Blockchain

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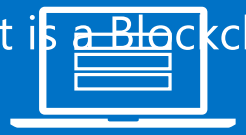
Microsoft

What is a Blockchain?



Originally developed for international payments.

A Blockchain is a secure, digital, distributed ledger that uses public/private signature technology to validate and record transactions in near real-time.

Blockchain is not just about money

"...a sweeping vista of opportunity to **reimagine how the financial system can and should work** in the Internet era, and **a catalyst to reshape that system** in ways that are more powerful for individuals and businesses alike"

- Marc Andreessen, A16z

CIO JOURNAL.

Why Blockchains Could Transform How the Economy Works

Bloomberg Businessweek

The Technology would turn a company into a seamless network of coordinated freelancers

Forbes

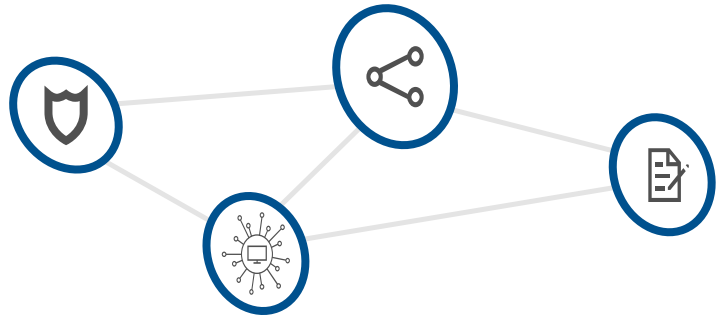
Blockchain For Supply Chain: Enormous Potential Down The Road

Is Blockchain the Most Important IT Innovation of Our Age?

By The Guardian

Blockchain | Advantages

A cryptographically secure, shared, distributed ledger



Secure

Each transaction recorded in the **database is digitally signed and mathematically guaranteed** to be authentic and impervious to fraud.

Shared

The database's main value is that it is **shared between separate entities**

More entities shared, the greater the value.

Distributed

Many copies of the database exist and they **are replicas of each other** in relative time.

Ledger

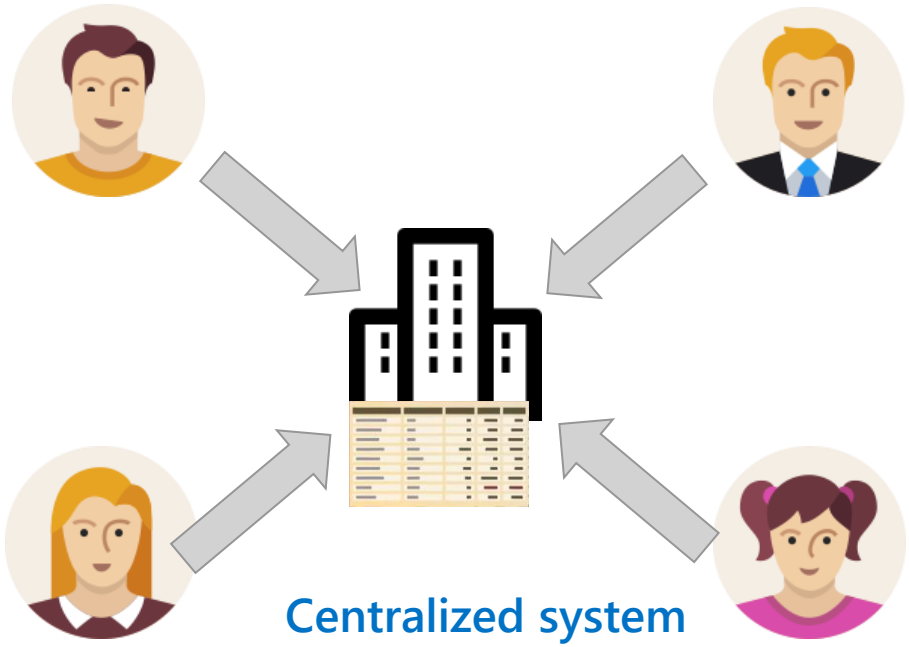
A write once, thus immutable, ledger that records every transaction.

The entire **history of all transactions is available**, math doesn't lie and there is no where to hide.

Decentralizes data in a trustless environment

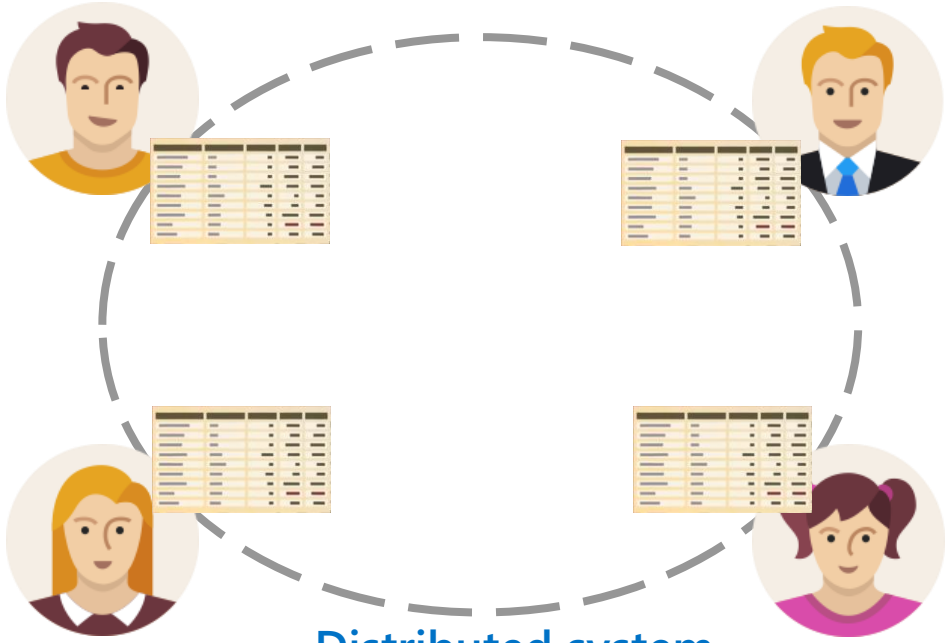
- Traditional ledgers are centralized and use third parties and middlemen to approve and record transactions
- Blockchain safely distributes ledgers across the entire network and does not require any middleman
- The technology maintains multiple replicas like P2P torrent file sharing

Traditional System



Centralized system
with stored ledger

Blockchain System



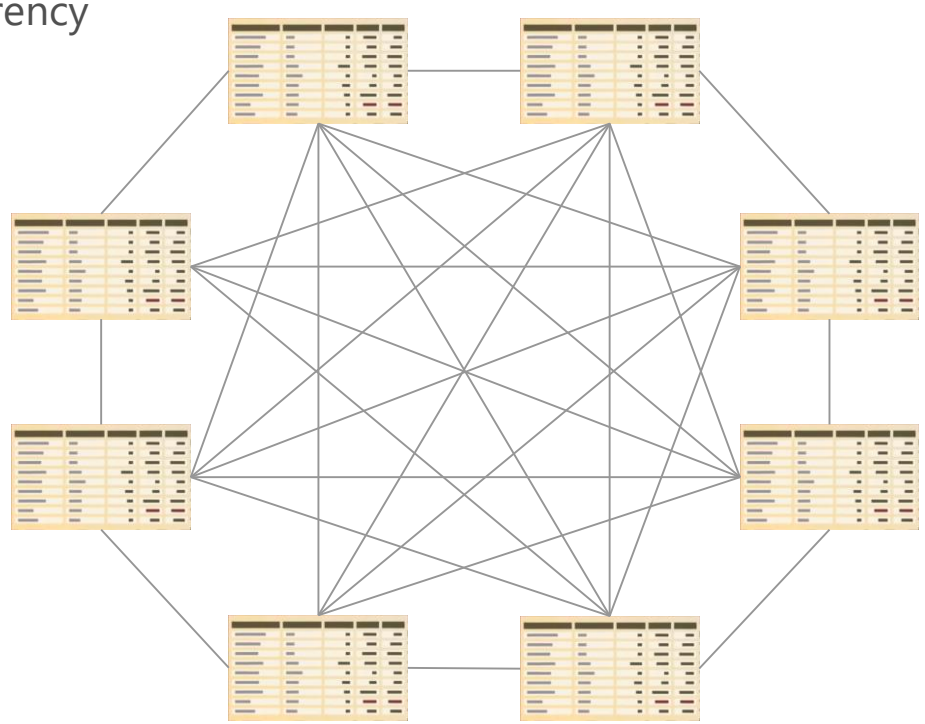
Distributed system
with distributed ledger

Ledger: Blockchain uses a distributed ledger to track transactions

- A ledger is a write only database most commonly used in accounting
- The digital distributed ledger creates the same copy of the data across all the participating nodes
- All new transactions are digitally signed and then broadcast across the blockchain network to be added to the system
- Participants in the blockchain verify the transaction is valid and then writes it to the ledger
- This is the technology 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

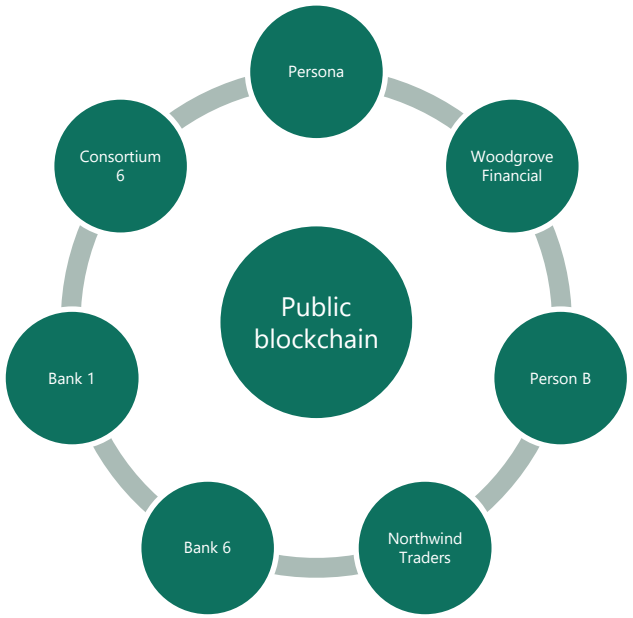
Example ledger



Entire network has same ledger

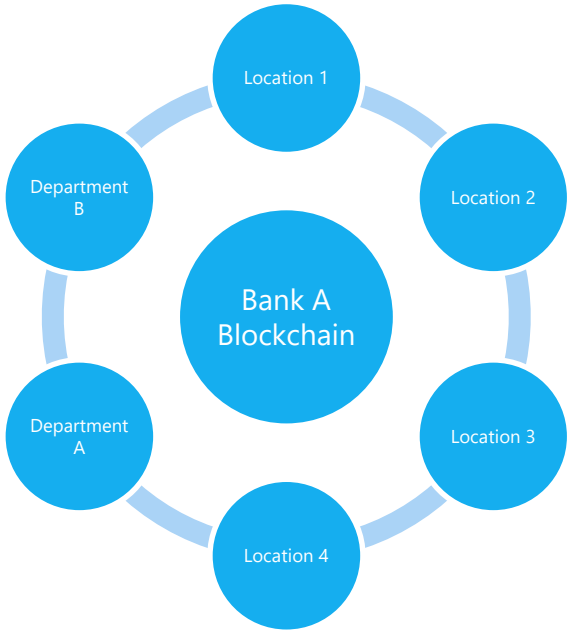
Blockchain | Network Types

Public



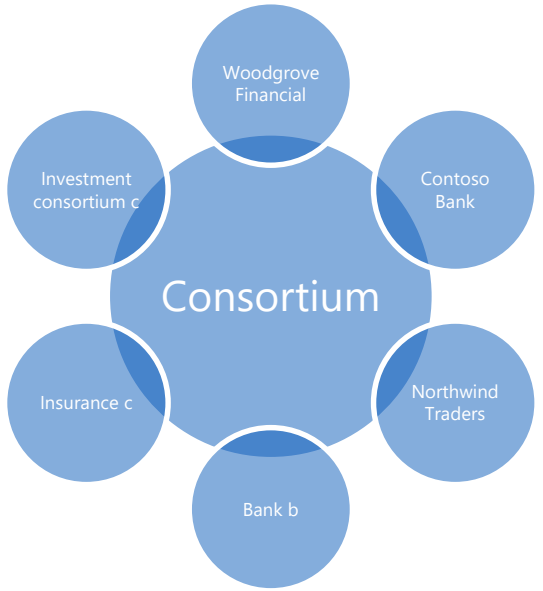
- Many, unknown participants
- Writes by all participants
- Reads by all participants
- Consensus by Proof of Work

