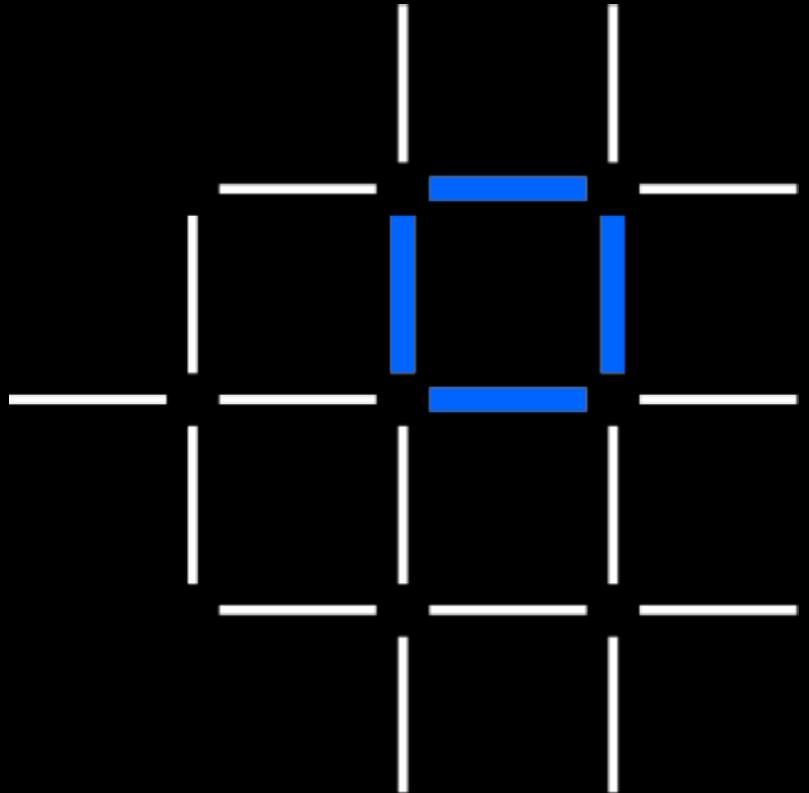


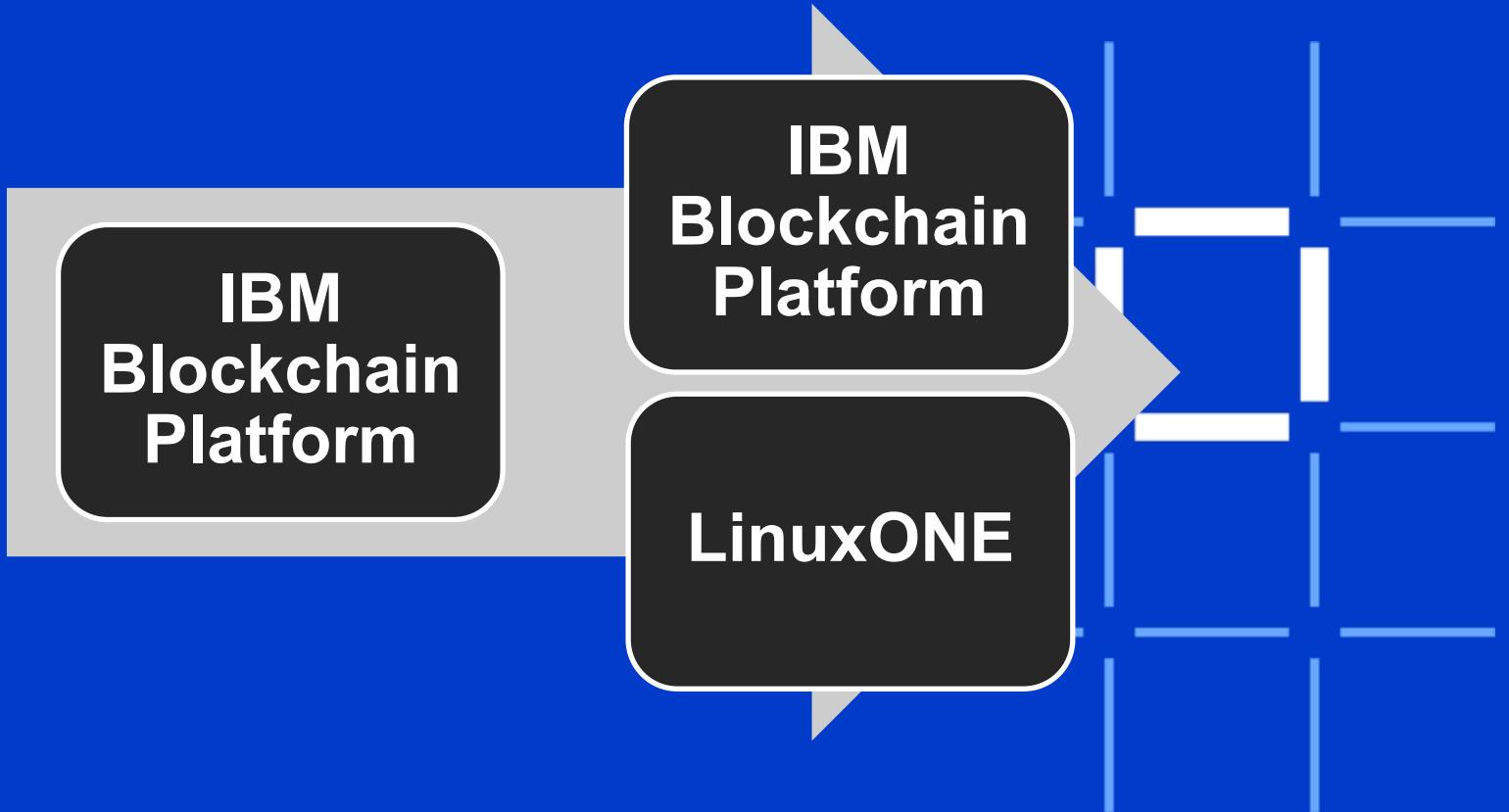
# IBM Blockchain Platform and LinuxONE

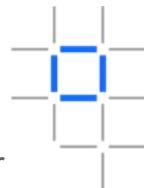
*Garrett Woodworth*

