

PA200 - OpenStack - Technical Insight

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OpenStack Overview

Lecture plan

- Warm-up
- VM deploy demo
- OpenStack key components
- OpenStack VM deploy workflow
- OpenStack service structure
- OpenStack contribution model

Morning exercise

Why cloud computing?

1. To improve the utilization of computer resources
2. To improve information security
3. To boost network performance
4. To improve service reliability
5. To achieve service elasticity

OpenStack service model?

1. Software as a Service
2. Application as a Service
3. Platform as a Service
4. Infrastructure as a Service
5. Computing as a Service

OpenStack is a:

1. Google software
2. Service of Amazon
3. Microsoft solution
4. Red Hat subscription service
5. Community effort

OpenStack major competitors

1. Amazon Web Services
2. IBM BlueMix
3. Google Compute
4. Microsoft Azure
5. In-house cloud management solutions
6. None of the above

OpenStack consumption model

1. License from the OpenStack Foundation
2. Commercial Red Hat subscription
3. Official certification from Mirantis
4. None of the above

Deploy a VM with OpenStack

- Request & launch a VM
- Log into the VM
- Destroy the VM

Demo: request & launch a VM

- Choose VM configuration
- Choose OS to install on the VM
- Create the VM, boot the OS
- Log into VM and use it somehow
- Tier down the VM

Demo: Choose VM configuration

```
$ openstack flavor list
```

ID	Name	Memory_MB	Disk	Ephemeral	Swap	VCPUs	RXTX_Factor
1	m1.tiny	512	0	0		1	1.0
2	m1.small	2048	10	20		1	1.0
3	m1.medium	4096	10	40		2	1.0
4	m1.large	8192	10	80		4	1.0
5	m1.xlarge	16384	10	160		8	1.0

Demo: Choose OS image

```
$ openstack image list
```

ID	Name	Status
----	------	--------

```

| afa49adf-2831-4a00-9c57-afe1624d5557 | CentOS-6 | active |
| 842c207f-6964-4ed7-a41a-06ec66a7c954 | Ubuntu-14 | active |
| 30a2a55a-2045-4ed8-a605-2d1c1143edd3 | Ubuntu-16 | active |
| 713f2fbc-05c5-491b-9e02-e000861e7b30 | Fedora-24 | active |
| 5cb9c233-5867-4e47-80a1-9d774f800444 | Debian-7 | active |
| f84868a5-5261-404a-9c54-ec317ea16b94 | CentOS-7 | active |
| b105ad3b-7df8-4318-9c3d-4e4fa4cc4563 | Debian-8 | active |
| b67b74bc-c3a8-4087-9c28-de02161fdedd | CoreOS | active |
+-----+-----+-----+

```

Demo: Create VM & boot OS

```

$ openstack server create --flavor m1.small --key-name mykey \
  --network mynetwork --image CentOS-7 mycentos

```

```

+-----+-----+
| Property | Value |
+-----+-----+
...
| id | 0e4011a4-3128-4674-ab16-dd1b7ecc126e |
| status | BUILD |
+-----+-----+

```

Demo: List running VMs

```

$ openstack server list

```

```

+-----+-----+-----+-----+
| ID | Name | Status | Networks |
+-----+-----+-----+-----+
| 76b3adb3-1f5a-4276-8b82-abdf21352946 | mycentos | ACTIVE | mynetwork=192.168.1.23 |
| 246e50b8-29fa-4310-b972-a71cd0df43bf | Ubuntu14 | ACTIVE | mynetwork=192.168.1.98 |
+-----+-----+-----+-----+

```

Demo: Log into VM

```

$ ssh centos@192.168.1.23

```

```

mycentos $

```

Demo: Tier down VM

```
$ openstack server delete mycentos
```

Orchestration: Heat

- Stacks up the resources
- Using declarative language (YAML)
- Heat engine executes the template

Orchestration: Heat templates

```
resources:
  instance:
    type: OS::Nova::Server
    properties:
      flavor: m1.small
      image: ubuntu-trusty-x86_64
      networks:
        - network: private
```

Orchestration: Heat

```
$ openstack stack create -t teststack.yaml teststack
```

```
+-----+-----+-----+-----+
| id     | stack_name  | stack_status    | creation_time    |
+-----+-----+-----+-----+
| ...    | teststack   | CREATE_IN_PROGRESS | 2018-03-05T18:10:40Z |
+-----+-----+-----+-----+
```

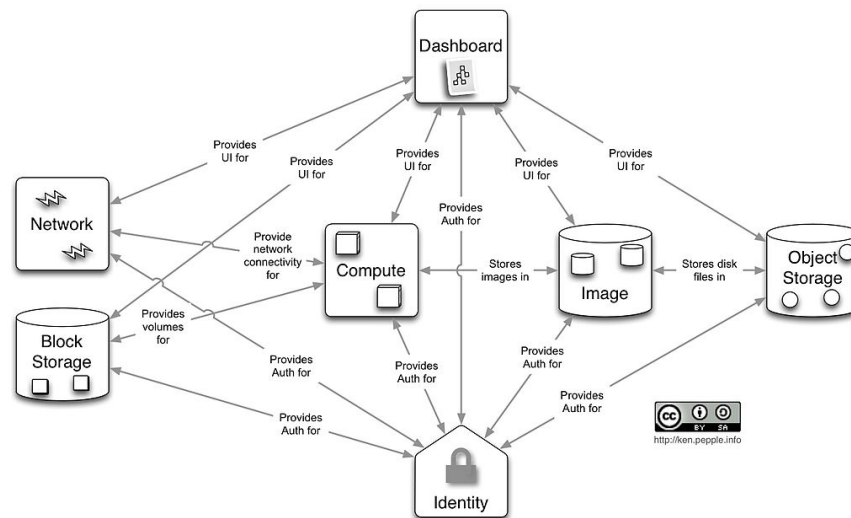
OpenStack design

- A collection of loosely coupled services
- Interacting over REST APIs
- Using well-defined protocols
- Each service is a project backed by a team

