Microsoft Blockchain Strategy and Roadmap

JT Rose

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What is Blockchain?

Blockchain Origins

In 2009, the Bitcoin cryptocurrency launched

Grew to $20b total market cap by 2017

Blockchain refers to the technologies behind it

Separate innovations in cryptography and distributed systems, combined in a new, innovative way

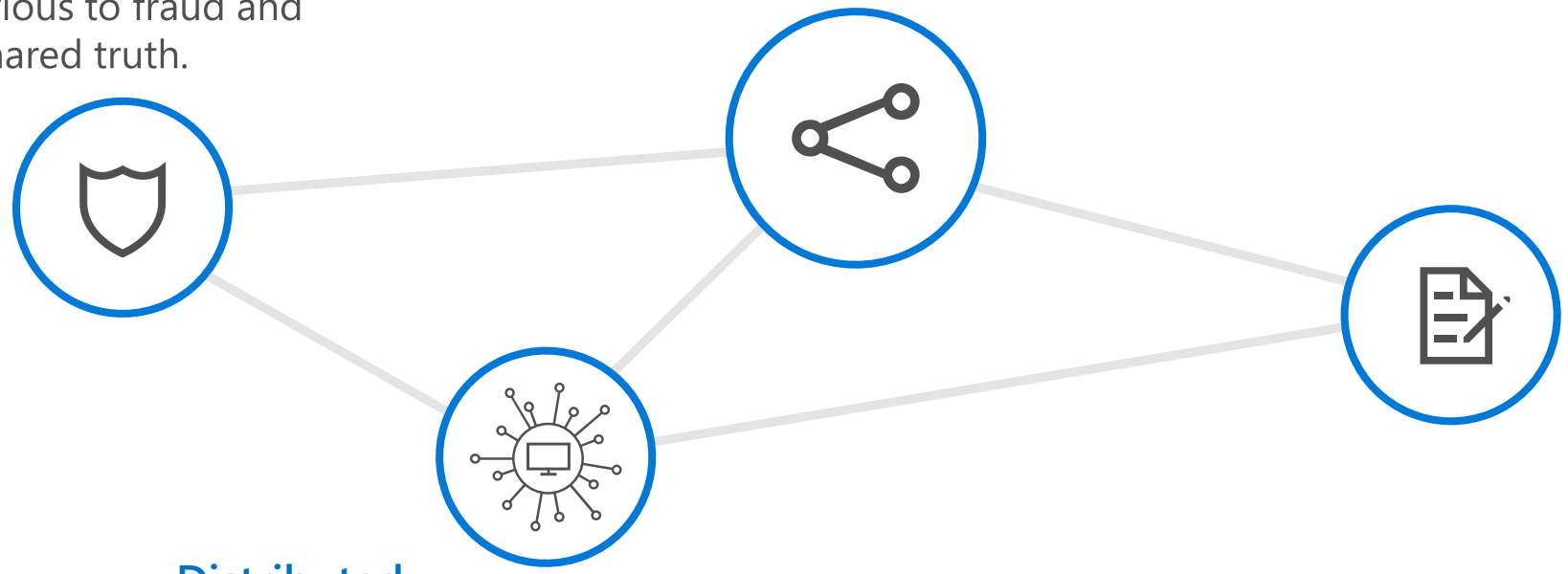
Has spawned over 70 different blockchain and distributed ledgers

Includes public blockchain networks like Bitcoin and Ethereum, as well as others intended to be used in private consortium networks

Fundamentals | Blockchain is a secure, shared, distributed ledger

Shared
Blockchain value is directly linked to the number of organizations or companies that participate in them. There is huge value to even the fiercest of competitors to participate with each other in these shared database implementations.

Secure
Uses cryptography to create transactions that are impervious to fraud and establishes a shared truth.



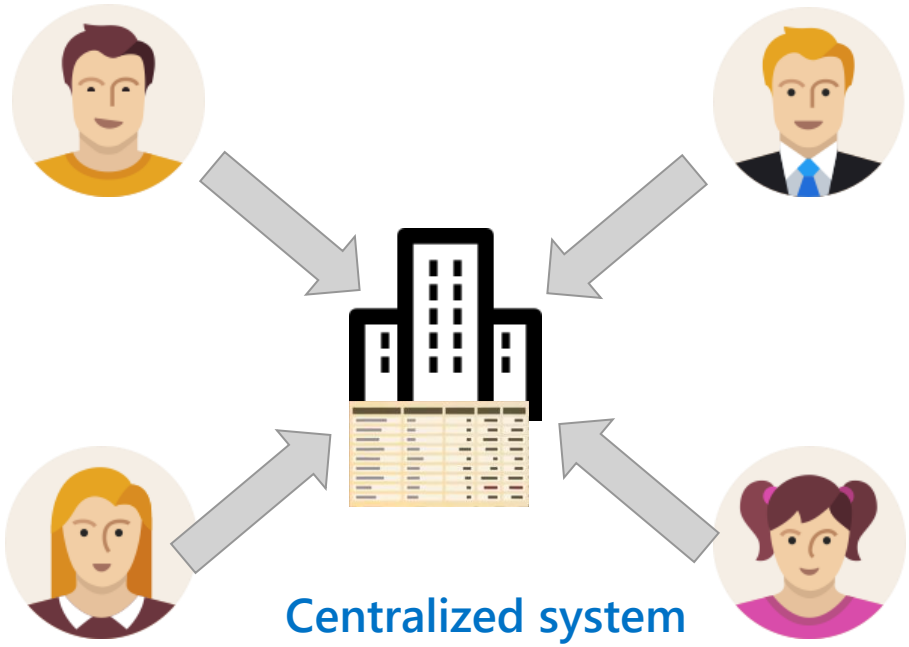
Ledger
The database is "write once" so it is an immutable record of every transaction that occurs.

Distributed
There are many replicas of the blockchain database. In fact, the more replicas there are the more authentic it becomes.

