IBM Blockchain Platform and LinuxONE

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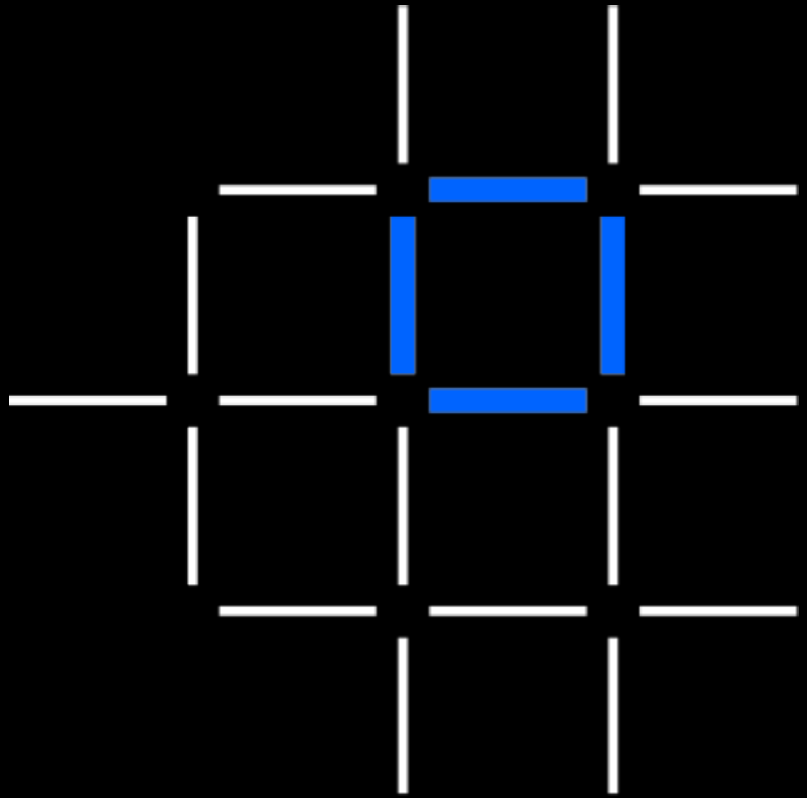
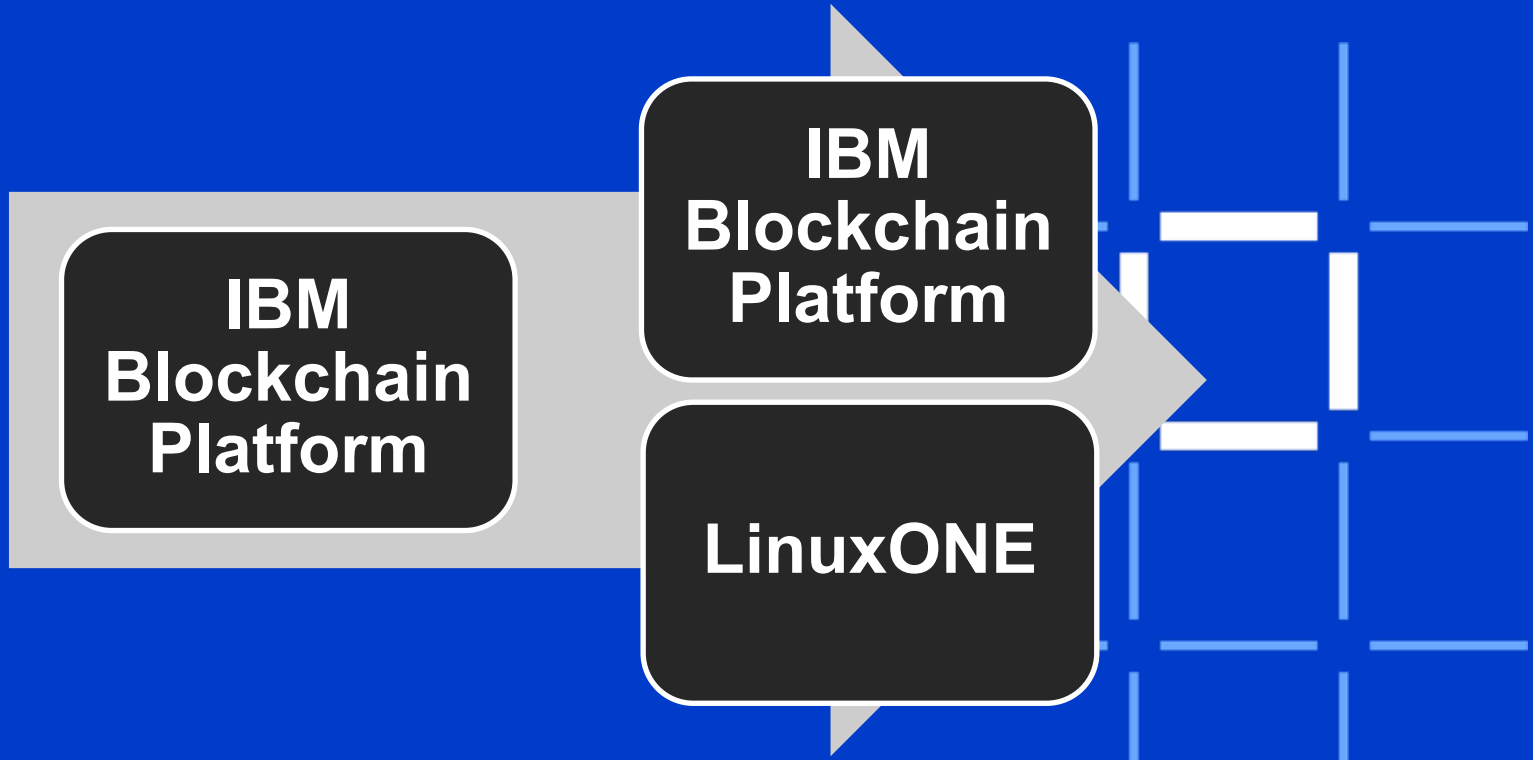
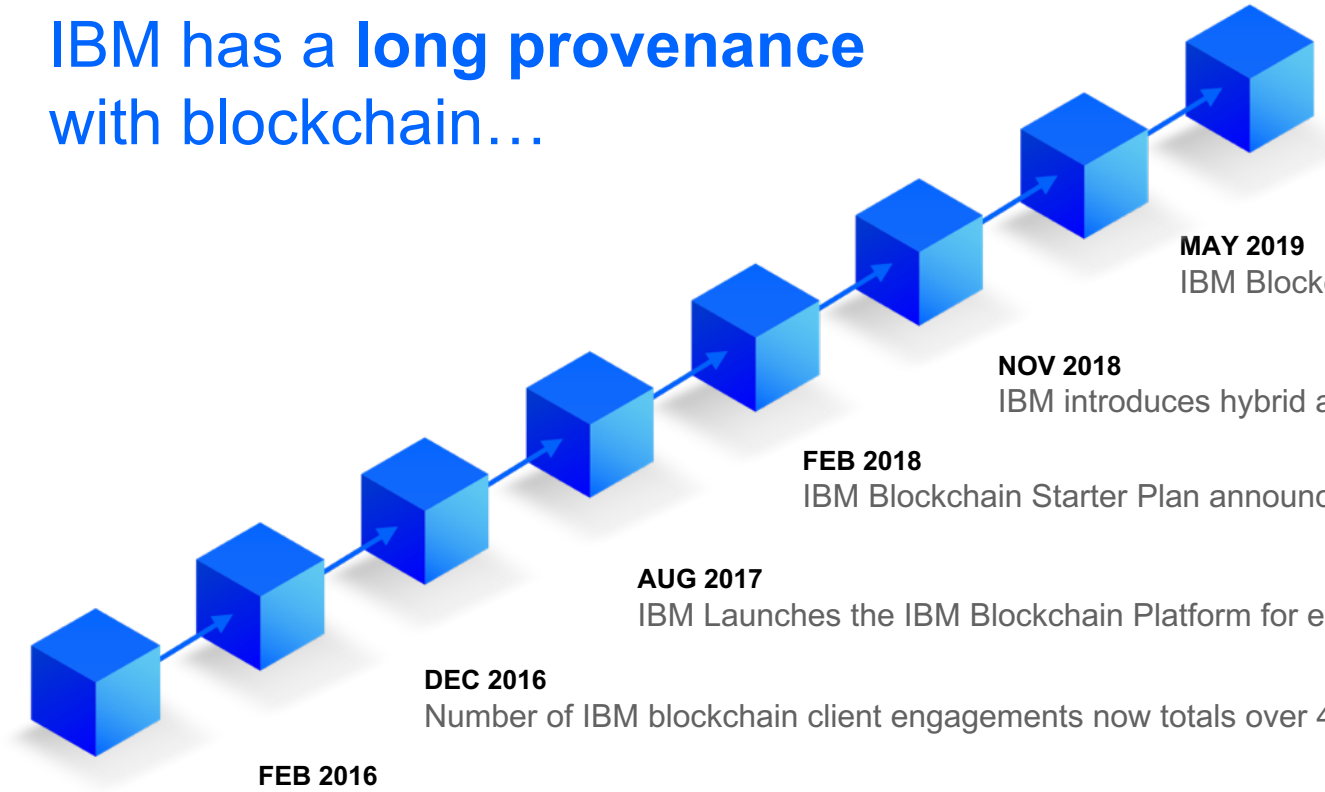



