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BLC201

Building your first blockchain application with Managed Blockchain

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Agenda

- Create a new Amazon Managed Blockchain network
- Overview of Amazon Managed Blockchain
- Hyperledger Fabric deep dive
- Build and deploy your application
- Have fun
- Ask blockchain questions

Workshop

- https://github.com/aws-samples/non-profit-blockchain
- https://tinyurl.com/y7h6369b

Overview of Amazon Managed Blockchain

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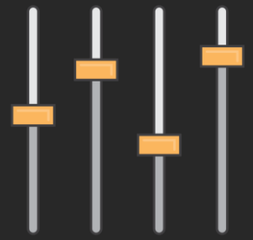
Amazon Managed Blockchain features



Fully managed

Create a blockchain network in **minutes**

HYPERLEDGER FABRIC

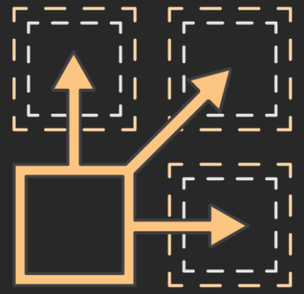
ethereum

Open-source **variety**

Support for two frameworks

Decentralized

Democratically govern the **network**



Reliable & scalable

Backed with **Amazon Quantum Ledger Database (Amazon QLDB) technology**

Low cost

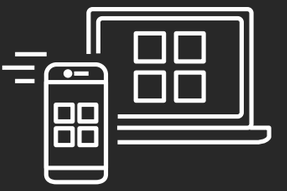
Only pay for resources **used**

How Amazon Managed Blockchain works

Create a network
Choose an open-source blockchain framework, set up a new blockchain network and your membership in your AWS account with just a few clicks.

Invite members
Invite other AWS accounts to join the network.

Add nodes
Create and configure blockchain peer nodes that store a copy of the distributed ledger.



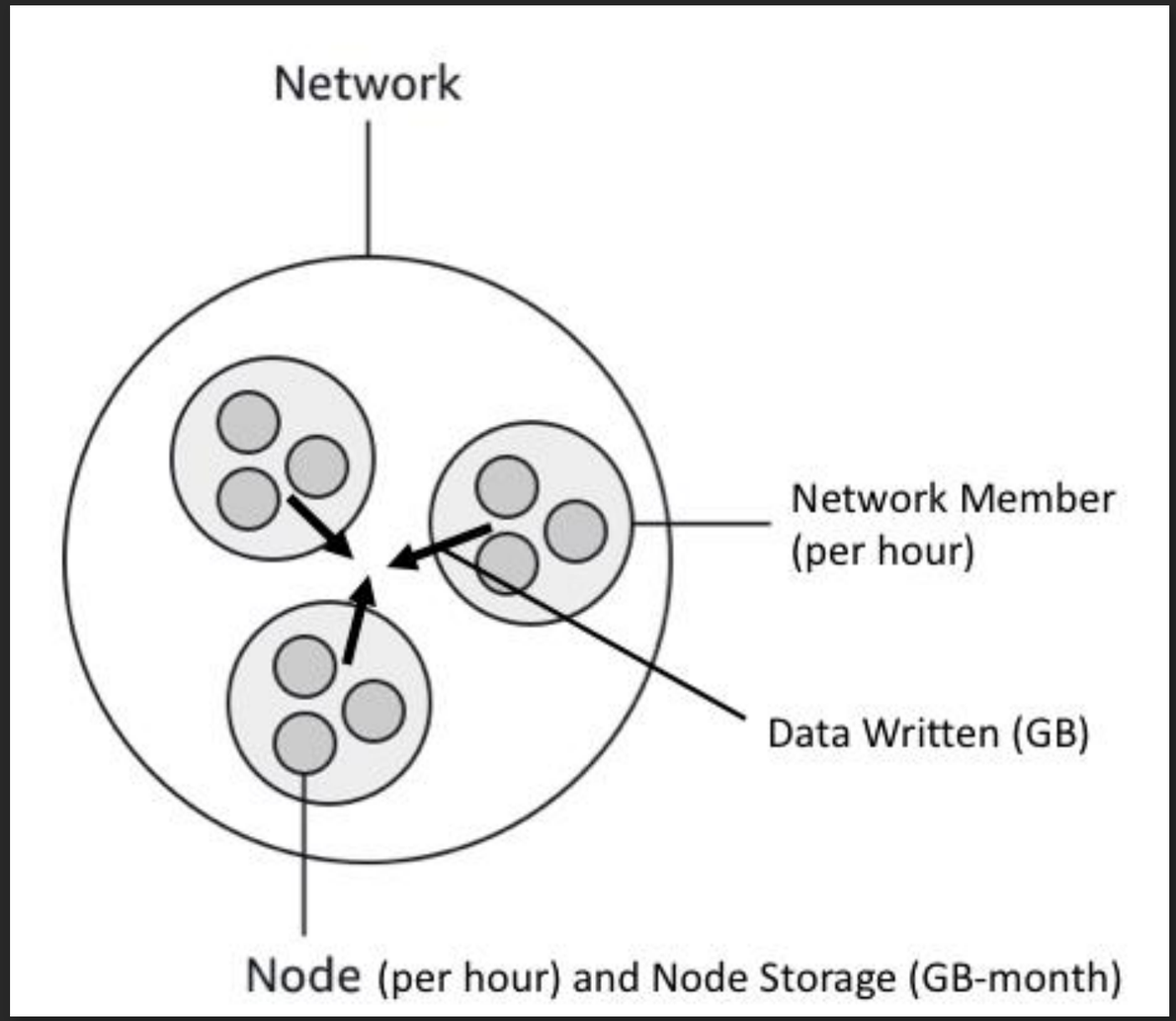
Deploy applications
Create and deploy decentralized applications to your network through your peer nodes. Transact with other members on the network.