Fundamentals | Data is shared in a blockchain network

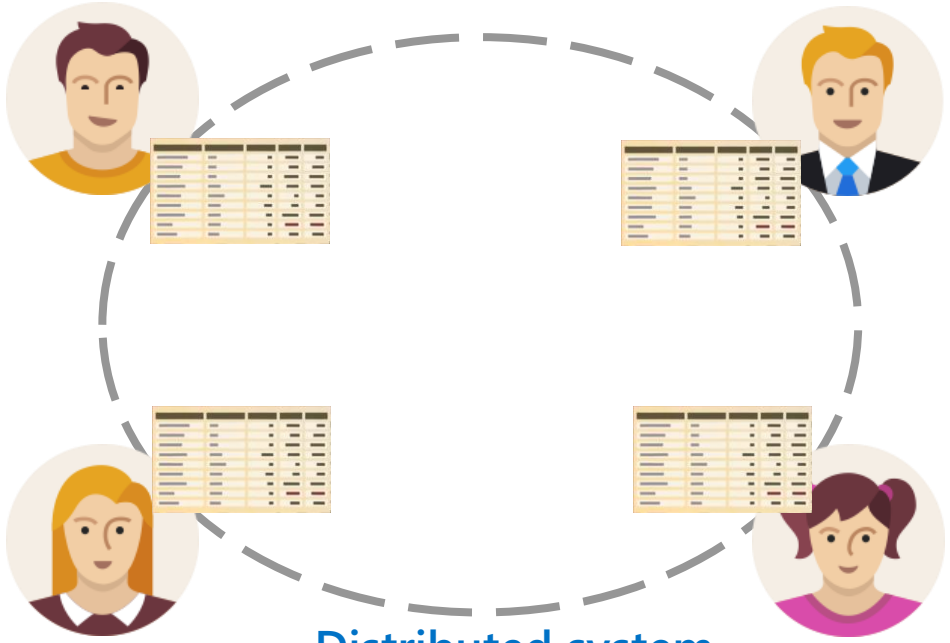
- Traditional ledgers are centralized and use 3rd parties and middlemen to approve and record transactions
- Blockchain safely distributes ledgers across the entire network and does not require any middleman
- The technology maintains multiple replicas like p2p torrent file sharing

Traditional System



Centralized system with stored ledger

Blockchain System



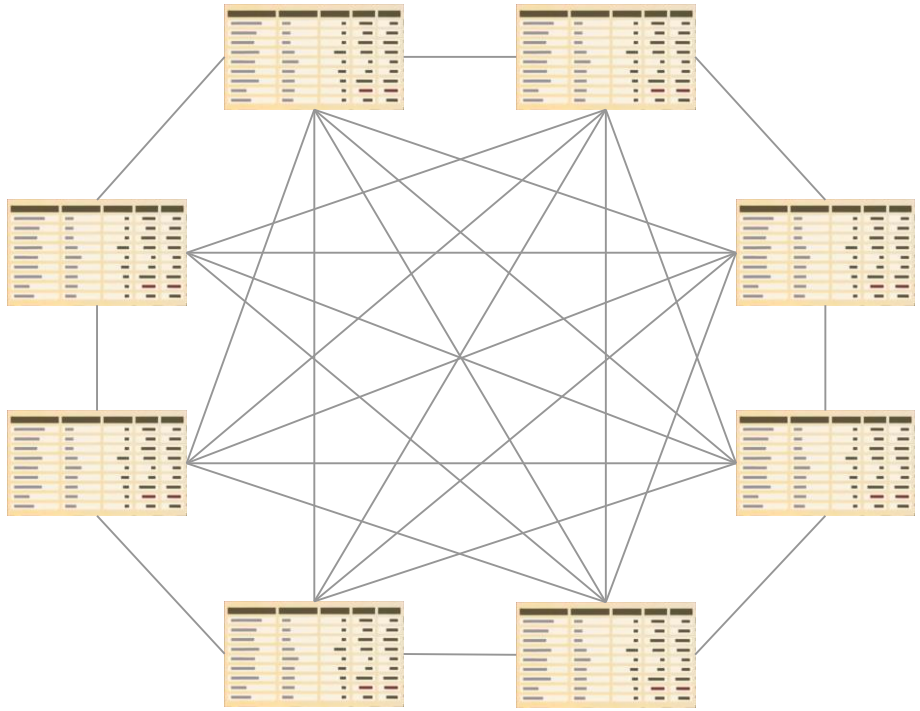
Distributed system with distributed ledger

Fundamentals | Data is stored in a ledger

A ledger is a write only database most commonly used in accounting
The ledger creates the same copy of the data across all the participating nodes
All new transactions are digitally signed, broadcast across the blockchain network, and added to the system
Participants verify the transaction is valid and then write it to the ledger
Originally designed to power the bitcoin currency

FROM	TO	PROPERTY	VALUE
Alex	Katie	Payment	$500
Jim	Sally	Payment	$300
Alex	Garth	Asset	Car
Katie	Tony	Payment	$100
Molly	Paula	Message	I love you

Example ledger



Entire network has same ledger

Where is blockchain valuable?

Benefits | Decentralization has great advantages

Eliminates Intermediaries
Allows industries to redefine or create new business models.

Reduces Fraud
Highly secure and transparent, making it nearly impossible to change historical records.

Increases Efficiency and Speed
Simplifies transactions and enables T+Zero settlement time.

Increases Revenue and Savings
Potential savings and new revenue opportunities through more efficient processes and reduced costs.

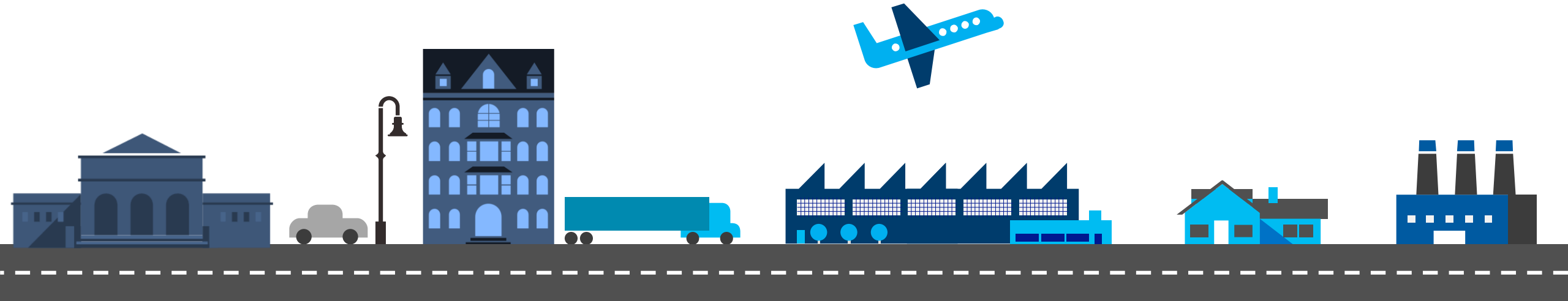
Benefits | Impact across many different industries

Financial
Redesign costly legacy workflows, improve liquidity and free up capital. Help reduce infrastructure costs, increase transparency, reduce fraud and improve execution and settlement times.

