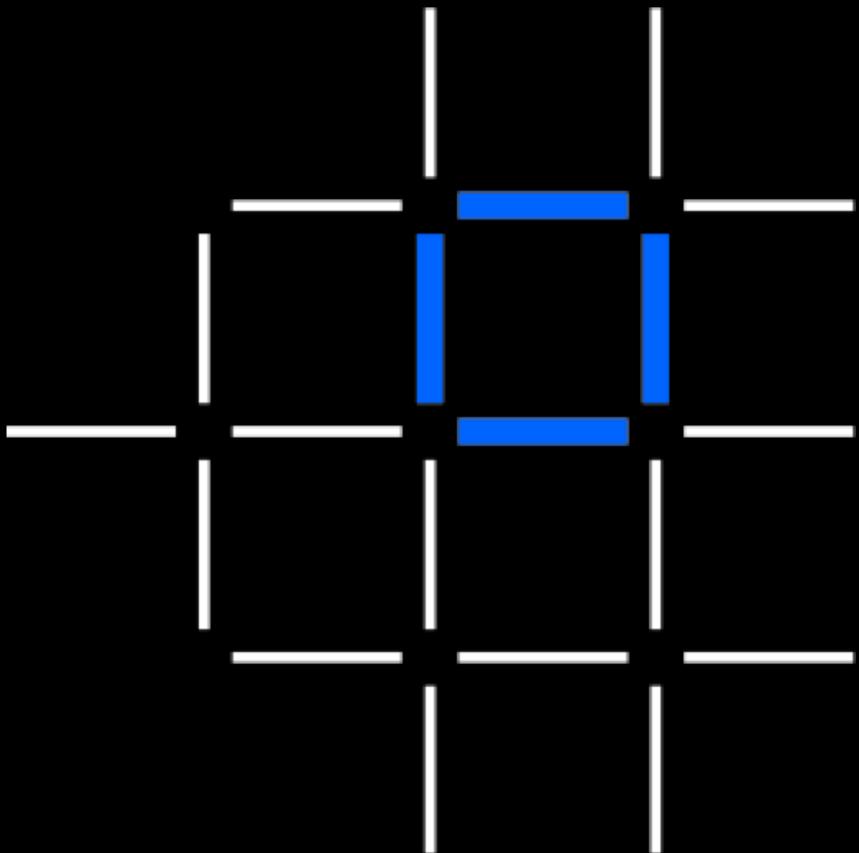


IBM Blockchain Platform

Jin VanStee
jinxiong@us.ibm.com

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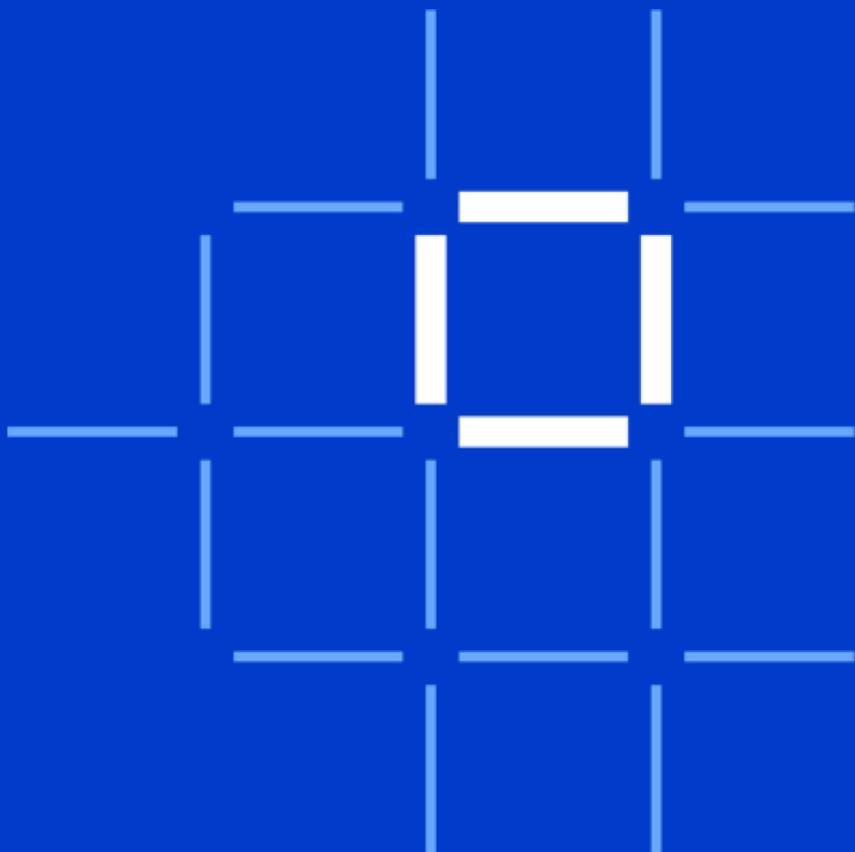
IBM Blockchain