Private



- Known participants from one organization
- Write permissions centralized
- Reads may be public or restricted
- Multiple algorithms for consensus

Consortium



- Known participants from multiple organizations
- Writes require consensus of several participants
- Reads may be public or restricted
- Multiple algorithms for consensus

Source: Ethereum blog by Vitalik Buterin https://blog.ethereum.org/author/vitalik-buterin/

Blockchain | Multiple Chain Types

Blockchains

bitcoin
(cryptocurrency)

ethereum
(cross-industry collaborative)

ripple

Alternative blockchains (*altchains*)

steemit
(Social News Blockchain DB)

La'Zooz
(Decentralized Transport)

HYPERLEDGER PROJECT
(cross-industry collaborative)

(IBM Open Blockchain)

(Corda from R3)
(FSI consortium)

MONAX
open platform for developers and devops to build blockchain apps

Chain
(banking industry collaborative)

Digital Asset

IROHA

Database vs. Blockchain – What's the difference?

Key-Value Database

- Overseen by central authority (owner)
- Single point of failure which is vulnerable to attack
- Easily altered, agile, high throughput and latency

Blockchain

- Overseen by predefined consensus algorithm (no owner)
- Distributed fabric, highly resilient. Vulnerable to 51% attack
- Somewhat difficult to alter, generally slower throughput

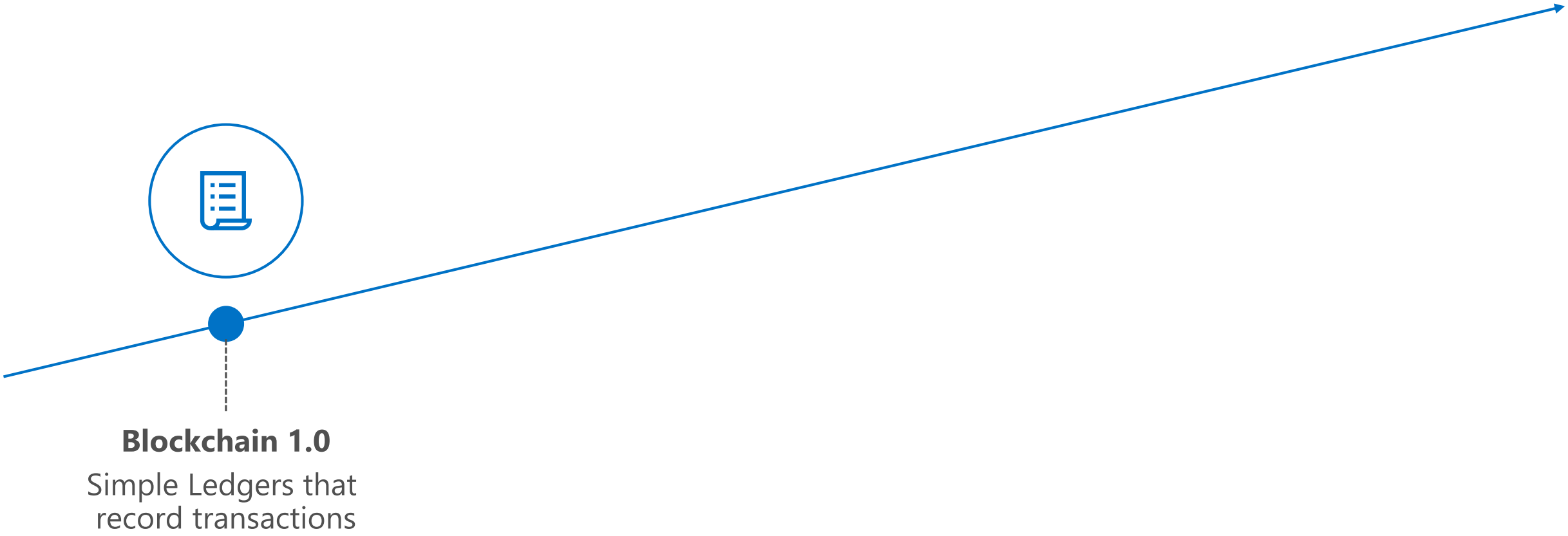
Potential Benefits of Blockchain

- **Eliminates Intermediaries** increasing efficiency and speed
- **Reduces Fraud** related to data integrity
- **Operation simplification** by helping to reduce cost and time related reconciliations and disputes
- **Helps Increase Revenue** from new business model and saving

How does it work?

Evolution of Blockchain

Blockchain 1.0 – A simple ledger



Blockchain 1.0

Simple Ledgers that record transactions

Basic blockchain to track financial transactions

In this example, Alex wants to send Katie $500 via a financial transaction blockchain system

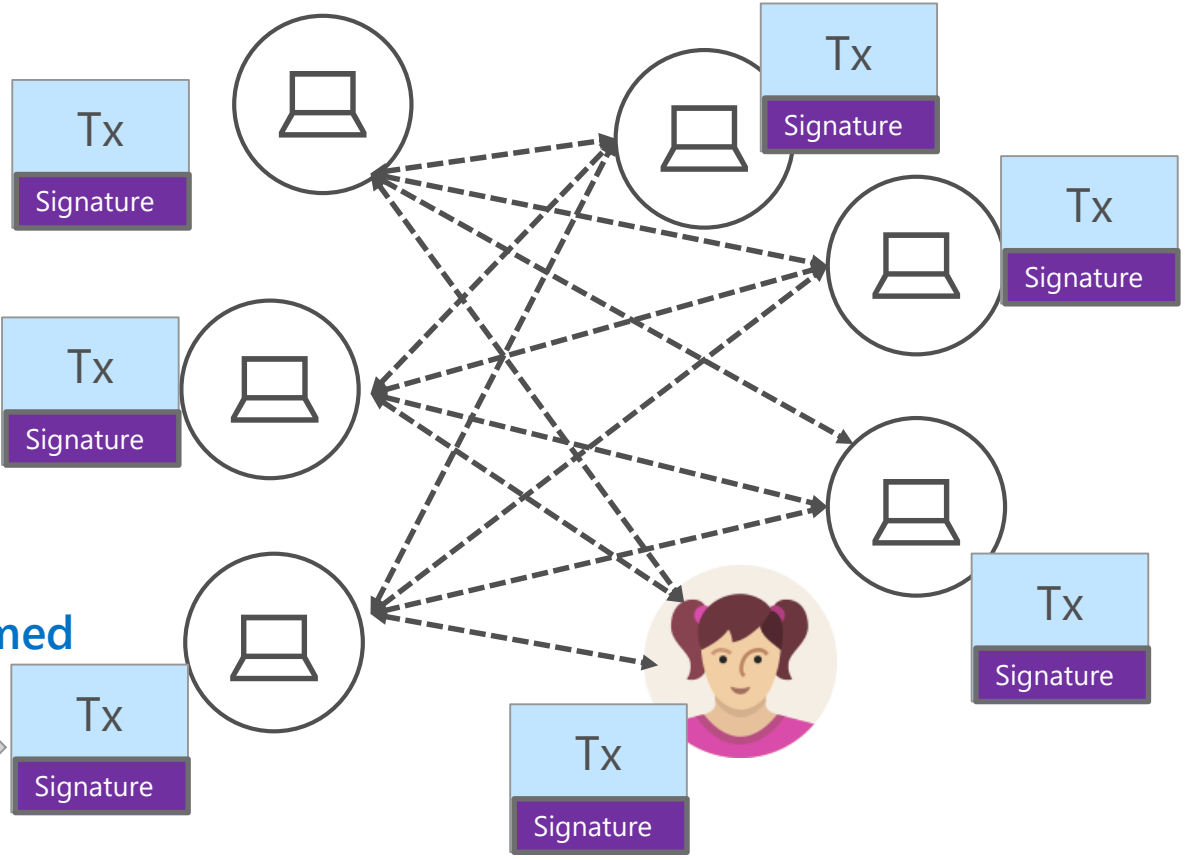
EXAMPLE

FROM	TO	PROPERTY	VALUE
Alex	Katie	Payment	$500

Transaction (Tx)
From: Alex (0xf5e...)
To: Katie (0x992...)
Amount: 500
Digital signature
0x23e423s3234...

1. Transaction information goes through hash functions (to secure it as well as create a time stamp)

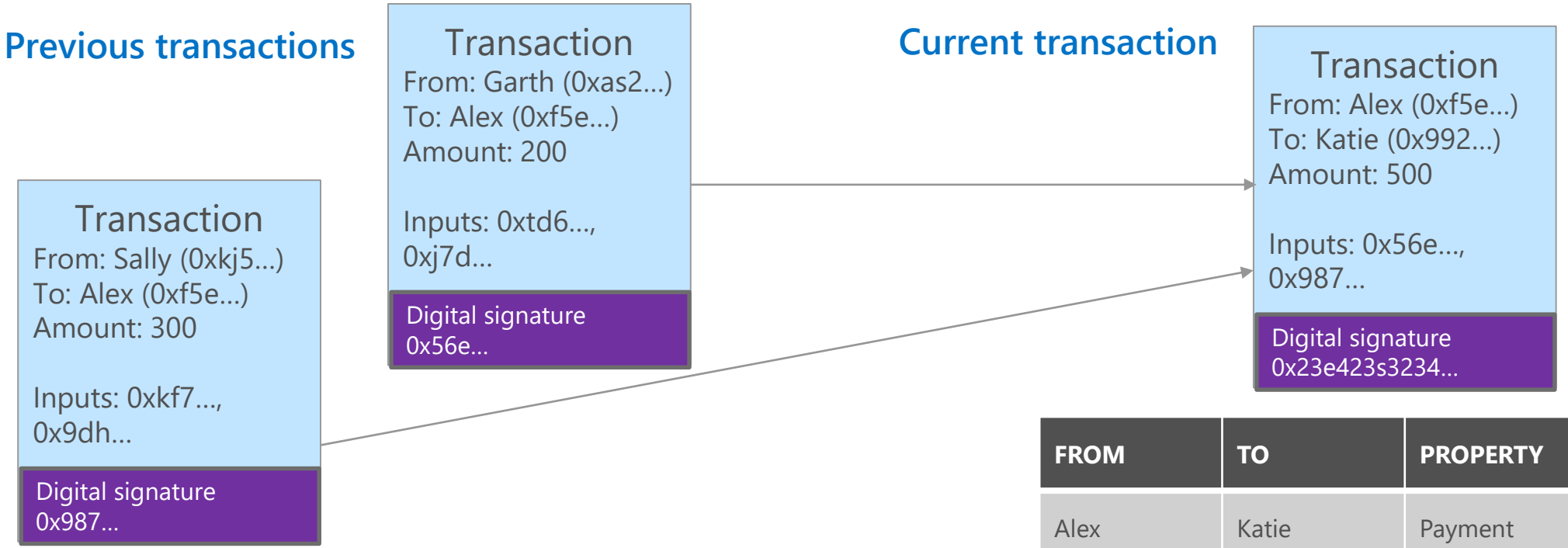
2. Transaction is confirmed through mining.



