

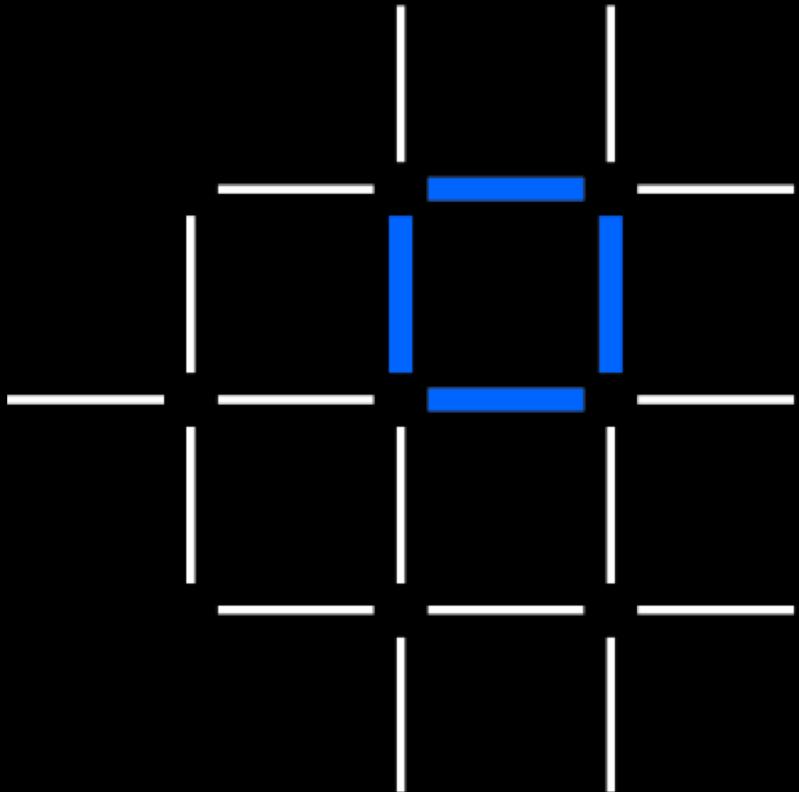
# IBM Blockchain Platform

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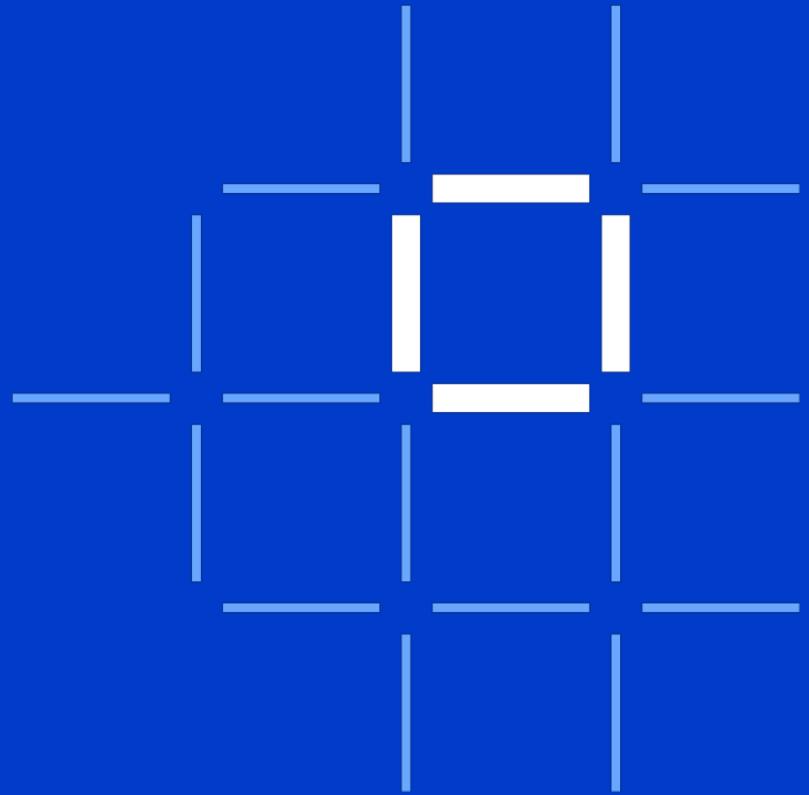
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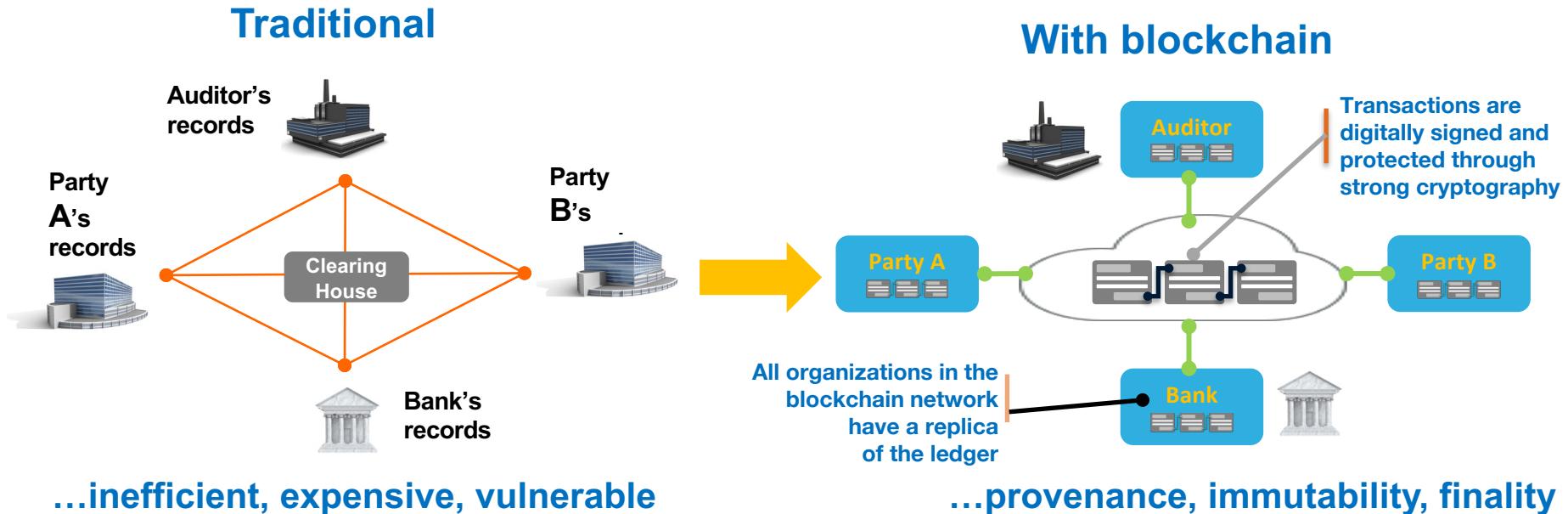
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# Blockchain Primer