IBM

IBM Blockchain Platform

Demo

Why IBM Z



IBM Blockchain

IBM

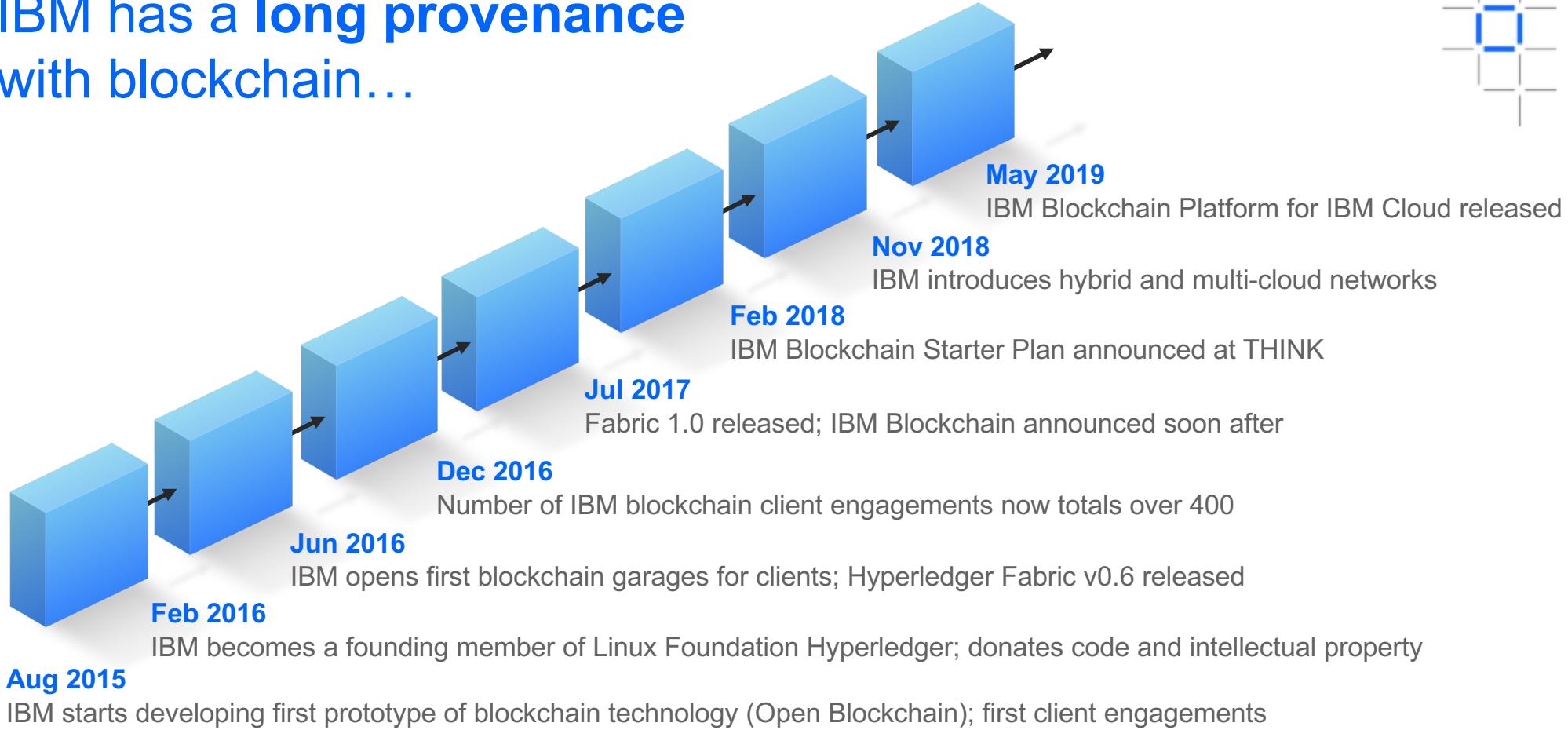
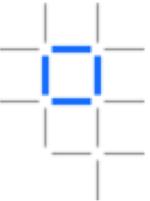
IBM Blockchain Platform



IBM Blockchain

IBM

IBM has a long provenance with blockchain...



Customers want choice and control to scale blockchain



It's a Multi-Cloud World

The multi-cloud era has arrived. Today, 8 out of 10 businesses rely on multiple clouds to meet their IT needs, with 71 percent using more than three

Data Control

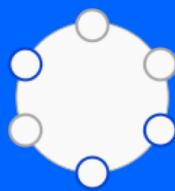
Increasing regulations (e.g. GDPR) and privacy concerns impact how and where data is stored within a blockchain network

Blockchain = Distributed Ledger

Growing networks need to have the ability to address the data hosting requirements of their members in order to recruit and scale

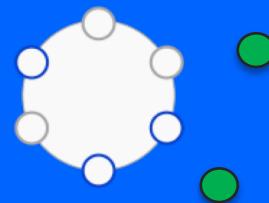
Blockchain ‘Network’ formation patterns emerging

‘Contained’ networks



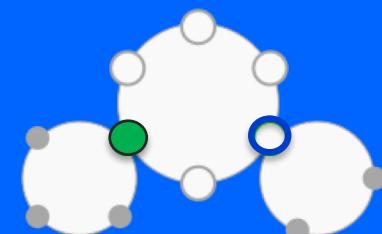
Deployed fully managed networks, often POC/Pilot

‘Distributed’ networks



Distributed peers – store ledger data wherever you want

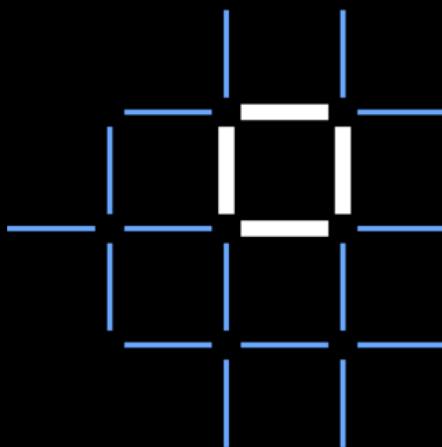
‘Connected’ networks



Unleashed power of the peer
- connect to multiple networks / Ordering Services

Technology & roadmap progression

You can now run
IBM Blockchain
Platform ***Anywhere***



Self—Managed

Private Cloud for on-premises
and public cloud deployments
of Hyperledger Fabric networks



Enables you to run Hyperledger Fabric components:
the **Ordering Service**, **Certificate Authority** and
Peer on Kubernetes through the deployment of
Helm Charts for these components.

