Microsoft Blockchain Strategy and Roadmap

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What is Blockchain?
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
Blockchain is a secure, shared, distributed ledger

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

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

**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.

**Ledger**
The database is “write once” so it is an immutable record of every transaction that occurs.
Data is stored in a ledger

<table>
<thead>
<tr>
<th>FROM</th>
<th>TO</th>
<th>PROPERTY</th>
<th>VALUE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alex</td>
<td>Katie</td>
<td>Payment</td>
<td>$500</td>
</tr>
<tr>
<td>Jim</td>
<td>Sally</td>
<td>Payment</td>
<td>$300</td>
</tr>
<tr>
<td>Alex</td>
<td>Garth</td>
<td>Asset</td>
<td>Car</td>
</tr>
<tr>
<td>Katie</td>
<td>Tony</td>
<td>Payment</td>
<td>$100</td>
</tr>
<tr>
<td>Molly</td>
<td>Paula</td>
<td>Message</td>
<td>I love you</td>
</tr>
</tbody>
</table>

Example ledger

Entire network has same ledger
Where is Blockchain valuable?
Blockchain technology supports two main goals.
When your project meets certain criteria

Answering a few questions can determine if blockchain is appropriate

- Is this a business process that crosses trust boundaries?
- Do multiple parties share data?
- Is there a requirement for verification?
- Can intermediaries be removed?
Blockchain shows tremendous potential across industries:

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

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
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.

“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

<table>
<thead>
<tr>
<th>Challenge</th>
<th>Strategy</th>
<th>Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Duplication, inefficiency, lack of transparency, lack of data, fraud, and errors across lots of parties interacting in marine insurance</td>
<td>• EY, Maersk, Guardtime, and Microsoft developed a real-time blockchain enabled platform for marine insurance</td>
<td>• Real-time visibility into the location, condition and safety of high-value assets moving around the world</td>
</tr>
<tr>
<td>• Change is hard due to multiple regulators and jurisdictions</td>
<td>• The solution streamlines claims and settlement processes, while reducing errors.</td>
<td>• Accurate, dynamic and fair underwriting and pricing based on that visibility</td>
</tr>
<tr>
<td>• Rates are under pressure and costs are becoming unmanageable</td>
<td></td>
<td>• Streamlined regulatory reporting and compliance</td>
</tr>
<tr>
<td>• Compliance is challenging</td>
<td></td>
<td>• Accurate and transparent data sharing among all relevant stakeholders with audit trail</td>
</tr>
</tbody>
</table>

“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.

“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.

“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
Inefficient operations

Working capital and balance sheet implications

Lack of visibility to exposures
Moving to digital is not enough
SBLC with Blockchain

Issuance time from weeks to hours

Increased sales and speed of delivered services

Transparency across all participants

SBLC process:
1. Applicant agrees to transact with Beneficiary via SBLC
2. Applicant submits SBLC request to the ledger
3. Applicant bank issues SBLC
4. Beneficiary bank reviews and advises SBLC
5. SBLC activated with expiration date; transaction complete

Ledger process:
Smart contract update
Smart contract update
Smart contract update
Why isn’t everyone using Blockchain right now?
Blockchain wasn’t built for enterprise

- **Enterprise-Grade Ledgers**
  Ledgers designed for public network cryptocurrencies lack the performance, confidentiality, and governance capabilities needed for commercial use

- **Smart Contracts**
  Smart contracts were not designed to leverage existing enterprise tools and skill sets

- **Getting Off the Island - Integration**
  There are a number of challenges to integrate a blockchain with existing IT architecture
Blockchain with Microsoft

Blockchain on your terms
- Open cloud
- The most regions
- True hybrid
- Deep partner bench

Integrated with your business
- Identity, key management with AAD and Key Vault
- Middleware support in Azure
- IaaS, PaaS, & SaaS

For the enterprise
- Secure off-chain integration
- Security, confidentiality, scalability
- Compliance
Choose the ledger technology that meets your needs
Single click automated deployment of ledgers and tools

Deploy in the topology of your choice

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

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

3. **Multi-member: Collaborate between multiple divisions and organizations**
   Multi-node across multiple regions, Azure subscriptions, and/or organizations
Overcome technology gaps with Coco Framework

**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

- Demo by Mark Russinovich: [https://www.youtube.com/watch?v=8s6JMcGJdY&feature=youtu.be](https://www.youtube.com/watch?v=8s6JMcGJdY&feature=youtu.be)
An enterprise-friendly platform

Connect to existing apps and workflows

Coordinate with relevant tools

Fully managed enterprise ledgers

Developer Services (Tools, Team, CI/CD)