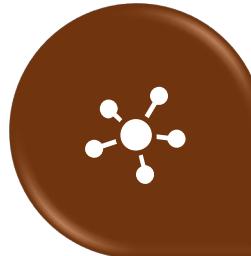
# Blockchain will fundamentally change business processes



# What is blockchain for business based upon

## Shared Ledger

Append-only,  
distributed system of record,  
shared across business  
network



## Smart Contract / chaincode

Business conditions  
embedded in code &  
executed as transactions

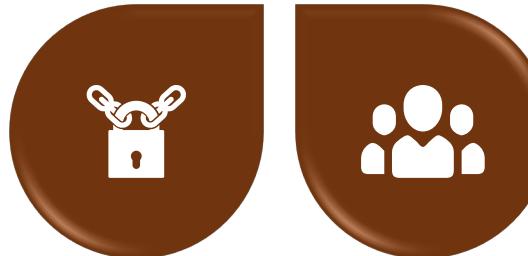
## Privacy

Ensuring appropriate  
visibility; transactions are  
secure, authenticated &  
verifiable



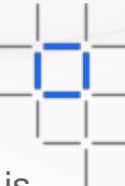
## Consensus

Appropriate parties agree to  
valid transactions



**Broader participation, lower cost, increased efficiency**

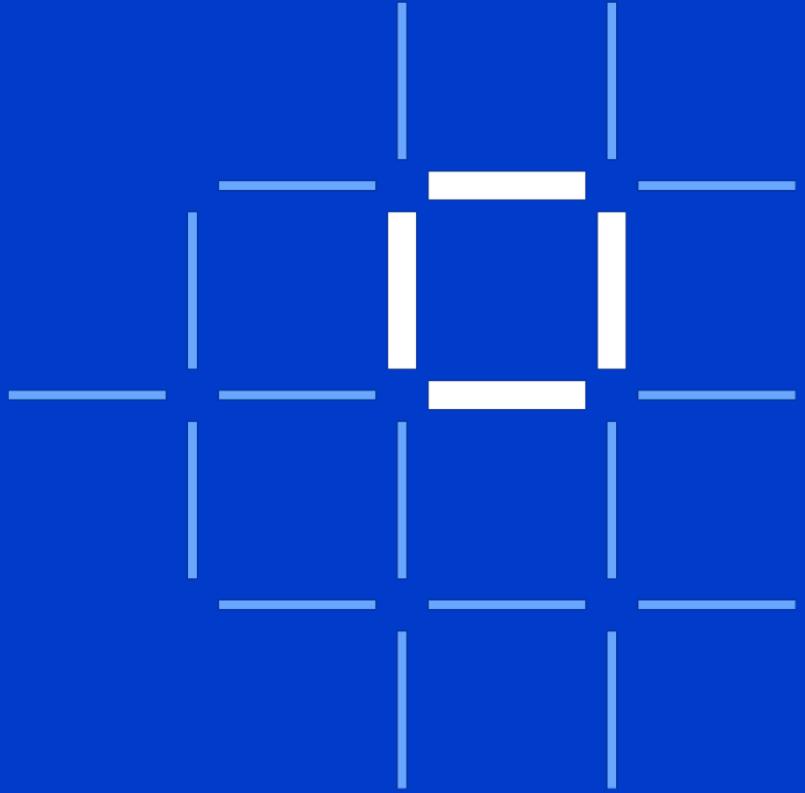
**Blockchain is usually not replacing systems of record (SoR),  
databases or transactional systems, but complementing them.**