Hybrid Deployment

Deploy individual components
(peers) locally within your own
Private Cloud or directly
through AWS and have the
broader network hosted in IBM
Cloud



Running a peer in a non-IBM Cloud environment
that can connect back to an IBP network

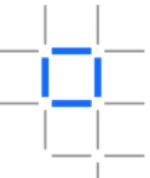
IBM Managed

IBM hosts it for you through its
IBM Cloud services



IBM Blockchain Platform
For IBM Cloud

SaaS offering that is the easiest way to get started
with Blockchain



What's new?

More visual, more choice, & more flexibility with better tools and scalable pricing

Flexibility to do what you want, where you want

- Access UI via IBM Cloud or on-premises (ICP)
- Self- Managed: Private Cloud for on-premises and public cloud deployments of Hyperledger Fabric networks
- Hybrid Deployment: Deploy individual components within your own Private Cloud or AWS and have the network hosted in IBM Cloud
- IBM – Managed: IBM hosts for you through IBM Cloud services
- Your network component visualized

Performance and expertise to help you scale

- Non-disruptive Fabric upgrades
- 99.995% availability, designed for production
- Disaster Recovery
- Single and multi-zone HA
- IBM created and open-sourced Hyperledger Fabric
- The only formal commercial support offering for Hyperledger Fabric
- Hundreds of networks

Tools to help you get started and manage

- Simple SDK for smart contract and application development
- IBM Blockchain Platform IDE
- Management of Peers (Cloud, on-premises, multi-cloud), Ordering Service (Solo, Kafka, Raft), CA, Channels, Identity
- Node-level logs
- API access to UI capabilities
- Quick start template and samples for development
- Management & Governance tooling

Why the New IBM Blockchain Platform?

IBP Anywhere! *The ultimate in choice & control for your blockchain network*

Build your network faster and easier within a seamless experience

- Smooth integration between smart contract development (VS Code) and network management
- Simplified DevOps allows you easily move from development to test to production from a single console
- Support for writing smart contracts in Javascript, Java, and Go languages

Operate and govern networks with total control

- Deploy only the blockchain components you need (Peer, Ordering Service, Certificate Authority)
- Redesigned console lets you manage network components in one place, no matter where they are deployed
- Maintain complete control of your identities, ledger, and smart contracts

Grow distributed networks with ease with newly enabled multi-cloud flexibility

- Connect to nodes running in any environment (on-premises, public, hybrid clouds)
- Easily connect a single peer to multiple industry networks
- Start small, pay as you grow for what you use with no upfront investment and upgrade easily through Kubernetes

IBM Blockchain Platform for Multicloud

- Deploy a distributed peer or the entire network to an environment of your choice
 - Supports **data residency, regulation and compliance** requirements
 - Includes single/Raft instances of orderers
- IBM Blockchain Platform distributed peers on IBM Cloud Private (ICP) leverage the ordering service and certificate authorities running on IBM Cloud
- ICP info:
 - http://www-01.ibm.com/common/ssi>ShowDoc.wss?docURL=/common/ssi/rep_ca/1/897/ENUS218-441/index.html&request_locale=en
 - https://console.bluemix.net/docs/services/blockchain/howto/remote_peer.html

Self Managed

Private Cloud for on-premises and public cloud deployments of Hyperledger Fabric networks



IBM Cloud Private

Enables you to run Hyperledger Fabric components: the **Ordering Service, Certificate Authority and Peer on Kubernetes** through the deployment of Helm Charts for these components.

IBM Blockchain Platform for Multicloud

Best suited for those who:

1. Won't consider IBM Blockchain Platform without having some **on-premises** option available
2. Have **data residency restrictions** (data cannot leave the country)
3. Have the requirement to **keep all of their data on-premises** (behind their firewall – some government entities, healthcare)
4. Have an **affinity to a particular cloud provider** (due do audit mechanisms, compliance, preference)

Scenarios when to choose IBP for ICP

	Need	IBP for ICP
Functional Requirement	Need a single contained solution/environment	IBP and ICP are both needed
	Need easy to use UI tooling	✓ (Q2)
	Need the ability to easily scale my resources up and down	✓
Non-Functional Requirement	All data must be on-premises (data privacy specific)	✓
	Data residency Restrictions (country specific)	✓
Preference	Non-IBM Cloud Infrastructure affinity (i.e. AWS)	Once ICP Cloud Automation Manager is validated
	Depreciate existing infrastructure investment	✓

Legend	Does not address	Depends/Future	Enabled
--------	------------------	----------------	---------

IBM Blockchain Platform for Multicloud

- Deploy a distributed peer in 10-15 minutes using ICP helm charts or AWS quick start templates
 - Supports **data residency, regulation and compliance** requirements
- Distributed peers on ICP/AWS leverage the ordering service and certificate authorities running on IBM Cloud
- Offered as a free-of-charge non-production Community Edition. User pays only for the AWS resources utilized by the distributed peer and IBM Blockchain Platform (IBP) membership.
- Support provided by the IBP resource and support forums
- Available now!

<https://aws.amazon.com/quickstart/architecture/ibm-blockchain-platform/>

Hybrid Deployment

Deploy individual components (peers) locally within your own Private Cloud (ICP) or directly through AWS and have the broader network hosted in IBM Cloud



IBM Cloud Private



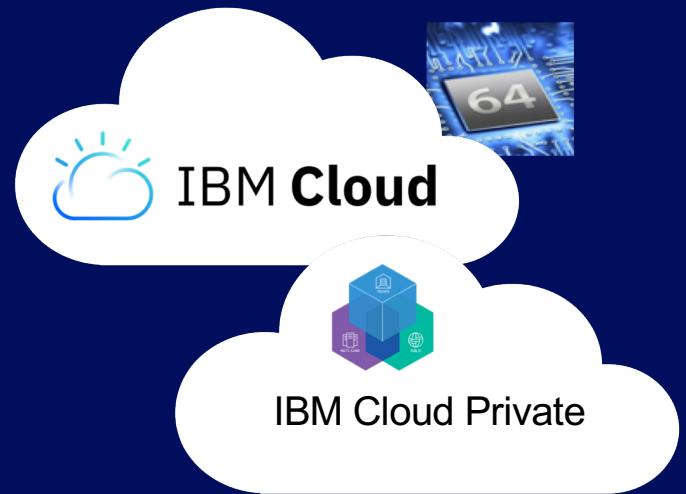
Running a peer in a non-IBM Cloud environment
that can connect back to an IBP network