IBM Blockchain Platform
IBM Blockchain Platform
LinuxONE

IBM has a **long provenance** with blockchain…



JUNE 2019
IBM Blockchain Platform for Multicloud released

MAY 2019
IBM Blockchain Platform for IBM Cloud released

NOV 2018
IBM introduces hybrid and multi-cloud networks

FEB 2018
IBM Blockchain Starter Plan announced at THINK

AUG 2017
IBM Launches the IBM Blockchain Platform for enterprise use cases

DEC 2016
Number of IBM blockchain client engagements now totals over 400

FEB 2016
IBM becomes a founding member of Linux Foundation Hyperledger; donates code and intellectual property

AUG 2015
IBM starts developing first prototype of blockchain technology (Open Blockchain); first client engagements

IBM Blockchain Platform is a key part of IBM's **Blockchain Strategy**

Services

Collaborate with services teams from ideation all the way to production

Ecosystem

Tap into our diverse ecosystem to develop strategic partnerships and create your competitive advantage

Solutions

Solve critical industry challenges by building and joining new business networks and applications

IBM **Blockchain Platform**

Build and operate blockchain networks in heterogeneous environments

HYPERLEDGER

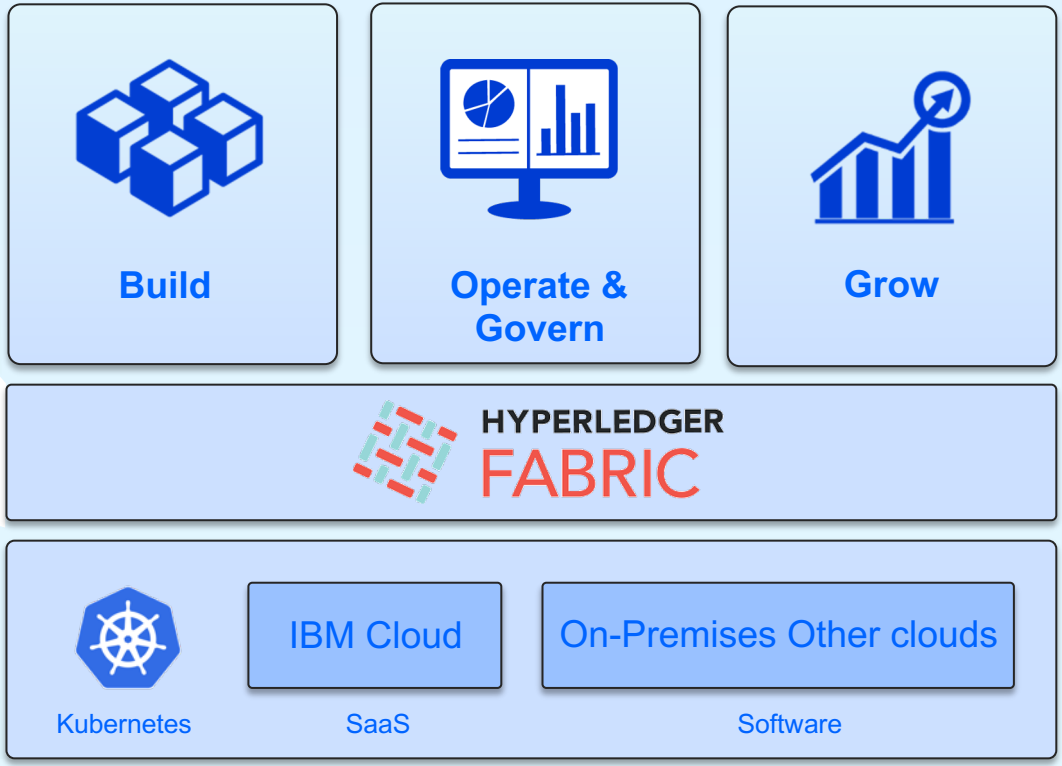
A founding, premier member of Hyperledger, IBM is committed to open source, standards & governance