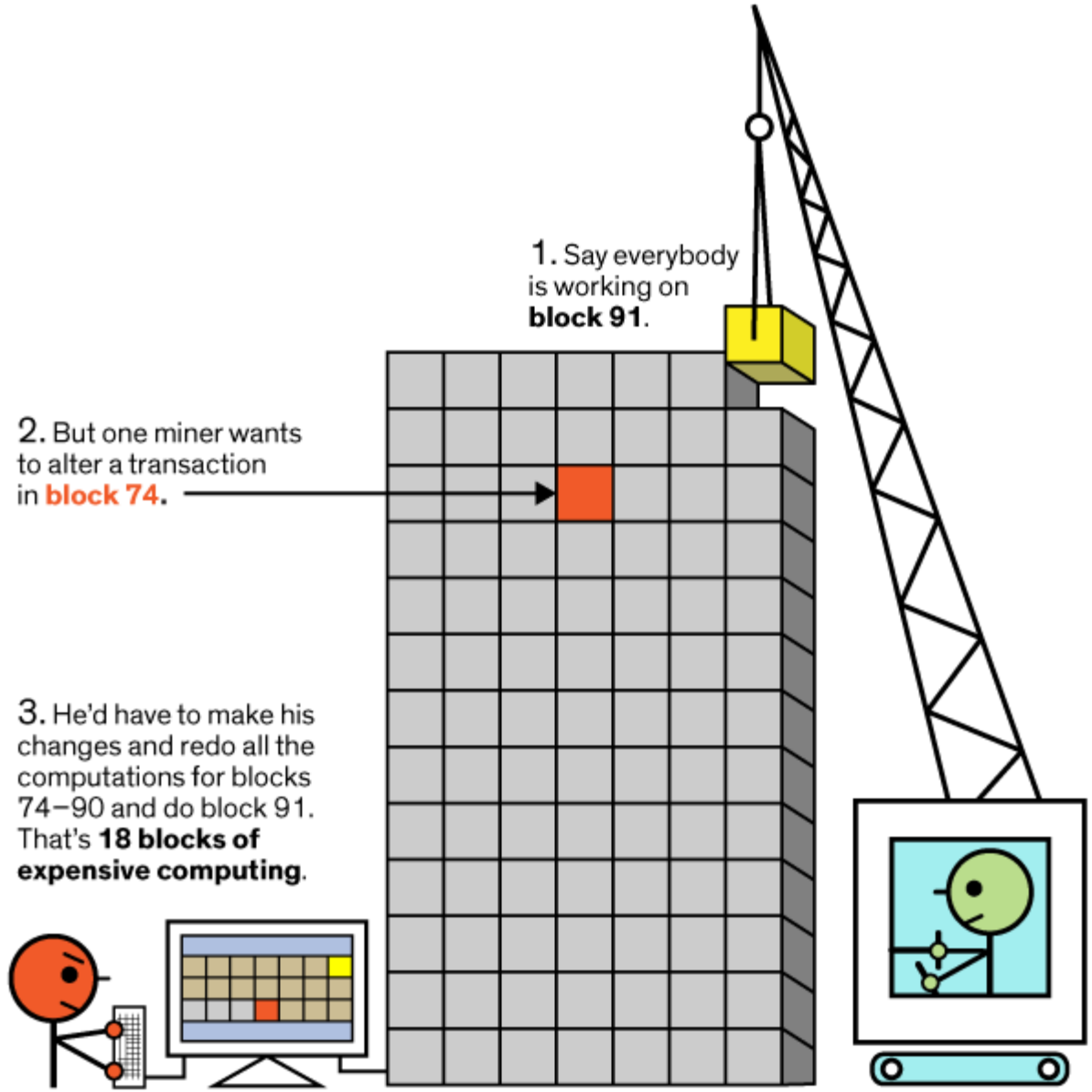
3. Confirmed transaction gets pushed to network

Blockchains create a transaction chain that maintains the history of ownership of an asset

- The **ledger itself does not keep track of digital asset account balances, it simply records transactions.**
- Instead of balances, ownership of digital assets is verified by links to previous transactions, using the immutable history inherently available in a blockchain solution.
- For example. For Alex to send $500 to Katie, he must reference previous transactions where he has received $500 or more to demonstrate that he, indeed, has that much money to send. These reference transactions are called previous input transactions. The current transaction(s) is called output transaction(s).
- Validity of each transaction is based on the validity of previous transactions, which is shared.



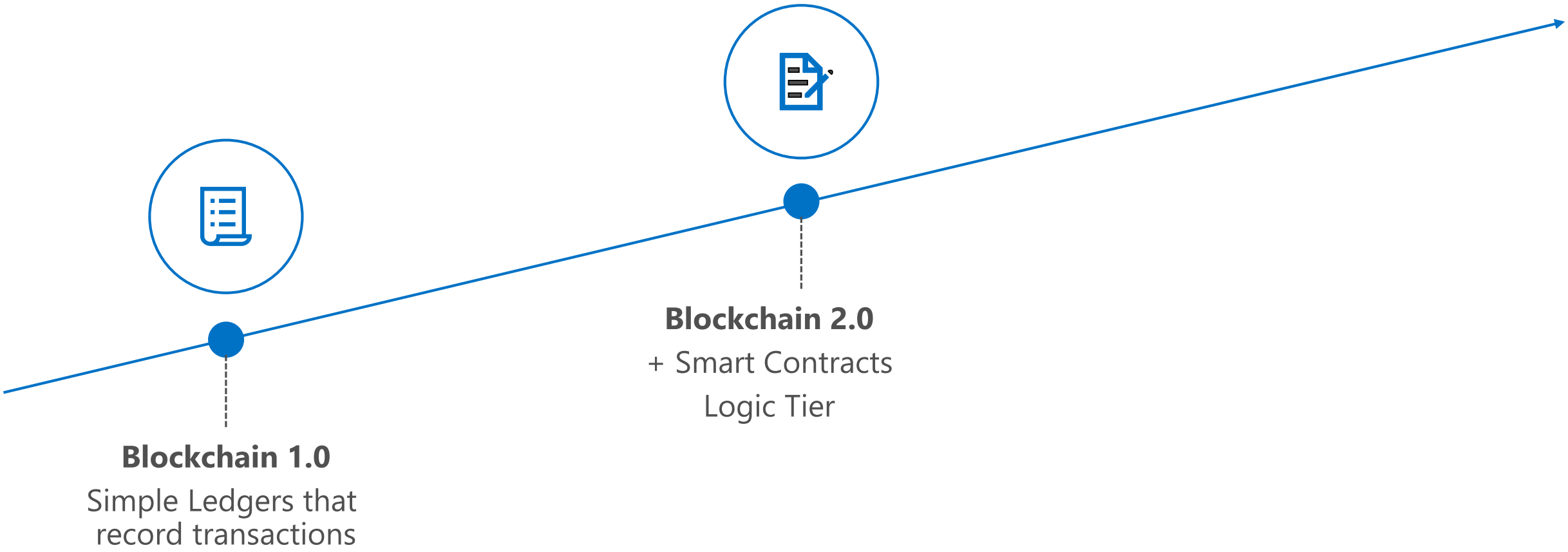
FROM	TO	PROPERTY	VALUE
Alex	Katie	Payment	$500



4. What's worse, he'd have to do it all **before** everybody else in the Bitcoin network finished **just the one block (number 91)** that they're working on.

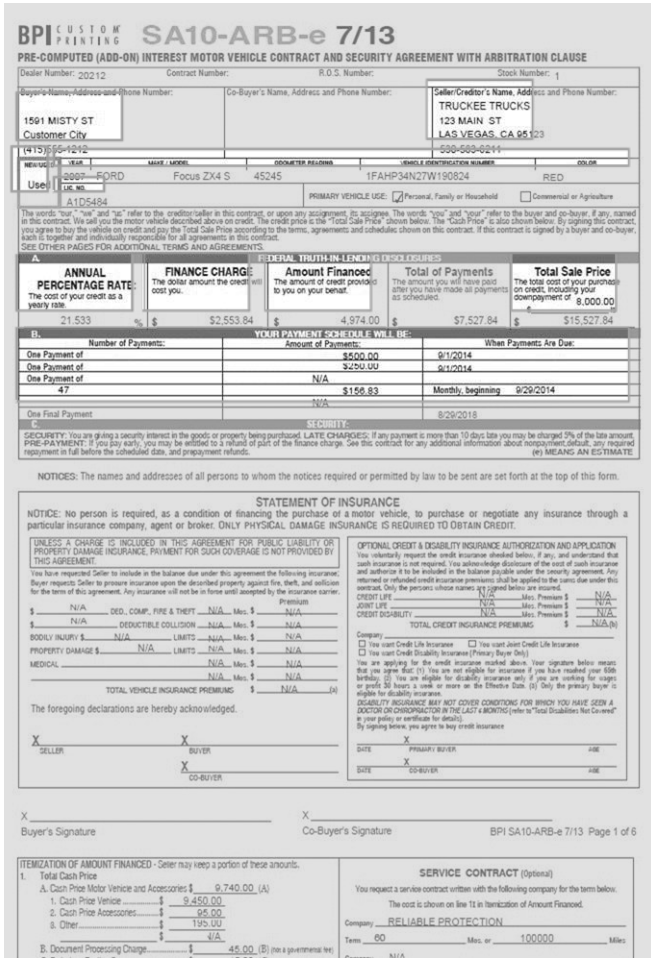
Evolution of Blockchain

Blockchain 2.0 – Introducing Smart Contracts



Blockchain 2.0 | Smart Contracts

Traditional Contract



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PRE-COMPUTED (ADD-ON) INTEREST MOTOR VEHICLE CONTRACT AND SECURITY AGREEMENT WITH ARBITRATION CLAUSE

Dealer Number: 20212 Contract Number: R.O.S. Number: Stock Number: 1

Buyer's Name, Address and Phone Number: 1591 MISTY ST Customer City (415)555-1212

Co-Buyer's Name, Address and Phone Number:

Seller/Creditor's Name, Address and Phone Number: TRUCKEE TRUCKS 123 MAIN ST LAS VEGAS, CA 95123 530-530-5211

NEW/USED	YEAR	MAKE / MODEL	ODOMETER READING	VEHICLE IDENTIFICATION NUMBER	COLOR
Used	2007	FORD Focus ZX4 S	45245	1FAHP34N27W190824	RED

LIC. NO. A1D5484

PRIMARY VEHICLE USE: ☑ Personal, Family or Household ☐ Commercial or Agriculture

The words "our," "we" and "us" refer to the creditor/seller in this contract, or upon any assignment, its assignee. The words "you" and "your" refer to the buyer and co-buyer, if any, named in this contract. We sell you the motor vehicle described above on credit. The credit price is the "Total Sale Price" shown below. The "Cash Price" is also shown below. By signing this contract, you agree to buy the vehicle on credit and pay the Total Sale Price according to the terms, agreements and schedules shown on this contract. If this contract is signed by a buyer and co-buyer, each is together and individually responsible for all agreements in this contract.
SEE OTHER PAGES FOR ADDITIONAL TERMS AND AGREEMENTS.