IBM Blockchain Platform for IBM Cloud

- Infrastructure is provisioned separately using Kubernetes
 - Scaling and flexibility
 - More availability zones and disaster recovery when using the IBM Kubernetes Service
 - Hybrid networks (post beta) using IBM Cloud Private (on-premises and other cloud providers)
 - New administration and governance UI
- New pricing structure (TBA)
- New IBM Blockchain Developer VSCode IDE
- Enterprise Grade:
 - Easy migration of networks from test to prod
 - Non-disruptive upgrades
 - 99.995% availability

The next generation

Provision the next generation of hybrid blockchain networks



IBM Cloud Private

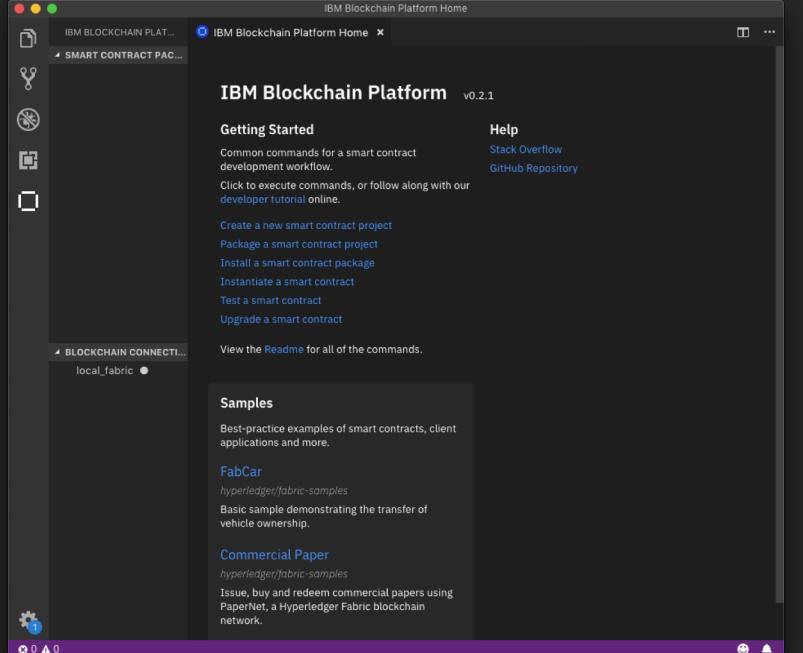
The easiest way to get started

IBM Blockchain Platform VSCode Extension

- Free IBM Blockchain Platform Open-Sourced Extension built on Hyperledger Fabric
- Consumed through VSCode, an industry-leading source code editor
- What can a developer do with it?
 - Generate a skeleton smart contract
 - Develop smart contracts
 - Package up a smart contract
 - Connect to any Fabric runtime
 - Install and Instantiate smart contract packages
 - Test and debug smart contracts
 - Pull down and modify Fabric samples from Github
- Available from:
 - <https://marketplace.visualstudio.com/items?itemName=IBMBLOCKCHAIN.ibm-blockchain-platform>

