



HYPERLEDGER
FOUNDATION
CAPITAL MARKETS SIG
Mortgage Subgroup

Hyperledger Capital Markets SIG Mortgage Group Update:

- 2021 Blockchain activity in the mortgage industry
- Proof of concept overview

Join us this **Thursday, January 13th | 9:00 AM PST**



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Meeting Agenda





- Welcome & Meeting Housekeeping
- Hyperledger Community Information
- State of Blockchain in the Global Mortgage Industry
- Proof of Concept Overview
- Future Agenda Topics
- Q & A



Hyperledger Foundation

Community Information

Sitemap

	Focus	Link
 THE LINUX FOUNDATION	Helping open technology projects build world class open source software, communities and companies.	https://www.linuxfoundation.org
 HYPERLEDGER FOUNDATION	Building enterprise blockchain ecosystems through global, open source collaboration	https://www.hyperledger.org
 HYPERLEDGER	Central knowledge base for Hyperledger's projects, labs, Working Groups, Special Interest Groups and other community activities	https://wiki.hyperledger.org/
 HYPERLEDGER Capital Markets SPECIAL INTEREST GROUP	Central knowledge base the Capital Markets Special Interest Group (CMSIG).	https://wiki.hyperledger.org/display/CMSIG/
 HYPERLEDGER CAPITAL MARKETS SIG Mortgage Subgroup	Central knowledge base the Mortgage Industry Subgroup.	https://wiki.hyperledger.org/display/CMSIG/CMSIG+Mortgage+Industry+Subgroup
 HYPERLEDGER	Hyperledger's GitHub is for software version control and collaboration.	https://github.com/hyperledger

How to create an LFID

Why do I need an LFID?

This allows you to:


- Browse through the mailing list history on groups.io:
<https://lists.hyperledger.org/groups>
- View, edit and add content to the Hyperledger Wiki
- Save them for both sites and you'll only login once!
- Use chat.hyperledger.org

Step-by-step guide

1. Visit <https://identity.linuxfoundation.org/>
2. Select "I need to create a Linux Foundation ID"
3. Choose a username, add an email and password. *Do not use any of the social login links.*
4. Input your first and last name
5. Click "create new account"
6. Check your email and validate the account
7. Save your username and password so you don't have to login again! Your username = your LFID. Remember that your email address is not the same as your username.

Watch quick 1.5 min video (click [here](#))


Blockchain Training ^{FREE}





Introduction to Hyperledger Blockchain Technologies


A primer to blockchain, distributed ledgers and Hyperledger technologies.

► Send by email




 **Estimated 10 weeks**
2-4 hours per week

 **Self-paced**
Progress at your own speed

 **Free**
Optional upgrade available

Blockchain for Business – An Introduction to Hyperledger Technologies – *Enroll for Free*


A primer to blockchain and distributed ledger technologies. Learn how to start building blockchain applications with Hyperledger frameworks.





Blockchain: Understanding Its Uses and Implications


Understand what blockchain is, and gain an appreciation for this transformative technology and its impact around the globe by analyzing use cases and future trends in technology, business, and enterprise products and institutions.


► Send by email



 Play Video

 **Estimated 14 weeks**
2-3 hours per week

 **Self-paced**
Progress at your own speed

 **Free**
Optional upgrade available

Blockchain: Understanding Its Uses and Implications – *Enroll for Free*

Understand exactly what a blockchain is, its impact and potential for change around the world, and analyze use cases in technology, business, and enterprise products and institutions

- Capital Markets SIG
- PAGE TREE
- Anti-trust Policy Notice and Hyperle
 - Capital Markets SIG Charter
 - Chat Channel Tips
 - CM Launch Blog - Launched
 - CM-Members
 - › CMSIG-Projects
 - CMSIG-Taxonomy-Firstlevel
 - CMSIG-Taxonomy-published
 - › Meeting notes
 - Trade Finance Securitization
 - › CMSIG Insurance Markets Subgroup
 - › CMSIG Bi-Annual Reports
 - ▼ CMSIG Mortgage Industry Subgrc
 - CMSIG Mortgage Industry Subgrc
 - ▼ Mortgage Subgroup Meeting Not
 - 2021-08-11 Meeting Notes
 - 2021-11-18 Meeting notes
 - 2022-01-13 Meeting notes

