Get Hands on with Containerized Deployment of OpenStack

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Agenda

- What is OpenStack?
- Use cases and work loads
- Containerized OpenStack deployment
- Install and operate on your laptop
- Additional resources
What is OpenStack?
Overview

• Cloud computing platform for public/private clouds

• Abstracts data centers into pools of resources

• Provides management layer for efficient, automated allocation of resources

• Empowers operators, admins, users via self service portals

• Provides APIs to develop cloud-aware applications
The OpenStack Community

- Over 9,000 developers
- Over 400 organizations
- Over 20 million lines of code
- Designed and developed in an open collaborative fashion
- Major release every 6 months

- Most recent release – Pike
  - 16th release
  - 30 August 2017
  - 2405 developers contributed
  - 201 organizations involved
- Improved
  - Manageability
  - Composability
  - Scale

- Next release – Queens
  - Feb 2018
Modular Software Architecture

Applications / Services

OpenStack Service APIs, SDK, CLI

Compute Service (Nova)
Storage Services (Cinder and Swift)
Network Service (Neutron)
Dashboard (Horizon)
Identity (Keystone)
Many more Services

Infrastructure Plugins

Physical and Virtualized Infrastructure

Compute Service
- Compute Services (Nova)
- Storage Services (Cinder and Swift)
- Network Services (Neutron)
- Dashboard (Horizon)
- Identity (Keystone)
- Many more Services

Physical and Virtualized Infrastructure
OpenStack Projects

- **Compute**
  - 6 OpenStack Projects

- **Storage, Backup & Recovery**
  - 5 OpenStack Projects

- **Networking & Content Delivery**
  - 7 OpenStack Projects

- **Data & Analytics**
  - 3 OpenStack Projects

- **Security, Identity & Compliance**
  - 4 OpenStack Projects

- **Management Tools**
  - 6 OpenStack Projects

- **Deployment Tools**
  - 6 OpenStack Projects

- **Application Services**
  - 4 OpenStack Projects

- **Monitoring & Metering**
  - 5 OpenStack Projects
Contributions by Company

Contributions by Module

http://stackalytics.com/?release=pike&metric=marks
Use Cases and Work Loads
OpenStack Use Cases

• Public cloud
  • AWS style offerings

• Private cloud
  • General purpose compute
  • Purpose-build for specific application
  • API-managed data center

• Edge Computing
  • Bringing the compute to the data

• Network Function Virtualization
  • Service provider led initiatives, including OPNFV

Photo Credits to https://www.openstack.org/user-stories/cern/, NTT, Rackspace, Comcast, SAP
Cisco OpenStack Platform Offers

**DIY-Customer Managed**
- **NFV Infrastructure**
  - Mobility
  - Media
  - Generic VNF

**Cisco Managed**
- **Metacloud ‘SPAN’**
- **Metacloud**

**Enterprise**
- **UCS-OpenStack**

**++Orchestration & Controllers**
- ACI
- NSO
- ESC
- VTS
- OpenDaylight

Get Hands on with Containerized Deployment of OpenStack
OpenStack Adoption Drivers

• APIs, APIs, APIs
• Speed
• Flexibility
• Cost
• Programmatic workflows
• Open and broadly interoperable
OpenStack Adoption Challenges

• Security model
• Lack of operational tools
• Complexity and difficulty of deployment

Containerized OpenStack Deployment
Why Containers?

- Simplify a large complex distributed system
- Increase flexibility through modularity
- Speed of deployment
- Simplified management and troubleshooting
Technology Used - Kolla

• Production-ready containers and tools to operate OpenStack clouds

• Toolchain to build Docker containers for OpenStack components in a local Docker registry

• Ansible orchestration to:
  • deploy containers
  • validate deployment
  • manage system after deployment
Kolla Workflow

OpenStack Source or Binaries

Kolla Source

kolla-build

glance_data

nova-api

nova-libvirt

heat-api

horizon

neutron-agents

...

Docker Registry

kolla-ansible

Install Target

glance_data

nova-api

nova-libvirt

heat-api

horizon

neutron-agents

...
Running OpenStack
On Your Laptop
Run OpenStack On Your Laptop

- Available through Cisco DevNet Learning Labs
- Packaged as a Linux VM you run within VirtualBox
  - OpenStack deployed using containers
  - You can customize and redeploy using Kolla scripts
- Interact with OpenStack cloud as a developer / user / operator
Prep VirtualBox

• Download and install VirtualBox and extension pack
• Configure networks in VirtualBox

Get OpenStack

• Download OpenStack OVA
• Import into VirtualBox
• Associated networks
• Boot VM

Step by Step instructions:
https://learninglabs.cisco.com/lab/openstack-install/step/1
OpenStack on Your Laptop

Get Hands on with Containerized Deployment of OpenStack

This learning lab walks you through the steps to install and start using OpenStack within a virtual machine (VM) on your laptop, or any other machine you are able to access and have permission to install software.