IBM Blockchain Platform

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

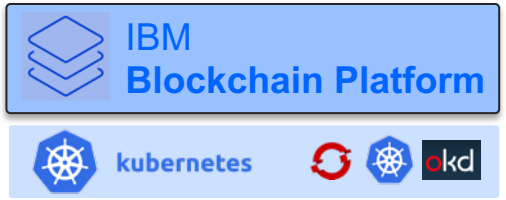
Open technology
uses the popular Hyperledger Fabric distributed ledger

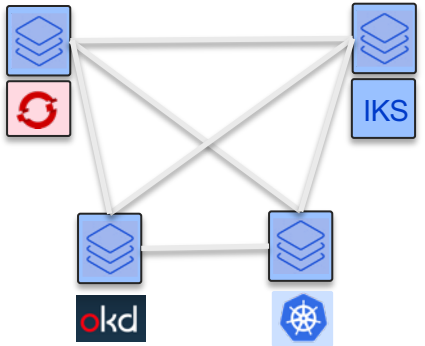
Deploy anywhere
fully managed, or flexible deployment on-premises or on other cloud vendors



IBM Blockchain Platform: **Deploy anywhere**

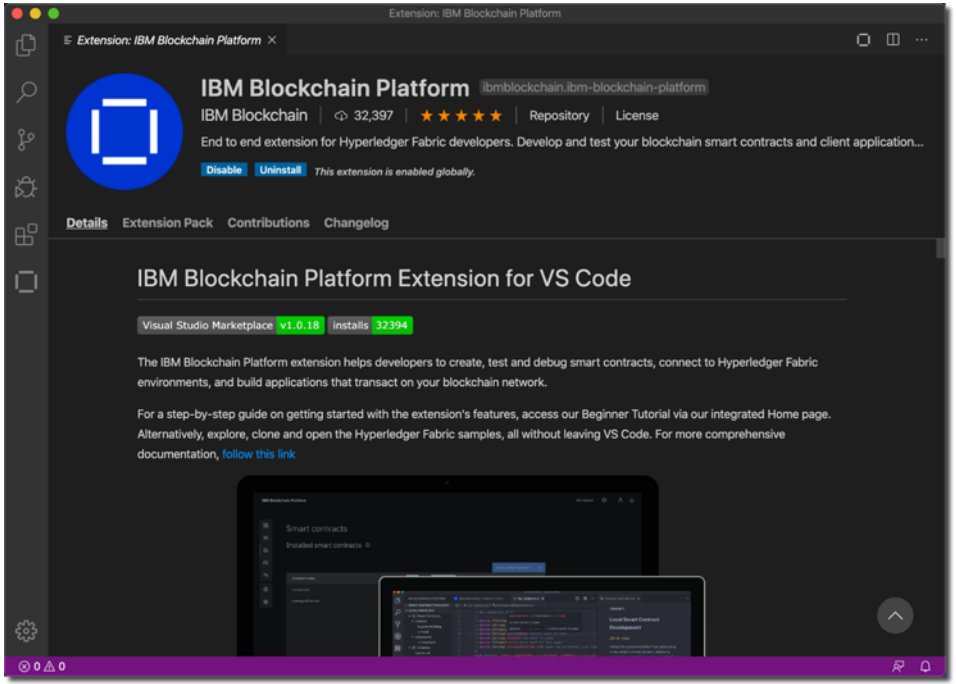
- IBM Blockchain Platform can be deployed wherever you want
  - **IBM Cloud** for an IBM-managed service, using IBM Kubernetes Service
  - **On-premises** or in **other cloud providers** for greater deployment flexibility, using any Kubernetes v1.11+ environment (e.g. RH OpenShift, OKD, AKS, Rancher)
- **Fully heterogeneous**: different components can be deployed in different environments
- Caters for different vendor biases in the business network and **avoids lock-in**