Industry Solutions

Middleware

Ledger Core

Horizontal SaaS & Adapters

Professional Services & Support

Identity & Key Management

Data Platform (ML/BI)

Secure Off-Chain Execution

Monitoring & Security

3rd Party Services

Azure & Azure Stack – Blockchain resource provider

Banking, Capital Markets

Discrete Manufacturing

Retail & CPG

Healthcare

Government

App Builder
Workflow Design & Orchestration

1st Party

3rd Party

Partner Distributed Ledger A

Partner Distributed Ledger B

Partner Distributed Ledger C

Partner Distributed Ledger D

Partner Distributed Ledger E

Coco Framework

Identity & Key Management

Data Platform (ML/BI)

Secure Off-Chain Execution

Monitoring & Security

3rd Party Services

Coco Framework

Azure & Azure Stack – Blockchain resource provider
Today, you can codify a workflow as a smart contract.
But it cannot deliver enterprise security or scale

Security
- Proprietary code stored in shared data layer.
- Unable to call off-chain data

Scale
- Storing business logic on-chain means that it has to be re-written for each chain, limiting scaling

### Variable Items
- % Rate
- Payment Amount

### Static Items
- Payment Date
- Late Date
- Term
- Assets or Security
- Amount Financed
- Total Sale

### Payments & Fees Recorded in Ledger

<table>
<thead>
<tr>
<th>Date</th>
<th>Payment</th>
<th>Late Fee</th>
</tr>
</thead>
<tbody>
<tr>
<td>12/1/16</td>
<td>$500.00</td>
<td>$0</td>
</tr>
<tr>
<td>1/1/17</td>
<td>$500.00</td>
<td>$0</td>
</tr>
</tbody>
</table>
You need a re-imagined architecture with Cryptlets

Traditional 3-Tier Software Architecture
- Presentation Layer
  - Business Logic
  - Data Layer
    - Stored Procedures (Data Handling)

Early blockchain Dapp architecture
- Presentation Layer
  - Blockchain (Data Layer)
    - Smart Contracts (Business Logic)

Blockchain + Cryptlets
- Presentation Layer
  - Blockchain (Data Layer)
    - Smart Contracts (Data Handling)
So apps can use the patterns, tech, and talent you already trust

**Security**
- Securely call off chain data

**Productivity**
- Code in traditional languages with existing devs

**Modularity**
- Write once, use for multiple ledgers
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
Simplifying Blockchain app development

Smart contracts plus config file stands up an app with UI

```solidity
pragma solidity ^0.5.8;

contract IFairTradeProperty
{
  function certify() public;
  function revokeCertification() public;
  function owner(address owner) returns (bool);

  contract FairTradeProperty
  {
    IFairTradeCertificate public TradeCertificate;
  }

  contract IManufacturer
  {
    IFairTradeCertificate public TradeCertificate;
    function distribute() public;
  }
}
```

```json
"Role": {
  "name": "Fair",
  "permissions": {
    "Role": "Participant",
    "Actions": [
      "AcceptOffer",
      "RejectOffer"
    ]
  }
},
"Buyer": {
  "Manufacturer": {
    "Role": "Participant",
    "Actions": "["PurchaseHasCocoa"]"
  }
},
"Manufacturer": {
  "Marketplace": {
    "Role": "Initiator",
    "Actions": "[null]"
  }
}
```

Smart contract (business logic)  Metadata  Blockchain application
The package has to be maintained at:
- Temperature < 10º C
- Humidity < 65%

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

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.
Get Started
Learn more

Sign up for an Azure account and go for a Hands on Lab:

Visit our Azure Blockchain Page

Visit the Azure Blockchain Blog and our Blockchain User Voice

Connect with the Microsoft Tech Community

Join the conversation on Azure Advisors
Hands on Lab


- Objectives
  - In this hands-on lab, you will learn how to:
  - Deploy an Ethereum blockchain network on Azure
  - Use MetaMask to create an Ethereum wallet
  - Write smart contracts and deploy them to Ethereum networks
  - Manipulate Ethereum blockchains using Node.js

- Prerequisites
  - An active Microsoft Azure subscription. If you don't have one, [sign up for a free trial](https://azure.microsoft.com/en-us/pricing/free-trial/).
  - PuTTY and PowerShell (Windows users only)
  - Google Chrome
  - Node.js

- Exercises
  - This hands-on lab includes the following exercises:
    - Exercise 1: Create a Blockchain on Azure
    - Exercise 2: Create a wallet
    - Exercise 3: Unlock the coinbase account (Windows)
    - Exercise 4: Unlock the coinbase account (macOS and Linux)
    - Exercise 5: Deploy a smart contract
    - Exercise 6: Invoke the contract from an app
    - Exercise 7: Delete the Ethereum network