Voting and proposals to govern the network

- Networks are decentralized and can remain active even after the initial creator leaves
- Members vote on who to invite and remove
- Network voting rules to determine how a proposal is approved

Pricing dimensions

- Pay as you go with no upfront costs
- Hourly rates billed per second
- Each member pays for their own resources and the data it writes to the network
- VPC endpoints created to access resource endpoints are billed separately
- Standard data transfer rates



A closer look at Hyperledger Fabric

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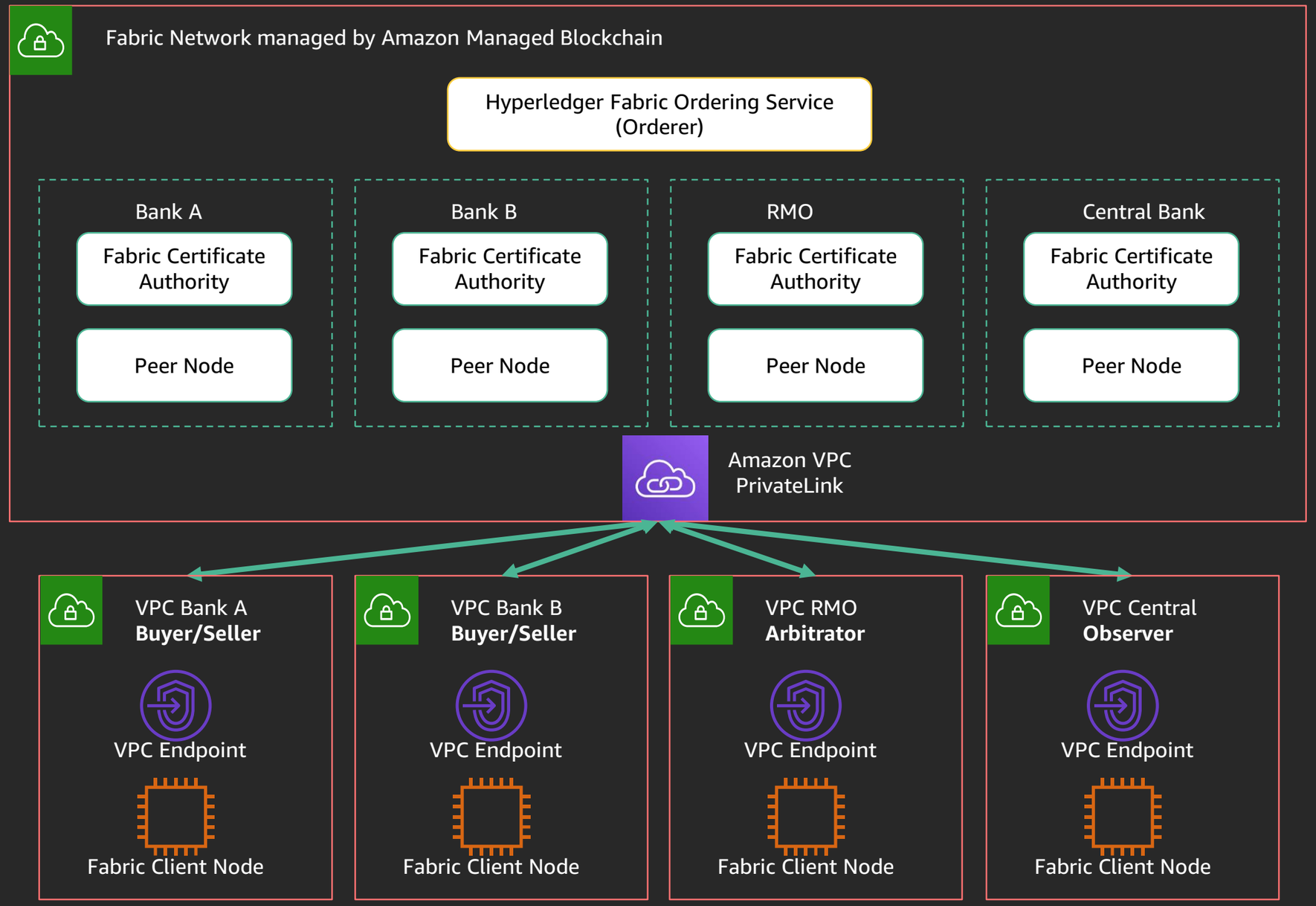
Hyperledger Fabric