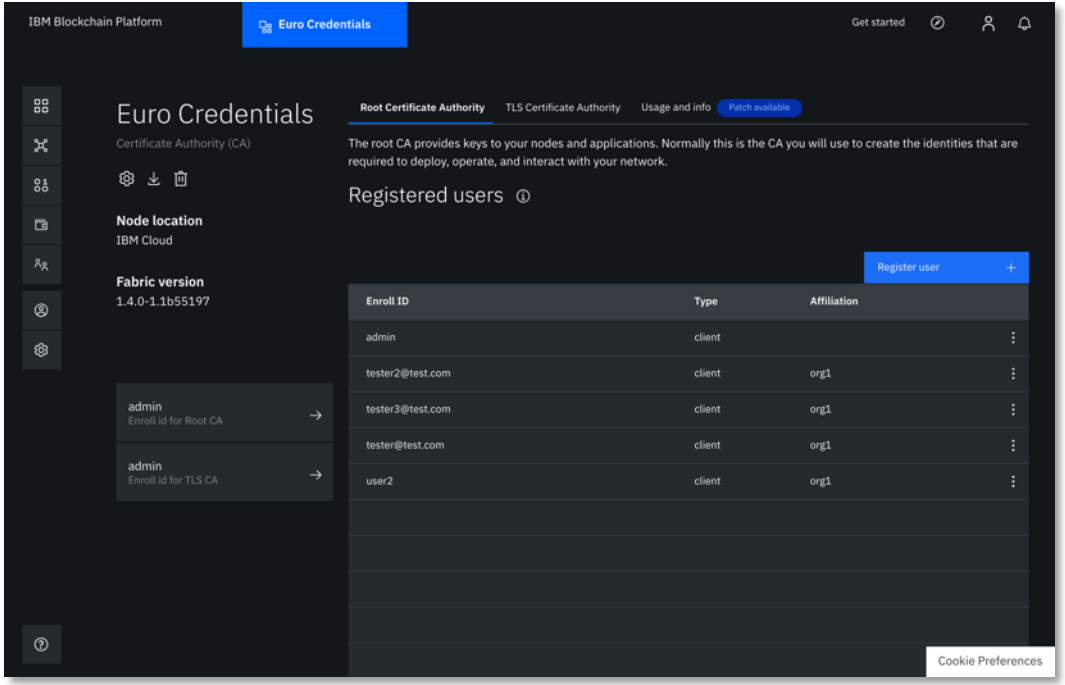
IBM Blockchain Platform's advanced tooling: **Build**

- Comprehensive developer tools for smart contracts and client applications, based on the popular **Visual Studio Code** environment
- Broad range of industry code samples and tutorials; smart contracts in JavaScript, TypeScript, Java and Go
- **Simplified DevOps** allows you easily move from development to test to production from a single console

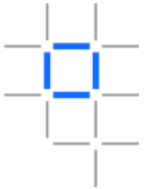


IBM Blockchain Platform's advanced tooling: **Operate**

- Maintain **complete control** of your blockchain: govern and operate ledgers, channels, identities and other assets in one intuitive console
- Deploy only the blockchain components you need and manage them - wherever they are hosted
- Support for **highly available** environments and **disaster recovery** scenarios



IBM Blockchain Platform has **affordable pricing** that scales with your network



- Get what you need and **only pay for what you use**
- **Pay less** per CPU-hour as your network grows
- **Customize** your components and compute allocation to fit your use-case and budget with **no fixed membership fees!**

Pricing options** (1 VPC = 1 CPU = 1 vCPU)	Test Network	Join a Network
CPU allocation	1.65 vCPU Includes: - 1 peer (1.1 vCPU) - 2 CAs (0.1 vCPU x 2) - 1 ordering node (0.35 vCPU)	4.5 vCPU Includes: - 2 peers (for HA) **(2x default compute = 2 x 1.1 x 2)** - 1 CA (0.1)
Hourly cost: IBM Blockchain Platform	$0.48 USD (1.65 vCPU x $0.29 USD/VPC-hr)	$1.31 USD (4.5 vCPUx $0.29 USD/VPC-hr)
Hourly cost: IBM Cloud Kubernetes cluster	$0.27 USD (Compute: 4 x 16 lowest tier; 1 worker node; 1 zone) (IP Allocation: $16 USD/month)	$0.46 USD (Compute: 8 x 32 lowest tier; 1 worker node; 1 zone) (IP Allocation: $16 USD/month)
Hourly cost: Storage	$0.07 USD 340GB Bronze 2 IOPS/GB	$0.13 USD 420GB Silver 4 IOPS/GB
Total hourly cost	**$0.82 USD**	**$1.90 USD**

