Introduction to OpenStack

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What is OpenStack ?

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- Free and open-source cloud-computing software platform
- Provides services for managing a Cloud environment on the fly.
- Consists of a group of interrelated projects that control pools of processing, storage, and networking resources
- Provides users methods and support to deploy virtual machines in a remote environment.
- State in OpenStack is maintained in centrally managed relational database (MySQL or MariaDB).
- **OpenStack provides all the services for an IaaS.**

- OpenStack (Kilo)

- hepiaCloud (Kilo)

- SWITCHEngines (Juno)

OpenStack forum

OpenStack releases

Series	Status	Releases dates
Austin	Deprecated	Oct. 2010
Baxer	Deprecated	Feb. 2011
Cactus	Deprecated	Apr. 2011
Diablo	End Of Life (EOL)	Sept 2011, Janv. 2012
Essex	EOL	Apr. 2012 … Oct. 2012
Folsom	EOL	Sept. 2012 …Apr. 2013
Grizzly	EOL	Apr. 2013 … Mar. 2014
Havana	EOL	Oct. 2013 … Apr. 2014
Icehouse	EOL	Apr. 2014 … Jun. 2015
Juno	Security supported	Oct. 2014 … Apr. 2015
Kilo	Current stable release, security supoorted	Apr. 2015 ... Jul. 2015
Liberty	Under development	Oct. 2015

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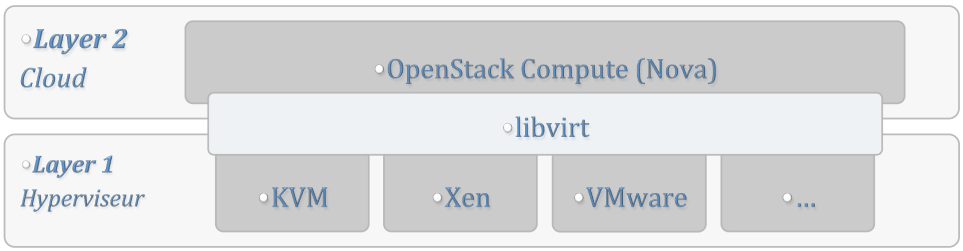
OpenStack components

- OpenStack identifies nine key components...
  - **Nova**: cloud computing fabric controller, main part of an IaaS system. It is designed to manage and automate pools of computer resources



OpenStack components

- **Keystone**: provides identity services for OpenStack. A central list of users/permissions mapped against OpenStack services. Provides multiple means of access.
- **Glance**: provides image services to OpenStack. "images" refers to images (or virtual copies) of hard disks. Used as templates for deploying new VMs.
- **Neutron**: provides the networking capability for OpenStack.
- **Horizon**: The dashboard behind OpenStack. The only native graphical interface to OpenStack.

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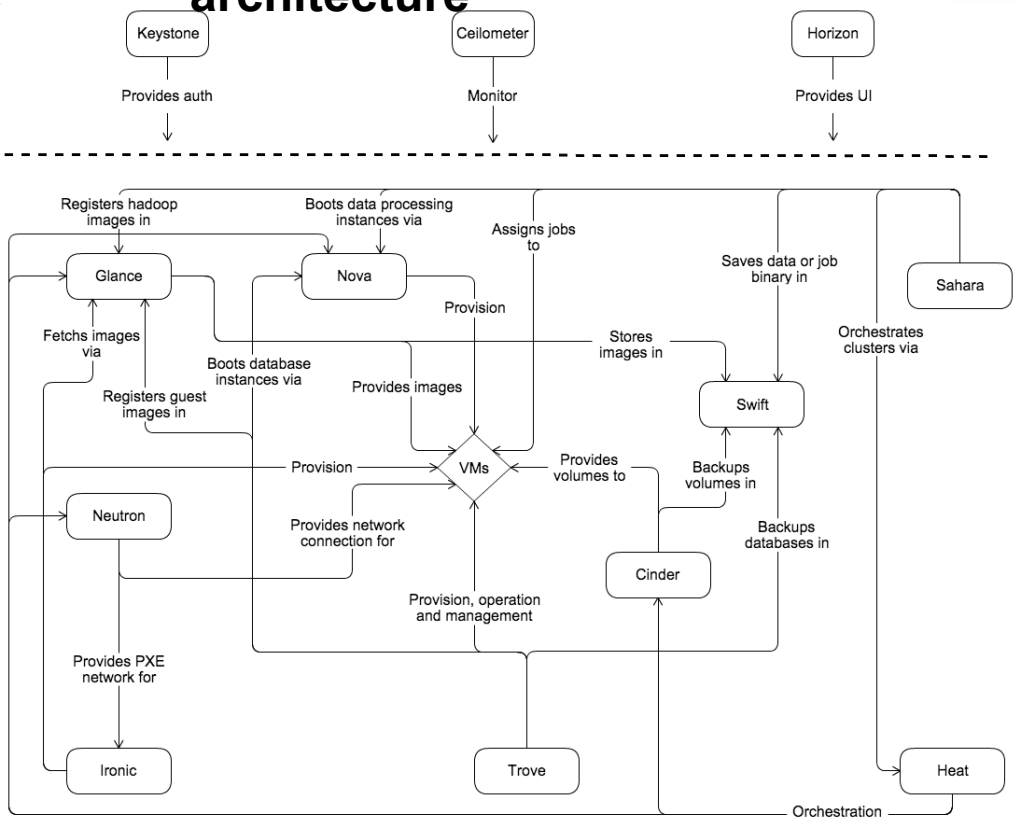
OpenStack components