- Create **permissioned** networks with channels to limit the transactions on the ledger each member can see
- Chaincode (smart contracts) written in Go, Node.js, or Java are executed in Docker **containers**
- Endorsement policy for executing chaincode is **configurable**
- Does not require a native **cryptocurrency** for **chaincode execution**


Fabric Network managed by Amazon Managed Blockchain
Hyperledger Fabric Ordering Service (Orderer)
Bank A
Fabric Certificate Authority
Peer Node
Bank B
Fabric Certificate Authority
Peer Node
RMO
Fabric Certificate Authority
Peer Node
Central Bank
Fabric Certificate Authority
Peer Node
Amazon VPC PrivateLink
VPC Bank A
Buyer/Seller
VPC Endpoint
Fabric Client Node
VPC Bank B
Buyer/Seller
VPC Endpoint
Fabric Client Node
VPC RMO
Arbitrator
VPC Endpoint
Fabric Client Node
VPC Central
Observer
VPC Endpoint
Fabric Client Node

Augmented Hyperledger Fabric

Ordering service

- Core component of a Fabric network to guarantee order of transactions and delivery of blocks
- Production-grade networks using open source will utilize Apache Kafka
- Managed Blockchain uses Amazon QLDB technology, increasing durability and reliability

Certificate authority (CA)

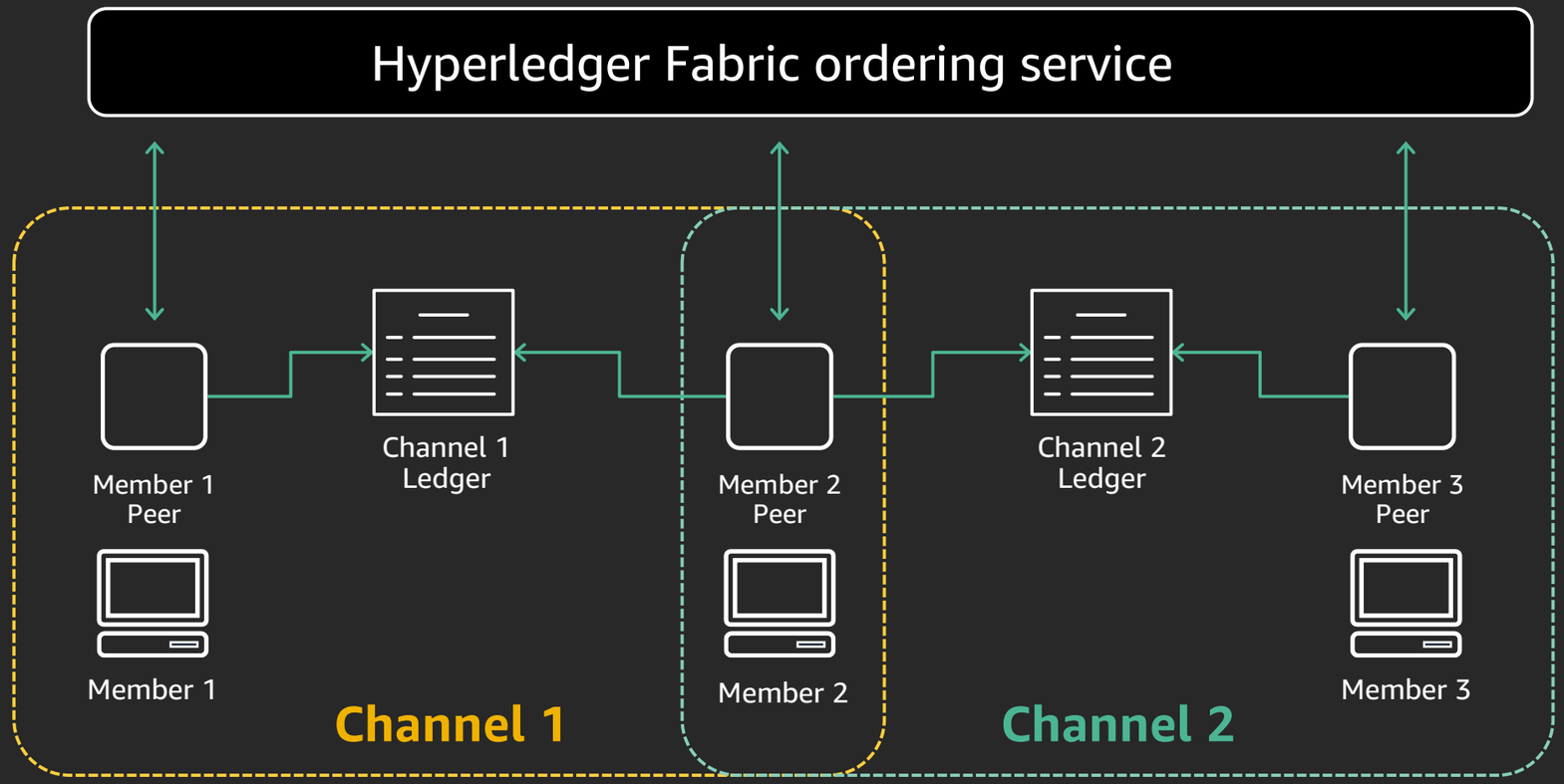
- Open source uses a “soft” HSM
- Managed Blockchain uses AWS Key Management Service (AWS KMS) to secure the CA service