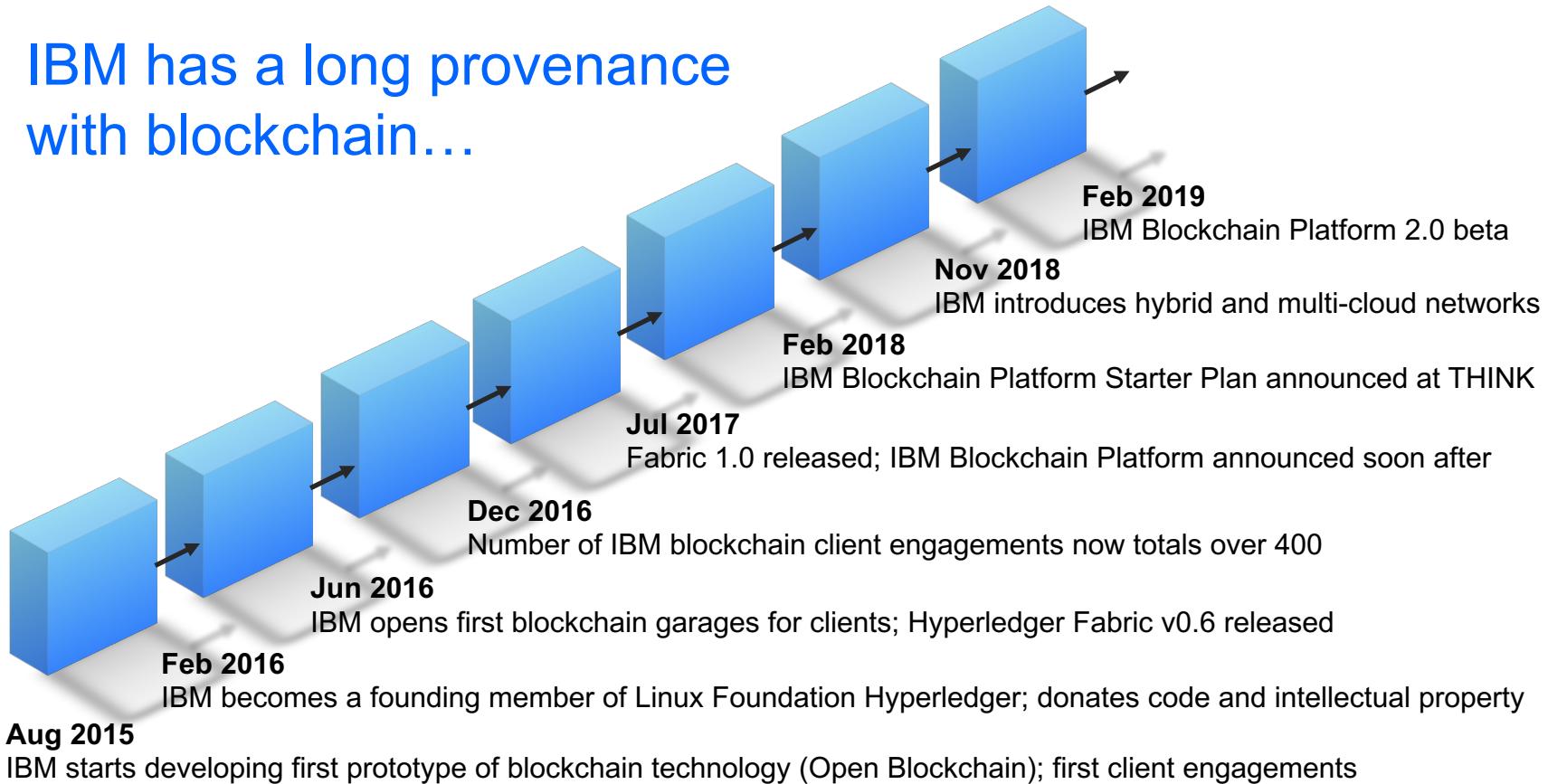
A screenshot of a web browser displaying the Hyperledger Fabric project page. The URL is https://www.hyperledger.org/projects/fabric. The page features the Hyperledger logo and the title "HYPERLEDGER FABRIC". It includes two prominent buttons: "GET THE CODE" and "BUILD YOUR FIRST NETWORK". Below these buttons is a large blue background image showing a network of nodes connected by lines. At the bottom left, there is descriptive text: "Type: DLT, Smart Contract Engine" and "Status: Active". A small video player thumbnail titled "Hyperledger Fabric Explainer" is also visible at the bottom right.

- An implementation of blockchain technology that is a foundation for developing blockchain applications
- Emphasis on ledger, smart contracts, consensus, confidentiality, resiliency and scalability.
- V1.4 released January 2019
  - Long Term Service release with emphasis on production operational and serviceability enhancements
  - New programming model abstractions for ease of development
- IBM is one of the many contributing organizations

# IBM Blockchain Platform



# 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

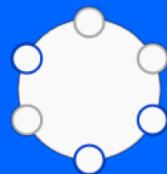
Increasing regulations (e.g. GDPR) and privacy concerns impact how and where data is stored within a blockchain network

## 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

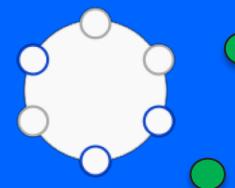
# Blockchain ‘Network’ formation patterns emerging

## ‘Contained’ networks



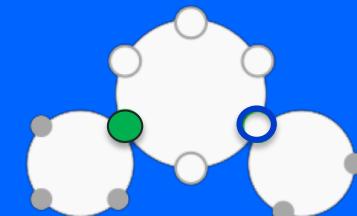
Deployed fully managed networks, often POC/Pilot

## ‘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

# The evolution of the IBM Blockchain Platform

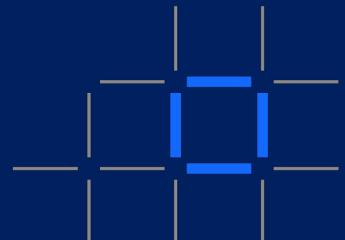
## IBM Blockchain Platform v1

- Starter Plan (SaaS)
- Enterprise Plan (SaaS)
- Enterprise Plus (SaaS)



## IBM Blockchain Platform v2

- IBM Blockchain Platform for Multi-cloud
- IBM Blockchain Platform for IBM Cloud Private
- IBM Blockchain Platform for AWS
- IBM Blockchain Platform 2.0 Beta (SaaS)



# Why IBM Blockchain Platform 2.0?

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

## Build your network faster and easier within a seamless experience

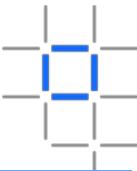
- Smooth integration between smart contract development (VS Code) and network management
- Simplified DevOps allows you easily move from development to test to production from a single console
- Support for writing smart contracts in Javascript, Java, and Go languages

## 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



# 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

## IBM Blockchain Platform 2.0 (beta)

- 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

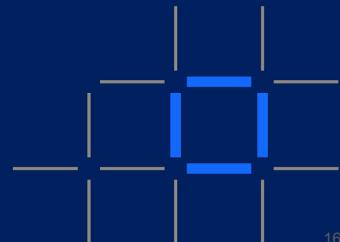
Provision the next generation of hybrid blockchain networks