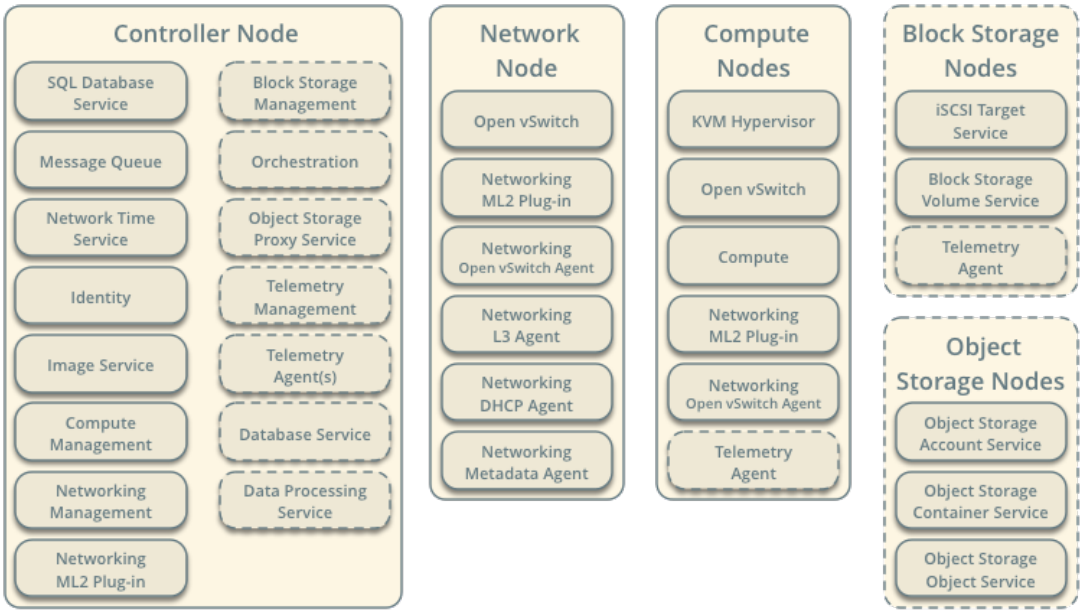
- **Swift**: storage system for objects and files.
  - Users refer to a unique file identifiers: OpenStack decides where to store/back-up etc.
- **Cinder**: block storage component, analogous to the traditional access on a disk drive.
- **Ceilometer**: provides telemetry services.
  - Metering and reporting. Allows OpenStack to provide billing
  - services to users.
- **Heat**: the orchestration component of OpenStack.
  - Users can store the requirements of a cloud application in a file.
  - Defines what resources are necessary for the application.

OpenStack conceptual architecture



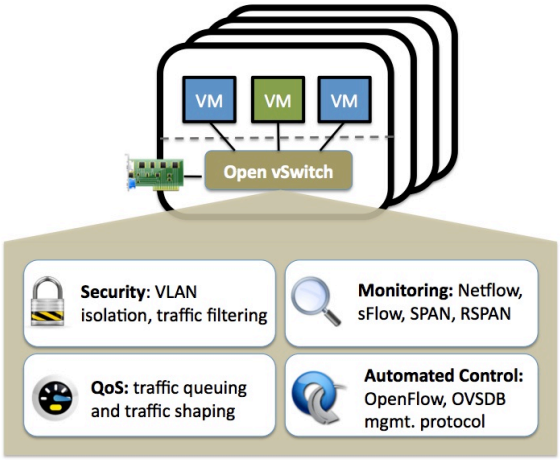
Minimal Architecture Example - Service Layout

OpenStack Networking (neutron)