Retail & Manufacturing
Better supply chain management, smart contract platforms, digital currencies, and tighter cybersecurity.

Healthcare
Removes third-party verifiers such as health information exchanges by directly linking patient records to clinical and financial stakeholders. Provides fast, secure, authenticated access to personal medical records across healthcare organizations and geographies.

Government
Increase transparency and traceability of how money is spent. Track asset registration, such as vehicles. Reduce fraud and operational costs.



Benefits | Popular scenarios where Blockchain adds value

Financial
Trading
Deal origination
POs for new securities
Equities
Fixed income
Derivatives trading
Total Return Swaps (TRS)
2nd generation derivatives
The race to a zero middle office
Collateral management
Settlements
Payments
Transferring of value
Know your client (KYC)
Anti money laundering
Crowd Funding
Peer-to-peer lending
Compliance reporting
Trade reporting & risk visualizations
Betting & prediction markets

Insurance
Claim filings
MBS/Property payments
Claims processing & admin
Fraud detection/prediction
Telematics & ratings
Digital authentication
Asset management
Automated underwriting
Self-administered insurance

Media
Digital rights mgmt
Game monetization
Art authentication
Purchase & usage monitoring
Ticket purchases
Fan tracking
Ad click fraud reduction
Resell of authentic assets
Real time auction & ad placements

Computer Science
Micronization of work (pay for algorithms, tweets, ad clicks, etc.)
Expanse of marketplace
Disbursement of work
Direct to developer payments
API platform plays
Notarization & certification
P2P storage & compute sharing
DNS

Medical
Records sharing
Prescription sharing
Compliance
Personalized medicine
DNA sequencing

Asset Titles
Diamonds
Designer brands
Car leasing & sales
Home Mortgages & payments
Land title ownership
Digital asset records

Government
Voting
Vehicle registration
WIC, Vet, SS, benefits, distribution
Licensing & identification
Copyrights

Identity
Personal
Objects
Families of objects
Digital assets
Multifactor Auth
Refugee tracking
Education & badging
Purchase & review tracking
Employer & Employee reviews

IoT
Device to Device payments
Device directories
Operations (e.g. water flow)
Grid monitoring
Smart home & office management
Cross-company maintenance markets

Payments
Micropayments (apps, 402)
B2B international remittance
Tax filing & collection
Rethinking wallets & banks

Consumer
Digital rewards
Uber, AirBNB, Apple Pay
P2P selling, craigslist
Cross company, brand, loyalty tracking

Supply Chain
Dynamic ag commodities pricing
Real time auction for supply delivery
Pharmaceutical tracking & purity
Agricultural food authentication
Shipping & logistics management

Use Cases | The Importance of Trust

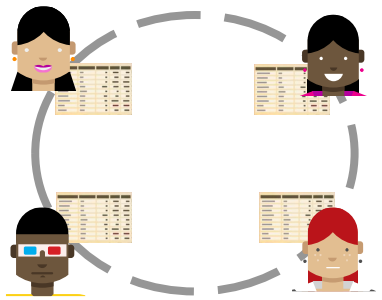
Blockchain was developed to enable transactions in completely untrusted environments

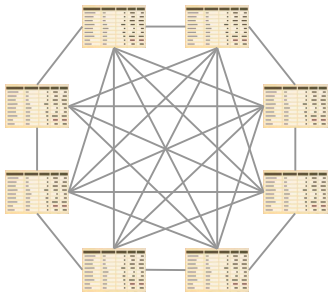
Blockchain shines where different parties that don't fully trust each other need to share data and cooperate.

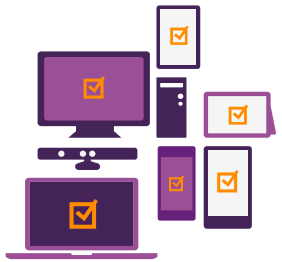
Use Cases | Recognizing scenarios

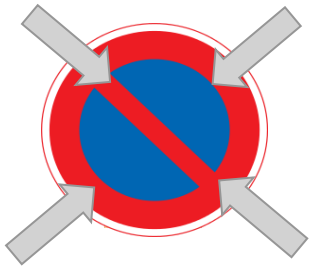
Answering a few questions can determine if blockchain is appropriate

Do multiple parties share data?	**Do multiple parties update data?**	**Is there a requirement for verification?**	**Can intermediaries be removed?**
Would a complete and reliable shared system of record benefit each of the participants in a business relationship?	Would there be greater data accuracy and timeliness if multiple participants can record and propagate concurrent transactions?	Would tamper-proof logging increase transactional throughput and reliability amongst semi-trusted business partners?	Would the removal of intermediaries reduce cost and complexity?









What are blockchain examples?

Webjet Uses Blockchain in First-Of-A-Kind Travel Bookings Solution

Challenge

- Webjet handles thousands of hotel bookings every day that pass through multiple operators. The high volume of transactions and number of parties involved in each transaction can lead to discrepancies.
- Booking errors negatively affect customers' experiences and undermine trust between Webjet and its partners, and can also have serious financial consequences.

Strategy

- Webjet and Microsoft developed a first-of-a-kind blockchain solution.
- The solution creates secure, independent transaction records that all parties can see. Known as 'Smart Contracts, they streamlining the booking and payment process, and reducing errors.

Results

- The use of blockchain removes the risk of data inaccuracy, boosts security and efficiency, and enhances trust and accountability between Webjet and its partners.
- The solution gives Webjet a competitive edge and could set a new industry standard.
- Webjet has an exciting opportunity to grow by facilitating transactions across the travel industry and selling its solution into other sectors.

webjet.com.au

"Microsoft's ongoing investments in building the industry's most trusted cloud platform around the principles of security, privacy and control, compliance and transparency, along with its deep heritage in guiding businesses, including Webjet, through periods of significant IT transformation made the decision to go on this journey with Microsoft a no-brainer."

— John Guscic, Managing Director, Webjet

Maersk Uses Blockchain to Secure and Streamline Marine Insurance Process

Challenge

- Duplication, inefficiency, lack of transparency, lack of data, fraud, and errors across lots of parties interacting in marine insurance
- Change is hard due to multiple regulators and jurisdictions
- Rates are under pressure and costs are becoming unmanageable
- Compliance is challenging

Strategy

- EY, Maersk, Guardtime, and Microsoft developed a real-time blockchain enabled platform for marine insurance
- The solution streamlines claims and settlement processes, while reducing errors.