Dashboard / Capital Markets SIG

CMSIG Mortgage Industry Subgroup

Created by Karen Orton, last modified by James Hendrick on Jan 05, 2022



Welcome to the Mortgage Industry Subgroup

Purpose

To foster sustainable, inclusive communities through efficient, fair, and quality mortgage lending around the globe.

Vision

To securely close home loans as efficiently as an auto loan while delivering a superior digital customer experience.

Mission

To educate mortgage lenders, vendor partners, investors, real estate records custodians, and government agencies around the globe of production-ready blockchain technologies that support the global housing mission of creating sustainable, inclusive communities through efficient, fair, and quality mortgage lending.

Introduction

The Mortgage Industry Subgroup (MIS) is a global community who will focus on technical and business-level challenges within the Mortgage Industry and on developing applicable use cases for blockchain technology. The Subgroup will bring together business, technical, academic, and industry-related expertise to work together on blockchain education, use case identification, POCs and production implementations.

At the heart of financial services is trust and, as an industry, we rely on our technology to record the truth of each transaction. The life cycle of a mortgage has a complex framework, involving many entities, for example originators, servicers, investors, regulators, and a vast ecosystem of vendors and service providers. This complexity creates trust issues and transparency challenges with no clear mechanism to track end-to-end activities of every entity. Each party must maintain their own independent database of customer information, loan transactions, and third party information. Data must be validated, re-validated and financial transactions need to be reconciled with third parties. Blockchain can address many issues in the lifecycle of a mortgage with its decentralized and distributed ledger technology, with trustless operability, that is immutable and auditable.

Objectives

- Promote blockchain education for the mortgage industry participants across business, technical to government agencies and vendor/service partners
- Identify specific opportunities where the application of blockchain technologies can meaningfully advance the state of the mortgage industry
- Devise a foundation for real-world use case identification, blockchain technology alignment, and operational validation of technology fit for purpose

Resources

New to Hyperledger? You'll need a Linux Foundation ID (LFID) to edit our wiki pages and chat on Hyperledger channels. Here's how to get your LFID

Mortgage Industry Subgroup: Join the mailing list.

Global Mortgage Industry Research

Canadian Ledn Announced Bitcoin-Backed Mortgage Product - Dec 2021
by The Tokenist



Redwood Trust Announces Pricing of the Market's First Non-Agency Residential Mortgage-Backed Securitization Leveraging Blockchain-Based Technology - Sep 2021