OpenStack | Cloud

Login to Start

Install and run OpenStack within a VM

Completion Time: 45 minutes

- Create your first OpenStack powered cloud
- Familiarize yourself with Horizon, the OpenStack UI
- Learn how to use the CLI, gaining a peak at OpenStack’s programatic interfaces

Prerequisites

Setup your Own Computer

- This lab requires the use of your own computer. Make sure you complete the steps in "How to Setup Your Own Computer" prior to starting Step 1.

Background

- We recommend that you have a general understanding of what OpenStack is and are familiar with the goals of the OpenStack project before you start this lab.

Step 1. Create Network Adaptors within VirtualBox

For this lab, you need a NAT adaptor and two Host-only adaptors.

- The Host-only adaptor allows the networking to be contained within the laptop and communicate with the host machine itself.
- The NAT adapter allows instances to connect to the outside world.
## OpenStack Network Architecture

### Diagram
- **Management Network**
  - **Network Node(s)**
    - Running Network Service Agents
  - **Compute Node(s)**
    - Running Compute and Network agents
  - **Controller Node(s)**
    - Running Database, Message Queue Server, API Services, Scheduler...

- **Data Network**
- **API Network**
- **External Network**
- **Router**
- **Internet**

### Table: Network Purpose and IP Addresses

<table>
<thead>
<tr>
<th>Network</th>
<th>Purpose</th>
<th>IP Address</th>
</tr>
</thead>
<tbody>
<tr>
<td>Management Network</td>
<td>Used for internal communication between OpenStack Components</td>
<td>Reachable only within the data center</td>
</tr>
<tr>
<td>External Network</td>
<td>Used to provide VMs with Internet access</td>
<td>Reachable by anyone from the Internet</td>
</tr>
<tr>
<td>API Network</td>
<td>Exposes all OpenStack APIs, including the OpenStack Networking API, to tenants</td>
<td>Reachable to Tenants</td>
</tr>
<tr>
<td>Data Network</td>
<td>Used for VM data communication within the cloud deployment</td>
<td>Reachable within the Tenant address space</td>
</tr>
</tbody>
</table>
OpenStack Demo
Additional resources
Open Source Dev Center

Your Source for Open Source at Cisco
https://developer.cisco.com/opensource

- Contributions to open source
- Use in products/solutions
- Community forums, blogs
- Developer Events
  - IETF Hackathons and MEF LSO Hackathons featuring open source implementations of open standards

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OpenStack Microsite
https://developer.cisco.com/openstack

1 Overview
Find out Cisco's technical and operational areas of involvement with OpenStack

2 Watch the videos
Watch OpenStack related videos and sessions delivered by the OpenStack team members at Cisco at various events

3 OpenStack Projects
GitHub Code pointers to Cisco device plugins/drivers and OpenStack related projects lead by Cisco
OpenStack Projects at Cisco

- **Product integrations**
  - Use Cisco products in your OpenStack deployment

- **Community Projects**
  - Public projects related to OpenStack lead by Cisco developers

- **Access to code for you to start using and contributing**
Welcome to the OpenStack Community for DevNet!
Here you'll find discussions with both developers integrating with Cisco and Cisco internal developers themselves within the OpenStack space. Start a discussion or ask a question today!

Actions
- Start a discussion
- Write a document
- Upload a file
- Write a blog post
- Create a poll
- Create a sub-space
- Create by email
- View feeds
- Create an event
- Manage Content
- Create a video

Engage with OpenStack Content
- How to deploy SR-IOV (PCI pass-through) in OpenStack using Cisco's UCSM ml2 neutron plugin
  - 8 months ago
  - by Vikram Hosakote
- Multicast with OpenStack using Cisco's Nexus9000 and UCS
  - 3 months ago
  - by Vikram Hosakote
- First OpenStack Summit Under New Format is a Winner
  - 4 months ago
  - by Charles Eckel
- Everything OpenStack@Cisco at OpenStack Summit Boston May 8-11, 2017
  - 5 months ago
  - by Charles Eckel
- How to stack DevStack Newton on CentOS-7 in VirtualBox on Mac
  - 5 months ago
  - by Vikram Hosakote
- Best REST in OpenStack
  - 6 months ago
  - by Vikram Hosakote

Open Source
- Aug 9, 2017
  - Open Source Summit in Los Angeles Sept 11-14
- Jul 23, 2017
  - Running Code is King at IETF 99 in Prague
- Jun 24, 2017
  - Open Source is Hot at CiscoLive Las Vegas, June 26-29
- Jun 24, 2017
  - What is the process for adding our script to the CiscoDevNet github repo?

OPNFV
- Feb 21, 2017

https://communities.cisco.com/community/developer/openstack
Learning Labs  https://learninglabs.cisco.com/

OpenStack on Your Laptop

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• Visit our Open Source Dev Center: https://developer.cisco.com/site/opensource/

• Swing by the Cisco booth at the show
Thank you!