LEARN. NETWORK. EXPERIENCE OPEN SOURCE.

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Boston, MA
OpenStack Architecture

Russell Bryant
Principal Software Engineer, Red Hat
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About Me

OpenStack for 1.5 years

- Project Technical Lead for OpenStack Compute (Nova)
- @russellbryant
- rbryant@redhat.com
Overview

● Recap, What is OpenStack?

● Architecture of OpenStack Projects
  ● Concepts, architecture, scaling

● Please fill out a session evaluation!
What is OpenStack?
OpenStack is ...

Compute, Networking, Storage

Image credit: http://www.openstack.org/software
OpenStack is ...

Public or Private Cloud

OMG CLOUD!!!
OpenStack is ...
OpenStack is ...

Pay as you go
OpenStack is ...

Illusion of Infinite Capacity
OpenStack is ...

Massive Scale
How does it work?

Architecture
OpenStack Components

- Identity
- Dashboard
- Orchestration
- Metering
- Object Storage
- Image Service
- Block Storage
- Networking
- Compute
OpenStack Identity (Keystone)
OpenStack Identity (Keystone)

Keystone

Credit: http://commons.wikimedia.org/wiki/File:Arch_voussoirs.svg
OpenStack Identity (Keystone)

- Important Concepts
  - Tenants – Groups of Users
  - Users
  - Roles
  - Tokens
  - Services
OpenStack Identity (Keystone)
OpenStack Identity (Keystone) Scaling
OpenStack Dashboard (Horizon)

- Identity
- Dashboard
- Orchestration
- Metering
- Object Storage
- Image Service
- Block Storage
- Networking
- Compute
<table>
<thead>
<tr>
<th>Keypair</th>
<th>Status</th>
<th>Task</th>
<th>Power State</th>
<th>Actions</th>
</tr>
</thead>
<tbody>
<tr>
<td>OS-keypair</td>
<td>Active</td>
<td>None</td>
<td>Running</td>
<td><img src="image" alt="Dropdown actions" /></td>
</tr>
</tbody>
</table>

Dropdown actions:
- Create Snapshot
- More
- Associate Floating IP
- Disassociate Floating IP
- Edit Instance
- Edit Security Groups
- Console
- View Log
- Pause Instance
- Suspend Instance
- Soft Reboot Instance
- Hard Reboot Instance
- Terminate Instance
OpenStack Dashboard (Horizon)

- Python WSGI Application
- Django framework
- Stateless client of OpenStack APIs
OpenStack Dashboard (Horizon) Scaling

Load Balancer

httpd
- horizon

Session Storage

OpenStack APIs
OpenStack Orchestration (Heat)
OpenStack Orchestration (Heat)

- Consumes all other OpenStack APIs
- Important concept: template defined stacks
OpenStack Orchestrations (Heat)

- ReST API / CFN API
- heat-api
- AMQP
- heat-engine
- DB
- OpenStack APIs
OpenStack Orchestration (Heat) Scaling
OpenStack Metering (Ceilometer)
OpenStack Metering (Ceilometer)

- The foundation of billing or charge back systems
- Concepts
  - Meters
  - Compute Pollsters
  - Central Pollster
  - Notifications
  - Collectors
OpenStack Metering (Ceilometer)

Credit: Doug Hellman
http://stevedore.readthedocs.org/en/latest/essays/pycon2013.html#requirements-for-ceilometer
OpenStack Metering (Ceilometer)
OpenStack Object Storage (Swift)
OpenStack Object Storage (Swift)

- Concepts
  - Accounts
  - Containers – Organize Your Data
  - Objects – Your Data
  - Ring – Internal Data Structure
OpenStack Object Storage (Swift)

Credit: Mark McLoughlin
OpenStack Object Storage (Swift) Scaling

Load balancer

Proxy

Proxy

Proxy

Storage

Storage

Storage

...
OpenStack Image Service (Glance)
OpenStack Image Service (Glance)

- Concepts
  - Images
  - Metadata
  - Storage Backends
OpenStack Image Service (Glance)
OpenStack Image Service (Glance) Scaling

* Scales horizontally the same way as the API
OpenStack Block Storage (Cinder)
OpenStack Block Storage (Cinder)

• Concepts
  • Volumes
  • Snapshots
  • Storage Backends
OpenStack Block Storage (Cinder)
OpenStack Block Storage (Cinder) Scaling
OpenStack Networking (...)

Identity  Dashboard  Orchestration  Metering

Object Storage  Image Service  Block Storage  Networking  Compute
OpenStack Networking (…)

- Concepts
  - Networks
  - Routers
  - Subnets
  - Ports
  - Vendor plugins
OpenStack Networking (...)

Diagram showing the components and interactions of OpenStack Networking:
- Compute Nodes
  - Nova Compute
  - L2 - Agent
- Message Broker
- Service Nodes
  - Networking Service
  - Networking Plug-in
- Network Nodes
  - DHCP-Agent
  - L3 - Agent
  - L2 - Agent
  - Meta Data Proxy
- Database
- API connections between the nodes and services.
OpenStack Compute (Nova)
OpenStack Compute (Nova)

- Concepts
  - Instances / Servers
  - Flavors / Instance Types
  - Virt drivers
- OpenStack API and EC2 API
OpenStack Compute (Nova)

- **nova-api**
- **nova-scheduler**
- **nova-conductor**
- **nova-compute**
- **Libvirt+KVM**
- **DB**

ReST API

AMQP
OpenStack Compute (Nova) Scaling (Step 1)
OpenStack Compute (Nova) Scaling (Step 2)

API Cell

AMQP

Compute Cell

Compute Cell

Compute Cell
OpenStack Compute (Nova) Scaling (Step 2)
OpenStack Compute (Nova) Scaling (Step 2)
OpenStack Compute (Nova) Scaling (Step 2)
OpenStack Components

- Identity
- Dashboard
- Orchestration
- Metering
- Object Storage
- Image Service
- Block Storage
- Networking
- Compute
Boot a Server – Step 1

- Identity
- Dashboard
- Orchestration
- Metering
- Object Storage
- Image Service
- Block Storage
- Networking
- Compute
Boot a Server – Step 2

- Identity
- Dashboard
- Orchestration
- Metering
- Object Storage
- Image Service
- Block Storage
- Networking
- Compute
OpenStack Compute (Nova)
Boot a Server – Step 4

1. Identity
2. Dashboard
3. Orchestration
4. Metering

Object Storage
Image Service
Block Storage
Networking
Compute
Boot a Server – Step 6

1. Identity
2. Dashboard
3. Orchestration
4. Networking
5. Metering
6. Compute

Object Storage
Image Service
Block Storage
Ta-da! Server in the cloud!
More Information

- Hands on Lab tomorrow!
  - “Deploying OpenStack on Red Hat Enterprise Linux Infrastructure”
  - Friday, June 14, 9-11am, Track: Labs

- RDO
  - http://openstack.redhat.com
  - Community supported OpenStack distribution
  - Everything you need to try OpenStack on RHEL
Questions?

Russell Bryant

Email: rbryant@redhat.com
Twitter: @russellbryant