by Redwood Trust



Real estate blockchain platform Coadjute raises \$8 million - Dec 2021

by Ledger Insights

<https://wiki.hyperledger.org/display/CMSIG/CMSIG+Mortgage+Industry+Subgroup>

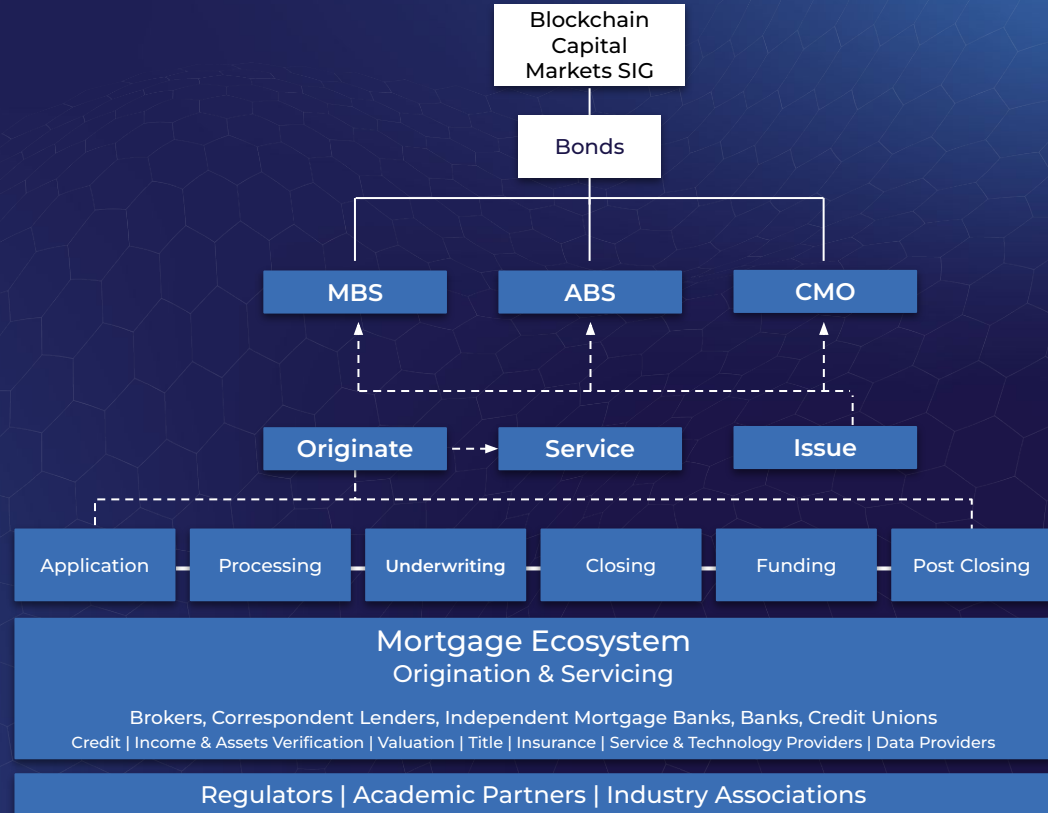
The Mortgage Blockchain Opportunity

Blockchain can address many issues in the lifecycle of a mortgage with its decentralized and distributed ledger technology, with trustless operability, that is immutable and auditable.

The Mortgage Blockchain Opportunity

- At the heart of financial services is trust and, as an industry, we rely on our technology to record the truth of each transaction.
- The life cycle of a mortgage has a complex framework, involving many entities, for example originators, servicers, investors, regulators, and a vast ecosystem of vendors and service providers.
- Each party must maintain their own independent database of customer information, loan transactions, and third party information.
- Data must be validated, re-validated and financial transactions need to be reconciled with third parties.

Mortgage Subgroup Landscape



State of Blockchain in the Global Mortgage Industry



Global | January 2022

Global Mortgage Blockchain Activity

Global

2018

China | Bank of Communications issues blockchain mortgage

2018

Hong Kong | Bank of China (Hong Kong) blockchain mortgage valuations

2020

Russia | A subsidiary of the Raiffeisen Bank Intl. announces blockchain mortgage project

2021

Spain | New bill to allow crypto for mortgage purchase and payments

2021

Canada | Ledn Announced Bitcoin-Backed Mortgage Product

2021

UK | Real estate blockchain platform Coadjute raises \$8 millions

USA

2014

USA | FACTOM blockchain mortgage technology (released 2018)