Results

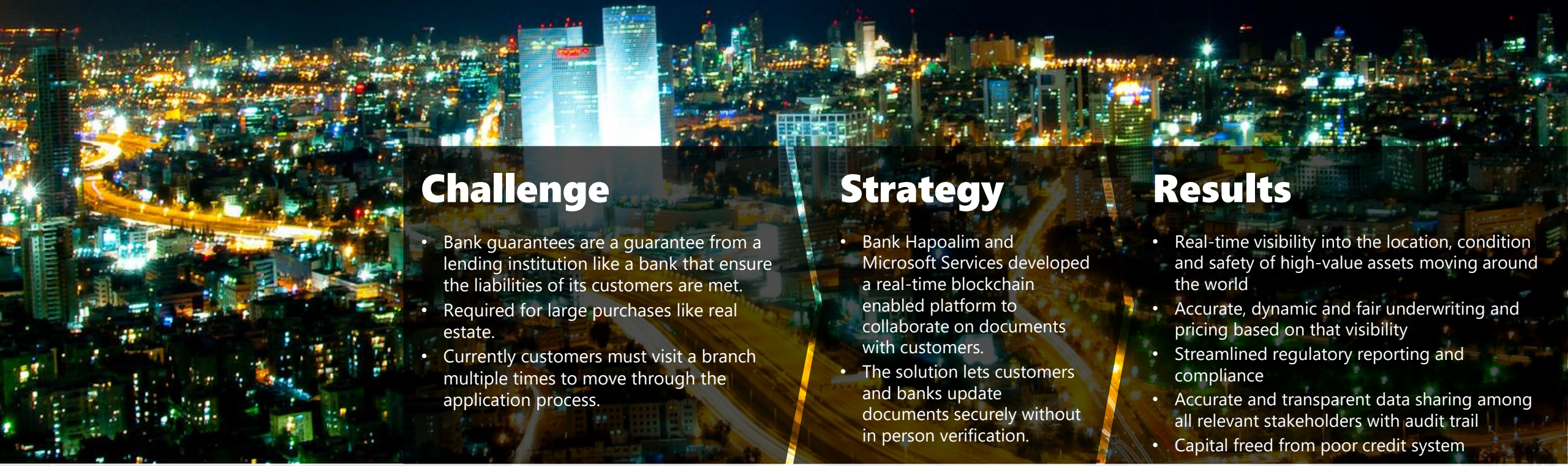
- Real-time visibility into the location, condition and safety of high-value assets moving around the world
- Accurate, dynamic and fair underwriting and pricing based on that visibility
- Streamlined regulatory reporting and compliance
- Accurate and transparent data sharing among all relevant stakeholders with audit trail
- Capital freed from poor credit system

MAERSK

"It is a priority for us to leverage technology to streamline and automate our interaction with the insurance market. Insurance transactions are currently far too tedious and frictional. The distance between risk and capital is simply too far."

— Lars Henneberg, VP, Head of Risk and Insurance of A.P. Moller-Maersk

Bank Hapoalim Uses Blockchain to Streamline the Bank Guarantee Process



Challenge

- Bank guarantees are a guarantee from a lending institution like a bank that ensure the liabilities of its customers are met.
- Required for large purchases like real estate.
- Currently customers must visit a branch multiple times to move through the application process.

Strategy

- Bank Hapoalim and Microsoft Services developed a real-time blockchain enabled platform to collaborate on documents with customers.
- The solution lets customers and banks update documents securely without in person verification.

Results

- Real-time visibility into the location, condition and safety of high-value assets moving around the world
- Accurate, dynamic and fair underwriting and pricing based on that visibility
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bank hapoalim

"The use of Blockchain technology will significantly improve the customer experience and the level of trust in the banking system."

— Arik Pinto, Chief Executive Officer of Bank Hapoalim

Example:

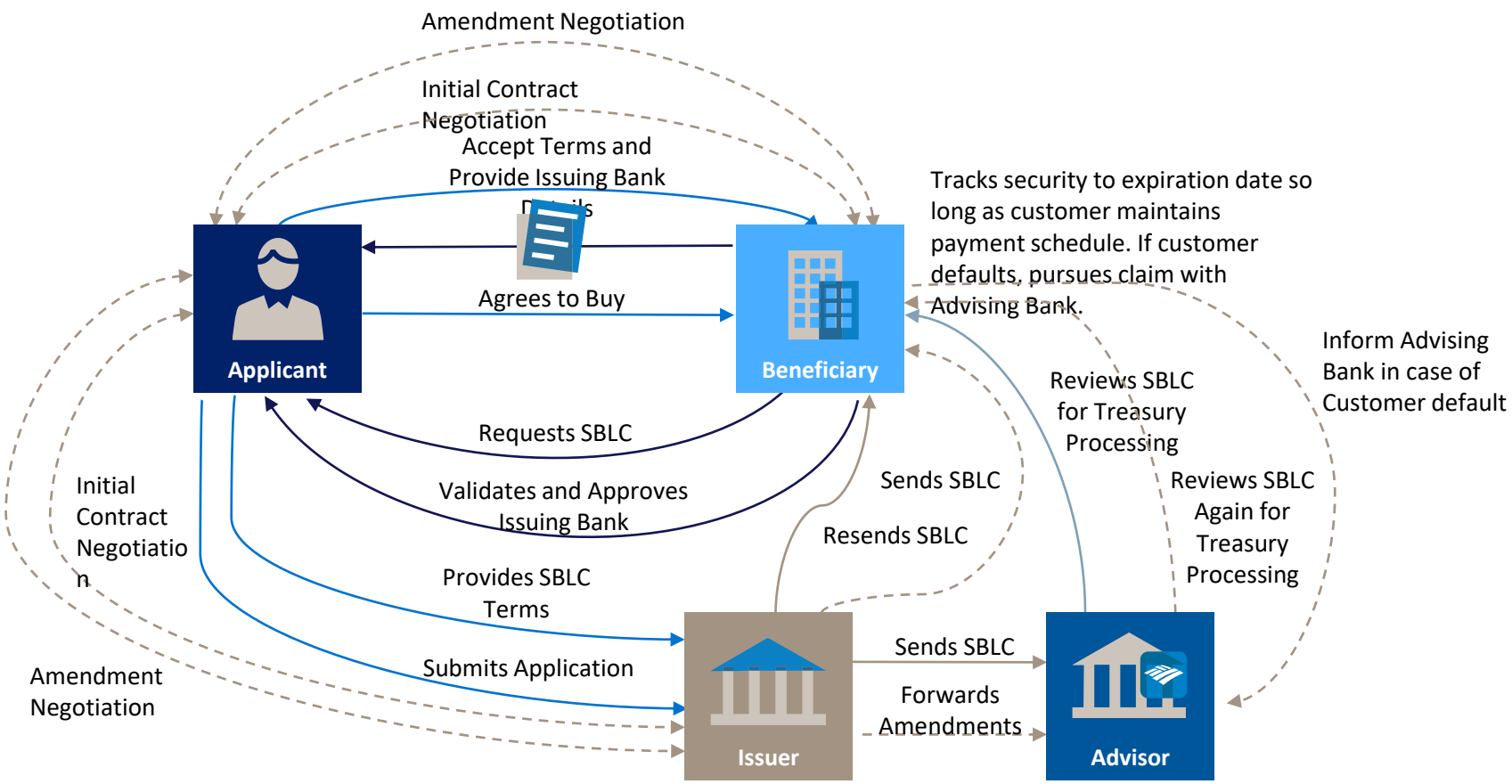
Standby Letter of Credit

Examples | Standby Letter of Credit (SBLC)

Inefficient operations

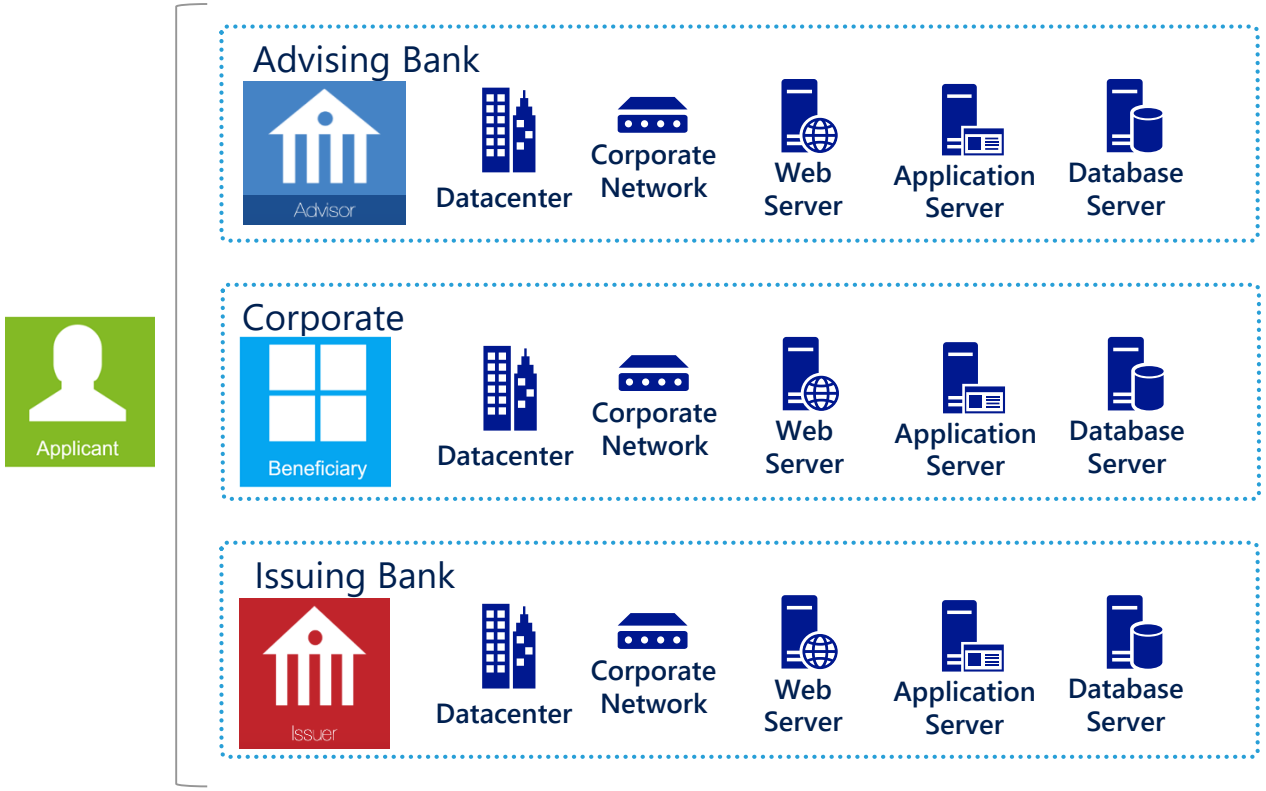
Working capital and balance sheet implications

Lack of visibility to exposures



Examples | Moving to Digital is Not Enough

Digitizing existing processes provides some benefits, but creates inefficiencies, and fails to solve key workflow challenges



Synchronization and reconciliation are still problems, although latency is reduced

No single party has authoritative system of record.

All parties need similar IT competencies to build and operate the system, and require compatible technology stacks with appropriate connections and security