[garrett.lee.woodworth@ibm.com](mailto:garrett.lee.woodworth@ibm.com)

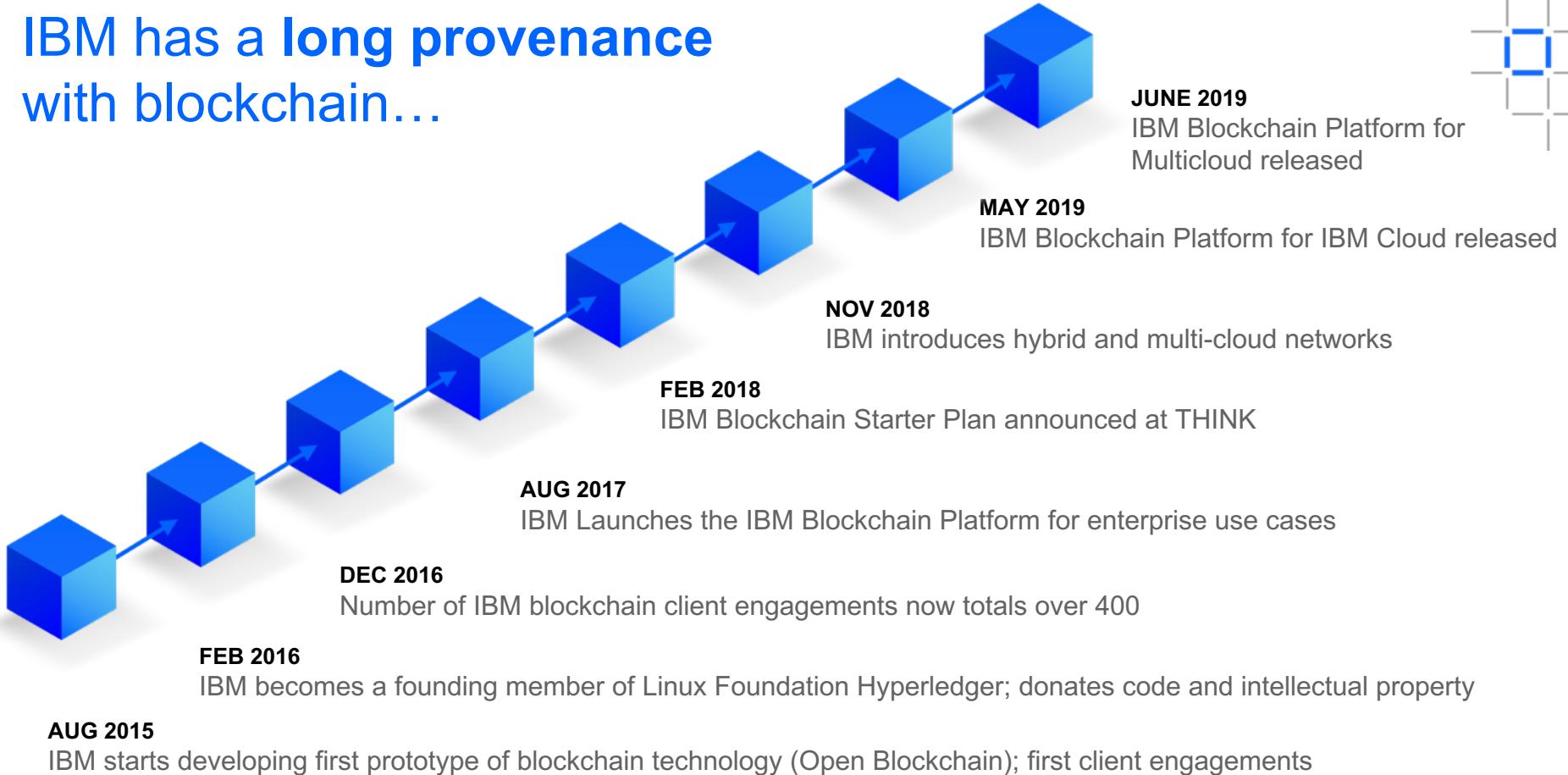
*Technical Specialist IBM Z – Blockchain & Kubernetes*