2018

USA | Figure blockchain Home Equity loans

2018

USA | Fluidity (acquired by ConsenSys) blockchain mortgage technology

2018

USA | Liquid Mortgage post-origination mortgage ecosystem

2021

USA | Riverside County, California blockchain records

2021

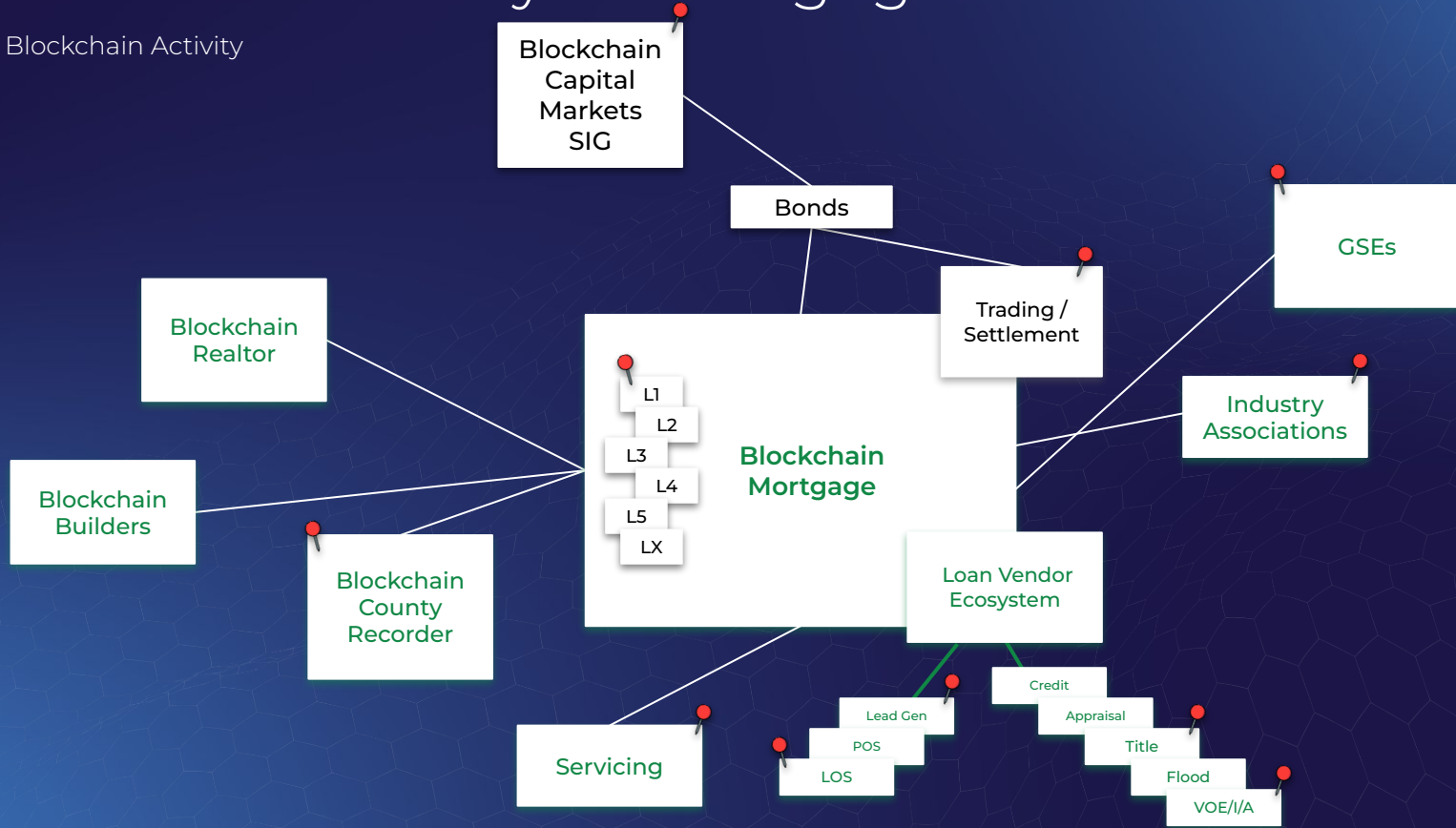
USA | Ginnie Mae announces blockchain project, Fannie Mae accepts Crypto for down payments*

2021

US | Redwood Trust Announces Market's First Non-Agency Residential Blockchain MBS