A. FEDERAL TRUTH-IN-LENDING DISCLOSURES

ANNUAL PERCENTAGE RATE The cost of your credit as a yearly rate.	FINANCE CHARGE The dollar amount the credit will cost you.	Amount Financed The amount of credit provided to you on your behalf.	Total of Payments The amount you will have paid after you have made all payments as scheduled.	Total Sale Price The total cost of your purchase on credit, including your downpayment of 8,000.00
21.533 %	$2,553.84	$4,974.00	$7,527.84	$15,527.84

B. YOUR PAYMENT SCHEDULE WILL BE:

Number of Payments:	Amount of Payments:	When Payments Are Due:
One Payment of	$500.00	9/1/2014
One Payment of	$250.00	9/1/2014
One Payment of	N/A	
47	$156.83	Monthly, beginning 9/29/2014
	N/A	
One Final Payment		8/29/2018

C. SECURITY:

SECURITY: You are giving a security interest in the goods or property being purchased. LATE CHARGES: If any payment is more than 10 days late you may be charged 5% of the late amount. PRE-PAYMENT: If you pay early, you may be entitled to a refund of part of the finance charge. See this contract for any additional information about nonpayment, default, any required repayment in full before the scheduled date, and prepayment refunds. (e) MEANS AN ESTIMATE

NOTICES: The names and addresses of all persons to whom the notices required or permitted by law to be sent are set forth at the top of this form.

STATEMENT OF INSURANCE

NOTICE: No person is required, as a condition of financing the purchase of a motor vehicle, to purchase or negotiate any insurance through a particular insurance company, agent or broker. ONLY PHYSICAL DAMAGE INSURANCE IS REQUIRED TO OBTAIN CREDIT.

UNLESS A CHARGE IS INCLUDED IN THIS AGREEMENT FOR PUBLIC LIABILITY OR PROPERTY DAMAGE INSURANCE, PAYMENT FOR SUCH COVERAGE IS NOT PROVIDED BY THIS AGREEMENT.

You have requested Seller to include in the balance due under this agreement the following insurance. Buyer requests Seller to procure insurance upon the described property against fire, theft, and collision for the term of this agreement. Any insurance will not be in force until accepted by the insurance carrier.

	Premium
$ N/A DED., COMP., FIRE & THEFT	N/A Mos. $ N/A
$ N/A DEDUCTIBLE COLLISION	N/A Mos. $ N/A
BODILY INJURY $ N/A LIMITS	N/A Mos. $ N/A
PROPERTY DAMAGE $ N/A LIMITS	N/A Mos. $ N/A
MEDICAL	N/A Mos. $ N/A
	N/A Mos. $ N/A
TOTAL VEHICLE INSURANCE PREMIUMS	$ N/A (a)

The foregoing declarations are hereby acknowledged.

X SELLER X BUYER X CO-BUYER

OPTIONAL CREDIT & DISABILITY INSURANCE AUTHORIZATION AND APPLICATION

You voluntarily request the credit insurance checked below, if any, and understand that such insurance is not required. You acknowledge disclosure of the cost of such insurance and authorize it to be included in the balance payable under the security agreement. Any returned or refunded credit insurance premiums shall be applied to the sums due under this contract. Only the persons whose names are signed below are insured.

CREDIT LIFE	N/A	Mos. Premium $	N/A
JOINT LIFE	N/A	Mos. Premium $	N/A
CREDIT DISABILITY	N/A	Mos. Premium $	N/A
TOTAL CREDIT INSURANCE PREMIUMS		$	N/A (b)

Company

☐ You want Credit Life Insurance ☐ You want Joint Credit Life Insurance

☐ You want Credit Disability Insurance (Primary Buyer Only)

You are applying for the credit insurance marked above. Your signature below means that you agree that: (1) You are not eligible for insurance if you have reached your 60th birthday. (2) You are eligible for disability insurance only if you are working for wages or profit 30 hours a week or more on the Effective Date. (c) Only the primary buyer is eligible for disability insurance.

DISABILITY INSURANCE MAY NOT COVER CONDITIONS FOR WHICH YOU HAVE SEEN A DOCTOR OR CHIROPRACTOR IN THE LAST 6 MONTHS (refer to "Total Disabilities Not Covered" in your policy or certificate for details).

By signing below, you agree to buy credit insurance

X DATE PRIMARY BUYER AGE

X DATE CO-BUYER AGE

X Buyer's Signature X Co-Buyer's Signature BPI SA10-ARB-e 7/13 Page 1 of 6

ITEMIZATION OF AMOUNT FINANCED - Seller may keep a portion of these amounts.

1. Total Cash Price
   A. Cash Price Motor Vehicle and Accessories $ 9,740.00 (A)
      1. Cash Price Vehicle $ 9,450.00
      2. Cash Price Accessories $ 95.00
      3. Other $ 195.00
      $ N/A
   B. Document Processing Charge $ 45.00 (B) (not a governmental fee)

SERVICE CONTRACT (Optional)

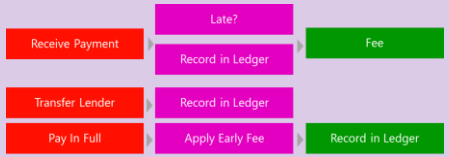
You request a service contract written with the following company for the term below. The cost is shown on line 1t in Itemization of Amount Financed.

Company RELIABLE PROTECTION

Term 60 Mos. or 100000 Miles

Smart Contract Package

Logic

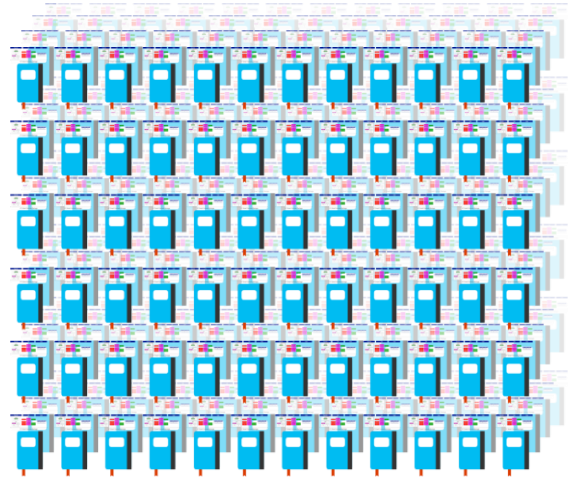


Properties

Ledger

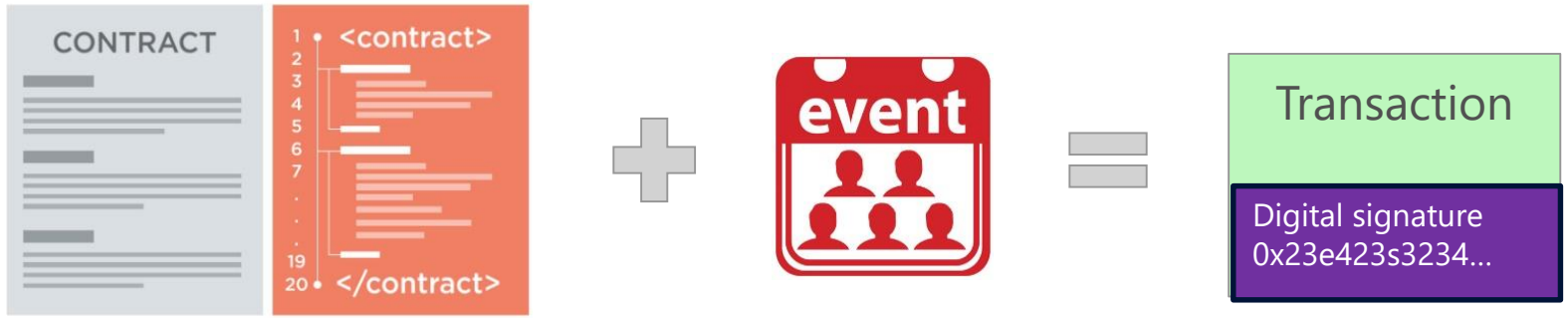
Date	Payment	Late Fee
12/1/2016	$500.00	$0
1/1/2017	$500.00	$0
...		

Deployed to Nodes



Blockchain 2.0 | More complex example

- What if you stored whole agreements on the blockchain, what would that look like?
- Blockchain 2.0 expands the power of the ledger to include additional logic (code) through Smart Contracts
  - Smart Contracts contain code and execute various terms written in that contract
  - Like normal contracts, these Smart Contracts are based on reaching agreed-upon conditions
  - Smart Contracts are now stored on and exist within Blockchain 2.0's distributed ledger
  - Think of Smart Contracts as the computer code representation of a legal contract
- Examples: Contracts can be as simple as recording a loan and making payments on that loan or as complex as swaps.



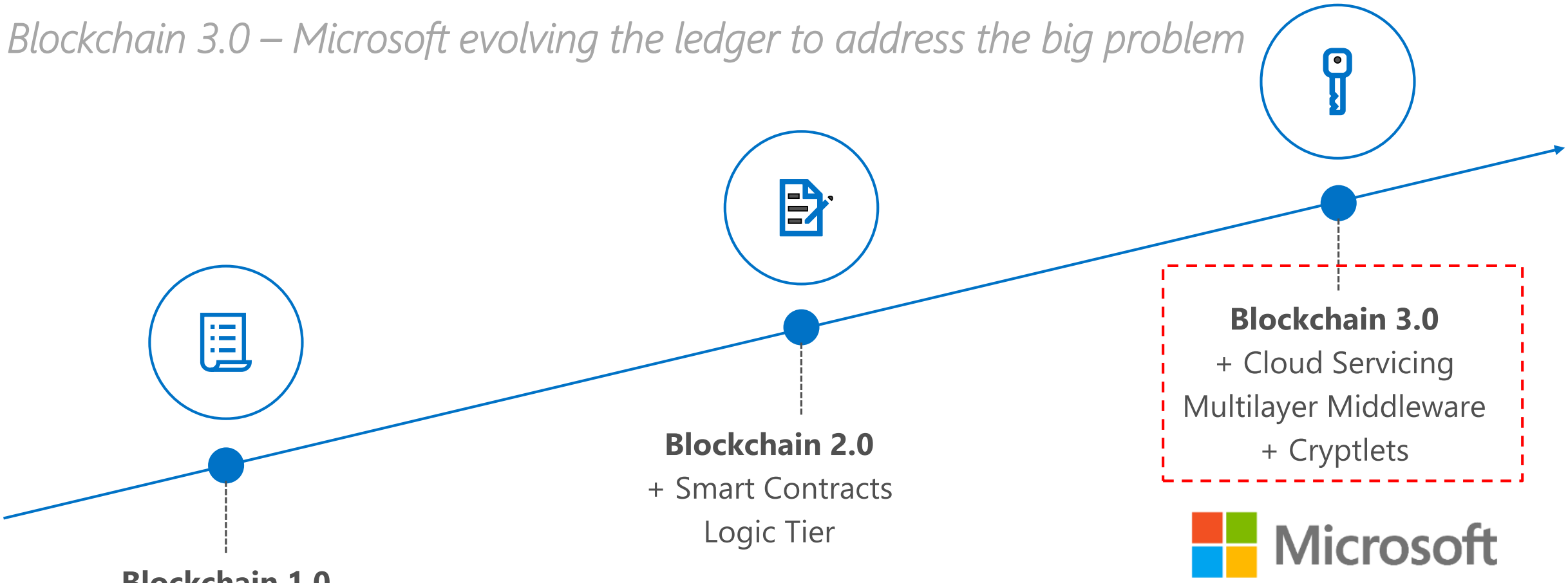
Smart Contract | Event | Executed transaction