# IBM has a long provenance with blockchain...



# IBM Blockchain Platform

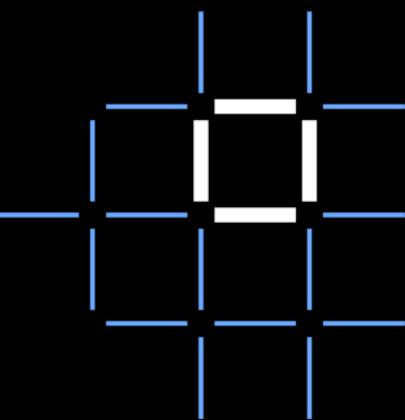
**Advanced tooling**  
allows you to quickly build,  
operate & govern and grow  
blockchain networks

**Open technology**  
uses the popular  
Hyperledger Fabric  
distributed ledger

**Deploy anywhere**  
fully managed, or flexible  
deployment on-premises or  
on other cloud vendors



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** using a Kubernetes operator.

## 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

# 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

## 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 Red Hat OpenShift (OCP) leverage the ordering service and certificate authorities running on IBM Cloud

## 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 using a **Kubernetes operator**.

## 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 using Red Hat OpenShift (on-premises and other cloud providers)
  - New administration and governance UI
- ❑ 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



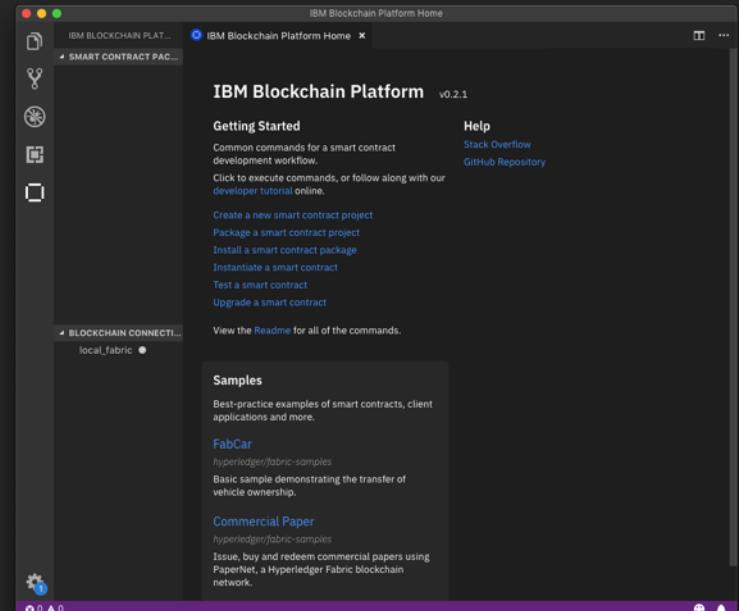
The easiest way to get started

# IBM Blockchain Platform VSCode Extension

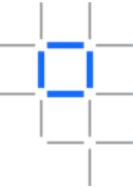
- Free IBM Blockchain Platform Open-Sourced Extension built on Hyperledger Fabric
- Consumed through VSCode, an industry-leading source code editor
- What can a developer do with it?
  - Generate a skeleton smart contract
  - Develop smart contracts
  - Package up a smart contract
  - Connect to any 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

