Application deployment on OpenStack

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by
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HOME AT CLOUD
Openstack

Introduction
Outline

• Openstack Introduction
  ○ Open Source Model, Industry, ...

• Openstack Architecture
Openstack - Facts

- Founded by NASA and Rackspace in 2010
- Currently involves 130 companies and 985 people (Stackalytics, 2017)
- Aim to be ‘Linux’ in cloud computing systems
- It is open-source
  - Amazon/VMWare is not
- Attracts start-ups
Openstack Organization Structure

● Foundation
  ○ board of directors
    • Rackspace, HP, AT&T, Dell, Aptira, Canonical Ltd, Red Hat, IBM, Yahoo!, DreamHost, eNovance, CERN, Cloudscaling, Nebula, UnitedStack, SUSE, ...
    • strategic and financial oversight of Foundation resources and staff

● Technical Committee
  ○ represents contributors and has technical insight

● User Committee
  ○ represents the community
Openstack Governance/Foundation

- Drives the Openstack
- Foundation Mission
  - The OpenStack Foundation is an independent body providing shared resources to help achieve the OpenStack Mission by Protecting, Empowering, and Promoting OpenStack software and the community around it, including users, developers and the entire ecosystem.
Openstack Governance/Foundation Responsibilities

- Development process and release management
- Developer, user and ecosystem community management
- Meet the needs of real world users by producing great software, and fostering their involvement in the community to provide feedback and direction
- Brand management (PR & marketing, trademark policy)
- Event management (Twice-annual Summit & Conference, meetups etc)
- Legal affairs (CLA process and docs, trademark defense)
Why Openstack?
Datacenters are being virtualized, Servers are first
Hypervisors provide abstraction between SW and HW (Servers)

- Hardware abstraction for each server
- Better resource utilization for each server

Next: Storage, Network... the building blocks

- Compute Pool
  Virtualized Servers
- Network Pool
  Virtualized Networks
- Storage Pool
  Virtualized Storage

- Flexibility, Efficiency are key drivers
- Resource pools for apps starting to form...

1. Virtualization
2. Cloud Data Center
3. Cloud Federation

Automation & Efficiency
But questions arise as the environment grows...

“VM sprawl” can make things unmanageable very quickly

How do you make your apps cloud aware?

Where should you provision new VMs?

How do you empower employees to self-service?

How do you keep track of it all?

A Cloud Management Layer Is Missing

1. Virtualization
2. Cloud Data Center
3. Cloud Federation

Automation & Efficiency
Solution: OpenStack, The Cloud Operating System

A new management layer that adds automation and control

- Connects to apps via APIs
- Self-service Portals for users

Cloud Operating System

- Creates Pools of Resources
- Automates The Network

1. Server Virtualization
2. Cloud Data Center
3. Cloud Federation

Automation & Efficiency
Imagine having a Common Platform across clouds. Seamlessly transporting workloads.

1. Virtualization
2. Cloud Data Center
3. Cloud Federation

Automation & Efficiency
A common platform is here.
OpenStack is open source software powering public and private clouds.

Private Cloud:
Run OpenStack software in your own corporate data centers

Public Cloud:
OpenStack powers some of the world's largest public cloud deployments.

OpenStack enables cloud federation
Connecting clouds to create global resource pools

Common software platform making Federation possible

1. Virtualization
2. Cloud Data Center
3. Cloud Federation

Automation & Efficiency
Openstack Architecture

● The OpenStack project is an open source cloud computing platform for all types of clouds, which aims to be simple to implement, massively scalable, and feature rich.

● OpenStack provides an Infrastructure as a Service (IaaS) solution through a set of interrelated services. Each service offers an application programming interface (API) that facilitates this integration.
Heat
- Orchestrates cloud

Horizon
- Provides UI

Neutron
- Provides network connectivity for

VM
- Provides images

Cinder
- Provides volumes for

Nova
- Provisions

Glance
- Stores images in

Swift
- Stores images in

Cellometer
- Monitors

Keystone
- Provides Auth for

Backups volumes in
## Openstack Services

<table>
<thead>
<tr>
<th>Service</th>
<th>Project</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Dashboard</strong></td>
<td>Horizon</td>
<td>Enables users to interact with all OpenStack services to launch an instance, assign IP addresses, set access controls, and so on.</td>
</tr>
<tr>
<td><strong>Identity Service</strong></td>
<td>Keystone</td>
<td>Provides authentication and authorization for all the OpenStack services. Also provides a service catalog within a particular OpenStack cloud.</td>
</tr>
<tr>
<td><strong>Compute Service</strong></td>
<td>Nova</td>
<td>Provisions and manages large networks of virtual machines on demand.</td>
</tr>
<tr>
<td><strong>Object Storage Service</strong></td>
<td>Swift</td>
<td>Stores and retrieve files. Does not mount directories like a file server.</td>
</tr>
<tr>
<td><strong>Block Storage Service</strong></td>
<td>Cinder</td>
<td>Provides persistent block storage to guest virtual machines.</td>
</tr>
<tr>
<td><strong>Image Service</strong></td>
<td>Glance</td>
<td>Provides a registry of virtual machine images. Compute Service uses it to provision instances.</td>
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</table>
# Openstack Services