The easiest way to get started

# IBM Blockchain Platform 2.0 capabilities checklist

- ✓ Easily create smart contracts and client applications using VSCode
- ✓ Console UI to create, manage and grow hybrid multi-cloud networks
- ✓ Customer is custodian of all private keys and certificates
- ✓ Support for rolling migrations
- ✓ Support for single and multi-zone HA
- ✓ 99.995% availability
- ✓ Integration with IBM Logging Service
- ✓ Integration with IBM Operational Metrics Service
- ✓ Governance using IBM Blockchain Platform Console UI
- ✓ Easy migration and management across dev, test and prod environments
- ✓ Support for advanced features such as: Service Discovery, Gossip and Private Data Collections
- ✓ Beta based on Fabric 1.4 LTS



## IBM Blockchain Platform for IBM Cloud Private

- Deploy a distributed peer or the entire network to an environment of your choice
  - Supports **data residency, regulation and compliance** requirements
  - Currently includes single instances of orderers
- IBM Blockchain Platform distributed peers on IBM Cloud Private (ICP) leverage the ordering service and certificate authorities running on IBM Cloud
- Pricing is Virtual Processor Core (VPC) based
- Free-of-charge Community Edition version available for evaluation, includes forum based support.
- 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](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](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



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 AWS

- Deploy a distributed peer in 10-15 minutes using AWS quick start templates
  - Supports **data residency, regulation and compliance** requirements
- Distributed peers on 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 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

# Evolving our platform to provide all the flexibility needed to build, deploy, govern and grow networks

IBM Blockchain



## IBM Blockchain Platform

### One Platform Experience

Cost varies

In an effort to simplify our offerings, all IBM plans will be consolidated into a single IBM Blockchain Platform offering, which customers can deploy on an environment of their choice as well as customize key features.

- IBM Blockchain Platform
- Ordering Service
- Certificate Authority
- Peer
- IBM Cloud Deployment
- Choice of Deployment



## SaaS

### Full Network

Deployed on IBM Cloud



For customers without specific deployment requirements, our IBM offering deployed on the IBM Cloud.

**Use:** Dev/Test and Production  
**Infrastructure:** Pre-defined by IBM Cloud  
**Configuration:** Default with optionality  
**Software lifecycle:** IBM

## Software - Multi Cloud

### Distributed Peer

Peers Deployed on customer's choice of environment



For customers who require greater deployment flexibility. They can deploy peers on an environment of their choice, while deploying other components on the IBM Cloud.

**Use:** Dev/test and production  
**Infrastructure:** on-premises, AWS  
**IBP Infrastructure:** IBM Cloud with custom options  
**Configuration:** Default with optionality  
**Software lifecycle:** IBM manages IBP & associated components, customer manages the Peer

### Full Network

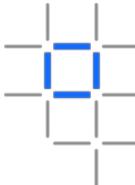
IBP & Components Deployed on customer's choice of environment



For customers who require the solution to run entirely on their infrastructure. They can license the full IBM Blockchain Platform with each of the components.

**Use:** Dev/test and production  
**Infrastructure:** customer-owned & managed  
**Configuration:** customer-managed  
**Software lifecycle:** customer-managed (compatibility guidelines apply)

# One product... Multiple Deployment Patterns



	SaaS + Distributed Peer	Full Fabric Network on ICP
Scope	Running a peer in a non-IBM Cloud environment that can connect back to an IBP network	Enables you to run Hyperledger Fabric components: the <b>Ordering Service, Certificate Authority and Peer on Kubernetes</b> through the deployment of Helm Charts for these components.  <i>This is not a 'production' suitable environment yet as it only has SOLO - updates will be included with UI release</i>
Component	Peer	Peer Ordering Service (Solo) CA (Single)
Infrastructure	IBM Cloud Private (Linux 64-bit & IBM Z/LinuxONE), AWS	

## IBP for ICP is 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)

## However, If you are:

- Exploring blockchain technology for your business
  - A developer looking to learn how to develop smart contracts, and govern networks
- > IBM Blockchain Platform Starter plan is our recommended product. An easy-to-use UI to reduce network administration and governance time for pilot evaluation or pre-production POCs.

## 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	✓ (Q1)
	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	✓

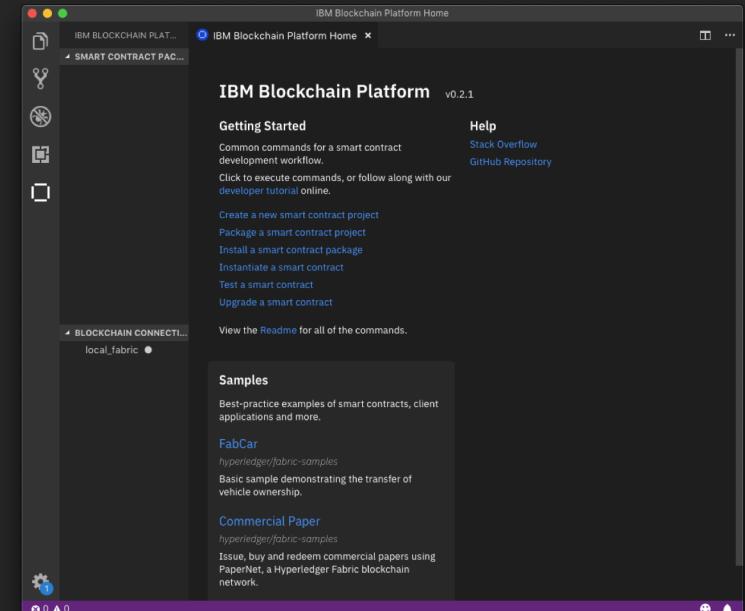
Legend	Does not address	Depends/Future	Enabled
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# IBM Blockchain Platform VSCode Extension

- 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

# Welcome to the new IBM Blockchain Platform Developer Experience!

The latest versions of the IBM Blockchain Platform and Hyperledger Fabric hail a new era of capabilities that bring simplicity, speed, and value to the blockchain developer community.