Channels and private data for access control

Channels allow isolation of transactions among specific members in the network

Create or update a channel with configuration transaction (configtx)

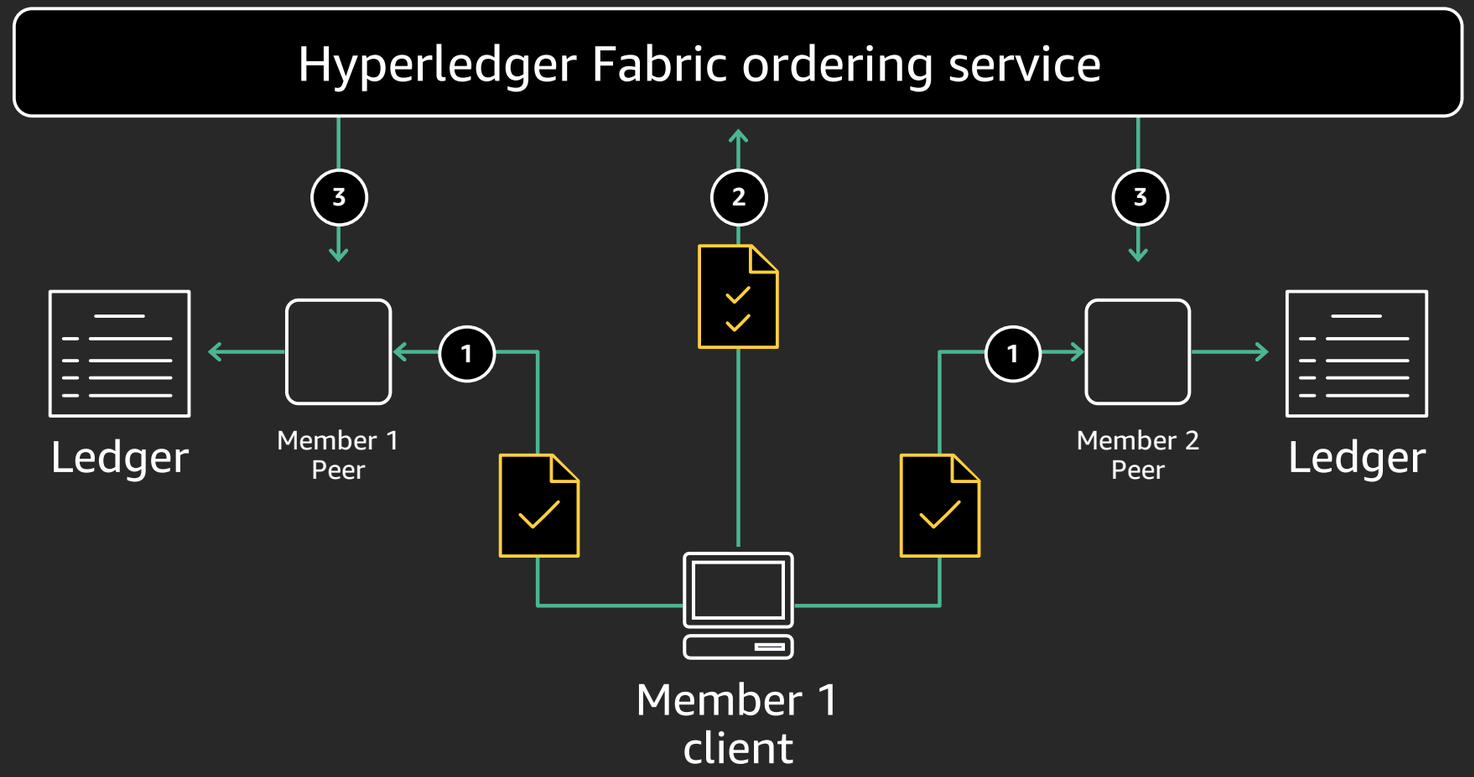
Private data enables sub-channel access control