Blockchain Activity in Mortgage

Blockchain Activity



Global Mortgage Blockchain Activity



Canadian Ledn Announced Bitcoin-Backed Mortgage Product - The Tokenist, Dec 2021

“Our clients want to diversify their portfolio in order to protect their wealth and then utilize that wealth for instances such as purchasing a home, but one should not come at the expense of the other.” - Adam Reeds, Ledn CEO and co-founder

Real estate blockchain platform Coadjute raises \$8 million - Ledger Insights, Dec 2021

Coadjute uses blockchain to link the CRM systems involved in the house buying process, and has signed up software platforms supporting 70% of the UK's estate agents. The company executed its first transaction in July, which completed in nine weeks, compared to a current average of five months.



US Blockchain Activity

**REDWOOD
TRUST**

Redwood Trust Announces Pricing of the Market's First Non-Agency Residential Mortgage-Backed Securitization Leveraging Blockchain-Based Technology

- Redwood Trust, Sep 2021

"By leveraging the speed and accuracy of distributed ledger technology we believe we can drastically increase transparency and reduce the points of friction in the life of a residential mortgage loan, including legal documents and contracts, diligence, reporting and data." - Fred Matera, Managing Director and Head of Residential at Redwood Trust

How Blockchain Technology Is Impacting the Mortgage Industry **- Assurance Mortgage, 2021**

Blockchain technology can help streamline the mortgage industry by improving efficiency and making the mortgage process more affordable.



Government-Sponsored Enterprise (GSE)



The Ginnie Mae Innovation Lab Embarks on Blockchain - GNMA, Apr 2021

Ginnie Mae's Innovation Lab, which explores emerging technology, is conducting a preliminary analysis of how blockchain might be used to reduce cost, reduce risk, enhance stakeholder experience, improve liquidity and meet the needs of the evolving mortgage industry.

Cryptocurrency and the Mortgage Industry - Mortgage Equity Partners, Jun 2021

FNMA has recently started allowing funds from Cryptocurrency to be used for a down payment on a home. Utilizing BitPay, an app that turns cryptocurrencies such as Bitcoin into dollars. Once the Cryptocurrency is converted into dollars, it must be deposited into an eligible asset account and seasoned for at least two months. Fannie Mae doesn't recognize Cryptocurrency unless these steps have been taken.



Proof of Concept Overview

“Don’t mind the ‘*blockchain*’ behind the curtain”

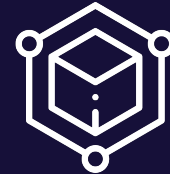
Our guiding principles for application development...