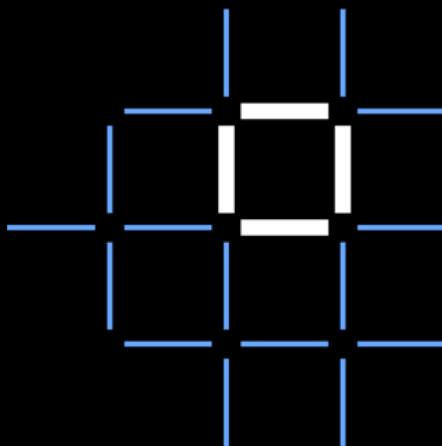
Develop

Provision the next generation developer tools



The easiest way to build

You can now run
IBM Blockchain
Platform ***Anywhere***



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IBM Managed

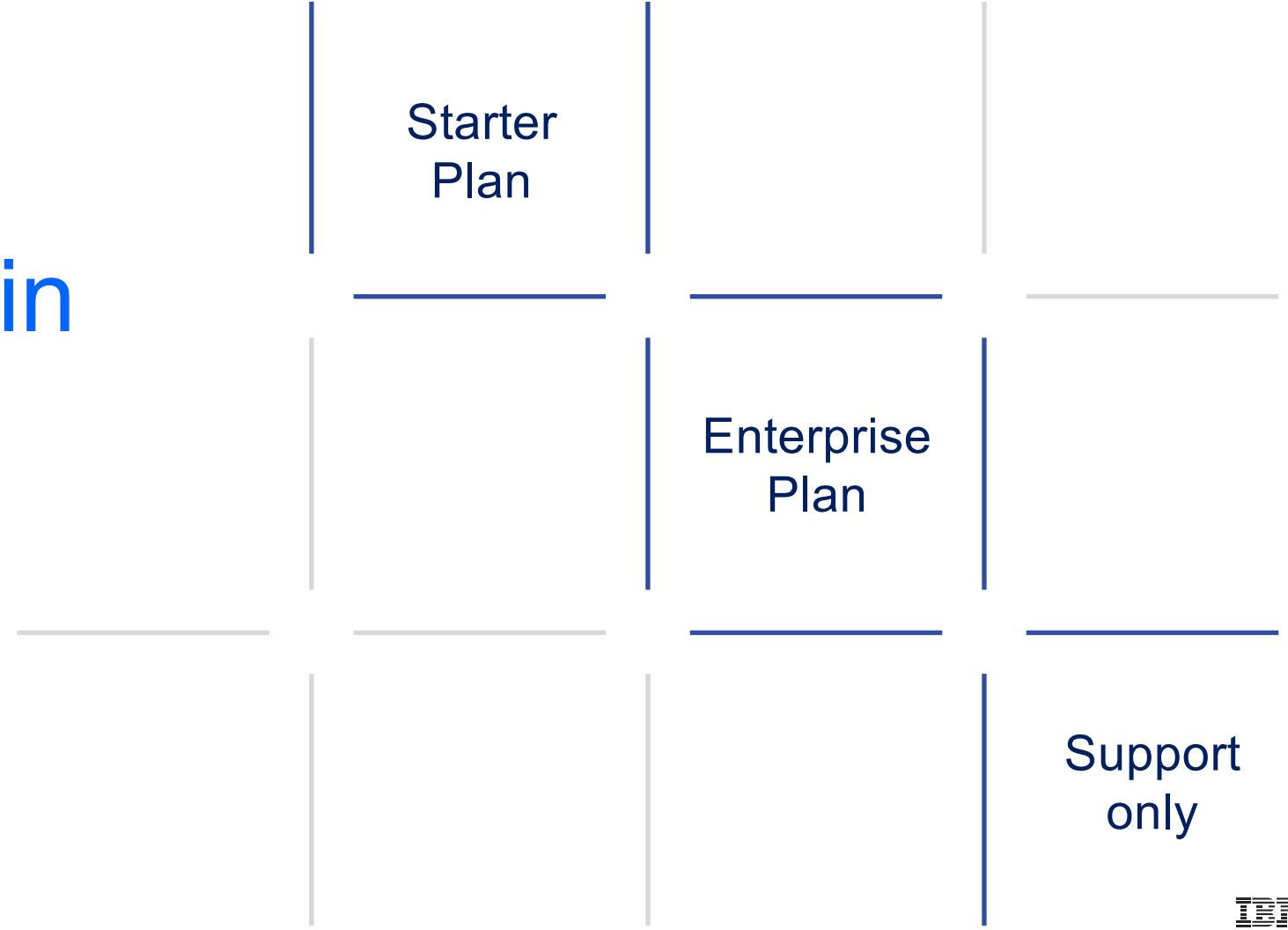
IBM hosts it for you through its
IBM Cloud services