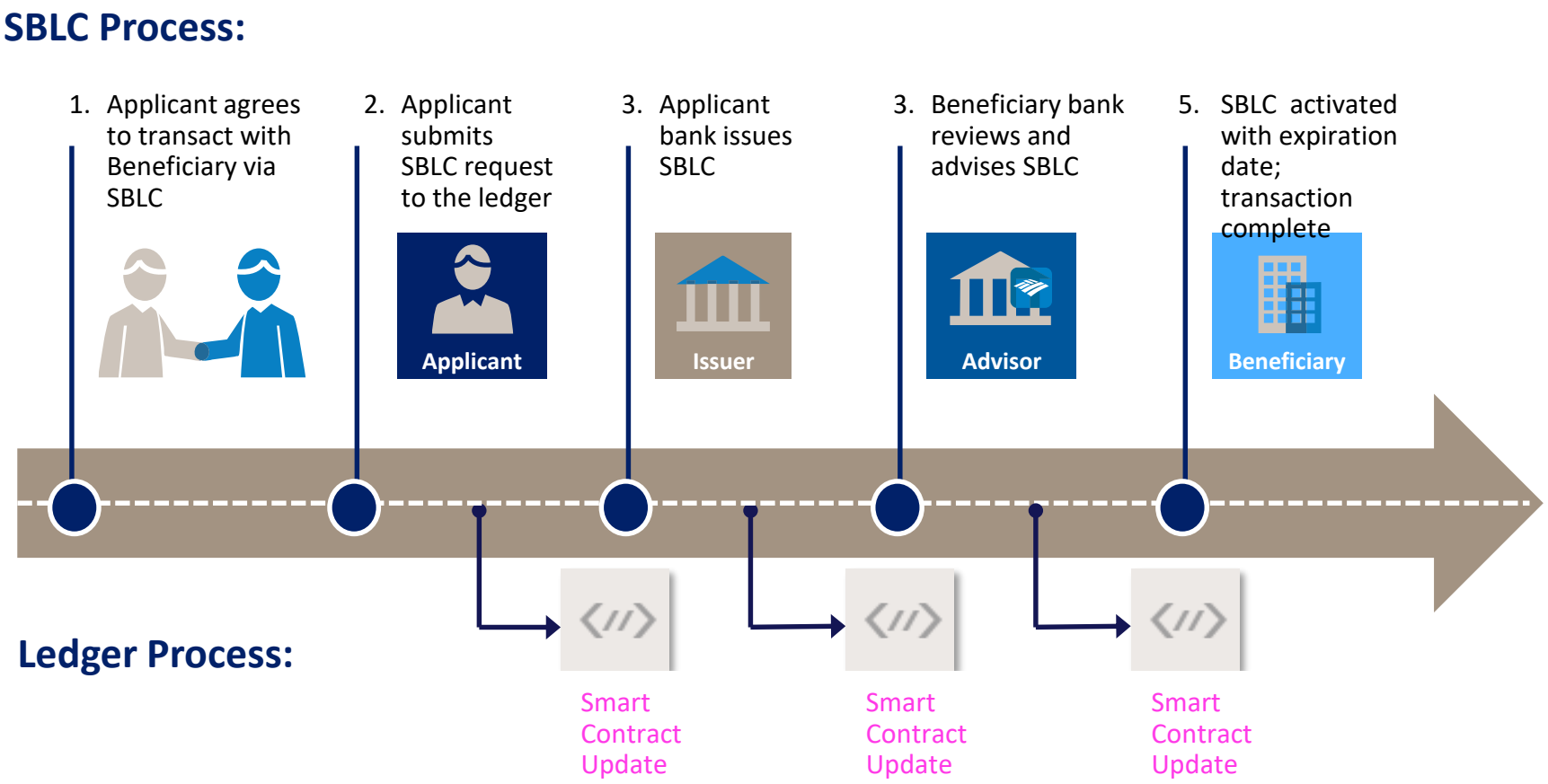
Underlying databases are still subject to data entry errors

Examples | SBLC Flow with Blockchain

Issuance time from weeks to hours

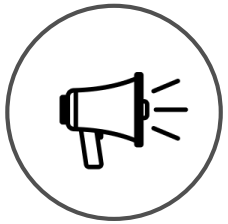
Increased sales and speed of delivered services

Transparency across all participants



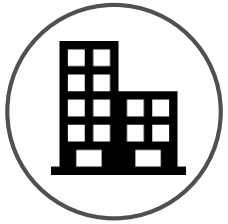
Strategy + Roadmap

Market Challenges

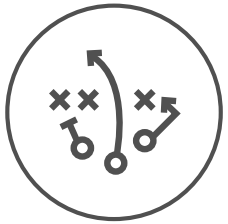


HYPE
Lots of press, announcements, and noise

IMMATURE
Many offerings are new or experimental



NOT ENTERPRISE READY
Most technology providers don’t have enterprise DNA.



PATH TO PRODUCTION IS AMBIGUOUS
Multiple obstacles can make it difficult to move beyond a POC

Microsoft's Strategy

Open Marketplace – Allow partners and customers to monetize and make available blockchain solutions through Azure marketplace

Easy Network – Make it as easy as possible to deploy a blockchain network within or across subscriptions

Open Cloud – Support as many blockchain stacks as possible

Enterprise-Grade Services – Allow blockchain developers to easily connect their blockchain applications to other core services, such as AAD

Accelerating enterprise adoption through infrastructure

Strategy | Azure is an open cloud

Hyper Scale

Enterprise Grade

Hybrid

We've delivered an open, broad, and flexible cloud across the stack

Azure BaaS

coinprism, Libra, bitpay, ETH BaaS, openchain, ripple, eris, NETKI, Libra, factom, MultiChain, Manifold Technology

Infrastructure

ubuntu, docker, CoreOS, SUSE, ORACLE LINUX, CentOS

+Hundreds of community supported images on VM Depot

Databases

DATASTAX, Hortonworks, Couchbase, MySQL, mongoDB, redis, SQL Server, cloudera, hadoop