## Hyperledger Fabric Features and Updates

**Now Available in Fabric 1.4:**

### A simple SDK for smart contract and application development

- [FAB-11246](#) allows developers to focus on the smart contract logic that describes their business transactions.
- [FABN-692](#) delivers a new high-level API that cuts the amount of application code required to invoke a smart contract by 90%.
- [FAB-12071](#) enables developers to seamlessly discover and exploit ever-changing networks without application change, making them more responsive and easier to scale.



## IBM Blockchain Platform Developer Tools

**Now Available:**

### IBM Blockchain Platform IDE

- The IBM Blockchain Platform VSCode Extension enables you to discover, code, test, debug, package, deploy, and publish smart contracts and applications using a single tool.



## Hyperledger Fabric and IBM Blockchain Platform Samples & Tutorials

**Now Available:**

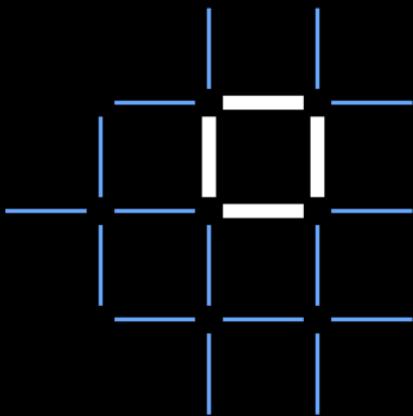
### Hyperledger Fabric Samples

- Fabcar
- Commercial Paper

## IBM Blockchain Platform Tutorials and Patterns

- Commercial paper with the IBM Blockchain VSCode extension
- Smart contract with the IBM Blockchain Platform VSCode extension
- Global finance blockchain application VS Code extension

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

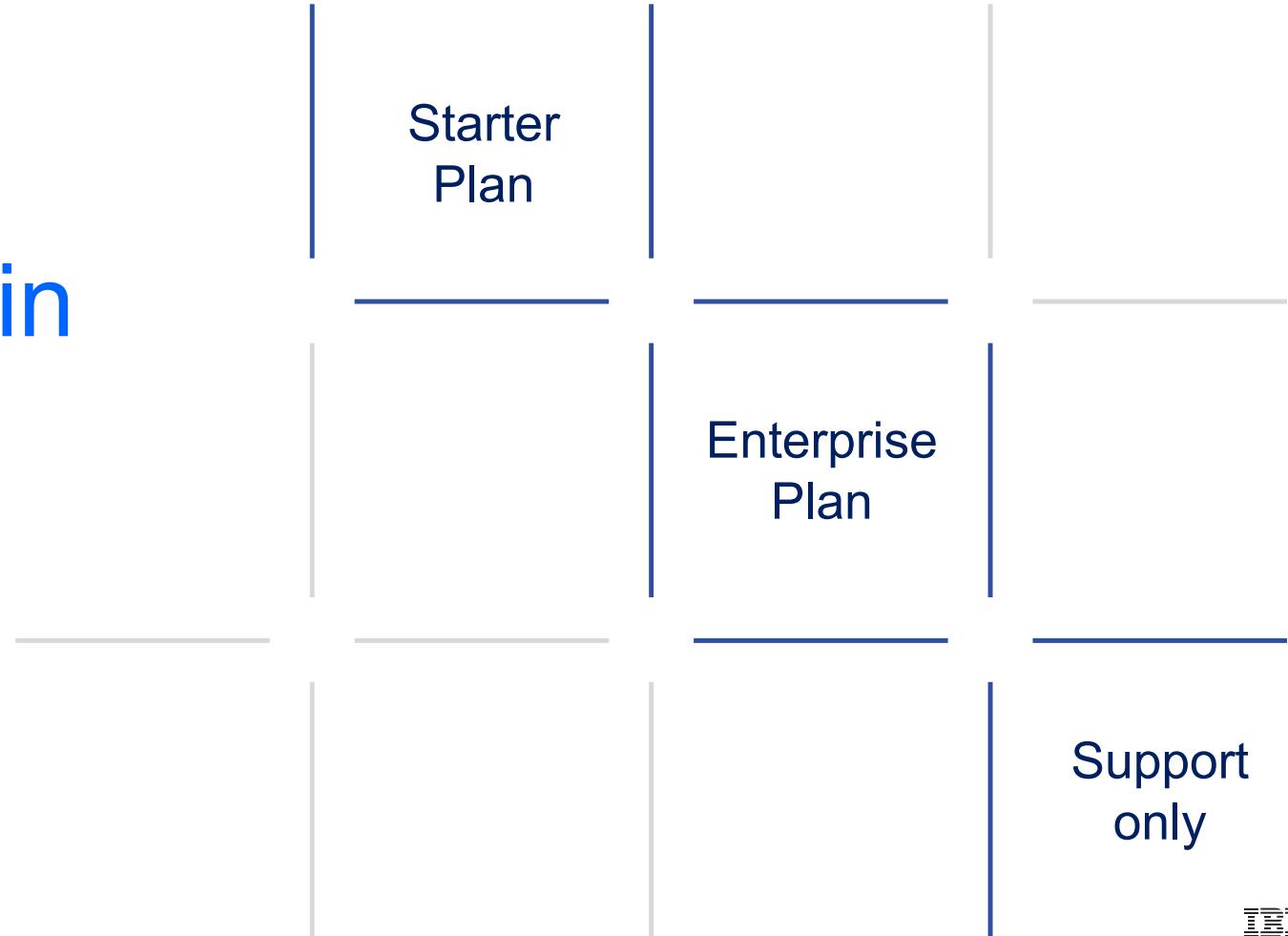
IBM hosts it for you through its  
IBM Cloud services