Easy to use

Users



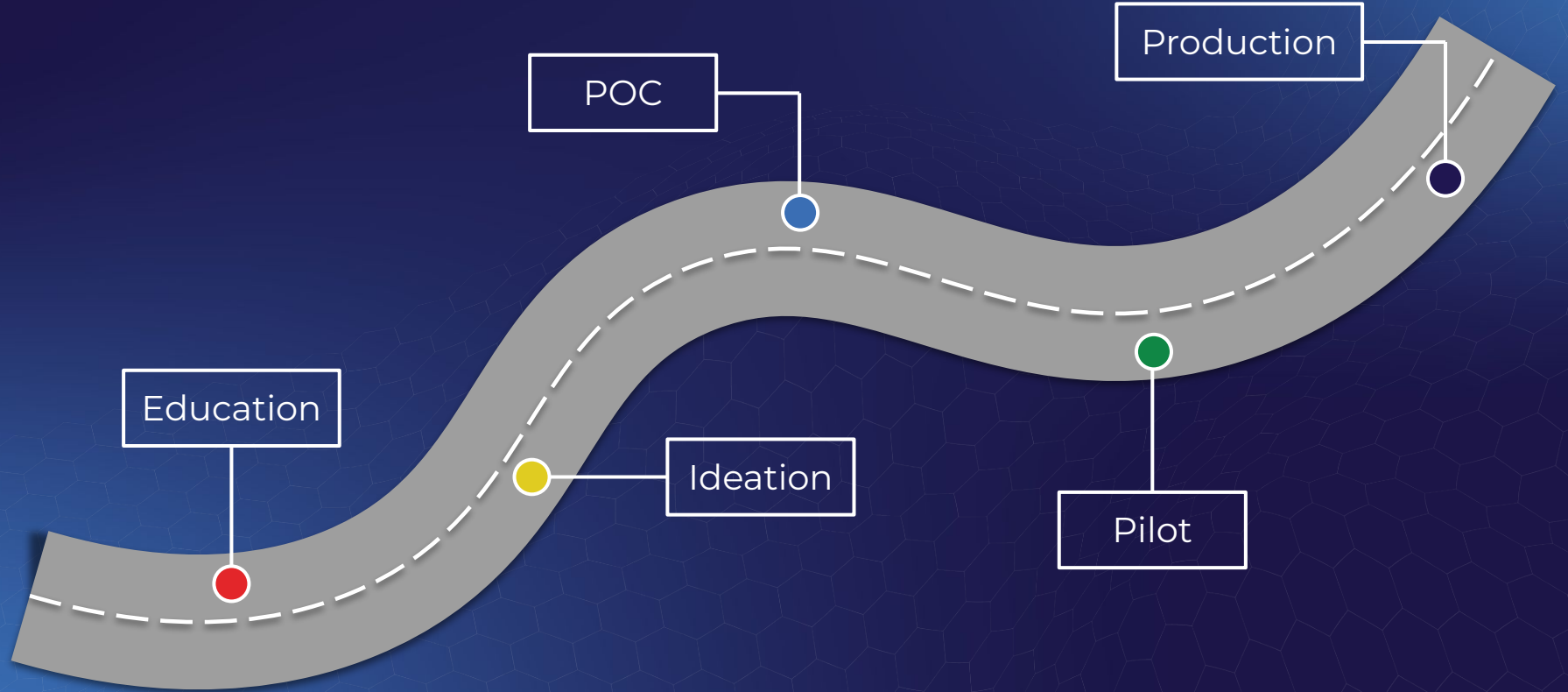
Blockchain Technologies



Improves outcomes

Makes business and/or life simple

The Blockchain Journey



Types of Blockchain Networks

	Public	Private	Consortium
Access	<ul style="list-style-type: none">• Anyone	<ul style="list-style-type: none">• Single organization	<ul style="list-style-type: none">• Multiple organizations
Participants	<ul style="list-style-type: none">• Permissionless• Anonymous	<ul style="list-style-type: none">• Permissioned• Known identities	<ul style="list-style-type: none">• Permissioned• Known identities
Security	<ul style="list-style-type: none">• Consensus mechanism• Proof of Work / Proof of Stake	<ul style="list-style-type: none">• Pre-approved participants• Voting/multi-party consensus	<ul style="list-style-type: none">• Pre-approved participants• Voting/multi-party consensus
Blockchain	<ul style="list-style-type: none">• Ethereum	<ul style="list-style-type: none">• Hyperledger	<ul style="list-style-type: none">• Hyperledger

Proof of Concept (POC)

- Education before ideation
- Think big, start small
- Where to start
- Team size, roles and responsibilities
- Success factors

Blockchain Sandbox Update

- Multiple technologies
- Hyperledger Fabric
- Hyperledger sample cases:
 - Fabcar
 - Asset-transfer
 - Smart contracts
- Local Environment: Ubuntu 20.04 LTS, React, NodeJS
- Cloud infrastructure
- Multiple programming languages



Proof of Concept (POC)

- One of the advantages of being part of The Hyperledger community is access to its knowledgebase. This includes the blockchain sample cases.
- These sample cases allow a user to quickly create and use different blockchain examples using Fabric.