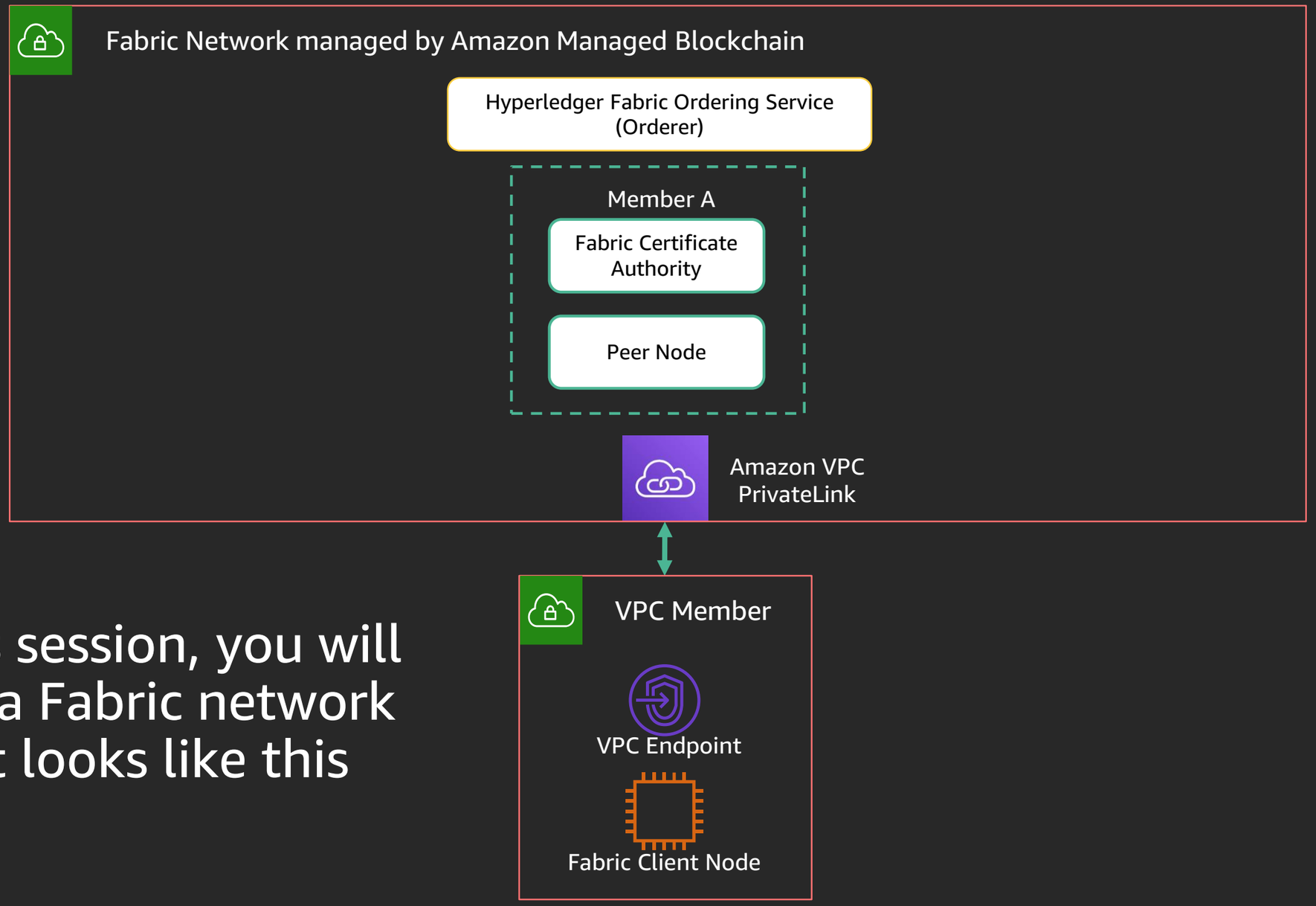
Endorsement policies

Endorsement policies allow chaincode to specify which members (or how many) need to endorse a transaction before submitting

Endorsed transactions then get submitted to the ordering service and assembled into blocks

