Architecting the Intelligent Edge

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Director, IoT Partner Marketing, Microsoft

Sarah Maston
IoT Solution Architect, Microsoft
The evolution of IoT in Action
The evolution of IoT in Action

Year 2 2018
The Evolution of IoT in Action
# Reasons for IoT adoption

<table>
<thead>
<tr>
<th>Reason</th>
<th>Percentage</th>
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<tbody>
<tr>
<td>Operations optimization</td>
<td>56%</td>
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<tr>
<td>Employee productivity</td>
<td>47%</td>
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<tr>
<td>Safety and security</td>
<td>44%</td>
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<tr>
<td>Supply chain management</td>
<td>40%</td>
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<tr>
<td>Quality assurance</td>
<td>40%</td>
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<td>Asset tracking</td>
<td>33%</td>
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<td>Sales enablement</td>
<td>31%</td>
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<td>Energy management</td>
<td>26%</td>
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<tr>
<td>Condition-based maintenance</td>
<td>25%</td>
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<td>Health and wellness</td>
<td>18%</td>
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### Additional top use case by industry

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<tbody>
<tr>
<td>Retail/Wholesale</td>
<td>64%</td>
<td>59%</td>
<td>48%</td>
<td>44%</td>
<td>40%</td>
<td>56%</td>
<td>51%</td>
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<td>38%</td>
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Top challenges

- Complexity/technical challenges: 38%
- Lack of budget/staff resources: 29%
- Lack of knowledge: 29%
- Haven’t found the right IoT solutions: 28%
- Security: 19%
Solution architecture—DIY

Custom cloud solution

- Provisioning Mgmt Services
- Solution UX
- Identity & registry stores
- Device state stores
- App backend
- Stream processing
- Storage
- Analytics & Machine Learning

IoT devices & sensors

Business systems

Digital feedback loop
We had a similar challenge in the past...
That was solved with Windows Plug and Play

Devices published their capability models and adhered to them. Windows used the capability model to know how to interact with them.
IoT today

Tight coupling between software on device and IoT solution in the cloud
IoT Plug and Play + Azure IoT Central
Daisuke Nakahara, Principal IoT Solution Architect, Microsoft
Connecting hardware is very “hard”

Provisioning
Configuration
Device management
Deployment
Monitoring
IoT Plug and Play defines common language.

A platform feature to describe models and capabilities to cloud.

Based on Digital Twin definition language.

Open source based on open standards (JSON-LD, RDF).
Benefits

Solution developers
Dramatically reduces the effort needed to build software on devices

Customers and partners
Large ecosystem of devices that just work with Azure IoT solutions, without any development required

Device builders
Certify your device for IoT Plug and Play and it can be used with thousands of Azure IoT solutions

In public preview
http://aka.ms/IoTPlugandPlay
Making IoT seamless

The total effort to build and operate an IoT Solution is rapidly decreasing.
Solution architecture—IoT Central
Azure IoT Central

IoT app platform with security, global scale, high availability, disaster recovery built in

- Device connectivity and management
- Telemetry ingestion and command and control
- Monitoring rules and triggered actions
- User roles and permissions
- Dashboards, visualization and insights
- Fully hosted and managed by Microsoft

- White labeling
  - Your SaaS—your brand

- IoT Plug-and-Play
  - Public Preview

- IoT Edge support
  - Incl. Module Management

- Multi-tenancy & RBAC

- Extensibility
  - APIs

- Solution Builder App Templates

- Device Bridge
  - Ingest data from other clouds

- Maps, location telemetry and geofencing

- Continuous Data Export
  - Bring data into downstream business applications
IoT Central App Templates

App templates for Priority Industry Verticals

**App Templates for Industries**
- **Retail**
  - Digital distribution center
  - In-store analytics
  - Checkout, Condition monitoring
  - Connected logistics
  - Smart inventory management
- **Healthcare**
  - Continuous patient monitoring
- **Energy**
  - Smart meter analytics
  - Solar power monitoring
- **Government**
  - Water quality monitoring
  - Water consumption monitoring
  - Connected waste management
Challenge #1
Getting connected

Challenge #2
Making it easier to combine services to “do something”

Challenge #3
Making it easier to use the data; it’s massive

“We’ve been here before”
“Big Data” started with Web 2.0
Remember these?
“Big Data” challenge 2.0
The digital feedback loop

1. Data: Capture digital signal across business
2. Insight: Connect and synthesize data
3. Action: Improve business outcomes
What is confidential computing?

The ability to store, transport, **and act** on compute workloads without compromising privacy of data and intellectual property.
Why confidential computing in IoT

Intelligent edge computing creates the need to protect code and data in use in addition to protection in storage and transit.