Fabcar

<https://github.com/hyperledger/fabric-samples>

<https://hyperledger-fabric.readthedocs.io/en/latest/>

Asset Transfer

https://hyperledger-fabric.readthedocs.io/en/latest/test_network.html

- The lessons learned in the POC were used in the production deployment of a certificate tracking blockchain application.

Proof of Concept (POC)

```
Query chaincode definition successful on peer0.org1 on channel 'mychannel'
jsing organization 2
Querying chaincode definition on peer0.org2 on channel 'mychannel'...
Attempting to Query committed status on peer0.org2, Retry after 3 seconds.
+ peer lifecycle chaincode querycommitted --channelID mychannel --name fabcar
+ res=0
Committed chaincode definition for chaincode 'fabcar' on channel 'mychannel':
Version: 1, Sequence: 1, Endorsement Plugin: escc, Validation Plugin: vscc, Approvals: [Org1MSP: true, Org2MSP: true]
Query chaincode definition successful on peer0.org2 on channel 'mychannel'
jsing organization 2
jsing organization 2
+ fcn_call '{"function":"initLedger","Args":[]}'
+ infoIn '\033[0;34minvoke fcn call:{"function":"initLedger","Args":[]}'
+ println '\033[0;34minvoke fcn call:{"function":"initLedger","Args":[]}\033[0m'
+ echo -e '\033[0;34minvoke fcn call:{"function":"initLedger","Args":[]}\033[0m'
invoke fcn call:{"function":"initLedger","Args":[]}
+ peer chaincode invoke -o localhost:7050 --ordererTLSCertOverride orderer.example.com --tls --cafile /home/fabric/fabric-samples/test-network/organizations/ordererOrganizations/example.com/orderers/orderer.example.com/msp/tlscacerts/tlsca.example.com-cert.pem -C mychannel -n fabcar --peerAddresses localhost:7051 --tlsRootCertFiles /home/fabric/fabric-samples/test-network/organizations/peerOrganizations/org1.example.com/peers/peer0.org1.example.com/tls/ca.crt --peerAddresses localhost:9051 --tlsRootCertFiles /home/fabric/fabric-samples/test-network/organizations/peerOrganizations/org2.example.com/peers/peer0.org2.example.com/tls/ca.crt --isInit -c '{"function":"initLedger","Args":[]}'
+ res=0
2022-01-13 09:29:53.315 CST [chaincodeCmd] chaincodeInvokeOrQuery -> INFO 001 Chaincode invoke successful. result: status:200
Invoke transaction successful on peer0.org1 peer0.org2 on channel 'mychannel'
~/fabric-samples/fabcar

Total setup execution time : 67 secs ...
```

Screenshot 1

Screenshot 2

Next, use the FabCar applications to interact with the deployed FabCar contract. The FabCar applications are available in multiple programming languages. Follow the instructions for the programming language of your choice:

JavaScript:

Start by changing into the "javascript" directory:
cd javascript

Next, install all required packages:
npm install

Then run the following applications to enroll the admin user, and register a new user called appUser which will be used by the other applications to interact with the deployed FabCar contract:
node enrollAdmin
node registerUser

You can run the invoke application as follows. By default, the invoke application will create a new car, but you can update the application to submit other transactions:
node invoke

You can run the query application as follows. By default, the query application will return all cars, but you can update the application to evaluate other transactions:
node query

Proof of Concept (POC)

Lessons learned

- Off-chain versus on-chain
- Accessing the state DB - LevelDB, CouchDB
- Focus on process orchestration and business logic around the blockchain
- Fabric easier to deploy on MacOS than Windows Subsystem for Linux 2.0 (WSL/Ubuntu)
- Fabric, Golang and NPM versions are very important in minimizing errors ensuring compatibility
- Tools, NPM libraries for developing Chaincode using NodeJS are helpful
- Monitor AWS usage/performance

Future Agenda Topics

Business Case



Demos



Technical



Use Case



Knowledge Share



Regulators



Q&A



HYPERLEDGER
FOUNDATION

Thank you!



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