https://cloud.ibm.com/docs/blockchain?topic=blockchain-ibp-saas-pricing

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

Self—Managed

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

OPENSHIFT

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

OPENSHIFT

aws

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 Cloud

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

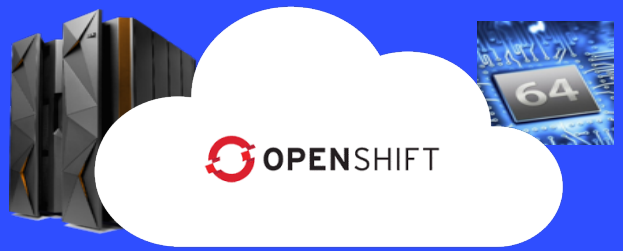
IBM Blockchain Platform for Multicloud

- 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

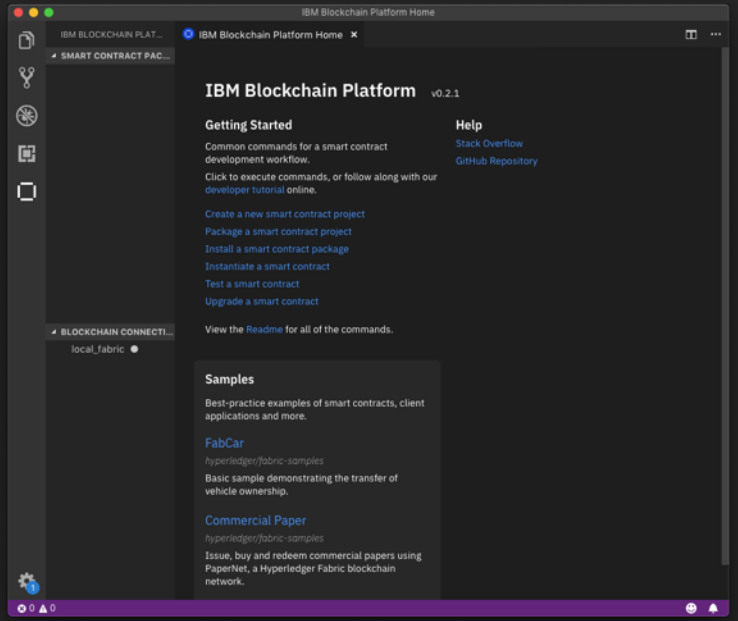
The easiest way to get started

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

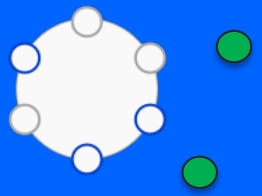
Recruit consortia members who also need deployment flexibility and on-prem capabilities

Blockchain ‘Network’ formation patterns emerging

‘Contained’ networks

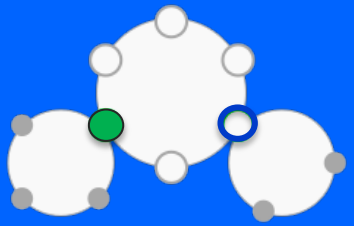
Deployed fully managed networks, often POC/Pilot

‘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

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)

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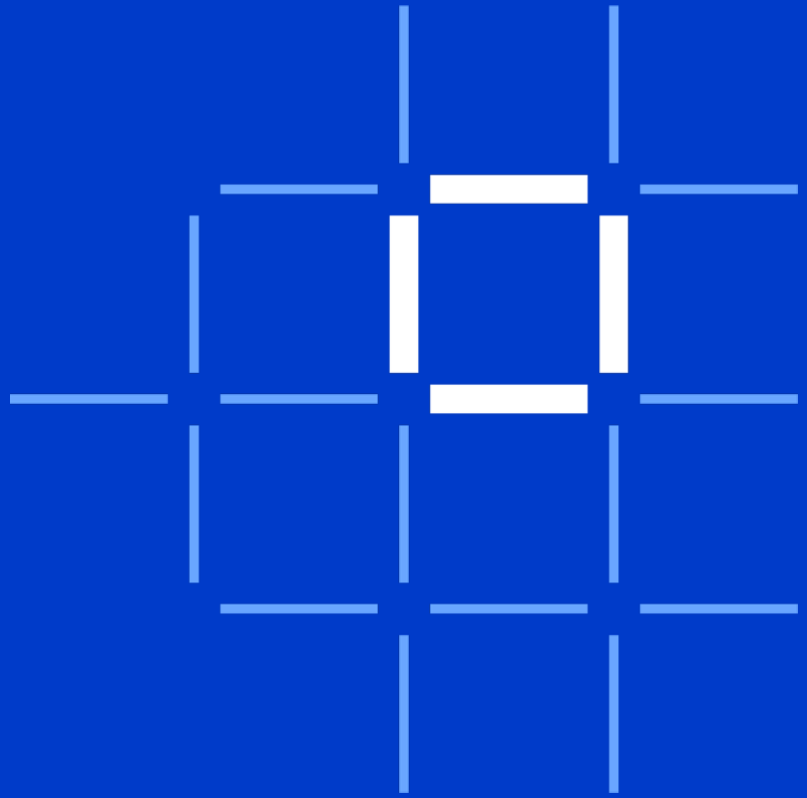
Why IBM LinuxONE