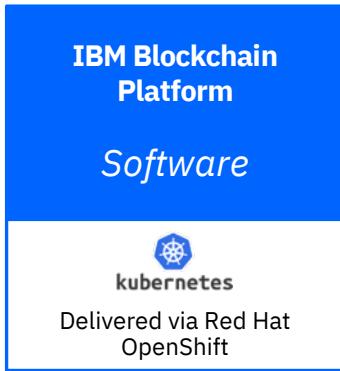


The easiest way to build



# Included Capabilities

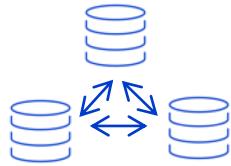
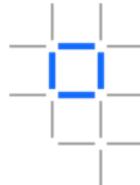
Easily build, manage, and grow your blockchain applications



- **Console** (User Interface)
  - Deploy
  - Manage
  - Upgrade
  - Govern
  - Scale
- **APIs** to automate operations
- Compatibility with **IBM Blockchain Platform Extension for VS Code** to easily write and deploy smart contracts
- Includes Certified Images for Hyperledger Fabric v1.4.x
- **Multicloud** capabilities
  - Compatibility with other IBM Blockchain Platform deployments – import and manage any node
  - Compatibility with other Hyperledger Fabric deployments – connect to any Hyperledger Fabric node to form a network
- Easily deploy IBM Blockchain Platform to **Kubernetes** via OpenShift

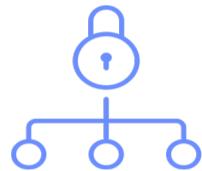
# Why IBM Blockchain Platform software?

It should be considered by clients with data residency, on-prem, or other public cloud requirements.



## DATA RESIDENCY

Address data residency requirements



## IaaS OF CHOICE

Enables organizations to work with their IaaS of choice without being locked into a single vendor



## ON-PREMISES DEPLOYMENT

Have a copy of your ledger on your own infrastructure

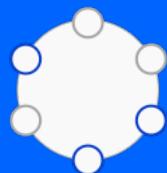


## NETWORK GROWTH

Recruit consortia members who also need deployment flexibility and on-prem capabilities

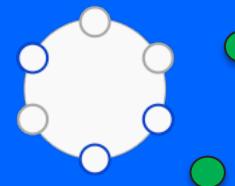
# Blockchain ‘Network’ formation patterns emerging

## ‘Contained’ networks



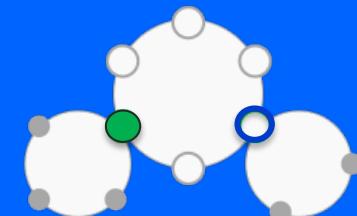
Deployed fully managed networks, often POC/Pilot