IBM Blockchain  
Platform 2.0 (SaaS)

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

# Existing IBM Blockchain Platform offerings



# IBM Blockchain Platform Starter Plan

- Get started with IBM Blockchain Platform with **one-click setup and a fully functional network**
  - One-click network configuration, code samples and support for Hyperledger Fabric 1.2.1
  - Environment enables iterative development prior to production deployment
  - Same experience as Enterprise
    - Uses SOLO ordering for simplified configuration, development and testing
- **Monthly charge of \$500** for two peers
  - \$250 membership fee per month, plus \$125 per peer
- Sign up at: [www.ibm.com/blockchain](http://www.ibm.com/blockchain)

## IBM Managed

IBM hosts it for you through its IBM Cloud services



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

# IBM Blockchain Platform Enterprise Plan

- Everything in Starter, plus everything you need for a **full production** environment:
  - Fault-tolerant ordering service, added layers of security and premium support
  - Compliance certification: ISO27001, GDPR (coming soon), SOC 2 Type 2 (coming soon)
  - Single-zone HA/DR
- Monthly cost starts at **US\$3000 per organization per network**
  - Assumes two peers for high availability (\$1000 per peer plus \$1000 membership fee)
  - Includes basic blockchain support only; support for services on IBM Cloud is an additional 10%
  - Certificate authorities and access to the ordering service is not chargeable

## IBM Managed

IBM hosts it for you through its IBM Cloud services



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

# IBM Blockchain Platform: IBM Provisioned Offerings

IBM Blockchain

Hyperledger Fabric Only



## Docker Images

No cost

Support for cost

For clients who do not wish to purchase the IBM Blockchain Platform, we offer IBM signed and certified Docker images allowing clients to build directly on top of Hyperledger Fabric.

IBM Blockchain Platform\*



## Starter

\$250 / month Network Fee – D1XFHLL

Plus \$125 / month per peer deployed – D1XFILL

Get started in development and pre-production with a one-click setup of the IBM Blockchain Platform. Includes a fully functional kick starter network, sample applications and informational tutorials.



## Enterprise

\$1000 / month Network Fee – D1V2RLL

Plus \$1000 / month per peer deployed – D1V2SLL

Get all the features of starter plan, plus everything you need for a full production environment; including HSM availability, fault tolerant ordering service, added layers of security and premium support.



## Enterprise Plus\*\*

Custom Pricing

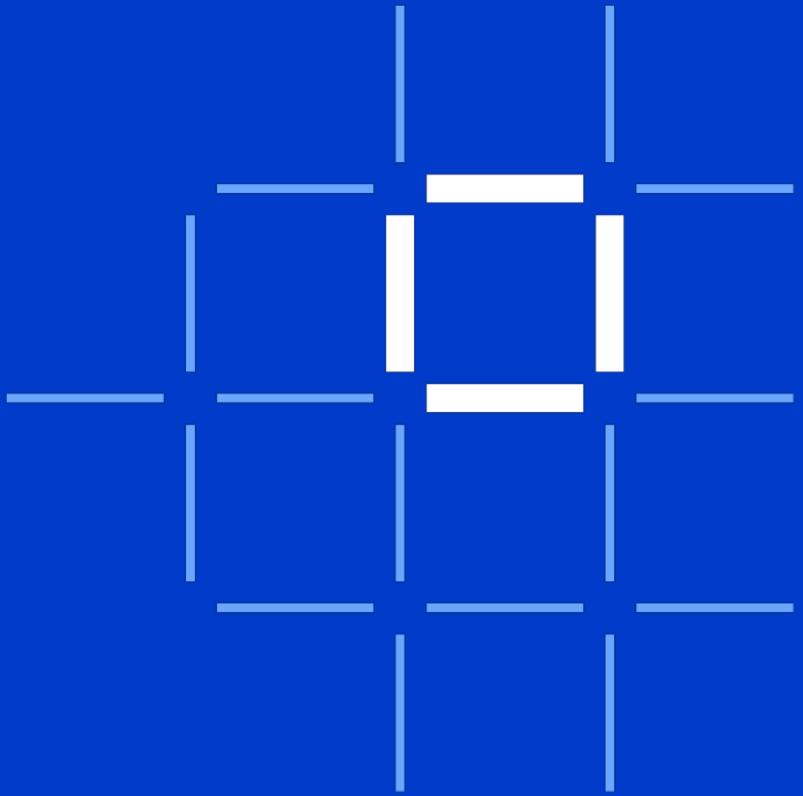
Limited Availability

Get all the features of Enterprise plan, plus the highest performance, isolation and scalability for the most demanding production workloads in regulated industries.

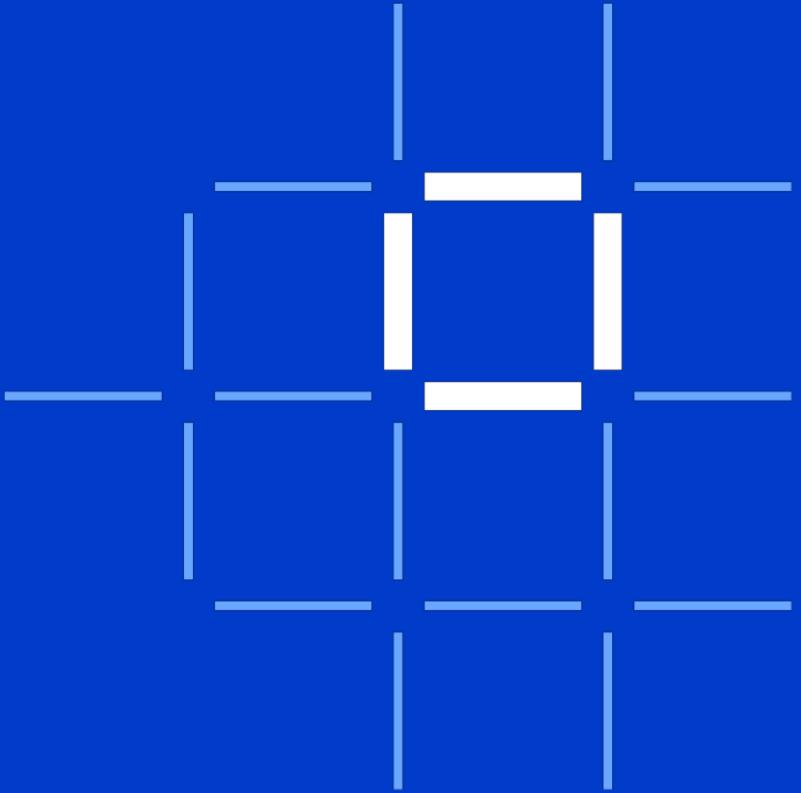
\*with some exceptions, IBM Blockchain Platform can only be deployed on the IBM Cloud