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

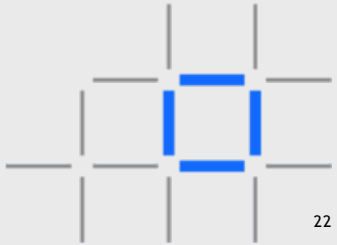
***Operational tools** that enable administrators to manage, monitor and govern their nodes across any deployment.*

IBM Cloud Private

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

IBM Blockchain Platform benefits from LinuxONE RAS

Extensive self-checking and self-recovery capabilities	Keep your blockchain up and running
Concurrent replace, repair, and upgrade	Make upgrades as needed
Redundant array of independent memory (RAIM) technology	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
Near-continuous availability and disaster recovery solutions	Make your blockchain network available to all participants all the time



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IBM Blockchain Platform benefits from LinuxONE 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 1st 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

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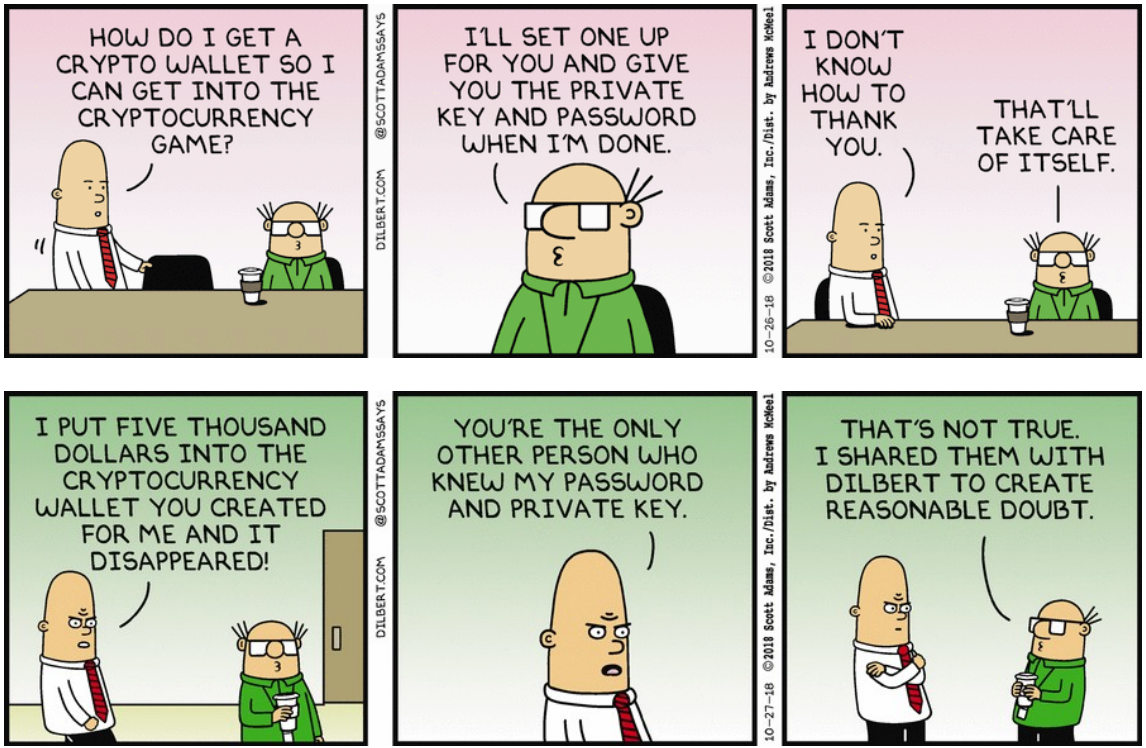

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FIPS 140-2 Level 4 – What is the difference?