## ‘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

## Best suited for those who:

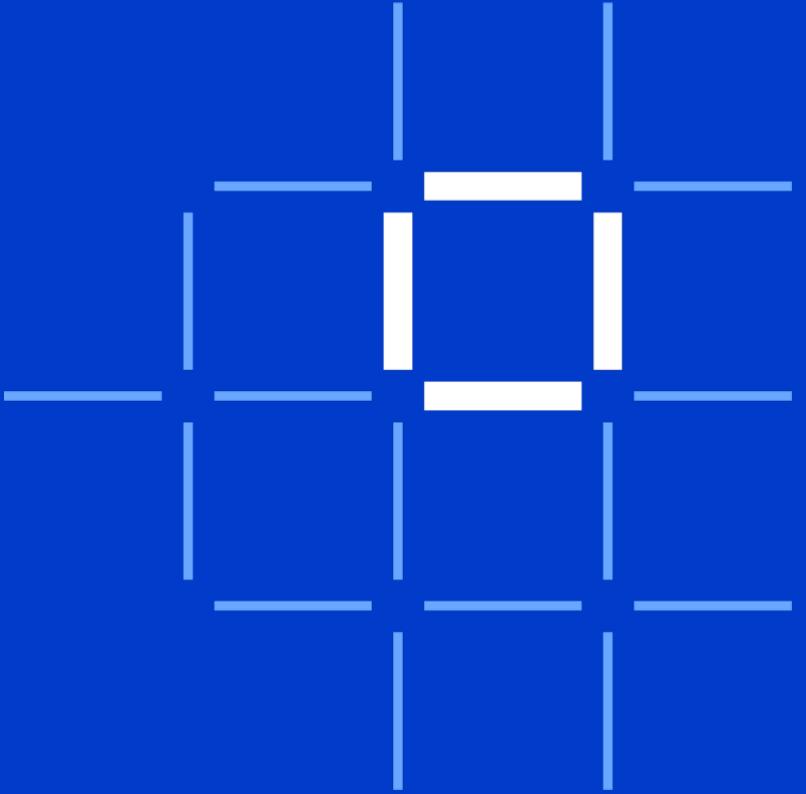
1. Won't consider IBM Blockchain Platform without having some **on-premises** option available
2. Have **data residency restrictions** (data cannot leave the country)
3. Have the requirement to **keep all of their data on-premises** (behind their firewall – some government entities, healthcare)
4. Have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

## Scenarios when to choose IBP for ICP

	Need	IBP for ICP
Functional Requirement	Need a single contained solution/environment Need easy to use UI tooling Need the ability to easily scale my resources up and down	IBP and ICP are both needed ✓ (Q2) ✓
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) Depreciate existing infrastructure investment	Once ICP Cloud Automation Manager is validated ✓

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

# Why IBM Z



# 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

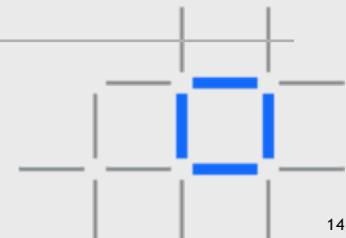
*Operational tools that enable administrators to manage, monitor and govern their nodes across any deployment.*

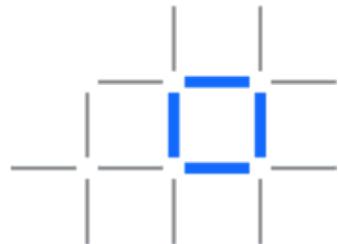
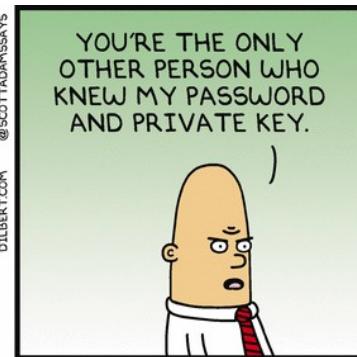
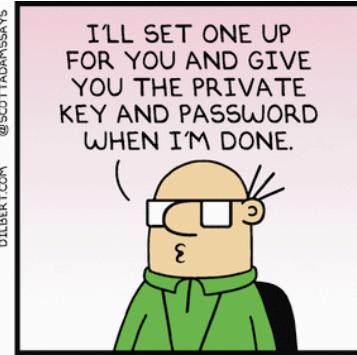
## IBM Cloud Private

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

# IBM Blockchain Platform benefits from Z Security

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



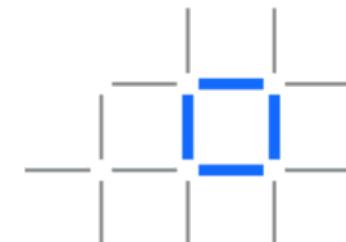


# FIPS 140-2 Level 4 - What is the difference?

IBM Blockchain



Security requirements	FIPS 140-2	Security level 1	Security level 2	Security level 3	Security level 4
<b>Environmental Failure Protection</b> Protection against attacks using extreme voltage or temperature.					✓
<b>Tamper resistance</b> Incl. active and immediate zeroization of plain text secret keys in case of attacks.					✓
<b>Identity-based authentication</b> The operator be individually identified.			✓	✓	
<b>Enhanced protection of secret and private keys</b> Key entry and output only encrypted or in split-knowledge procedure.			✓	✓	
<b>Tamper detection and response</b> Attempts at removal or penetration of the strong enclosure will have a high probability of causing serious damage to the module, i.e., the module will not function.			✓	✓	
<b>Tamper evidence</b> An attack leaves visible traces. The attack may have been successful.		✓	✓	✓	✓
<b>At least one cryptographic algorithm or security function implemented</b>	✓	✓	✓	✓	