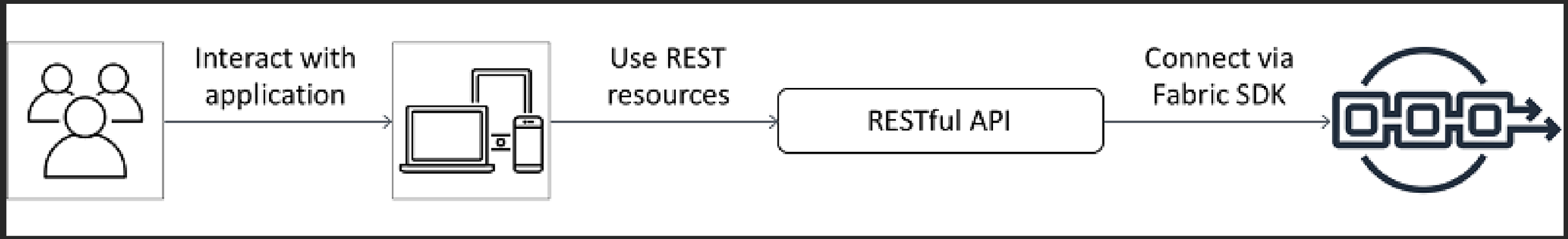


What we will build today



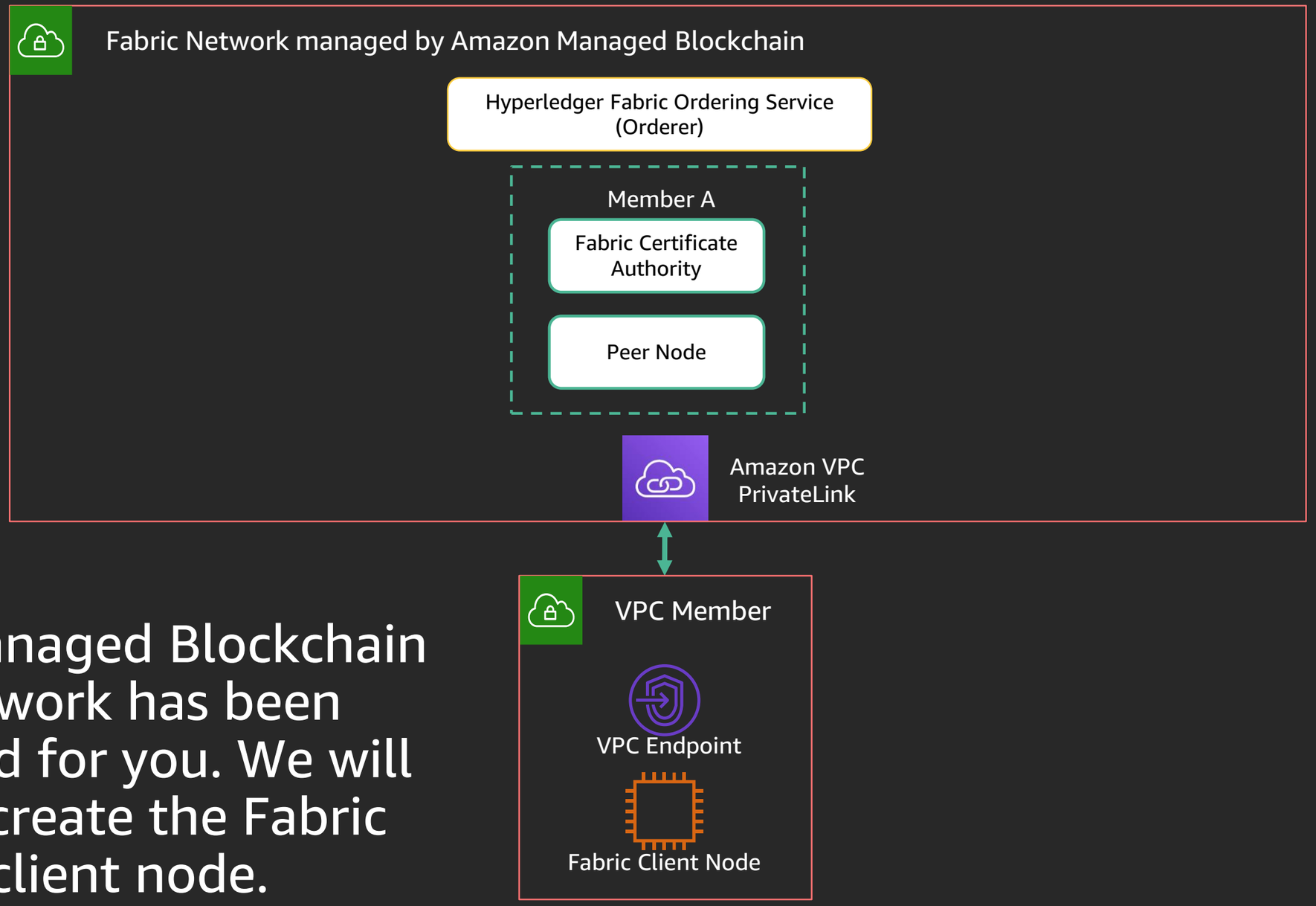
In this session, you will build a Fabric network that looks like this

Layered architecture



Layers you will build in this workshop:

1. Hyperledger Fabric network & chaincode that executes on the Fabric peer node
2. A RESTful API that uses the Hyperledger Fabric Client SDK to interact with the Fabric network
3. A user interface application that calls the API