OpenStack key services

- Compute service - Nova
- Network service - Neutron
- Image service - Glance
- Object Storage service - Swift
- Identity service - Keystone

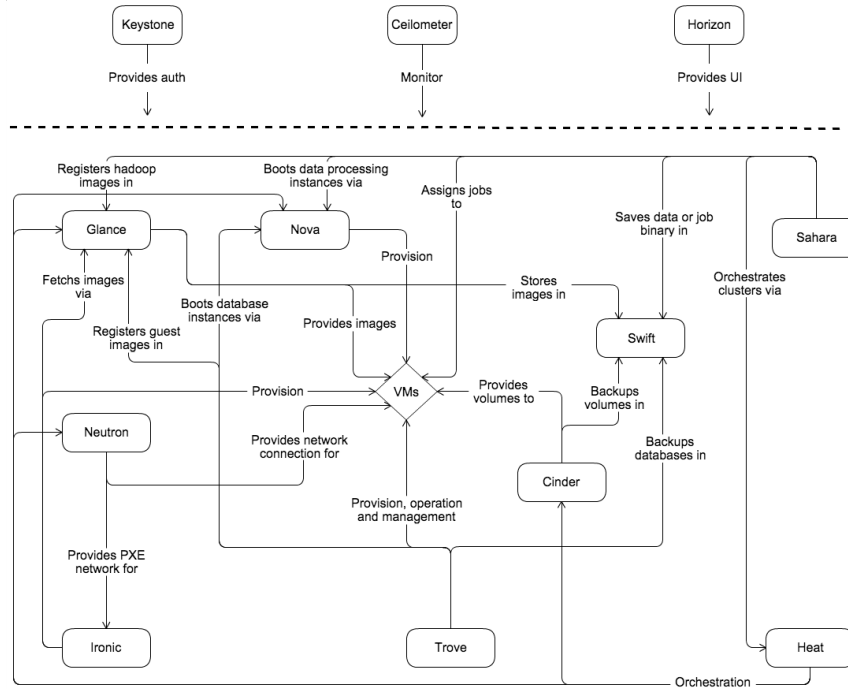
OpenStack key services



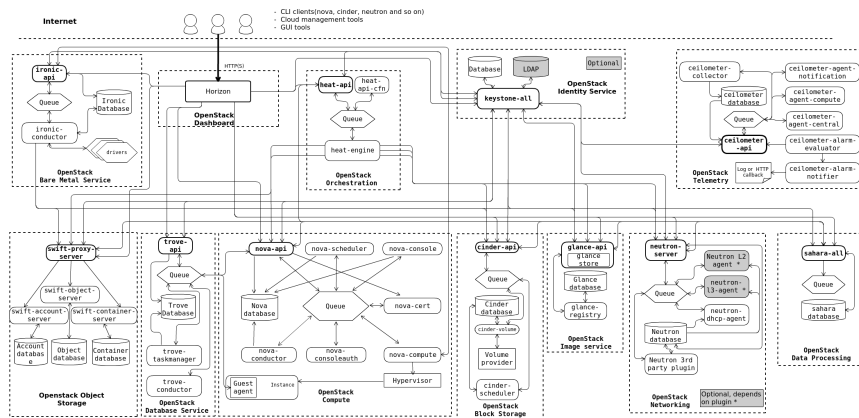
VM deployment workflow

- Heat engine executes a template
- Nova schedules VM creation
- Nova asks Glance for image
- Glance asks Swift for image contents
- Heat asks Cinder for volume
- Nova asks Neutron for network

VM deployment workflow



VM deployment workflow



OpenStack service structure

- Message queue

- Persistent database
- REST API service
- Service engine
- Remote agent

Other OpenStack services

- Orchestration - Heat
- Baremetal provisioning - Ironic
- Non/relational database service - Trove
- Dashboard - Horizon
- Block Storage - Cinder
- Telemetry - Ceilometer

More OpenStack services

- Elastic Map Reduce - Sahara
- Messaging Service - Zaqar
- Shared Filesystems - Manila
- DNS Service - Designate
- Key Management - Barbican
- Containers - Magnum
- Application Catalog - Murano
- Governance - Congress

OpenStack governance

- Open source
- Open community
- Open design
- Open development

Open source

- Fully functional, no vendor-specifics
- Apache 2.0 License

Open community

- Public meetings on IRC
- Mailing lists, bugs on Launchpad and Storyboard
- Elected Project Team Lead
- Elected Technical Committee

Open design

- OpenStack Summit
- OpenStack Forum
- Project Team Gatherings

Open development

- Code contributions - <https://review.openstack.org/>
- Project Team Lead
- Core Reviewers
- Specifications - <https://specs.openstack.org/>

Questions?

- <https://www.openstack.org/>