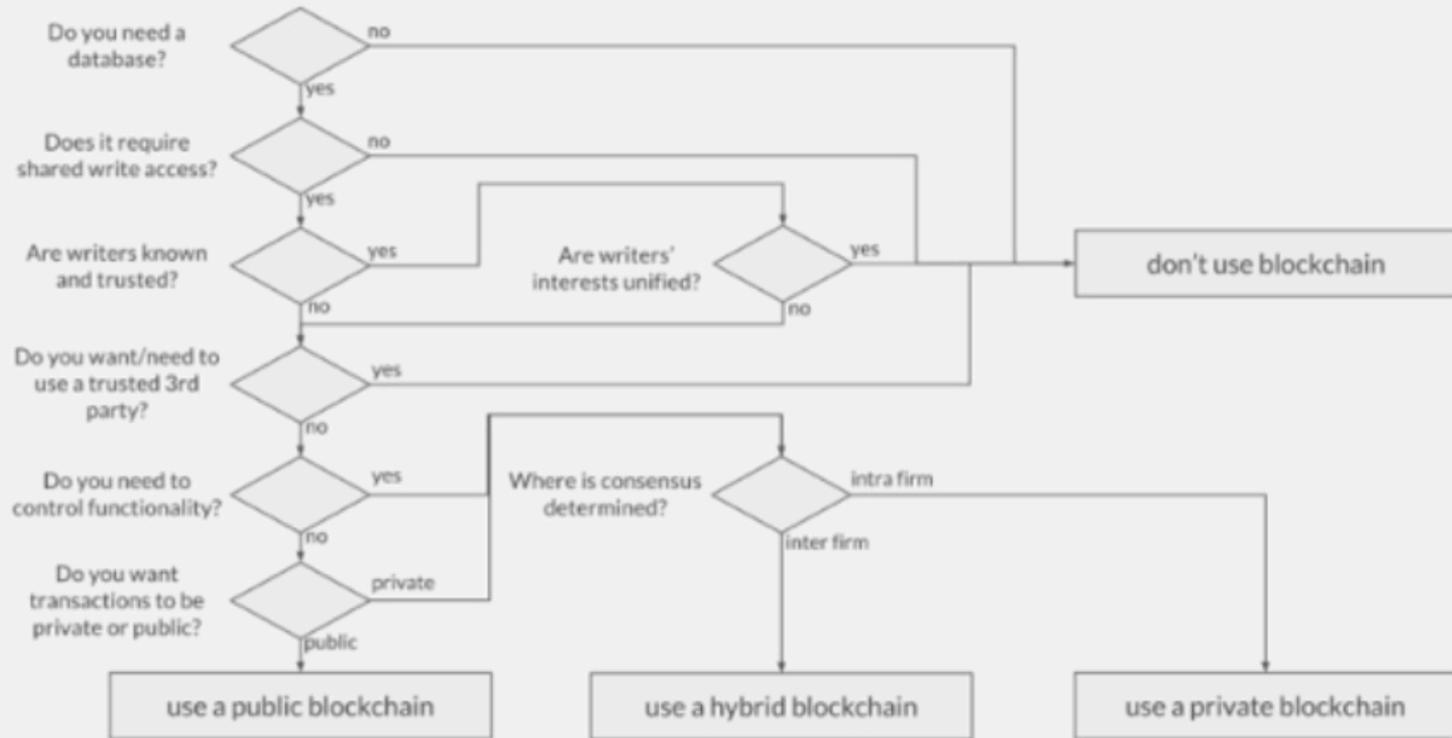




Blockchain Value



Do you even need Blockchain?





Blockchain Value

[?] Why

Not for all ...

Blockchain is not ...

- Suited to high performance (millisecond) transactions
- For just one participant (no business network)
- A replicated database replacement
- A messaging solution
- A transaction processing replacement
- Suited for low value, high volume transactions





REST

<https://github.com/plucena/blockchain-sdk>

GRPC - npm install hfc —save

<https://github.com/hyperledger/fabric/tree/master/sdk/node>

IBM SAMPLE APPS - <https://github.com/IBM-Blockchain>

DeveloperWorks Tutorial - <http://ibm.co/2bOZoMh> -

Java - <https://github.com/xspeedcruiser/java-chaincode-tutorial>