Security requirements	FIPS 140-2	Security level 1	Security level 2	Security level 3	Security level 4
	Environmental Failure Protection Protection against attacks using extreme voltage or temperature.	—	—	—	✓
	Tamper resistance Incl. active and immediate zeroization of plain text secret keys in case of attacks.	—	—	—	✓
	Identity-based authentication The operator be individually identified.	—	—	✓	✓
	Enhanced protection of secret and private keys Key entry and output only encrypted or in split-knowledge procedure.	—	—	✓	✓
	Tamper detection and response 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.	—	—	✓	✓
	Tamper evidence An attack leaves visible traces. The attack may have been successful.	—	✓	✓	✓
	At least one cryptographic algorithm or security function implemented	✓	✓	✓	✓

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How we protect our keys – Why FIPS matters?

- 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

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Keeper of the keys!

TECH • BITCOIN

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

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

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

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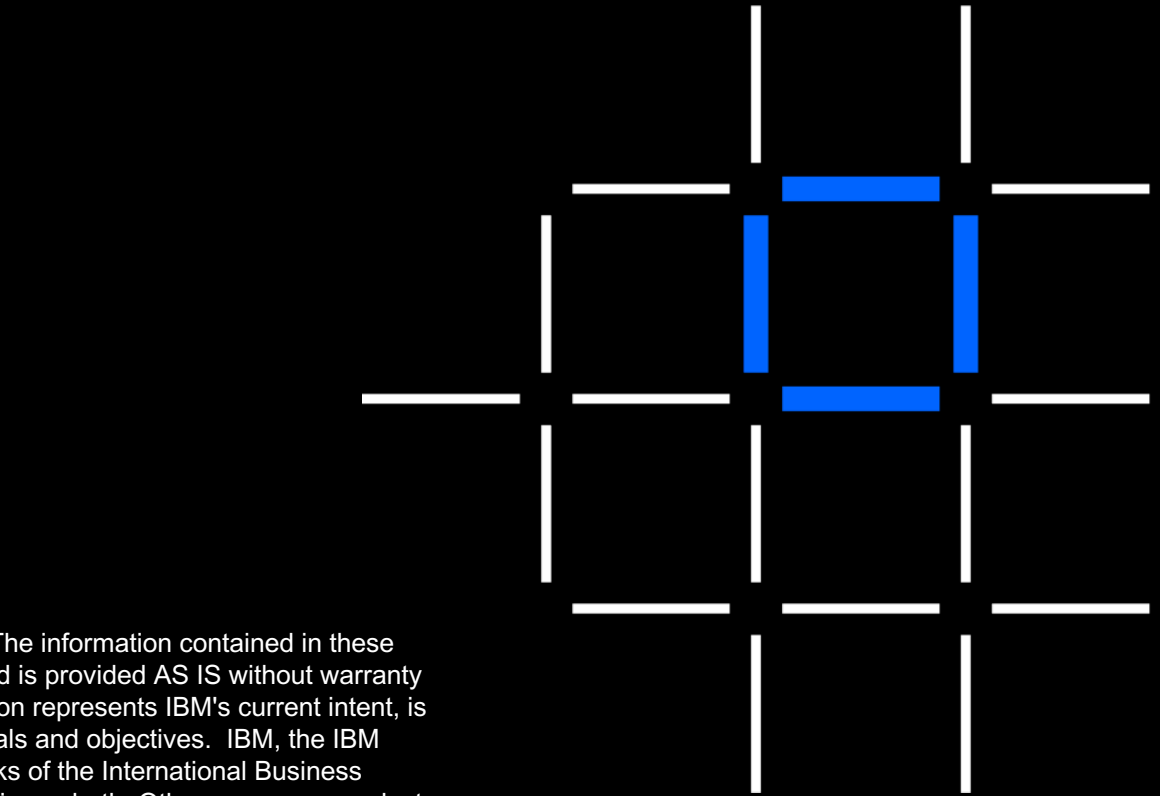
Thank you

IBM **Blockchain**

www.ibm.com/blockchain

developer.ibm.com/blockchain

www.hyperledger.org



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