Blockchain 2.0 | Changes from 1.0

Blockchain 1.0		Blockchain 2.0	POTENTIAL BENEFITS
Bitcoin Blockchain	→	Ethereum, Corda, Hyperledger, Sawtooth Lake, many others yet to come	Not locked into one vendor
Simple Transactions	→	Generic Contracts	Can handle more complex needs
One Blockchain	→	Multiple, Linked Blockchains	Can partition information & pick different chains for different needs (location, regulation, speed, privacy, etc.)
Public Only	→	Public, Private, Consortium, or Domain Specific	Solves many regulatory and privacy needs
Proof of Work Only	→	Different ways to reach Consensus improvement for need – Proof of Work, Stake, Identity, Vote, etc.	Overcomes some of the existing Blockchain issues such as speed and computational cost
Continually Open & Distributed	→	User Choice	Craft blockchain solutions around the business needs

Evolution of Blockchain

Blockchain 3.0 – Microsoft evolving the ledger to address the big problem



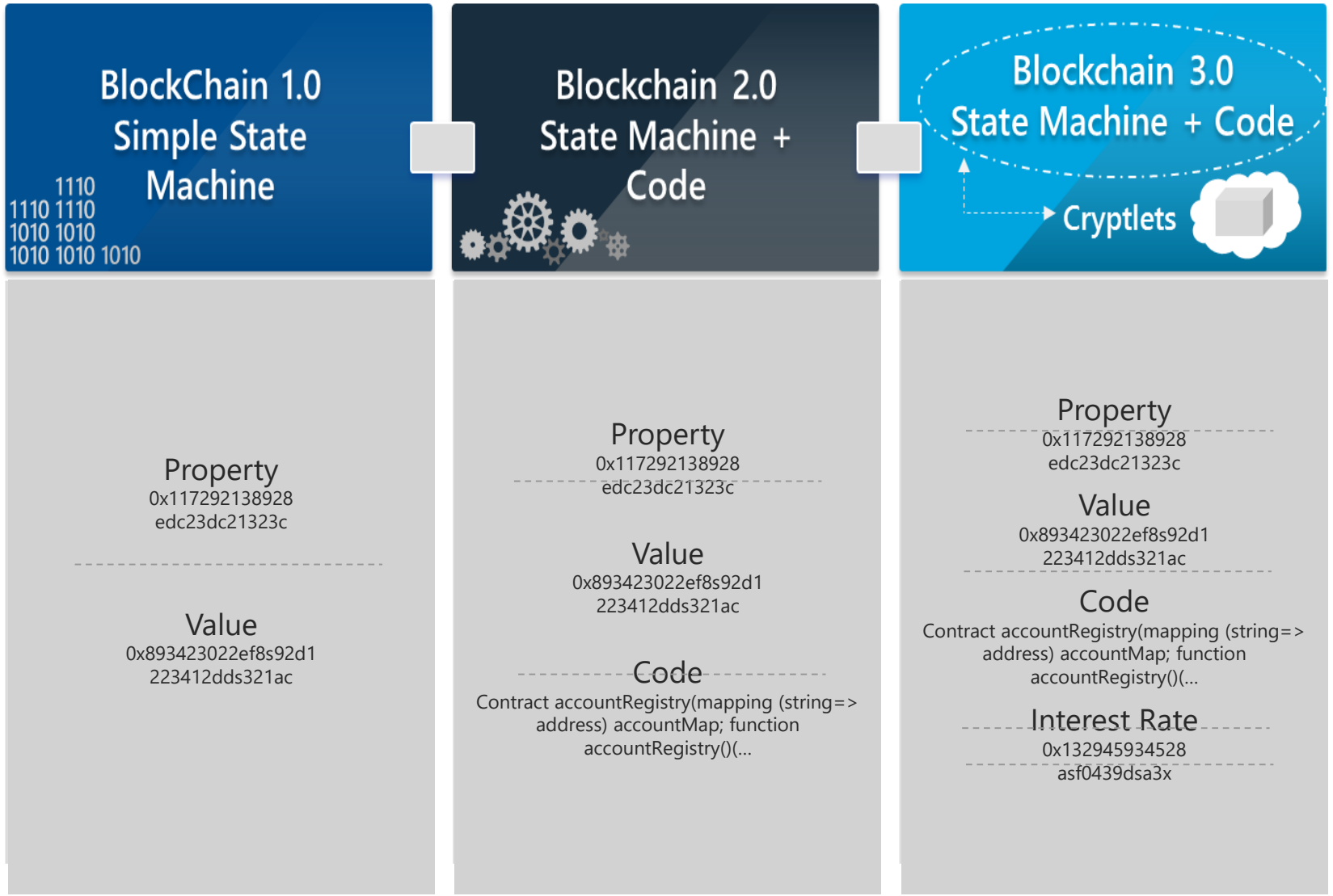
Blockchain 1.0
Simple Ledgers that record transactions

Blockchain 2.0
+ Smart Contracts
Logic Tier

Blockchain 3.0
+ Cloud Servicing
Multilayer Middleware
+ Cryptlets

Microsoft

Blockchain 3.0 | State-of-the-art cryptlets innovation



Financial Services | Key Value Drivers

Value Driver	Detail
Operational simplification	Blockchain reduces / eliminates manual efforts required to perform reconciliation and resolve disputes.
Regulatory efficiency improvement	Blockchain activates near real-time monitoring of financial activity between regulators and regulated entities.
Counterparty risk reduction	Blockchain challenges the need to trust counterparties to fulfill obligations as agreements are codified and performed in a shared, immutable environment.
Clearing and settlement time reduction	Blockchain distintermediates third parties that support transaction verification / validation and accelerates settlement.
Liquidity and capital improvement	Blockchain reduces locked-in capital and provides transparency into sourcing liquidity for assets.
Fraud minimization	Blockchain implements asset provenance and full transaction history to be established with a single source of truth.

Business Scenarios

Blockchain shows tremendous potential across industries

Energy

- Asset tracking
- Real time auction for supplier contracts
- Supply chain transparency
- Commodity trading

Retail

- Loyalty tracking
- Product provenance
- Logistics management

Insurance

- Claims Management
- MBS/Property Payments
- Fraud detection
- Automated underwriting

Banking and Capital Markets

- Bond Issuance
- Trade Finance
- Loan Syndication
- Post Trade Settlement
- Cross Border Payments
- Derivatives Trading
- KYC/AML

Government

- Licensing and ID
- Benefits distribution
- Aid tracking
- Military security

Health

- Personalized medicine
- Records sharing
- Compliance

Blockchain Scenarios for all Industries

Financial

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

Retail & Manufacturing

Improved supply chain management, smart contract platforms, digital currencies, and cybersecurity.

Healthcare

Removes third-party verifiers such as health information exchanges by directly linking patient records to clinical and financial stakeholders. Provides fast, security-enhanced, 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.

Construction

Together with Building Information Technology (BIM) can be used to streamline compliance and solve issues with trust and verification in the whole process.

Reduce cost and time related to payment disputes by allowing participants to create contracts that force them to move through a certain checklist before being paid.

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

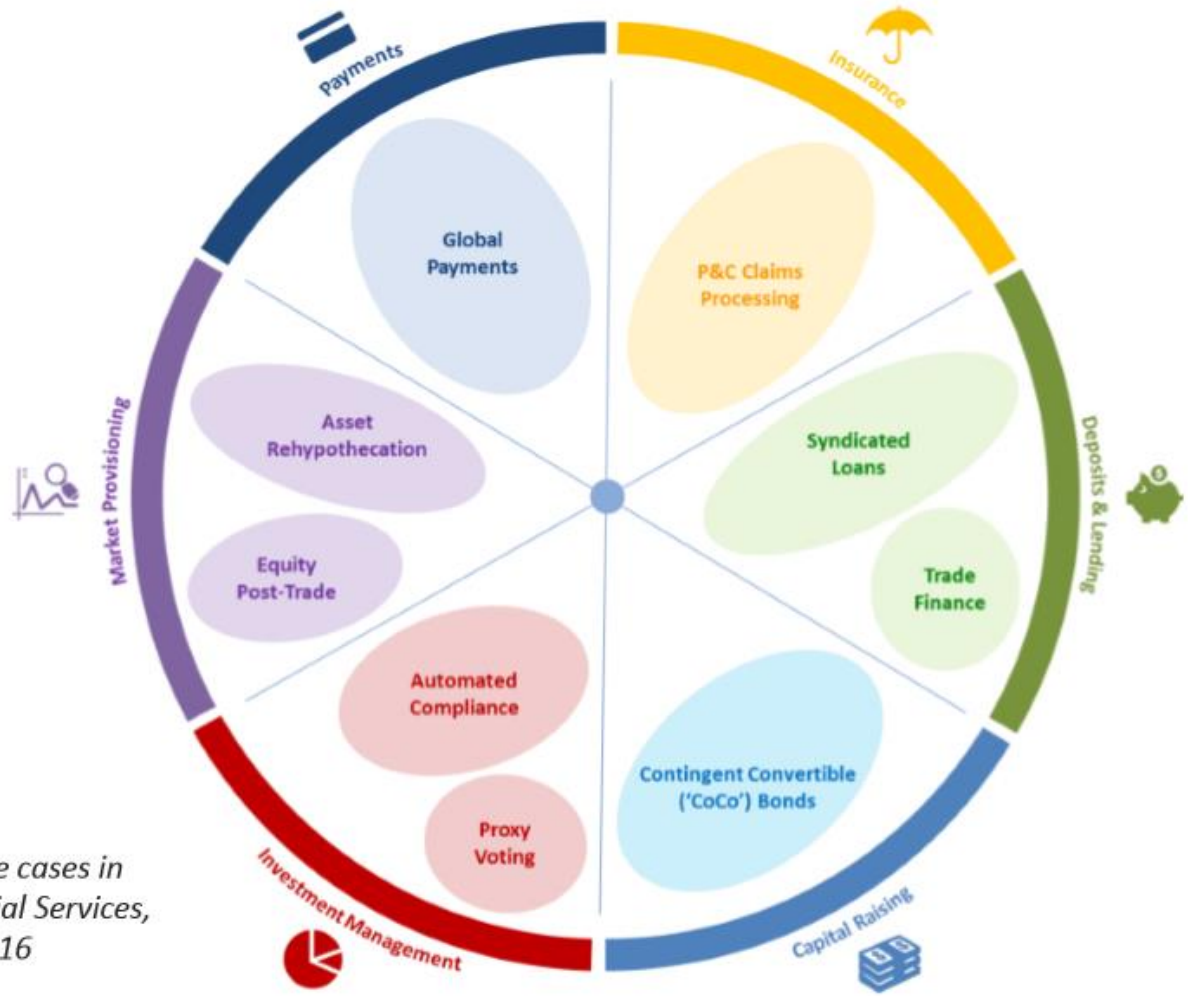
Payments
Micropayments (apps, 402)
B2B international remittance
Tax filing & collection
Rethinking wallets & banks

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

Blockchain Disruption

Financial Services Institutions



DLT use cases in Financial Services, July 2016

Financial

Trade Finance
Deal origination
POs for new securities
Equities
Fixed income
Derivatives trading
Escrow Services
Total Return Swaps (TRS)
Second generation derivatives
The race to a zero middle office
Collateral management
Settlements
Global Payments
Transferring of value
Know your client (KYC)
Anti money laundering
Client and product reference data.
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 prediction
Telematics & ratings