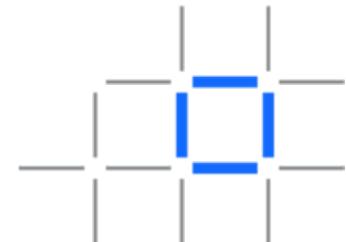


# How we protect our keys – Why FIPS matters?

IBM Blockchain



- **Why risk the protection of the most important part of a blockchain?**
- **How do you access your keys to do transactions?**
- **Keys never in the clear**
- **Domains – more master keys per card**
- **TRNG**



# Keeper of the keys!



**Bitstamp Reminds Users of the \$25 billion Lost Bitcoin to Encourage Strong Security Measures**

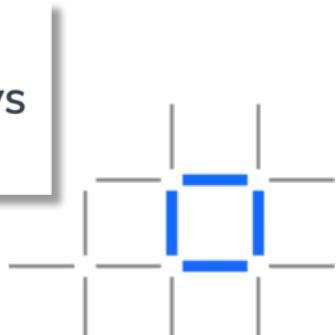


TECH • BITCOIN

## **Bitcoin Worth \$72M Was Stolen in Bitfinex Exchange Hack in Hong Kong**

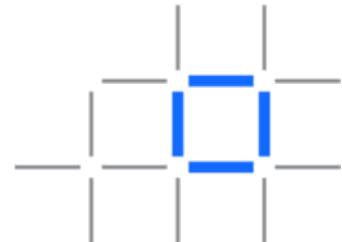
**MAN WHO 'THREW AWAY' BITCOIN HAUL NOW WORTH OVER \$80M WANTS TO DIG UP LANDFILL SITE**

**CEO of Canadian Exchange QuadrigacX Dies With Private Keys to Cold Wallet**



# You're not using bitcoin - Why should you care about key safety with blockchain for business?

**TRUST**  
Hard to build, easy to lose



# 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'

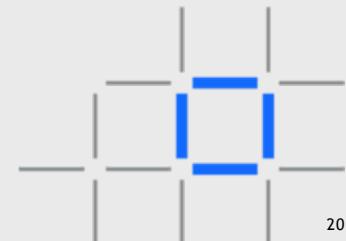


Grow your blockchain network to suit your needs (CPU, Memory, Network)

## Operational efficiency

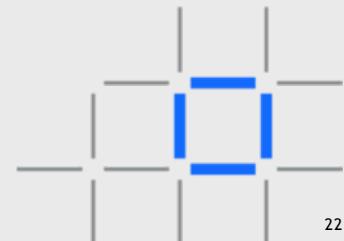


Manage your system efficiently and securely



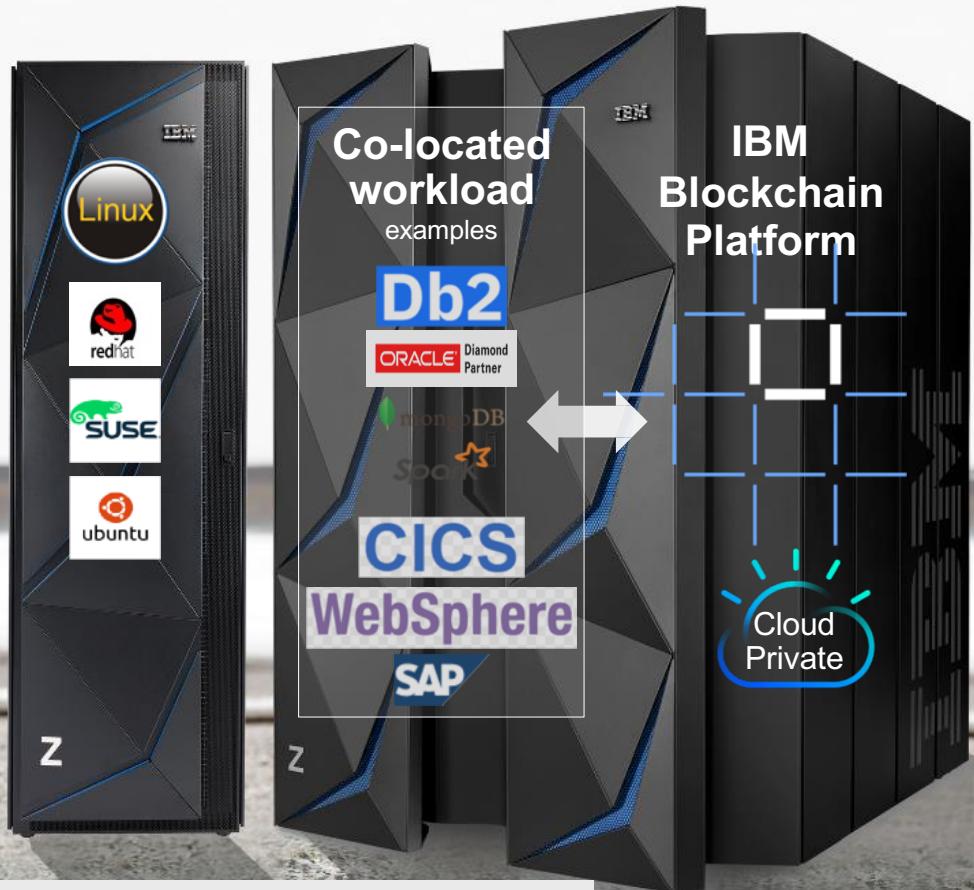
# IBM Blockchain Platform benefits from IBM Z RAS