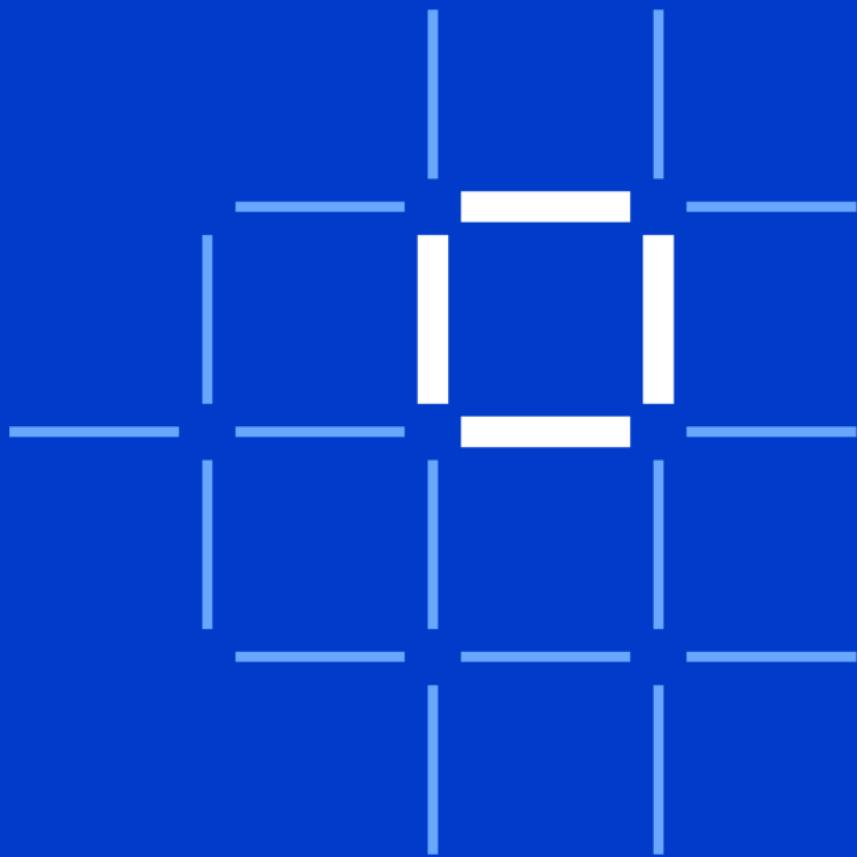
IBM Blockchain
Platform for IBM Cloud

SaaS offering that is the easiest way to get started
with Blockchain

Existing IBM Blockchain Platform offerings



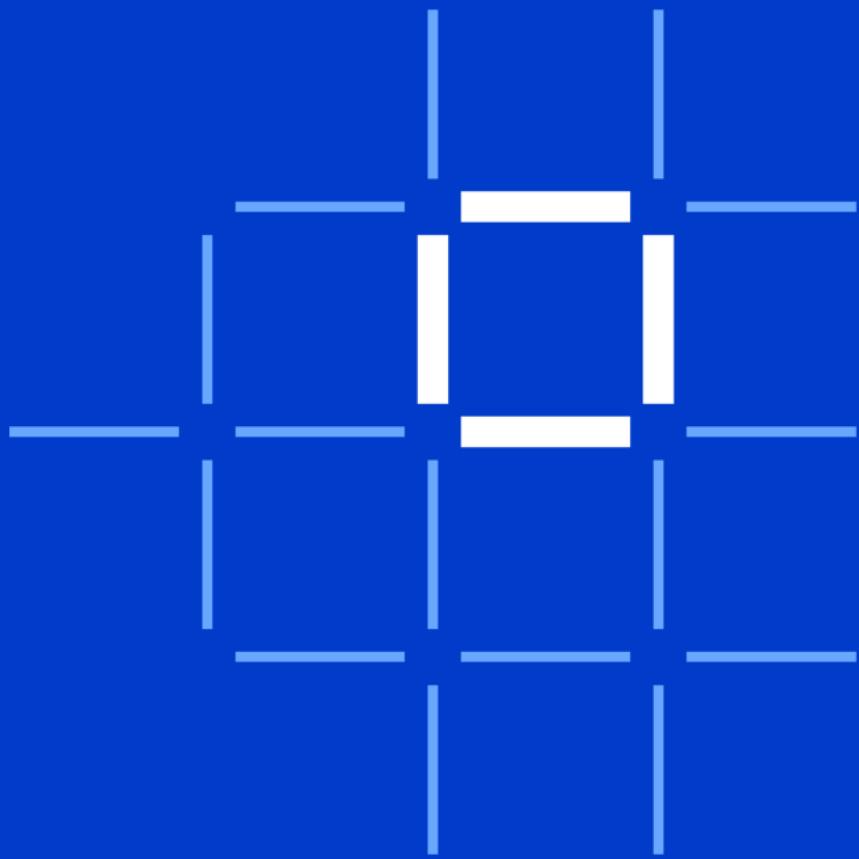
Demo



IBM Blockchain

IBM

Why IBM Z



IBM Blockchain

IBM

IBM Blockchain Platform on LinuxONE

Same experience on the power of LinuxONE

Integration

Seamless and low latency connections between legacy applications

Scalability

Scale peers horizontally, multiple secure peers hosted on the same infrastructure

User Interface

One User Interface, multiple platforms

Modern Development

Hyperledger Fabric on Kubernetes that can be deployed through IBM Cloud Private

Helm charts to ease deployments

Tooling

Operational tools that enable administrators to manage, monitor and govern their nodes across any deployment.

IBM Cloud Private

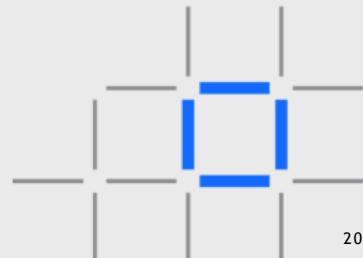
Out-of-the box IBM Cloud Private capabilities including management console, logging and monitoring frameworks.

IBM Blockchain Platform benefits from Z Security

Workload Isolation	 Enables isolation of network components on one system from each other and from other processes
Integrated Crypto Hardware	 Every transaction requires signatures and verification which involves crypto (make sure this is done right)
Key Encryption & Management	 Protect your keys -> your keys are your identity (estimated 1.1 \$billion worth of cryptocurrency stolen in 1 st half of 2018)
Data Encryption	 Blockchain has potentially sensitive data -> protect with encryption
Network Encryption	 Protect data transmitted between application, blockchain components, and integrated systems
Time Source Security	 Blockchain timestamps crucial to keeping accurate ledger

IBM Blockchain Platform benefits from Co-location on IBM Z with core transaction systems

Integration with transaction systems	 Integrate Blockchain apps with legacy systems that contain connected information such as PII
Performant communication	 Important for blockchain to reduce latency between network components to increase tx/s and to reduce wait time when connecting to legacy systems for information
Scalability 'Data center-in-a-box'	 Grow your blockchain network to suit your needs (CPU, Memory, Network)
Operational efficiency	 Manage your system efficiently and securely



360 degree tamper detection and response is critical for blockchain key protection

FIPS 140-2 Level 2

Tamper-evident physical security features (seals) on enclosed card



Gemini Hot Wallet

FIPS 140-2 Level 3

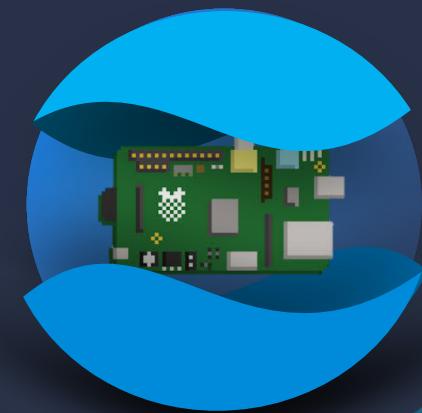
Level 2 + Tamper detection and response for covers and doors*



AWS & Google Cloud HSM
Azure Dedicated HSM
Bitgo, Ledger, Gemini Cold Wallet
Securosys