Escrow Services for real estate

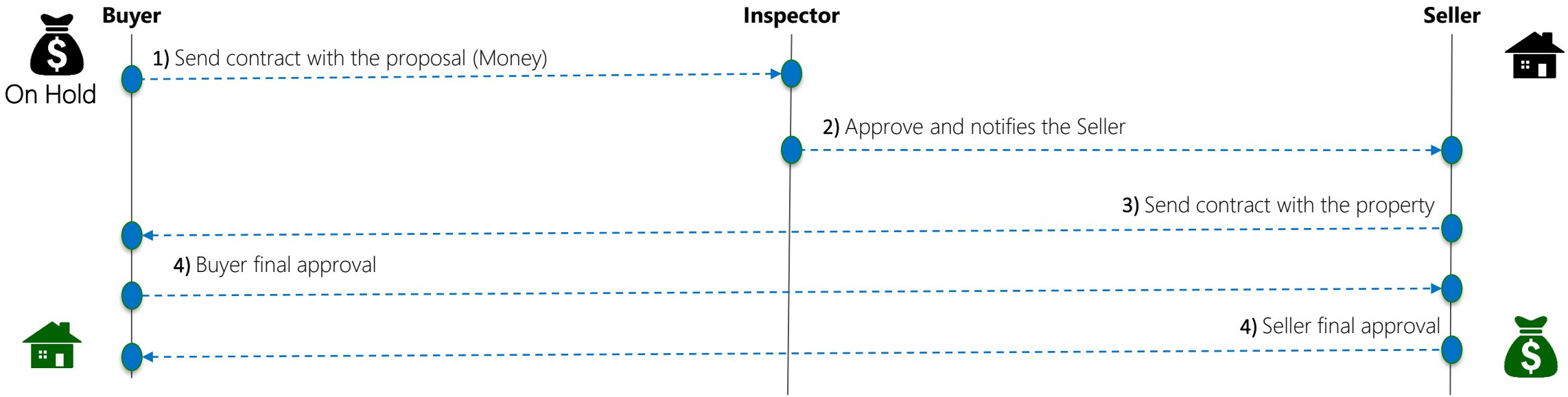
Supporting Contracts

- Property Registry (*map properties id with owners*)
- Bank (*maps users to their balances*)

Roles

- Buyer
- Inspector (information about the property)
- Seller

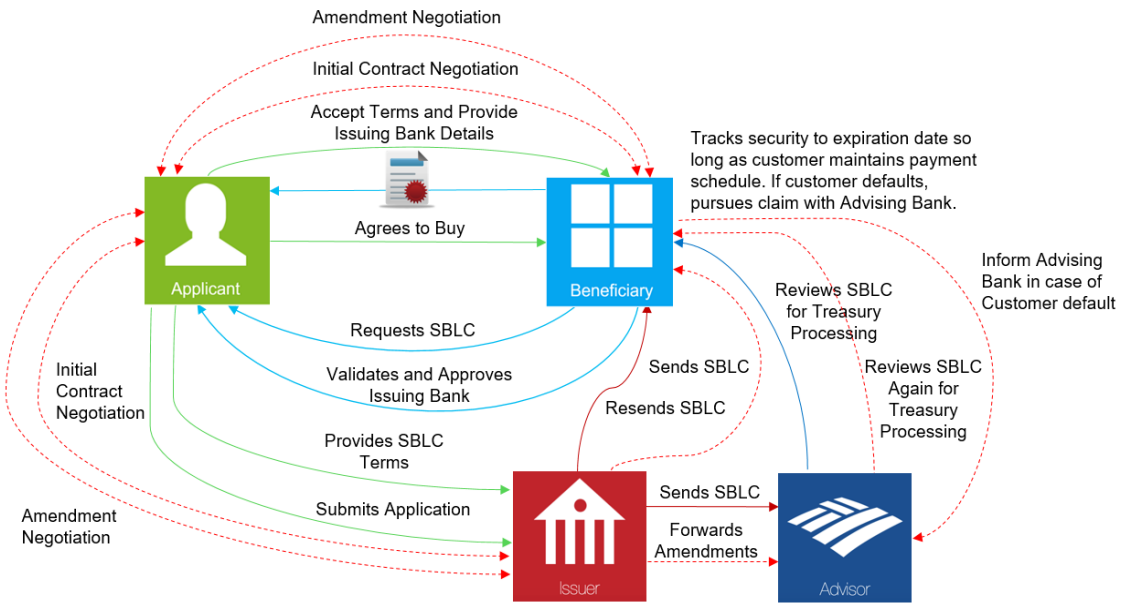
Business Process



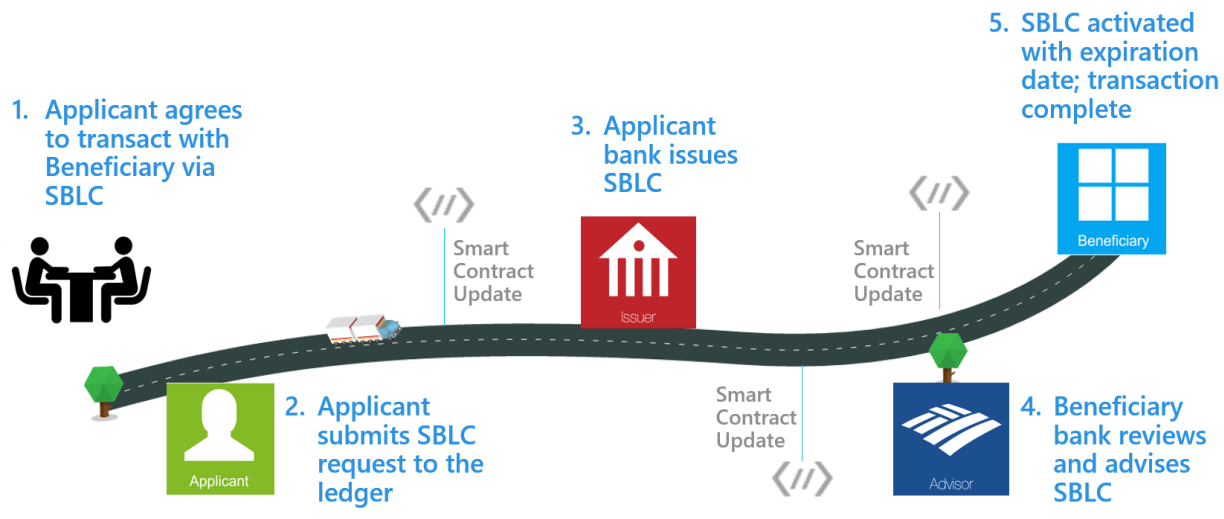
Standby Letter of Credit (SBLC)

Microsoft Treasury

Bank of America Merrill Lynch



Non Optimized Process

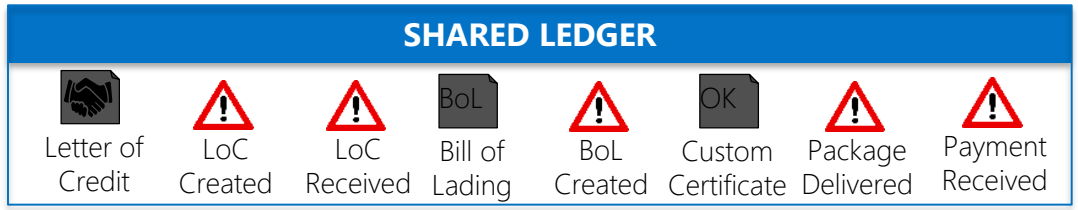


Process Transformation with Blockchain

Announcement https://news.microsoft.com/2016/09/27/microsoft-and-bank-of-america-merrill-lynch-collaborate-to-transform-trade-finance-transacting-with-azure-blockchain-as-a-service/

Import and Exports

Trade Finance



1) A Smart Contract Is Created

Agreement

EXPORTER

IMPORTER

2) Issuing bank creates a Letter of Credit (LoC)

Issuing Bank

3) Advisor Bank is notified about the LoC, reviews it and notifies the Exporter that everything is correct.

Advisor Bank

4) The exporter prepare the package and hand it over to the shipment company

EXPORTER

Shipping Company

5)The shipment company issues a Bill of Lading (BoL)

6) After receiving the consensus from all the trusted members, the customs certificate gets added to the blockchain

Destination Port

7) A Carrier pick the package and deliver it to the Importer

Carrier

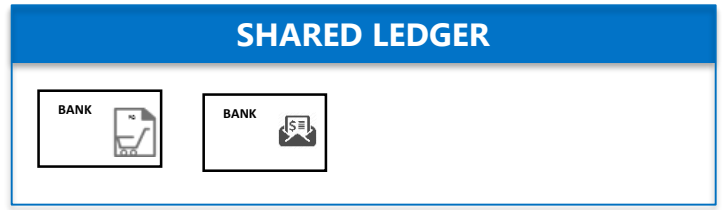
8) Package Delivered Successfully

IMPORTER

9) After the package is received and all the conditions of the smart contract are honored, payment is made to the exporter

EXPORTER

Credit Chain



Fashion Retailer

Supplier 1

Commercial Agreement between parties

Bank

1) Contract & Purchase Order (PO) is created

2) The BANK digitally signs the PO and the Supplier is notified to let them know the BANK will handle the auto-payment

3) If the supplier is a customer of the BANK , a Money lo Proposal is also provided *(Business Opp)*

4) In this case, the supplier doesn't need a loan and the order is processed

5) Order ready and delivered

6) A Proof of Payment letter (PoPL) is created *(usually to pay in 60 or 90 days)*

7) the BANK digitally signs the PoPL and the supplier receives notification of the Money loan *(Business Opp)*

8) Supplier accepts the loan proposal and **9)** the BANK proceeds with the standard loan process and transfers the money to Supplier 1

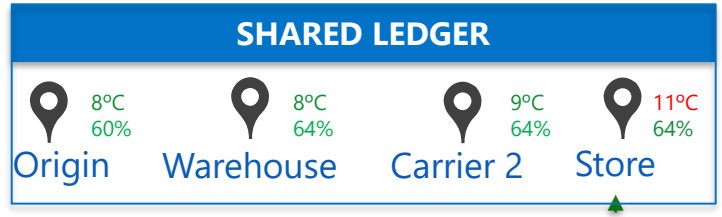
In this case, the supplier wants the money ASAP.

10) Deposit a loan commission into the Fashion Retailer

11) After the time of payment described in the PoPL, the BANK gets the amount from the Fashion Retailer account

Supply Chain

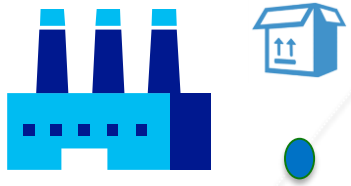
Freight Transportation



At various points in the journey, the IoT device from the package sends the Temperature & Humidity data which are recorded on the blockchain

The milk product is sealed in an IoT-enabled package for shipping

Temperature 8º C
Humidity 60%



Food Processor

PRODUCER

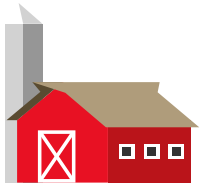
Milk producer supplies Milk to Food Processing Company

SMART CONTRACT

The terms of shipping are registered using a **smart contract** on the Blockchain

The package has to be maintained at :
Temperature < 10º C
Humidity < 65%

CARRIER 1



Warehouse

Temperature 8º C
Humidity 64%

Temperature 9º C
Humidity 64%

CARRIER 2

Temperature 11ºC
Humidity 64%

Retail Store

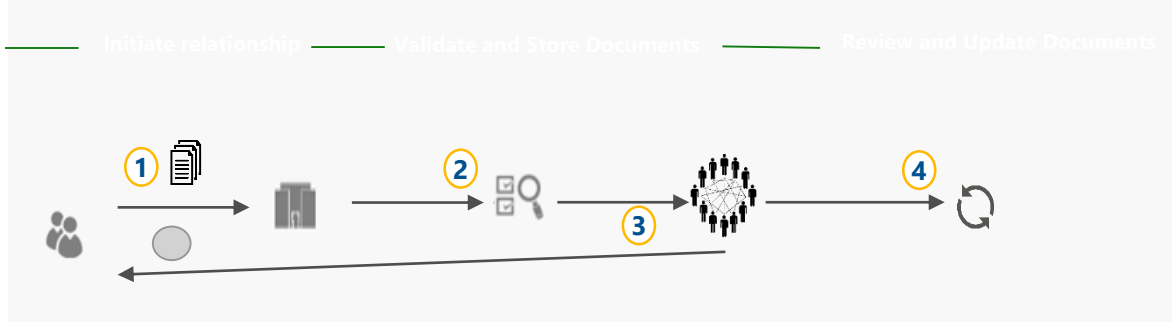
The conditions of the contract have been violated.

