Building the intelligent edge

Venkat Yalla
Program Manager – Azure IoT Edge
Agenda

- IoT Edge overview and features
- AI on IoT Edge
- IoT Edge resiliency
IoT application pattern + edge intelligence

Things

Cloud Gateway

Insights

Actions

Azure IoT Hub

Insights

Actions

IoT in Action
Edge intelligence enabled with Azure IoT Edge

Video Camera → IoT Edge runtime → Azure IoT Hub

Container Registry

Custom Code (data transform)

Custom Code (action)

Azure Cognitive Services (insight)
Azure IoT Edge gateway topology
Enabling intelligent edge spectrum

Azure IoT Edge requirements
Hardware sizing depends on workload
Flexible architecture – ARM or AMD64
Linux and Windows
• Docker-compatible container runtime
Security is critical for IoT devices

Azure IoT Edge has an industry leading security framework

- Secure boot
- Secret storage
- Correct workload
- Encrypted communication
- Secure execution (public preview)
- Security monitoring
IoT Edge module marketplace

Solution builder:
Leverage an ecosystem

ISV:
Highlight your tech

July ‘18
1st party modules only

October ‘18
Open to 3rd party modules
Deeper tooling integration

Feb ‘19
1st party monetization

2019
3rd party monetization

Results in IoT Edge Modules (24)
Azure IoT Edge certified devices

Simplifies IoT solution development

Streamlined certification process

All certified devices are featured

Visit http://aka.ms/certfaq to learn more about program requirements
### Azure IoT Edge features

**Open**
- IoT Edge runtime is open source
- Moby-based container runtime, compatible with Docker containers
- Azure IoT Edge Marketplace for Edge modules

**Secure**
- Zero-touch provisioning of Edge devices at scale with Device Provisioning Service
- Security framework provides end to end security and support for variety of hardware-based root of trust
- Trusted computing via Open Enclave

**Intelligent**
- **Services onboarded**
  - Azure Machine Learning
  - Azure Stream Analytics
  - Cognitive Services
  - Custom Vision
  - Blob storage
  - RedisEdge
  - SQL Server on Edge
  - Alleantia Industrial GW
  - Aveva IoT Edge HMI
  - Codit Nebulus
  - Swim Enterprise
  - ... and more in the marketplace

**Enterprise ready**
- Scaled deployments with Automatic Device Configuration Service
- Use existing coding skills (C, C#, Node, Python, Java)
- Development tooling in Visual Studio and VSCode
- Multi-person development tools for CI/CD using VSTS
- Enterprise Windows and Linux support
Artificial Intelligence on the edge

the killer app
Azure Stream Analytics at the edge

- Near real-time custom analytical intelligence closer to IoT devices
- Built-in unsupervised models for inline learning and real-time scoring
- 5 types of anomalies detected: Spikes and Dips, Slow positive/negative trend, Bi-level change
Cognition modules

- **Custom Vision**
  Supports exporting object detection models!

- **Face detection** & **Text recognition**

  [http://aka.ms/visioncontainerspreview](http://aka.ms/visioncontainerspreview)
Online and offline bots in private preview

Online Cortana skills
http://aka.ms/CortanaSDK

IoT Edge

Your own bot, offline

Speech-to-text
LUIS
Text-to-speech

IoT Edge

http://aka.ms/speechcontainerspreview
Computer vision scenarios: two topologies

**Intelligent camera**
- A handful of cameras per site
- Light internal bandwidth consumption
- Requires new cameras
- Requires AI capable cameras

**Intelligent gateway**
- Many cameras per site
- Heavy internal bandwidth consumption
- Works with existing CCTV networks
- Requires AI capable gateway
NVIDIA intelligent gateway on IoT Edge demo
### Events from Belt 1 - Belt 16

<table>
<thead>
<tr>
<th>Location</th>
<th>Event</th>
<th>Time</th>
<th>View</th>
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<tbody>
<tr>
<td>Belt 1</td>
<td>Ok</td>
<td>06/06/2019 3:30PM</td>
<td>View</td>
</tr>
<tr>
<td>Belt 2</td>
<td>Ok</td>
<td>06/06/2019 3:30PM</td>
<td>View</td>
</tr>
<tr>
<td>Belt 3</td>
<td>Wrong package</td>
<td>06/06/2019 3:30PM</td>
<td>View</td>
</tr>
<tr>
<td>Belt 4</td>
<td>Ok</td>
<td>06/06/2019 3:30PM</td>
<td>View</td>
</tr>
<tr>
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<td>Belt 13</td>
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<td>06/06/2019 3:30PM</td>
<td>View</td>
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**Belt 1 Camera**
Camera 3

Events from Belt 3

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<tbody>
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<td>06/06/2019 3:30PM</td>
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<tr>
<td>Wrong package - &quot;Box 2&quot;</td>
<td>06/06/2019 3:32PM</td>
</tr>
</tbody>
</table>
Coming this summer...

ThinkSystem SE350 Edge Server, EPC300 Edge Gateway & IoT510-C Camera will be IoT Edge certified in the Azure IoT Device catalog

Nvidia Deepstream will be available in the IoT Edge marketplace

By Nvidia

Nvidia Deepstream is an application framework featuring hardware-accelerated building blocks that bring deep neural networks and other complex processing tasks into a stream processing pipeline.
Shipping soon

Azure IoT Edge
Vision AI Developer Kit
A Smart Camera for the Intelligent Edge

Demo!

Preregister now: https://visionaidevkit.com/
Improving resiliency at the edge
Deploy IoT Edge workloads on Kubernetes (public preview)

- Adds hardware failure resilience to IoT Edge deployments by leveraging Kubernetes platform features
- Manage applications from IoT Hub with the same familiar app model
- Automatic translation to Kubernetes native application model (pods, services, deployments...)
- Cluster can be shared by the multiple edge devices

Learn more: aka.ms/iotedge-on-kubernetes
Azure IoT Edge resources

- Documentation – docs.microsoft.com
  - https://docs.microsoft.com/en-us/azure/iot-edge

- Bugs – IoT Edge OSS project GitHub issue page
  - https://github.com/azure/iotedge/issues

- Feature requests - Azure IoT Edge User Voice forum
  - https://feedback.azure.com/forums/907045-azure-iot-edge
Thank you!

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