App Frameworks

Microsoft .NET, Java, php, eclipse, Ruby, python, IntelliJIDEA

Applications

CLOUD FOUNDRY, Drupal, SharePoint, Joomla!, Jelastic, pprenda

Web App Gallery

Dozens of .NET & PHP CMS and Web apps

Management

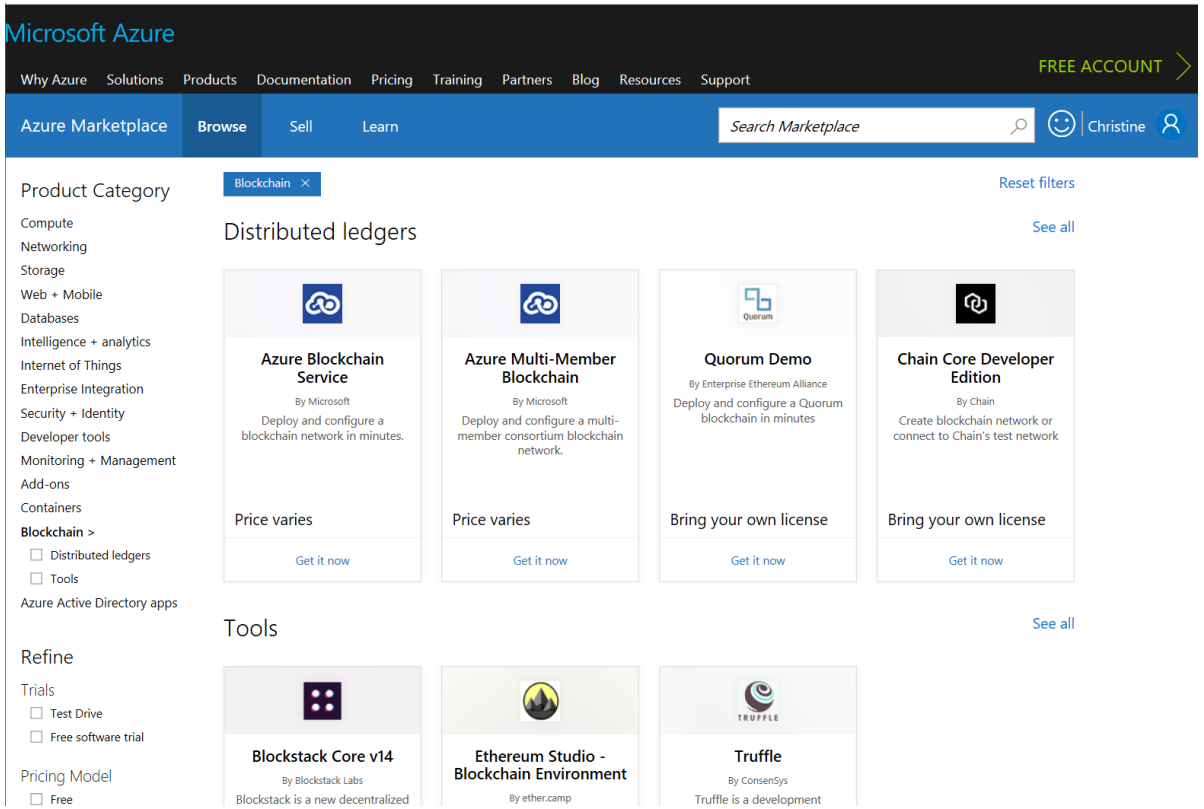
juju, CHEF, puppet labs, ANSIBLE, GitHub, SALTSTACK

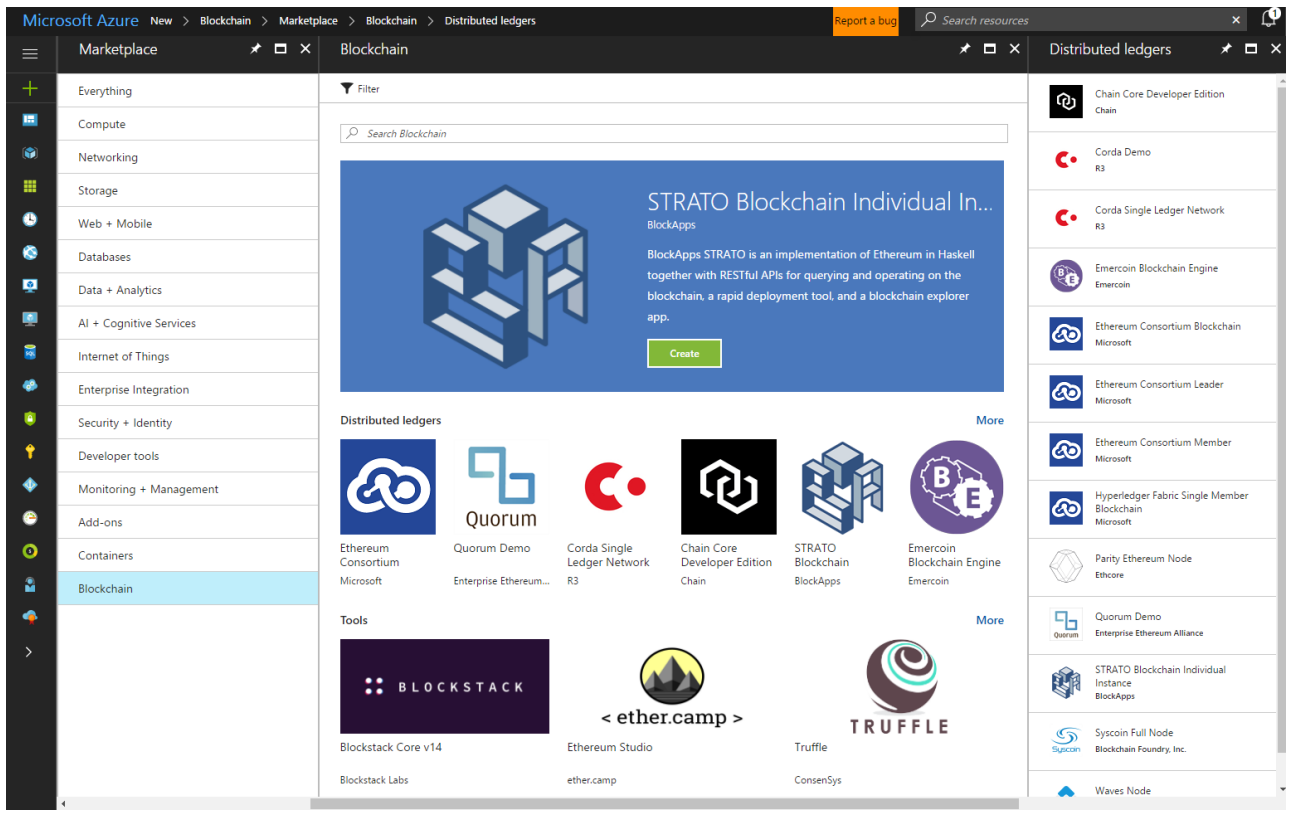
Clients

APACHE CORDOVA™, Xamarin

Ecosystem | Azure supports an open blockchain ecosystem

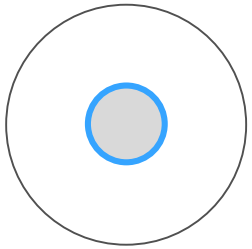
- Choose the ledger and blockchain development tools of your choice
- Single click automated deployment of infrastructure and configuration of blockchain protocol