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<tr>
<td>Networking Service</td>
<td>Neutron</td>
<td>Enables network connectivity as a service among interface devices managed by other OpenStack services, usually Compute Service. Enables users to create and attach interfaces to networks. Has a pluggable architecture that supports many popular networking vendors and technologies.</td>
</tr>
<tr>
<td>Metering/Monitoring Service</td>
<td>Ceilometer</td>
<td>Monitors and meters the OpenStack cloud for billing, benchmarking, scalability, and statistics purposes.</td>
</tr>
<tr>
<td>Orchestration Service</td>
<td>Heat</td>
<td>Orchestrates multiple composite cloud applications by using the AWS CloudFormation template format, through both an OpenStack-native REST API and a CloudFormation-compatible Query API.</td>
</tr>
</tbody>
</table>
How to start with Openstack?

- [http://www.openstack.org/software/start/](http://www.openstack.org/software/start/)
  - you can install it yourself
    - [http://devstack.org/](http://devstack.org/)
      - For O/S developers
      - Installation projects like Kolla, Fuel; distributions
  - Public clouds
    - Such as Homeatcloud
      - [https://www.homeatcloud.cz](https://www.homeatcloud.cz)
      - Horizon at [https://openstack.homeatcloud.cz](https://openstack.homeatcloud.cz)
How to Create VM in VIA O~S?

- Configure Virtual Network
- Configure Security
- Create VM
Virtual Network Configuration

- public network
  - aka ‘internet’
- private network
  - created VMs will be connected to this network
- router
  - connects private network and public network
Security Configuration

● keypair
  o ssh key to sign in to VM
  o it is injected into VM on creation

● security group
  o ‘firewall’ configuration
VM creation

- **Image**
  - What will be running - e.g., Linux, Windows, ...

- **Flavor**
  - HW machine type - e.g., CPU, memory,

- **Security**
  - keypair
  - security group

- **Network**
  - VM will be connected to the network

- **Volumes**

- **After creation run script**
Demo/Network Configuration

- Private Network creation
  - Project/Networks, +Create Network
    - enter: Network Name, Subnet Name, Network Address (e.g., 192.168.77.0/24)
    - enter: Subnet details/DNS Name Servers: 8.8.8.8

- Router creation
  - Project/Routers, + Create Router
    - enter: Router Name
  - Action Set Gateway on your router
    - select External Network: public
  - Show detail of your router, +Add Interface
    - select your private network subnet in Subnet
Demo/Security Configuration

• Configure *default* Security Group
  o *Project/Access & Security/Security Groups*
  o select *default* security group and click *Edit Rules*
  o Add rules:
    ▪ SSH: TCP, port 22
    ▪ Web: TCP, port 80

• Keypair
  o *Project/Access & Security/Keypairs, +Add Keypair*
    ▪ enter: name
  o download keypair
Demo/VM creation

- Project/Instances, +Launch Instance
  - Tab Details
    - Select Image - e.g., TurnKey Wordpress
    - Enter Instance name
    - Select Flavor - e.g., b1.micro
  - Tab Acces & Security
    - check if values created in previous steps are used
  - Tab Networking
    - select network created in previous step
  - click on Launch
Demo/VM accessing

- Assign floating IP
  - Project/Instances, on instance run action +Associate Floating IP
    - select IP address
      - note: if it fails, check if IP address are associated to the project in Project/Access & Security/Floating IPs. Allocate new ones using +Allocate IP to project

- Connect to the VM
  
  $ ssh -i <keypair.pem> ubuntu@<floating-ip>
Demo/Using Volume

- Volume is a persistent block device
- Can be mounted in VM
- Steps
  - create volume
  - attach it to VM
  - use it in VM
Demo/Volume Create

- Project/Volumes, +Create Volume
  - enter Volume name
  - enter size (in GB)

- on volume, +Edit Attachments
  - select instance
  - enter device name: /dev/vdb
Demo/Volume Usage

- ssh to VM
- use block device
  
  ```
  # lsblk
  vdb 253:16 0 1G 0 disk
  # mkfs.ext3 /dev/vdb
  # mkdir /
  # mount /dev/vdb /
  ```
Demo/Volume Snapshots

• Volume can be ‘shared’ between VMs
  o volume must be duplicated

• Steps
  o create snapshot
  o create volume from snapshot
  o upload to image
  o download to volume
    ▪ Last two steps because of our HPE storage
Demo/Launch VM from Volume

• In the New Instance dialog, do as before
• Choose Boot Source: from Volume
Demo/Blue-Green Deployment

- Disassociate Floating IP
- Associate to second instance
Is there more time?

- Start a second instance
- Load Balancer or Database?
Questions?

If not:
You can keep the trial account for 1 week.
Write to support@homeatcloud.cz
If you need an extension.