FIPS 140-2 Level 4

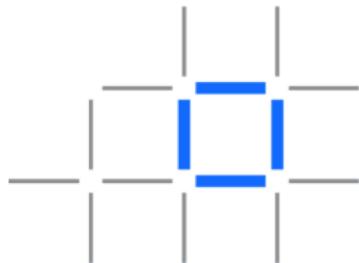
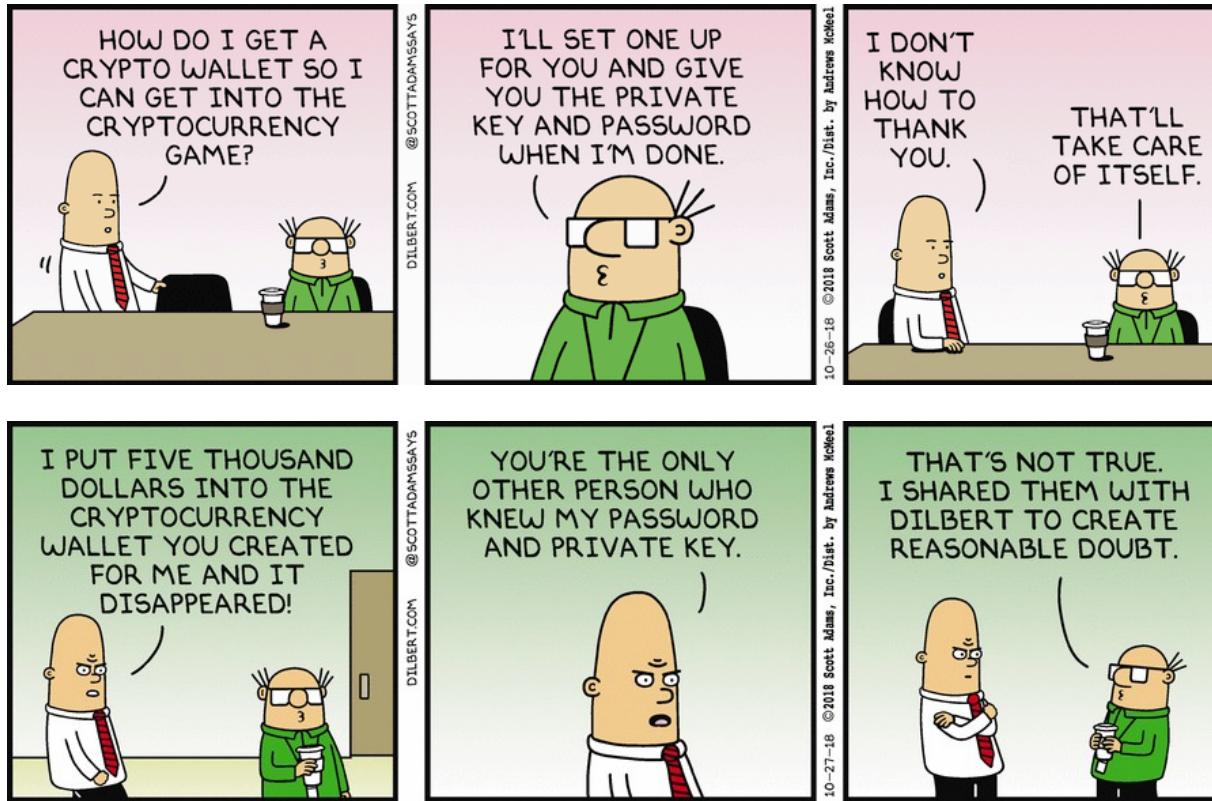
Complete 360 degree envelope of protection and response to all events **including key destruction**



IBM Crypto Express 6S


Unique to IBM: Error-code Correcting
(prevents key loss due to CPU processing faults)

* Some Level 3 vendors include key destruction, Level 3+



Digital assets are protected in key stores within the SSC



**IBM Secure Service
Containers (SSC)**

16 tb

Intel Software Guard Extensions (SGX)
0.00012 tb



The SSC is secured by a high entropy AES-256 bit secure key wrapped by the master key held in CryptoExpress6S HSM



The IBM Secure Service Container is like SGX on steroids

Intel Software Guard Extensions (SGX)

Requires re-factoring of code; must choose what to protect

Neighboring applications can attack the SGX application (side channel)

Does not support built-in secrets – SGX applications start up in the clear

Command line interface access (CLI) into enclave

Persisting data is limited to sealing data in a file; not a full database



IBM Secure Service Containers

No requirement to write application specific to Secure Service Container

Vertical Isolation: EAL5+, ‘air-gap’ isolation from neighbors

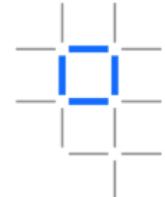
Horizontal Isolation: separation from the rest of host environment

Secure Service Container is encrypted on disk and firmware tamper proof booted- supports secrets

Admins must use a white labeled Rest API – no CLI

All code & data in Secure Service Container is secure 100%

Secure Blockchain Today & what's coming soon



TODAY

Full Blockchain Network Deployed to LinuxONE

For customers who require the solution to run entirely on their infrastructure. They can license the full IBM Blockchain Platform, enabling you to develop and run a full Hyperledger Fabric blockchain network with all the runtime components: the Ordering Service, Certificate Authority and Peer(s) on Kubernetes through the deployment of Helm Charts for these components.