Carrier 2 is liable for penalty as the temperature of the package when it reached the retail store was above the prescribed limit

SMART CONTRACT UPDATED

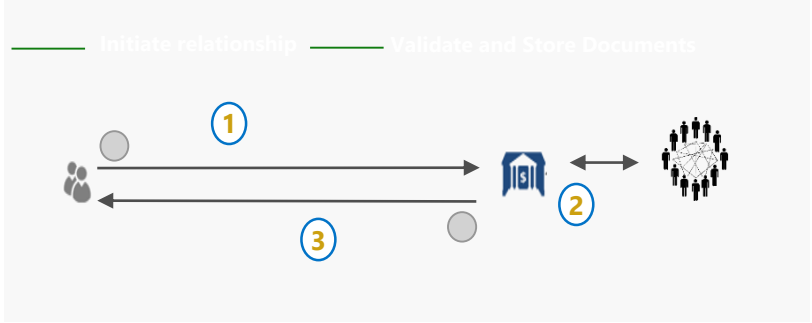
Know your Customer (KYC)

1/2) Registration



1. Private documents are selectively shared by a customer with a trusted party (regulator, government entity, or licensed partner.)
2. The trusted party reviews and verifies the authenticity of the documents, then produces a digital signature from the documents' cryptographic proffs, which is then notarized onto a blockchain.
3. A cryptographic token is generated for the customer, which can be used to verify the authenticity of the trusted party's signature, the documents, and thus the validity of each step of the KYC process.
4. As documents become obsolete or invalid, a workflow is introduced and updates are timestamped into a public blockchain to demonstrate the validation of these documents by a trusted party.

2/2) Onboarding at Institution



1. Customer presents validated token as cryptographic proof.
2. Using the token and the signed hashes in the blockchain, the institution uses independent techniques to verify its validity.
3. Once the new service has validated the customer token, the service can sign the confirmation of the customer's validation into a blockchain, giving the customer an updated token which includes the additional record of validation.

Common Characteristics

Characteristic		Example
Shared repository	**A shared repository** of information is used by multiple parties	*Ledger that stores financial assets in which an owner and owned assets are tracked and shared with other internal/external parties (e.g. regulators and other geographical units).*
Multiple writers	**More than one entity** generates transactions that require modifications to the shared repository	*Payments system collectively managed and maintained by a small group of banks, but each bank has millions of end users transacting with their bank.*
Minimal trust	A level of **mistrust exists between entities** that generate transactions	*Multiple parties within a trade finance arrangement (e.g. importer, exporter, issuing bank, receiving bank, correspondent banks and customs) that do not "trust" each other and, therefore, institute layers of verification and impose collateral requirements.*
Intermediaries	**One (or multiple) intermediary** or a central gatekeeper is present to enforce trust	*Removing and/or reducing the importance of a central intermediary whose primary role is to provide "trust" to the post-trade ecosystem.*
Transaction dependencies	Interaction **or dependency between transactions** is created by different entities	*A situation in which Alice needs to send funds to Bob, then Bob needs to send funds to Charlie. Bob's transaction is dependent on Alice's transaction, and one cannot verify Bob's transaction without checking Alice's first.*

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

- Blockchain technology improves the customer experience and confidence in the banking system by enabling them to receive automated, digital documents without the need to go to a physical bank branch.
- The solution creates a competitive advantage and cost savings for Bank Hapoalim by streamlining existing systems and services.

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

Utilidex Reimagines Energy Trading with Blockchain

Challenge

- The sector is becoming increasingly complex, with new suppliers entering the market.
- Markets have also suffered from increased volatility, while generation trends have shifted significantly towards renewable sources such as solar power.
- Changing dynamics of the market, and increasing value in energy flexibility.

Strategy

- Help customers buy, sell and optimise their energy in an open, transparent way.
- Worked with Microsoft to trial blockchain technology and prove the technology's application in buying and selling energy.

Results

Utilidex's blockchain technology will:

- Let users analyse data on plants.
- Make billing easier.
- Show real-time market data.
- Predict energy production.
- Feature a personal digital assistant that offers instant alerts.

utilidex

"This work is part of our broader ambitions to help customers buy, sell and optimise their energy in a very different way"

- Richard Brys, Chief Executive Officer of Utilidex

Microsoft Vision and Strategy

Market Challenges

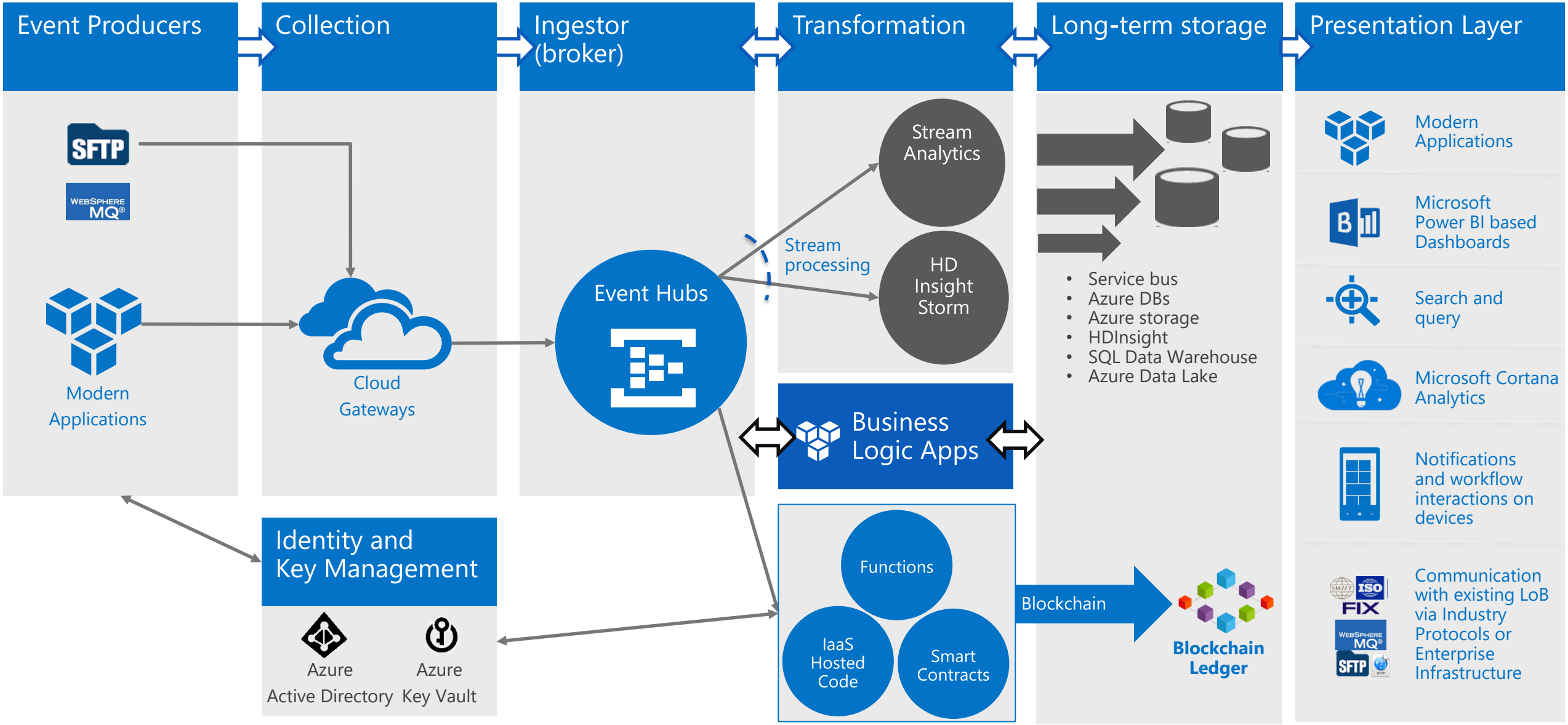
HYPE
Lots of hype and noise.

IMMATURE
Many offerings are immature and early.

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

PATH TO PRODUCTION IS AMBIGUOUS
Not always clear to go from concept to production.

What do Blockchain Architectures look like?



Build development environment consisting of blockchain protocol clients and network infrastructure

Build Blockchain Network on premises/cloud providers: 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

VS

Deploy Blockchain Network in Azure using BaaS Bletchley Framework: 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)

Why Microsoft for Blockchain?

- Open Blockchain Ecosystem
- Our platform will integrate with your investments
- Regulatory and Compliance Ready (including Financial Services)