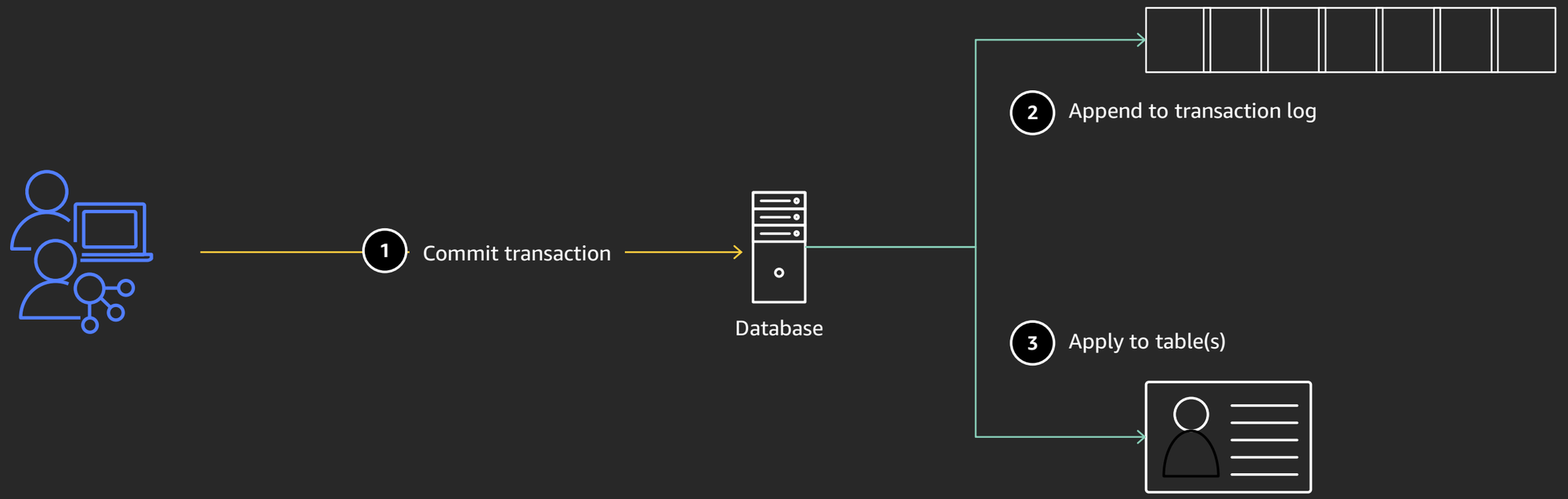


The Managed Blockchain network has been created for you. We will now create the Fabric client node.

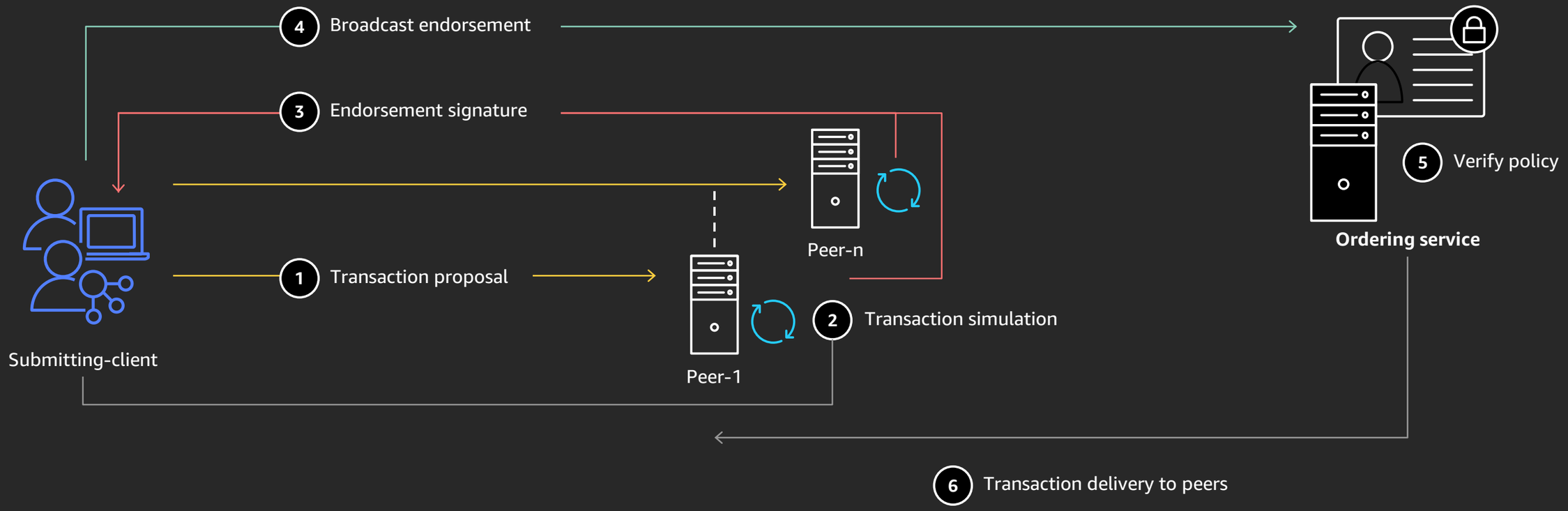
Getting started—Part 1

Let’s get hands-on with part 1

Transaction flow in RDBMS



Transaction flow with Hyperledger Fabric



Smart contracts—Part 2

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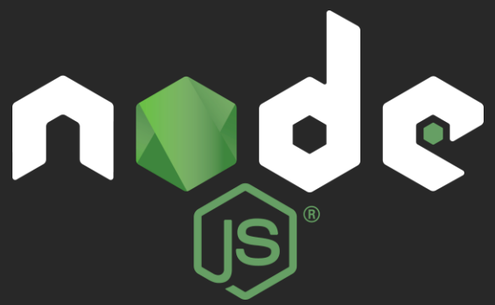
Chaincode basics

Code executed on a peer node that can query and update ledger

Fabric supports chaincode in three languages:



Chaincode executes within a docker container on peer nodes

Chaincode has two operations in its interface:

- Init()—Initializes the chaincode with parameters
- Invoke()—Invokes the chaincode with parameters

Chaincode example

https://github.com/aws-samples/non-profit-blockchain/blob/master/ngo-chaincode/src/ngo.js

Lines 400 onward show the implementation of the chaincode interface

Line 455 shows how to add a new donor to the ledger

Let’s get hands-on with part 2

RESTful API—Part 3

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Hyperledger Fabric SDK example

https://github.com/aws-samples/non-profit-blockchain/blob/master/ngo-rest-api/app.js

Line 203 shows how to post a new donor—this calls the `createDonor` chaincode method we looked at earlier

https://github.com/aws-samples/non-profit-blockchain/blob/master/ngo-rest-api/invoke.js