Use: Dev/ test and production

Infrastructure: customer owned & managed

Configuration: customer managed

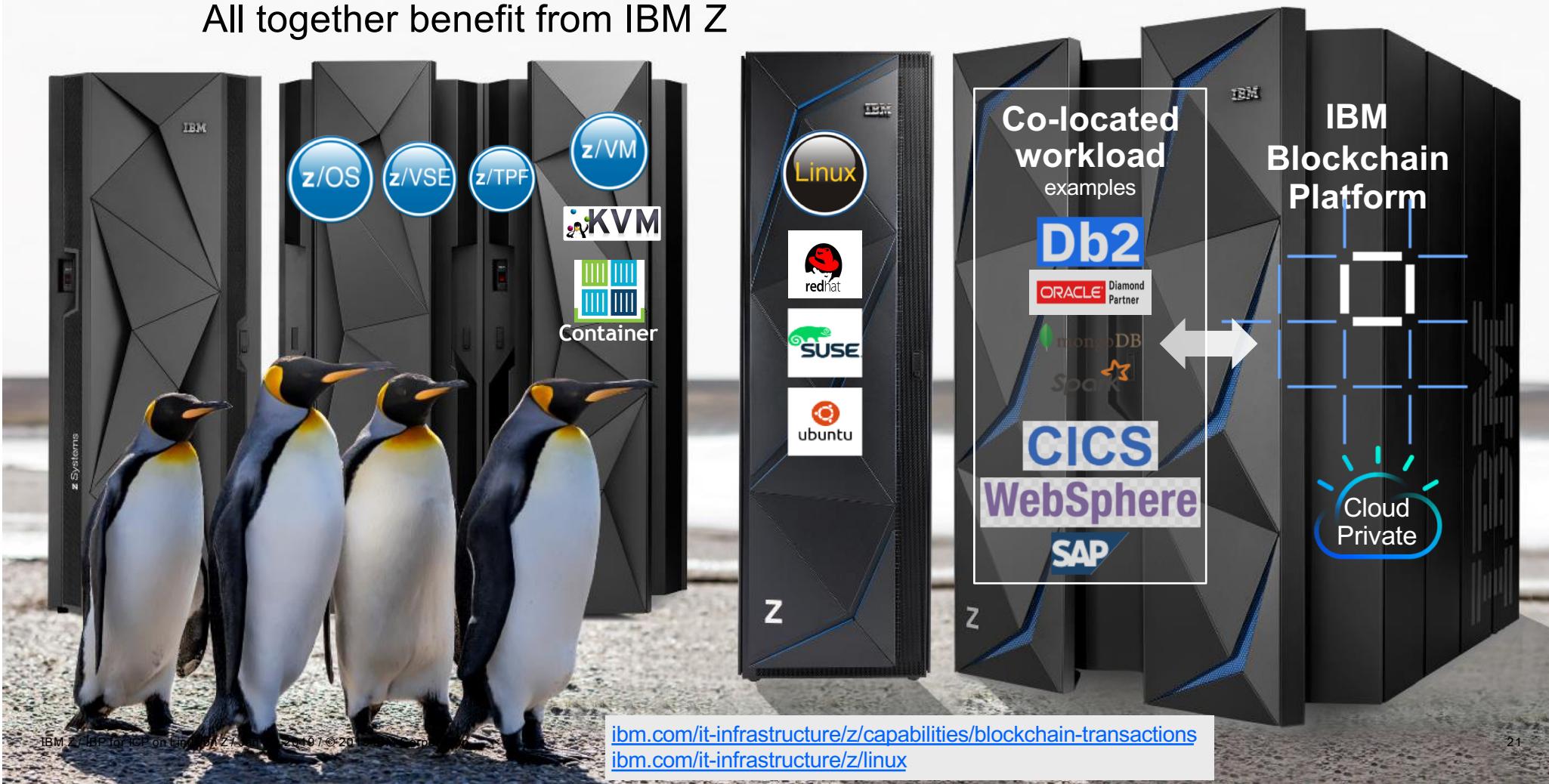
Software lifecycle: customer managed (compatibility guidelines apply)

IBM Blockchain Platform for ICP* on		Roadmap				
LinuxONE	Deploy Full Pilot/Dev Fabric Network to LinuxONE and from LinuxONE	Deploy Fabric Network to SSC4ICP	Fabric Network UI Beta	Full Production Fabric Network with CFT OS support	Fabric Network UI GA	HSM Integration
Delivered	Delivered	Delivered	Delivered	Delivered	3Q19 beta 4Q19 GA	

*IBM Cloud Private is an application platform for developing, scaling and managing on-premises, containerized applications. It includes the container orchestrator Kubernetes, a private image repository, a management console, and monitoring frameworks.

IBM Blockchain Platform on IBM Z

All together benefit from IBM Z



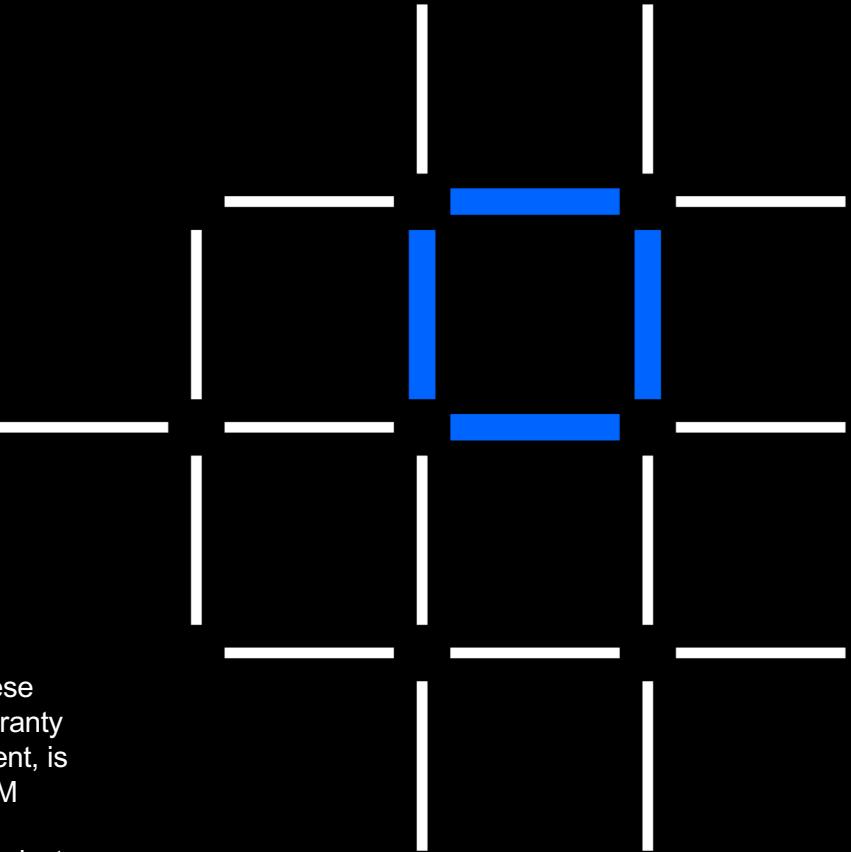
Thank you

IBM Blockchain

www.ibm.com/blockchain

developer.ibm.com/blockchain

www.hyperledger.org



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IBM