Azure

Microsoft Azure | Open Cloud

Hyper Scale

Enterprise Grade

Hybrid

Azure BaaS

coinprism

Libra

bitpay

ETH BaaS

openchain

ripple

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

apprenda

Web App Gallery

Dozens of .NET & PHP CMS and Web apps

Management

JUJU

CHEF

puppet labs

ANSIBLE

GitHub

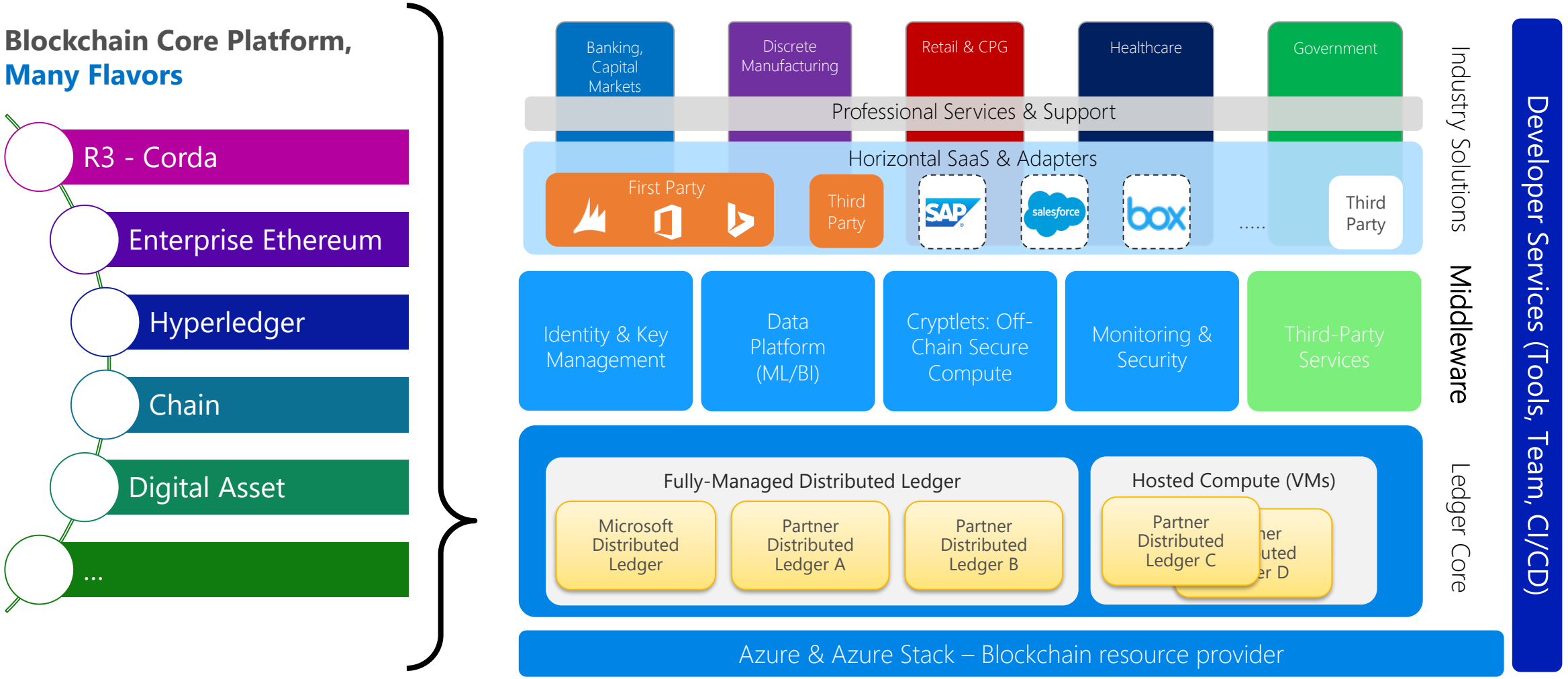
SALTSTACK

Clients

APACHE CORDOVA

Xamarin

Enterprise Smart Contracts Overview

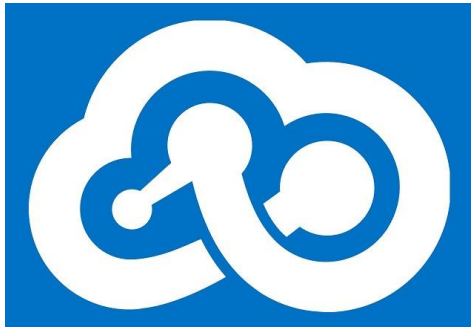


Addressing Enterprise Challenges | Introducing the Coco Framework

Enterprise Challenges	Coco Enterprise Framework
Performance and Scalability	Database Throughput
Data Privacy and Security	Richer Controls and Granular Access
Consortium Governance	Flexible/Distributed Governance Policy
Energy Consumption	Energy Efficient Consensus

Microsoft Azure | Azure Blockchain Solutions

Bletchley Framework

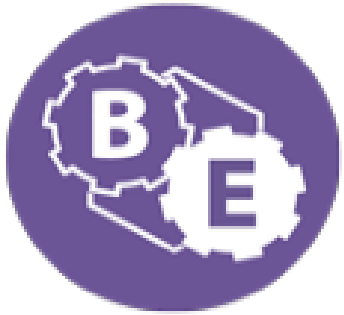


Ethereum Consortium Blockchain
by Microsoft

STRATO Blockchain LTS
by Blockapps

Chain Core Developer Edition
by Chain

Ethereum Studio
by Ether.camp



Emercoin Blockchain Engine
by Emercoin

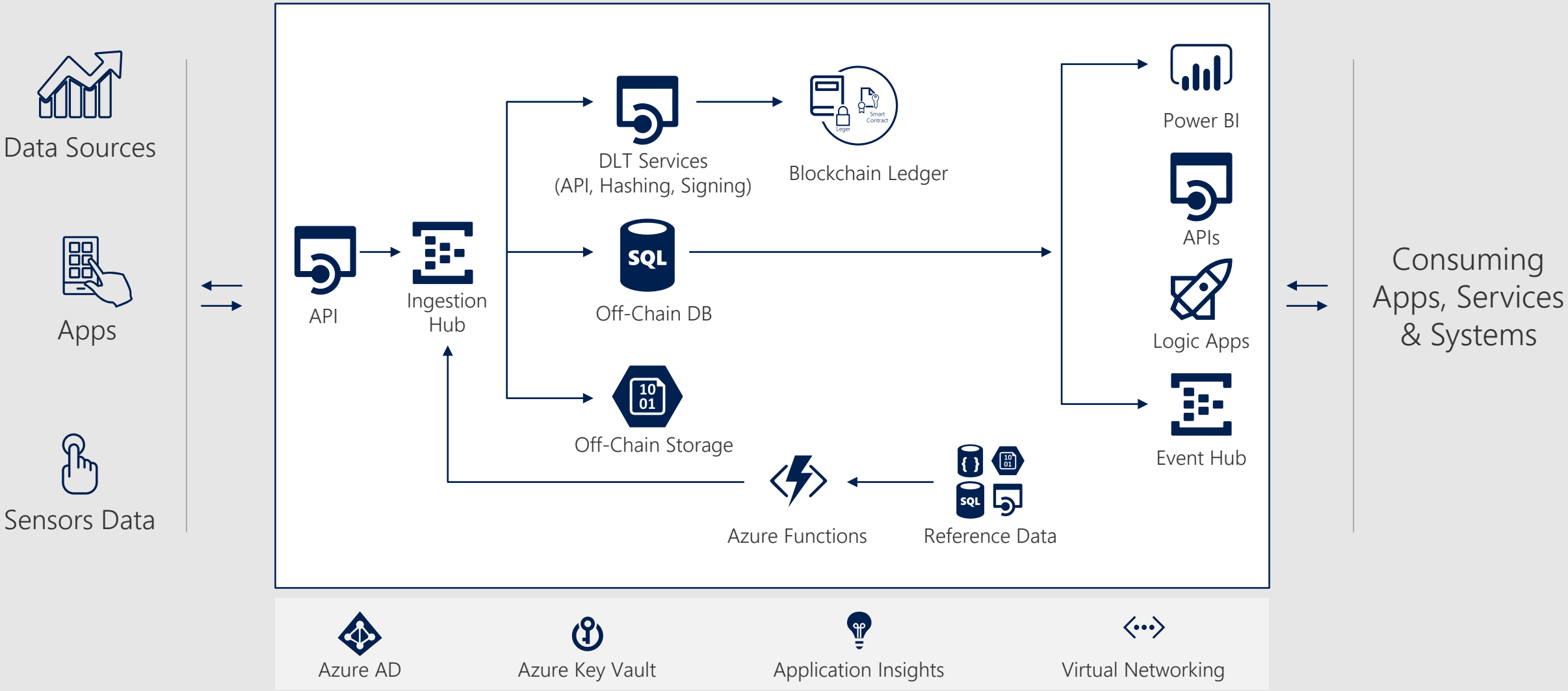
Blockchain as a **Service** (BaaS)

Virtual Machines

Blockchain App Builder helps our customers get started with building applications for blockchain by providing scaffolding including not limited to;

- Generated, Responsive Web UI,
- Automated off-chain storage, i.e: databases
- Day one extensibility for data and other clients
- Hashing and signing services
- Integration with AAD and Azure Key vault services
- Support for advanced analytics

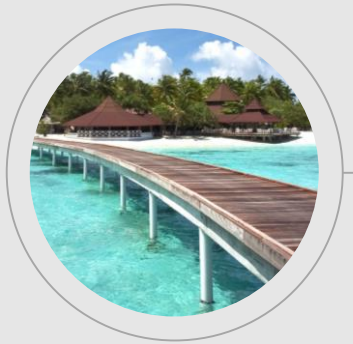
With a clear, simplified approach



Accelerate your development with App Builder

Reduce Cost and Time

Build Blockchain apps faster and easier and reduce costs of development



Get Off the Island

Automatically connect Blockchain applications to services you care about

Move towards production

Move towards production faster with automatically built scaffolding

Tenets of our BaaS Strategy

FAIL FAST & CHEAP
in a development test environment

MIX & MATCH
from the world-class blockchain technologies

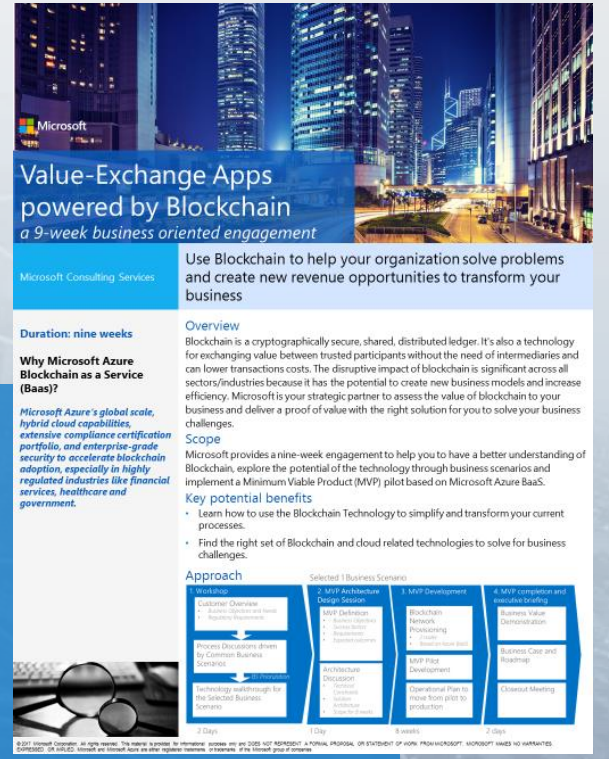
CREATE & INNOVATE
by building solutions on blockchain quickly

SHARE SOLUTIONS
through a worldwide distributed platform

PROVISION
with one-click to test & iterate

Blockchain Maturity Model & Needs

Level 4 **1%**	• Multiple, well defined scenarios • Multiple years of Blockchain experience • Operations and support processes well defined • Seeking early access and technical guidance for platform features	• Briefing • EAP for Blockchain vNext Features (such as Cryptlets Fabric)
Level 3 **4%**	• Target scenario well defined • Some Blockchain experience • Operations and support processes may be defined • Seeking help with a Production Pilot	• Briefing • Strategy / Arch Workshop • DA Engagement • Consulting Delivery (24-30 weeks)
Level 2 **15%**	• Potential scenario(s) identified • Limited Blockchain experience • Operations and support processes not defined • Seeking help with a Minimal Viable Product (MVP) Proof of Concept	• Briefing • Strategy / Arch Workshop • DA Engagement • Consulting Delivery (8-12 weeks)
Level 1 **80%**	• Scenarios not identified • No Blockchain experience • Operations and support processes not defined • Seeking education and strategy for business and IT	• Briefing • Strategy / Arch Workshop • Technical Training • Lab Setup • Hackathon



Microsoft

Get started today!

Value-Exchange Apps powered by Blockchain Essentials

Microsoft Services workshop is a two-day working session to help you to have an increased **understanding of Blockchain**, **explore the potential of blockchain** in your organization and **identify business scenarios**.

microsoft.com/**blockchain**

Thank you

ευχαριστώ Salamat Po متشكرم شكراً Grazie благодаря ありがとうございます

Kiitos Teşekkürler 谢谢 ขอบคุณครับ Obrigado شكريه Terima Kasih Dziękuję

Hvala Köszönöm Tak Dank u Wel дякую Tack Mulţumesc спасибо Danke

Cám ơn Gracias 多謝晒 Ďakujem תודה நன்றி Děkuji 감사합니다

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