Request is sent to peer nodes for endorsement (line 51), then endorsements are packaged and sent to the orderer (line 127)

Let’s get hands-on with part 3

User interface—Part 4

Blockchain Events

Block: 43 Block: 44 Block: 45 Block: 46

Choose an non-profit organization to make your donation

Making the Earth Green
Total donations: $545.00 USD
My donation: $0.00 USD

Books Now Fund
Total donations: $525.00 USD
My donation: $425.00 USD

Animal Rescue Troop
Total donations: $1,574.00 USD
My donation: $0.00 USD

Helping Hands
Total donations: $120.00 USD
My donation: $0.00 USD

STEM Sprout
Total donations: $1,015.00 USD
My donation: $0.00 USD

Making the Earth Green

Regn. No. 1101
101 Making the Earth Green
6304972628
makingearth@makingearth.com,

Total Donations	Utilized fund	My donations
$545.00	$343.00	$0.00

Total Projects	Total no.of donors
25	2

Gallery

About

Our Earth is losing an estimated 18 million acres (7.3 million hectares) of forest every year. The impact of deforestation includes declining biodiversity, ecological imbalances and climate changes around the world. If the current rate of deforestaion continues, it will take less than 100 years to destroy all the rainforests on Earth. Making the Earth Green, a non-profit organization, works with governments, companies and communities to educate and promote responsible forest management practices and protect forest areas. We strongly believe that our children and the future generations deserve a better environment than the current state and it is our responsibility to make that happen. Please donate to make the Earth greener!

$ 150.00

Donate

Let’s get hands-on with part 4

Bonus: Serverless REST API using Lambda and API Gateway—part 6

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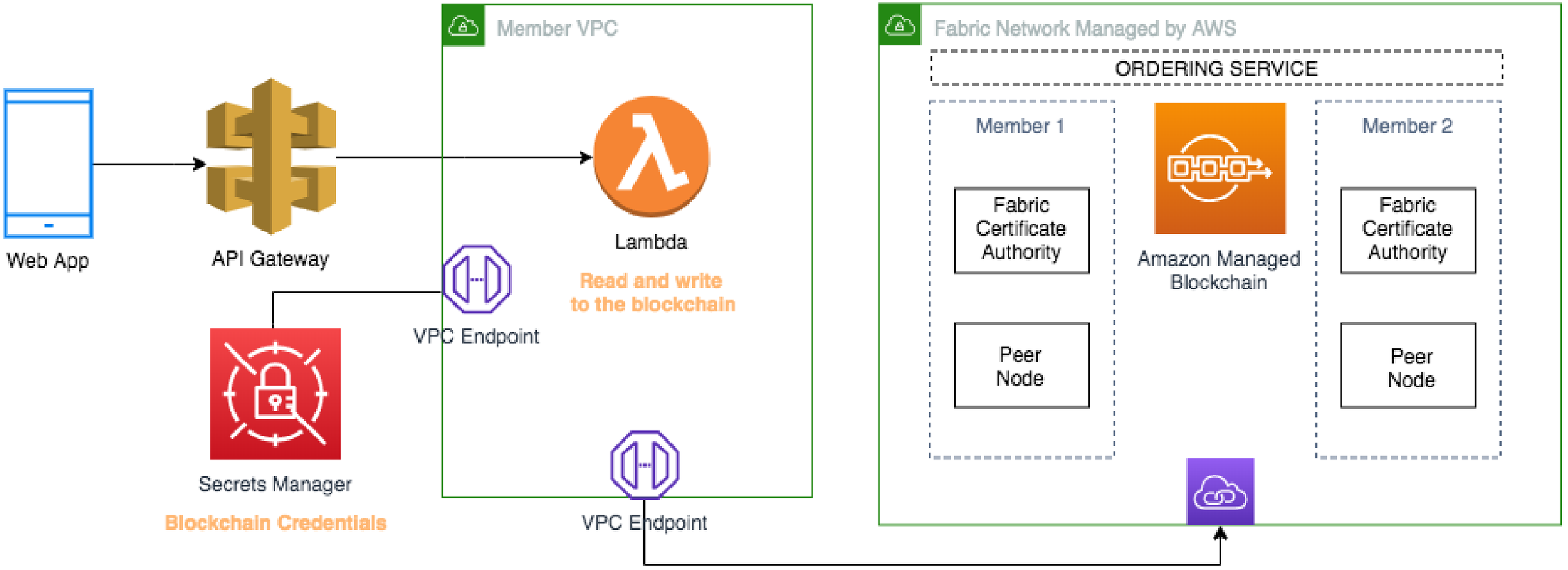
Member VPC
Fabric Network Managed by AWS
ORDERING SERVICE
Member 1
Member 2
Web App
API Gateway
Lambda
Read and write
to the blockchain
VPC Endpoint
Fabric
Certificate
Authority
Amazon Managed
Blockchain
Fabric
Certificate
Authority
Peer
Node
Peer
Node
Secrets Manager
Blockchain Credentials
VPC Endpoint

Let’s get hands-on with part 6

Thank you!

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