IoT Action At the Edge –
EdgeX Foundry 1.0 Released!

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Agenda

Industry 4.0 & Edge
What is EdgeX?
EdgeX 1.0
Beyond
**IoT – Industry 4.0**

Physical and Digital worlds coming together

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**1st**
- Mechanization, water power, steam power

**2nd**
- Mass production, assembly line, electricity

**3rd**
- Computer and automation

**4th**
- Cyber Physical Systems
Emerging Edge Applications & Convergence of Technologies are demanding & fueling lower latency + accelerated processing

<table>
<thead>
<tr>
<th>NFV Edge Infrastructure</th>
<th>Wireless (vRAN, vEPC)</th>
<th>Wireline (PON)</th>
<th>uCPE (SD-WAN)</th>
<th>IP Enterprise Services</th>
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</thead>
<tbody>
<tr>
<td>Autonomous Devices</td>
<td>Drones</td>
<td>Autonomous Vehicles</td>
<td>Industry Robots</td>
<td>Medical</td>
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<tr>
<td>Immersive Experiences</td>
<td>Virtual Reality</td>
<td>Augmented Reality</td>
<td>360 Video</td>
<td>Wearable Cognitive Assistance</td>
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<tr>
<td>IoT &amp; Analytics</td>
<td>Industrial Sensors</td>
<td>Home Devices</td>
<td>Retail</td>
<td>Healthcare</td>
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On-Demand NFV | Hardware Acceleration | A.I. | Microservices | 5G

THE LINUX FOUNDATION
IoT - Edge is where the action is!

Process close to the data source

- Reduce response latency
- Lower network bandwidth needs
- Preserve Privacy
EdgeX Foundry
Open Source Edge Focused Framework

**EdgeX Is**
- Open Source, LF-Edge member
- Provides data ingestion, persistence, processing, & export
- Provides Multi-protocol connectivity
- Extensible/Customizable
- Chiefly Go, some Java and C
- Collection of Microservices
- Event driven

**EdgeX Is Not**
- An orchestrator
- A management plane
- Hardware opinionated
- Operating System restrictive
EdgeX Foundry
Code & Resources

- Code: [https://github.com/edgexfoundry](https://github.com/edgexfoundry)
- Wiki: [https://wiki.edgexfoundry.org](https://wiki.edgexfoundry.org)
- Slack: [https://slack.edgexfoundry.org/](https://slack.edgexfoundry.org/)

Release Roadmap

‘Barcelona’
Improved fit and finish, formalized Core Service APIs, additional Device and Export Services, test apparatus

‘California’
First integration of security, Java to Go code base, run in < 256MB RAM, come up in < 10 sec

‘Delhi’
First manageability capabilities, Go / C device service SDKs & sample device services, EdgeX UI

Edgex 1.0!! ‘Edinburgh’
Supports: binary data, Application (north) and Device (south) SDKs, More device protocols, microservice improvements, security gateway More documentation, devkit, tutorials, increased Black Box testing

Fuji
Oct 2019

Released Oct 2017
Released Jun 2018
Released Oct 2018
Released Jun 2019
EdgeX Foundry 1.0
Edinburgh

https://www.edgexfoundry.org/release-1-0-edinburgh/whats-new/
Enhancements

• System Management Improvements
  • CPU usage and other metrics
  • Service status & restart

• Correlation Identifier
  • Better tracing, logging, debugging

• More Unit & Black Box Tests

• New Performance Test Framework

• Improvements to Microservices

• Upgraded to Go 1.11 and use of modules
Device & Application SDKs

• **Device SDK**
  - Device profiles
  - Value types
  - Commands

• **Application SDK**
  - Pipeline definition
  - Re-useable functional components
Data Persistence Options

- MongoDB
- Redis
- None – pass thru
Easier Onboarding

• Better and more documentation
• Tutorials
• DevKit

• Sample Device Services
  • Device Simple (template)
  • Device Random - boolean, integer(signed/unsigned 8/16/32/64), float 32/64
  • SNMP - network switch device driver TrendNet TEG-082WS 10
  • Camera
  • GPS
More Protocol Support
Out of the Box

• **BACnet**
  
  Building Automation
  

• **Modbus**

  Industrial Internet of Things a serial comm protocol for Programmable
  
  https://en.wikipedia.org/wiki/Modbus

• **BLE**

• **MQTT**
CBOR Data Support
Concise Binary Object Representation

- Images
- Video Data

CBOR is a binary data serialization format loosely based on JSON. Like JSON it allows the transmission of data objects that contain name–value pairs, but in a more concise manner.

Data serialization used by CoAP Internet of Things protocol suite

https://en.wikipedia.org/wiki/CBOR
Security

Secure Communications
PKI
CA, Keys and Certificates
Imported or Created/fly

Security Gateway
Kong
JWT & OAuth2 Tokens
Single REST entry point
Access Control Lists
Key+Cert

Secret Store
Hashicorp Vault
Service Secrets
(API keys, PKI materials ..)
Key+Cert

Security Incident Response
Email: security-issues@lists.edgexfoundry.org
Small team, triage, rank, resolve/mitigate/publish
### Beyond

<table>
<thead>
<tr>
<th>When/Where</th>
<th>What</th>
<th>Details</th>
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<tbody>
<tr>
<td>Oct 7-8, Chicago, IL</td>
<td>Hackathon</td>
<td><a href="https://www.lfedge.org/event/edgex-foundry-hackathon/">https://www.lfedge.org/event/edgex-foundry-hackathon/</a></td>
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<tr>
<td>Oct End/Nov</td>
<td>Fuji Release</td>
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Fuji Release Oct/Nov 2019

A peek

• Security Enhancements
  • Per Service Secrets and PKI materials
  • Integration across services
  • Hardware backed secret store

• CLI – increased developer productivity

• Cloud Connectors – AWS, Azure, VMware Pulse

• Certification

• More manageability APIs

• Leaner inter-microservice communications

• Richer application pipelines

• More black box and performance testing
More EdgeX Talks @OSS NA

• Easy as a pi: EdgeX on Raspberry Pi for Automotive IoT
  Alex Courouble/VMware
  Friday August 23, 2019 2:25pm - 3:00pm  Indigo CG
  https://ossna19.sched.com/event/PUkv/easy-as-a-pi-edgex-on-raspberry-pi-for-automotive-iot-alexandre-courouble-vmware?iframe=yes&w=100%&sidebar=yes&bg=no#

• An Agile Approach to Threat Modeling for Securing Open Source Project EdgeX Foundry
  Tingyu Zeng/Dell
Thank You