\*\*Enterprise Plus plan is being merged with Enterprise Plan

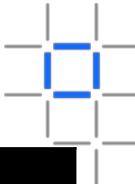
# Demo



# Offering Roadmap

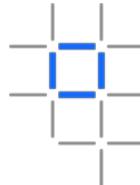


# Offering components



	GA IBP for ICP setup	Closed Beta Operational & Governance Tools	Open Beta Developer Tools
Description	Set up Fabric components as Helm Charts	<p>Operational tools that make network management easier; connecting, deploying and managing blockchain peers</p> <p>Governance tools that simplify the management of the business network, including: Activating, customizing and changing networks (inviting new members/participants etc), implementation of policies that control how channels (subset of networks) get updated and simplifying the implementation of rules that authorize network updates</p>	<p>Enables you to quickly build your blockchain application including tutorials, a simplified programming model, and an extension to:</p> <ol style="list-style-type: none"><li>1) Write, test, and debug your smart contract</li><li>2) Test sample applications</li><li>3) Seamlessly deploy smart contracts into a production-ready blockchain environment</li></ol>
Offering	IBP for ICP	UI for IBP for ICP	IBP VS Code Extension
Available in first release	Yes	No	No
Screens	<ul style="list-style-type: none"><li>• ICP Catalog UI</li><li>• IBP Helm Chart UI</li><li>• ICP additional capabilities; monitoring, logging</li></ul>	<ul style="list-style-type: none"><li>• Capabilities</li><li>• Flows of key features (i.e. add peer to channel)</li></ul>	<ul style="list-style-type: none"><li>• Azure discovery</li><li>• Install steps</li><li>• Editor/Explorer</li></ul>

# IBM Blockchain Platform “anywhere” roadmap



IBM Blockchain Platform for	Offering Roadmap				
	Distributed Peer	Full Pilot/Dev Fabric Network	Full Production Fabric Network & UI <i>[CFT OS support]</i>	Deployment to SSC4ICP (Secure Service Container)	HSM Integration
IBM Cloud Private*	Q4	Q4	Q1/Q2 2019	Q1 2019	1H 2019
Mainframe/Z Unique Features					

\*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 LinuxONE

*Same experience to 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*

## Coming Soon:

*User Interface similar to IBP2.0*

*One User Interface - multiple platforms*

## Modern Development

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

*Helm charts to ease deployments*

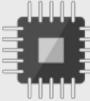
## Tooling

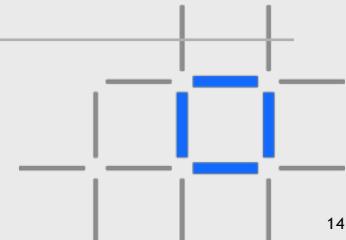
*Operational tools that enable administrators to manage, monitor and govern their nodes across any deployment.*

## IBM Cloud Private

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

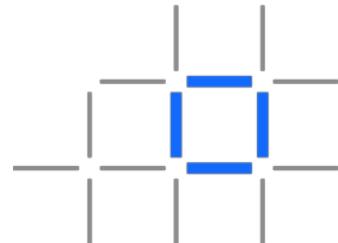
# IBM Blockchain Platform benefits from Z Security

<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



# Why is encryption so important in Blockchain?

IBM Blockchain



# Keeper of the keys!

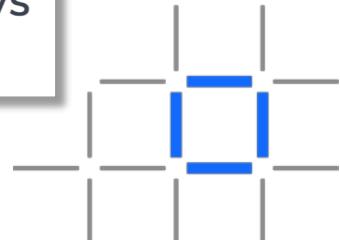


TECH • BITCOIN

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

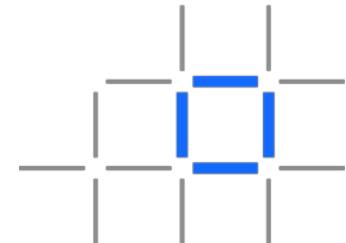
MAN WHO 'THREW AWAY' BITCOIN HAUL NOW WORTH OVER \$80M WANTS TO DIG UP LANDFILL SITE

### 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

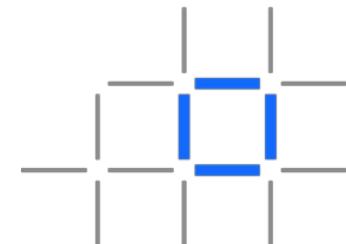


# How we protect our keys – Why FIPS matters?

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**

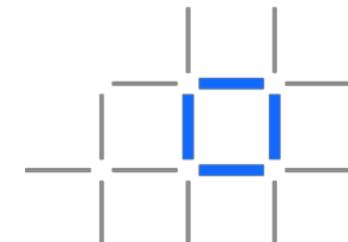


# FIPS 140-2 Level 4 - What is the difference?

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>	✓	✓	✓	✓	✓



# 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'

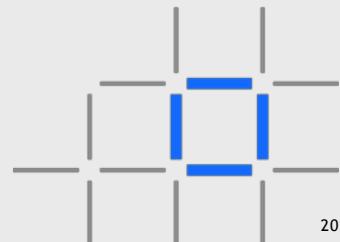


Grow your blockchain network to suit your needs (CPU, Memory, Network)

