Container hybrid deployment to the EDGE powered by Openshift & RHEL

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#RedHatOSD
ENTERPRISE IoT ARCHITECTURE

Driving datacenter function to the edge

- Business processing
- Reporting
- Long-term data analytics
- Data infrastructure
- Enterprise integration
- Software-defined storage

Communications/messaging
- Data pre-processing
- Real-time data analytics
- Real-time actions/rules
- Software-defined storage
- Security

- Communications/messaging
- Data acquisition

DATACENTER

GATEWAYS

DEVICES
EXAMPLES OF TARGETED USE CASES
Remote factories, disconnected ferries, trains, oil stations
CUSTOMER NEEDS
How to handle containers deployment to the edge?
FROM DEVELOPMENT TO THE EDGE

DEPLOY TO THE EDGE

BUILD & DEPLOY TO THE EDGE

APPLICATION

PLATFORM AS A SERVICE

NON-PROD | DEV | UAT | PROD

CONTAINER

CONTAINER

CONTAINER

Datacenter

Edge
USE CASE SCENARIO
From Datacenter to the Factory
FROM DEVELOPMENT TO EDGE DEPLOYMENTS

DEPLOY TO THE EDGE

BUILD & DEPLOY TO THE EDGE

APPLICATION

PLATFORM AS A SERVICE

NON-PROD

DEV

UAT

PROD

Datacenter

Factory

APPLICATION

PLATFORM AS A SERVICE

GATEWAY HUB

CONTAINER

EDGE GATEWAYS

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USE CASE SCENARIO
From Datacenter to the Factory
THE RED HAT STACK
Can support your edge deployments
HOW DO YOU HANDLE IT?
# Red Hat OS Deployment Scenarios

## Multiple Edge Deployments Scenarios

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<th>Deployment Scenarios</th>
<th>Available capabilities</th>
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<td><strong>SCENARIO 1</strong></td>
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<td>Low resource (Edge Gateway) Non reliable connectivity</td>
<td>- Data gathering</td>
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<td>Available resource (Edge Server) High affidability connectivity</td>
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<td></td>
<td>- Centralized Management</td>
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**Deployment Scenarios** (Based on resource (CPU/Memory) and connectivity (Bandwidth/Latency) availability)

**Corporate Node**

**Plant Node**

**Edge Node**

**Available capabilities**

- Data gathering
- Basic analytics remotely managed

**Corporate DC**

**Plant DC**

**IoT Hub**

**Multiple Edge Deployments Scenarios**

- **RED HAT OPENSIFT Container Platform**
- **RED HAT**
- **Container Platform**
- **Corporate DC**
- **Plant DC**
- **IoT Hub**
CI/CD THROUGH DATACENTERS & GATEWAYS

EXISTING CI/CD PIPELINE
- IMAGE BUILD & DEPLOY
- PROMOTE TO UAT
- PROMOTE TO PROD
- PROMOTE TO PROD

OPENSIFT IMAGE REGISTRY
- OPENSHIFT CLUSTER
- NON-PROD: DEV, UAT, PROD

GIT SERVER

ARTIFACT REPOSITORY

OPENSHIFT IMAGE REGISTRY

QUAY

EDGE GATEWAYS
- RHEL 7.X CONTAINER
- RHEL 7.X CONTAINER

GATEWAY HUB
- OPENSHIFT CLUSTER
- OPENSHIFT NODE

Datacenter

Geo-Distributed Factories (plants)

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IMAGES DISTRIBUTION w/ RED HAT QUAY
Content governance and ingress for OpenShift / Kubernetes / Edge

Container Catalog (RHCC)
Docker Hub
Other Registries

security scan
lifecycle mgmt
image history
webhooks

RED HAT
OPENSHIFT

RED HAT
OPENSHIFT

kubernetes

QUAY
SCALE IoT SOLUTION THROUGH CENTRALIZED AUTOMATION PROCESSES

Centralized Management

for...

- RED HAT® OPENSHIFT®
  Service broker

- RED HAT® ANSIBLE®
  Tower

- RED HAT® SATELLITE

...Automatized processes to the edge

- Manage Application Deployment up to the edge

- Manage Operation System RHEL Deployment on HW at the edge

Business Applications

Gateway/Edge Server

RED HAT® ENTERPRISE LINUX

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## WHAT ABOUT THE TECHNOLOGY?
Six Building Blocks

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<th>Description</th>
<th>Technology</th>
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<td>ENTERPRISE READY VIRTUALIZATION LAYER</td>
<td>RED HAT® VIRTUALIZATION</td>
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<td>CONTAINER BASED PLATFORM AS A SERVICE</td>
<td>RED HAT® OPENSShift Container Platform</td>
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<td>3.</td>
<td>AUTOMATION ENGINE ENTERPRISE FRAMEWORK</td>
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<td>CRITICAL RELIABLE &amp; MILITARY GRADE SECURE OS</td>
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<td>5.</td>
<td>O.S. INSTALLATION &amp; MANAGEMENT</td>
<td>RED HAT® SATELLITE, QUAY</td>
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A REAL USE CASE: INTELLIGENT IoT GATEWAY

https://www.youtube.com/watch?v=bNipu5OA1q4
THE PLATFORM: OPENSHEIFT
Demo firstly developed for Red Hat Summit 2016
(https://github.com/redhat-iot/Virtual_IoT_Gateway)
❖ Build the Intelligent IoT Gateway with open source software in a few simple steps
❖ Main components of the Gateway are:
  ➢ Red Hat Enterprise Linux to provide Enterprise class foundation
  ➢ Red Hat Fuse to transform sensor data and route it to end points
  ➢ Red Hat Decision Manager to enable real-time decision making at the edge
  ➢ Red Hat AMQ to arbitrate sensor data
❖ Red Hat Fuse integrate sensor app and a business rules service
❖ Sensor app sends temperature data using MQTT to the Red Hat AMQ broker, these messages will be forwarded to the earlier services
❖ Finally the business rules will trigger desired action when the sensor value reaches a threshold
DEPLOY THE CONTAINERS
TEST THE CONTAINERS
DEMO’s CONTAINERS DEPLOYMENT TOPOLOGY
Multiple Openshift projects simulating DC and HUB

- Development
- Testing
- HUB

Datacenter

Geo-Distributed Factories (plants)
DEPLOY REMOTE CONTAINERS

This default plan deploys deploy-containers-apb
This is a sample APB application that deploys containers on remote host
OPENSHIFT ANSIBLE PLAYBOOK BUNDLE

Deploy the container just built through OpenShift

APB container runs deploy.yaml playbook to provision container on Edge Gateway

oc run postgresql-apb bind $vars

ansible-playbook deploy.yaml $vars
COCKPIT: RHEL MANAGEMENT
DATA FLOWS BACK TO THE HUB
CI/CD THROUGH DATACENTERS & GATEWAYS

https://github.com/alezzandro/iotgw_mainproject
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GRAZIE PER L’ATTENZIONE