- **Code and data confidentiality**
  - Proprietary code and algorithms
  - Sensitive data like patient information and ML models

- **Actions from insights**
  - Safe actions from insights out of intelligent edge processing
  - Trustworthy I/O for command and control of critical infrastructure

- **Valued transactions**
  - Metering actions for billing
  - Events tracking e.g., violations for warranty management
Partners make more possible
The anatomy of the architectural design session
The output
Bryan S. Hamilton
Cloud Architect
Losses in the supply chain

- 22.8 billion global shipments are damaged, delayed, or lost every year\(^2\)
- 30% of perishable goods spoil before they reach their destination\(^3\)
- $60 billion in goods are stolen each year worldwide; $35 billion in the U.S. alone\(^5\)
Intel® Connected Logistics Platform
Automate shipment tracking and gain visibility into the logistics chain*

Edge connectivity
Multifunction IoT tags measure a variety of conditions

Continuous communication
A mesh sensor network helps ensure comprehensive asset visibility

Gateway interface
Gateways efficiently send aggregated data to the cloud via Wi-Fi or cellular connections

Powerful cloud
Microsoft Azure connects, monitors, authenticates and automates data transmission

Meaningful insights
Insights are visualized and delivered through mobile apps or online dashboards

*The Intel® Connected Logistics Platform is fully implemented with the help of an experienced Microsoft Systems Integrator
Reference architecture
Digital transformation requires partnerships

Operational technology (OT) is hardware and software that detects or causes a change through the direct monitoring and/or control of physical devices, processes and events in the enterprise.

Information technology (IT) is the application of computers to store, study, retrieve, transmit, and manipulate data, or information, often in the context of a business or other enterprise.
Our partnerships scale digital transformation projects
Next steps

→ We’ll connect you with the Arrow team to find out how easy it is to adopt the Intel Connected Logistics Platform: iot@arrow.com

→ Learn more about the Intel Connected Logistics Platform at https://www.arrow.com/en/campaigns/iot-intel-connected-logistics-platform

→ Learn more about Microsoft Azure at azure.microsoft.com
Bryan S. Hamilton
Cloud Architect

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David Brown
Director Technical Sales
Who is Neal Analytics?
Seamless digital transformation consulting, bringing together AI, Cloud, and Strategy

Business and Data Strategy
- Data strategy
- Processes/Methodology
- Change management
- Capability building/Knowledge transfer

Cloud Technologies
- Cloud infrastructure
- Security & governance
- DB/data estate migration & design
- Data and app modernization

Neal Analytics has the unique ability to address these multi-dimensional needs “under one roof” to companies of all sizes

<table>
<thead>
<tr>
<th>Cloud Tech</th>
<th>Data &amp; AI</th>
<th>Strategy</th>
<th>Audience</th>
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</thead>
<tbody>
<tr>
<td>VARs/SIs</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>AI/ML</td>
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<tr>
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<tr>
<td>Neal Analytics</td>
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</tbody>
</table>
Retail operations

What can be done to optimize operations and drive revenue using intelligent edge in Retail?

$1 trillion
In retailer sales missed because of stockouts!

1 in 3
Shopping trips encounter out of stocks

24%
Of ecommerce retail sales result from stockouts

45%
Reduction in customer loyalty from out of stocks

20-90%
Reduced out of stock lost sales

5-15%
Increased revenue
Intelligent Edge in action

Capability showcase: Retail—Smart Shelf
Intelligent Edge use cases
Where else can this technology make a difference?

**Retail**
- Out of stock detection
- Loss prevention
- Intelligent display

**Manufacturing**
- Health & safety/remote asset inspection
- Visual inspection automation
- Autonomous systems

**Public Sector**
- Data aggregation
- Remote AI processing
- Traffic and toll systems
David Brown
Director Technical Sales

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Aka.ms/intelligentedge

- Distributor & SI ➔ AppSource Entry
- ISV ➔ AppSource Entry
- Solution Provider & OEMs ➔ AppSource Entry
- CSP ➔ AppSource Entry
- Architect or Developer ➔ Check out open-source codebase
- Business Decision Maker ➔ Read our whitepaper
Welcome to Microsoft Learn
Azure fundamentals

8 hr 17 min remaining • Learning Path • 1 of 12 modules completed

In this learning path, you will:

- Learn cloud concepts such as High Availability, Scalability, Elasticity, Agility, Fault Tolerance, and Disaster Recovery
- Understand the benefits of cloud computing in Azure and how it can save you time and money
- Compare and contrast basic strategies for transitioning to the Azure cloud
- Explore the breadth of services available in Azure including compute, network, storage and security

Once you complete this learning path, you will have the necessary knowledge to take the AZ900 Microsoft Azure Fundamentals exam.

Prerequisites
None

Modules in this learning path

Cloud Concepts - Principles of cloud computing
1 hr 2 min • Module • 10 Units

Explore the core concepts of cloud computing and how it can help your business.

Overview
Azure fundamentals

Interested in the cloud, but aren’t quite sure what it can do for you? This path is the place to start.

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★★★★★ 4.8 (23350)
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Overview ▼
Leveling up your Azure skillz with Microsoft Learn

I can haz *ALL* the badgez!
Microsoft Certified: Azure IoT Developer Specialty

Exam AZ-220: Microsoft Azure IoT Developer
Top challenges

**Complexity**
IoT PnP, IoT Central

**Knowledge**
MS Learn

**Security**
Confidential Computing

**Solution == Partners**
Project 15 from Microsoft
An Animal Conservation Initiative