## Operational efficiency

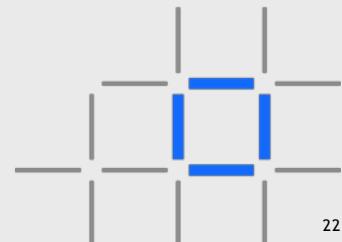


Manage your system efficiently and securely



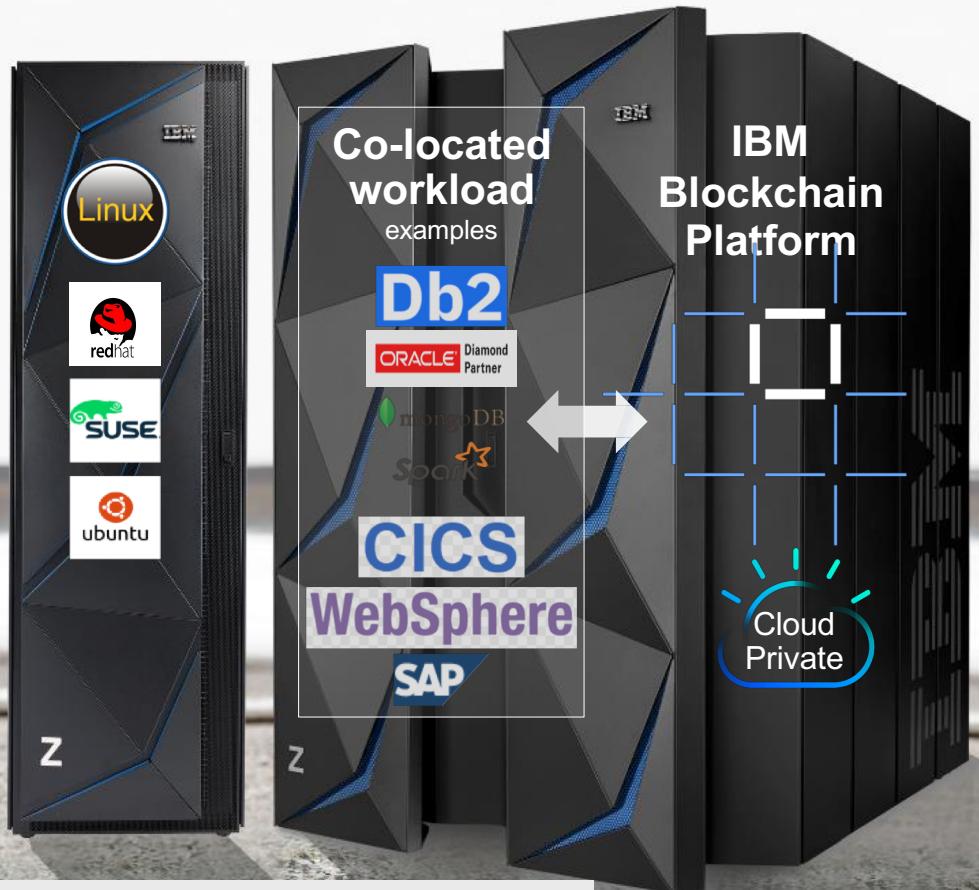
# IBM Blockchain Platform benefits from IBM Z RAS

<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



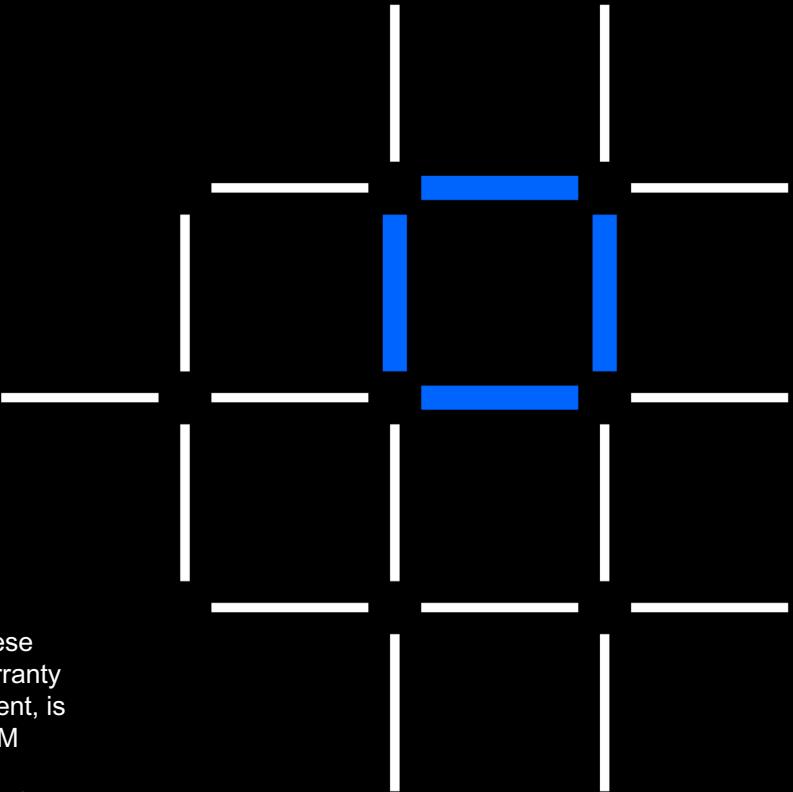
# Thank you

## IBM Blockchain

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

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



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