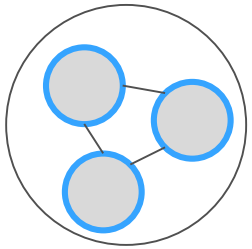


Topology | Create the blockchain topology of your choice

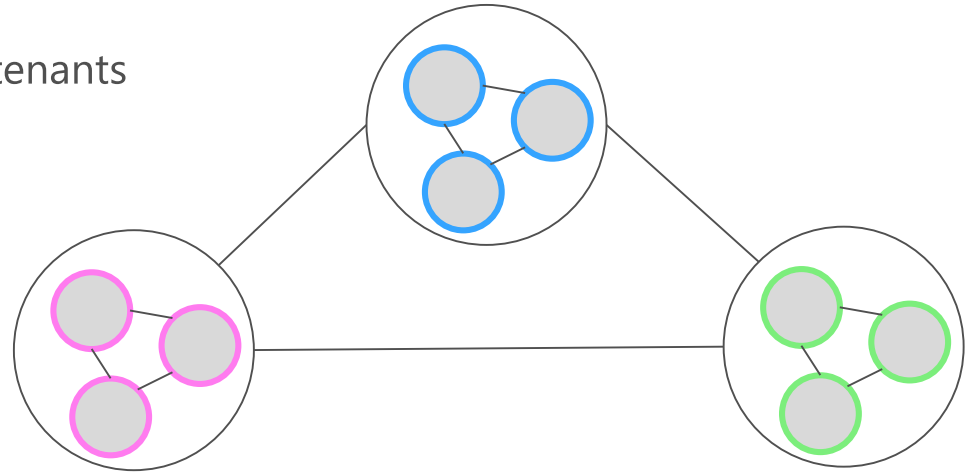
- **Dev/Test**: Enable developers to get started
  - Single node (virtual machine)



- **Single Member**: Simulate production for multiple divisions within a single organization
  - Multi-node across multiple region



- **Multi-member**: Simulate production for multiple divisions within multiple organization
  - Multi-node across multiple regions, Azure subscriptions, and/or AAD tenants



Strategy | Blockchain deployment templates

Build Blockchain Network from scratch: 3 weeks

1. Review blockchain protocol specific network documentation
2. Determine topology for a consortium network
3. Map topology to IT resources
4. Manually deploy
5. Configure blockchain clients via Linux BASH scripts to support private network (peering, isolate mining nodes, etc.)
6. Configure other blockchain protocol properties (consensus algorithms, max peers, etc.)
7. Trial and error to make above steps work
8. Configure IT networks and firewall ports to permit blockchain protocol traffic
9. Test, debug, and repeat

Deploy Blockchain Network in Azure: 15 minutes

1. Activate Azure subscription
2. Search Azure Marketplace for desired blockchain
3. Click on blockchain image of choice
4. Provide 10 user parameters (number of consortium members, number of blockchain VMs, admin usernames and passwords, etc.)
5. Deploy and wait 15 minutes (+/- depending of nodes selected)

Purchase - Microsoft Azu

https://ms.portal.azure.com/#create/microsoft-azure-blockchain.azure-blockchain-serviceethereum-consortium-blockchain

Preview | Microsoft Azure « | Create Ethereum Consortium Blockchain > Purchase | Report a bug | Search resources | mattker@ntdev.micro... MICROSOFT

Create Ethereum Conso...

1 Basics
Done

2 Network size and performance
Done

3 Ethereum Settings
Done

4 Summary
Ethereum Consortium Blockcha...

5 Buy

Purchase

Azure Blockchain Service
by Microsoft
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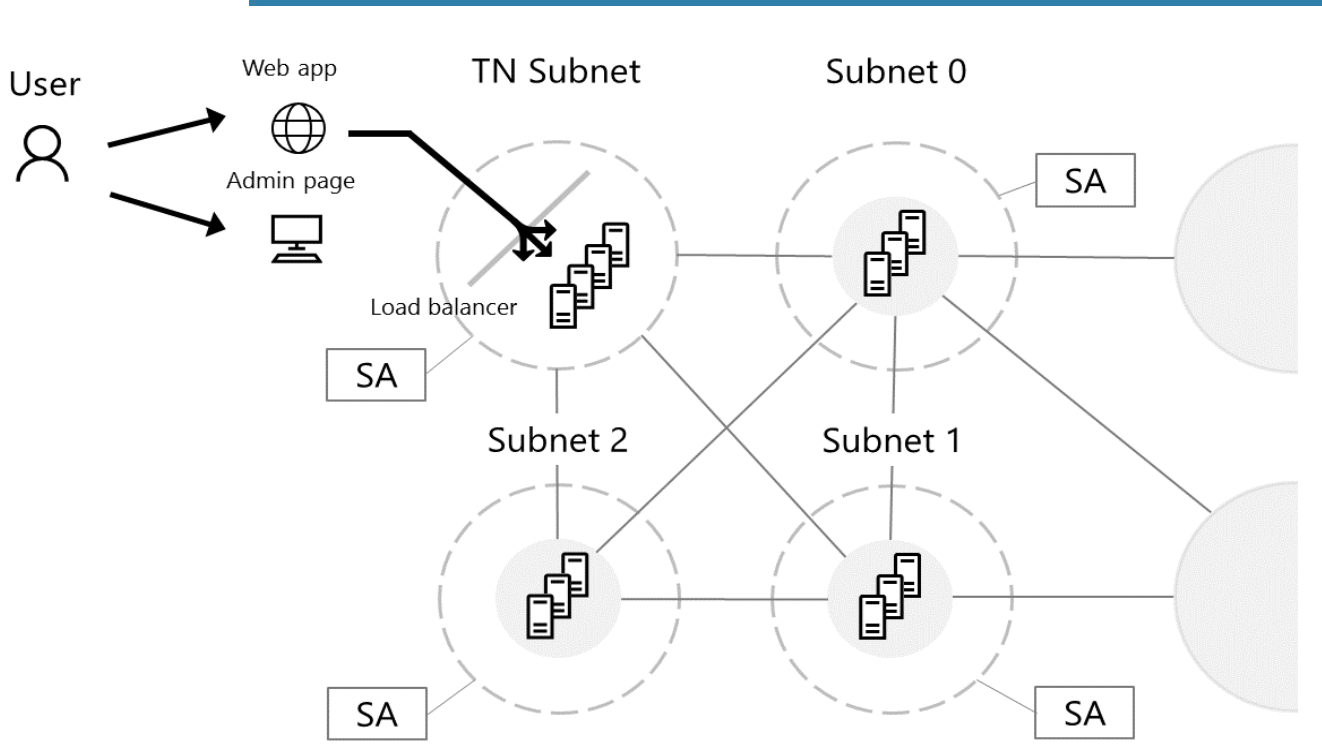

Making blockchain stacks more enterprise ready with Coco Framework

Coco Framework | Framework provides enterprise capabilities

Scalability

Database-like speeds for transaction throughput and latency

Confidentiality

Richer and more flexible confidentiality models

Consortium Governance

Configurable constitution to govern membership

Coco Framework | Architecture