ORCHESTRATING AN OPENSTACK* BASED IOT SMART HOME

Michael Kadera, John Geier, Dr. Yih Leong Sun

Intel Open Source Technology Center

26th October, Wednesday, 17:55-18:35

*Other names and brands may be claimed as the property of others.
INTRODUCTION

Michael Kadera
Cloud & Data Center Manager

John Geier
Cloud & Data Center Engineer

Dr. Yih Leong Sun
Senior Software Cloud Architect
AGENDA

Demonstrate an architecture that enables an IoT Smart Home solution

• The IoT wave of data
• An example IoT application
• Cloud reference architecture
• Application solution options
• Data analytics
Are you ready to ride the wave or will you be washed away?

**People**
- In 2020, it is expected that the average internet user will generate ~1.5 GB of traffic per/day\(^1\)
- Up from ~650MB in 2015

**Machines**
- A Smart Hospital will generate 3,000 GB/day\(^2\)
- Self-driving cars are generating over 4,000 GB/day... each\(^3\)
- A connected plane will generate 40,000 GB/day\(^4\)
- A connected factory will generate 1 million GB/day\(^5\)
OPEN HOUSE (DEMO)

Tour the house
IOT AUTOMATED CONTROL: SMART HOME

POWERED BY THE

IoTivity

FRAMEWORK AND

node

SENSORS
Temp
Gas
Power
Solar

ACTUATORS
Heater
Vent
Light
Solar
Position

CONTROL

MinnowBoard Turbot*
Home Gateway

Ostro™

REST APIs

CONTROL

DATA

openstack.

+ CLOUD FOUNDARY

+ Intel

INTEL® CLOUD FOR ALL

*Other names and brands may be claimed as the property of others.
### Application Profile

#### Behavior
- Steady and predictable
- High growth
- On-off
- Random or periodic bursting

#### Microservices
- Application service
- Collection orchestration
- Growth and scalability

#### Lifecycle
- Upgrades and API compatibility
- CI/CD

#### Security
- User authentication
- Network encryption
- Data Encryption
- Patching
- Intrusion Detection

#### Data
- Gathering
- Processing
  - Edge vs the cloud
- Retention
  - Edge vs the cloud
**Compute and Data: Location is Everything**

CLOUD REFERENCE ARCHITECTURE

IoT devices and applications

PaaS
Big data
Containers
VMs

OpenStack* - scalable cloud & API

nova
Neutron*
glance
Cinder*
swift

Physical layers (compute, storage, network)
• Scalable infrastructure

*Other names and brands may be claimed as the property of others.
IOT APPLICATION PLATFORM OPTIONS

Platform as a Service

- Cloud Foundry*, OpenShift*, Juju*, and many more
- Containers

Infrastructure as a Service

- VM
- Bare metal

*Other names and brands may be claimed as the property of others.
IOT APPLICATION PLATFORM EXAMPLE

Cloud Foundry* deployment on OpenStack*

- Validate your OpenStack Instances
  - OpenStack API, metadata service, instance inter-connectivity, mount volume, deploy image
  - Security groups
    - Ingress/egress filter
  - DNS
  - Cloud Foundry deployment manifest

*Other names and brands may be claimed as the property of others.
IOT ANALYTICS - DATA PROCESSING MODEL

- **Data Store** → **Batch processing** → **Static View Analytics**
- **Real-time Data** → **Real-time Streaming** → **Real-time Event Analytics**
- **Recent + Historical Data** → **Predictive Processing** → **Predictive Analytics**
The diagram illustrates a Hadoop* deployment on an OpenStack* platform for IoT analytics.

- **Master**
  - Name Node
  - Job Tracker

- **Slave**
  - Data Node
  - Task Tracker

Additional note: Other names and brands may be claimed as the property of others.
IOT ANALYTICS - HADOOP* DEPLOYMENT ON OPENSTACK*

https://www.openstack.org/software/sample-configs/#big-data
KEY POINTS

What is different about a deployment for IoT?

Data management

Balance of analytics location and control

Scaling

Micro services and API architecture (know your requirements)

Loss of connectivity is not an issue, it is a feature -> design for failure
CALL TO ACTION

• Know your application requirements
• Implement data management and processing at all levels
• Expect services to drop, devices to float on and offline.
• Plan for scalability
• Download the demo source and test the IoT solution
  • https://01.org/smarthome
THANK YOU

michael.j.kadera@intel.com
john.geier@intel.com
yih.leong.sun@intel.com
Session - Building a Flexible OpenStack Cloud from the Ground Up:
https://www.youtube.com/watch?v=ewiR1xG1pOs

Validate your OpenStack instances:
• https://docs.cloudfoundry.org/deploying/openstack/required-flavors.html
• https://docs.cloudfoundry.org/deploying/openstack/cf-stub.html
• https://docs.cloudfoundry.org/deploying/openstack/using_swift_blobstore.html
Validate your OpenStack instances:

- https://docs.cloudfoundry.org/deploying/openstack/required-flavors.html
- https://docs.cloudfoundry.org/deploying/openstack/cf-stub.html
- https://docs.cloudfoundry.org/deploying/openstack/using_swift_blobstore.html

IoTivity:

- https://www.iotivity.org/
Legal notices and disclaimers

Intel technologies' features and benefits depend on system configuration and may require enabled hardware, software or service activation. Learn more at intel.com, or from the OEM or retailer.

No computer system can be absolutely secure.

Tests document performance of components on a particular test, in specific systems. Differences in hardware, software, or configuration will affect actual performance. Consult other sources of information to evaluate performance as you consider your purchase. For more complete information about performance and benchmark results, visit http://www.intel.com/performance.

Intel, the Intel logo and others are trademarks of Intel Corporation in the U.S. and/or other countries. *Other names and brands may be claimed as the property of others.

© 2016 Intel Corporation.