<b>Extensive self-checking and self-recovery capabilities</b>	Keep your blockchain up and running
<b>Concurrent replace, repair, and upgrade</b>	Make upgrades as needed
<b>Redundant array of independent memory (RAIM) technology</b>	You use blockchain to come to a consensus on which data should be on the ledger, make sure all this work is preserved by protecting data in case of emergency
<b>Near-continuous availability and disaster recovery solutions</b>	Make your blockchain network available to all participants all the time



# IBM Blockchain Platform on IBM Z

All together benefit from IBM Z



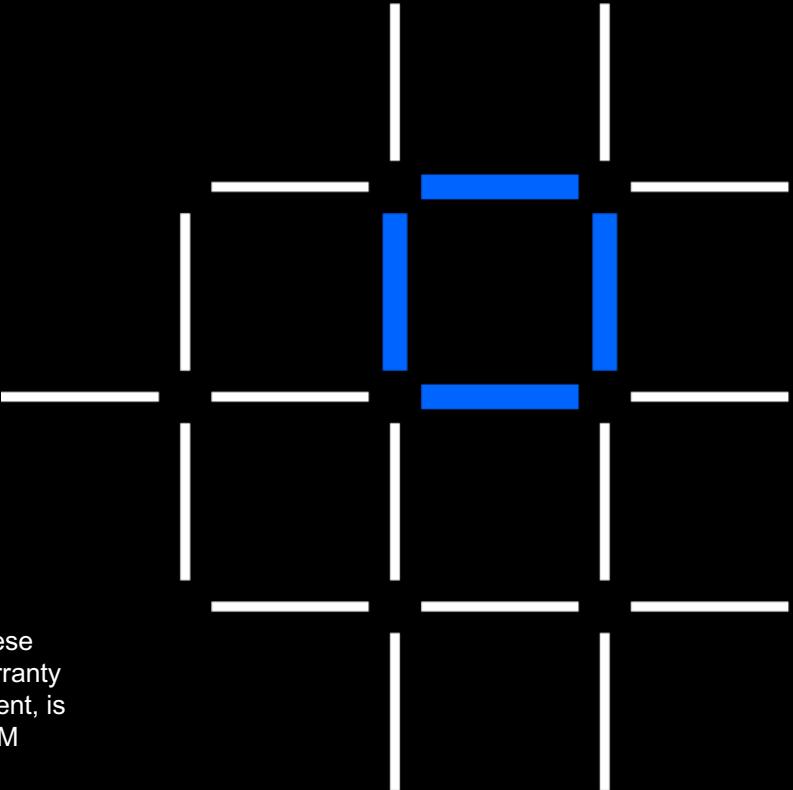
# Thank you

## IBM Blockchain

[www.ibm.com/blockchain](http://www.ibm.com/blockchain)

[developer.ibm.com/blockchain](http://developer.ibm.com/blockchain)

[www.hyperledger.org](http://www.hyperledger.org)



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IBM