Open vSwitch

- http://openvswitch.org/
- open source Apache 2.0 license



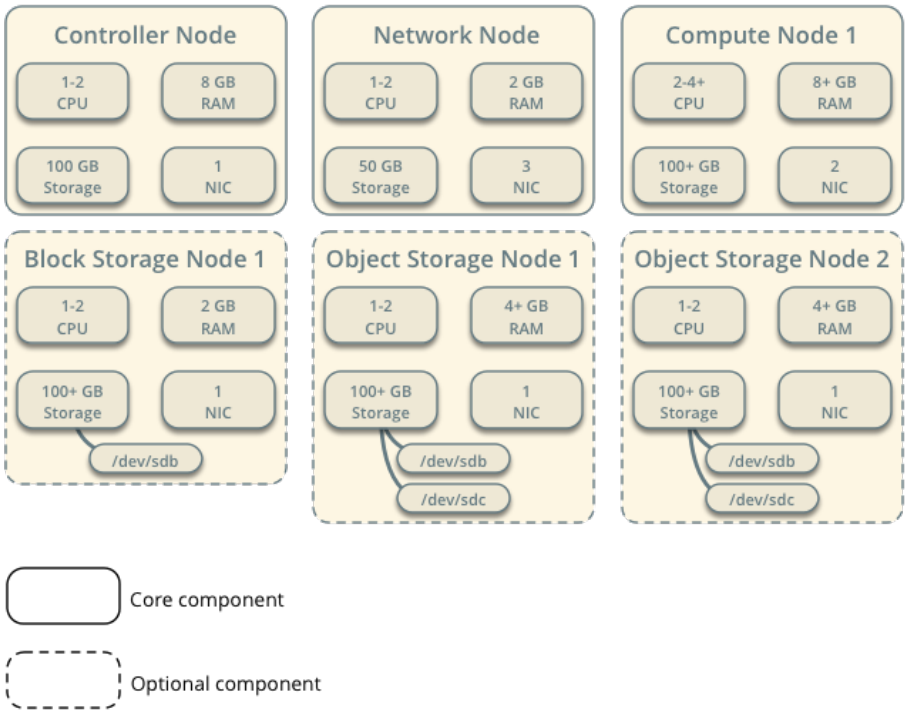
Controller Node

- Controller node Runs:
  - Identity service (**Keystone**), Image Service (**Glance**)
  - Management portions of Compute and Networking
  - Networking plug-in (**Open vSwitch**), and the dashboard (**Horizon**).
  - Supporting services: SQL database, message queue, and Network Time Protocol (NTP).

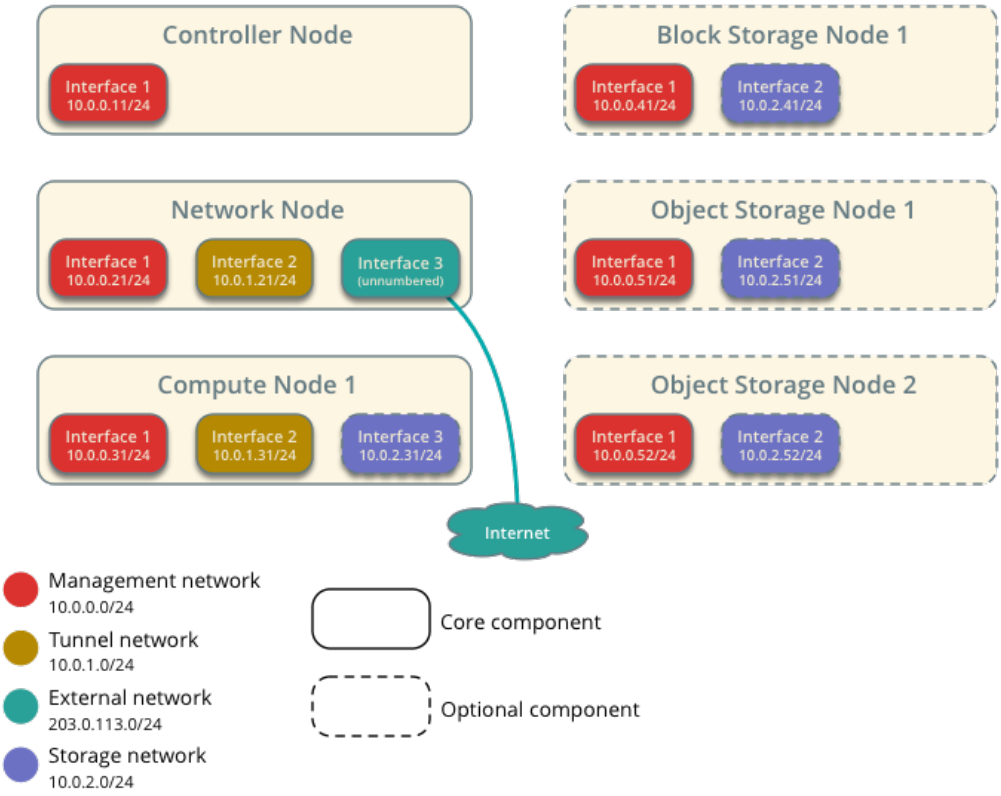
Network and Compute nodes

- Network node:
  - Runs Networking plug-in (**Open vSwitch**)
  - Provides switching, routing, NAT, and DHCP services. Also handles external (Internet) connectivity for tenant VMs.
- Compute node(s)
  - Runs the hypervisor (default KVM) that operates tenant VMs.
  - Networking plug-in (**Open vSwitch**) and an agent to connect tenant networks to VMs.
  - Agent to provide firewalling (security groups) services.

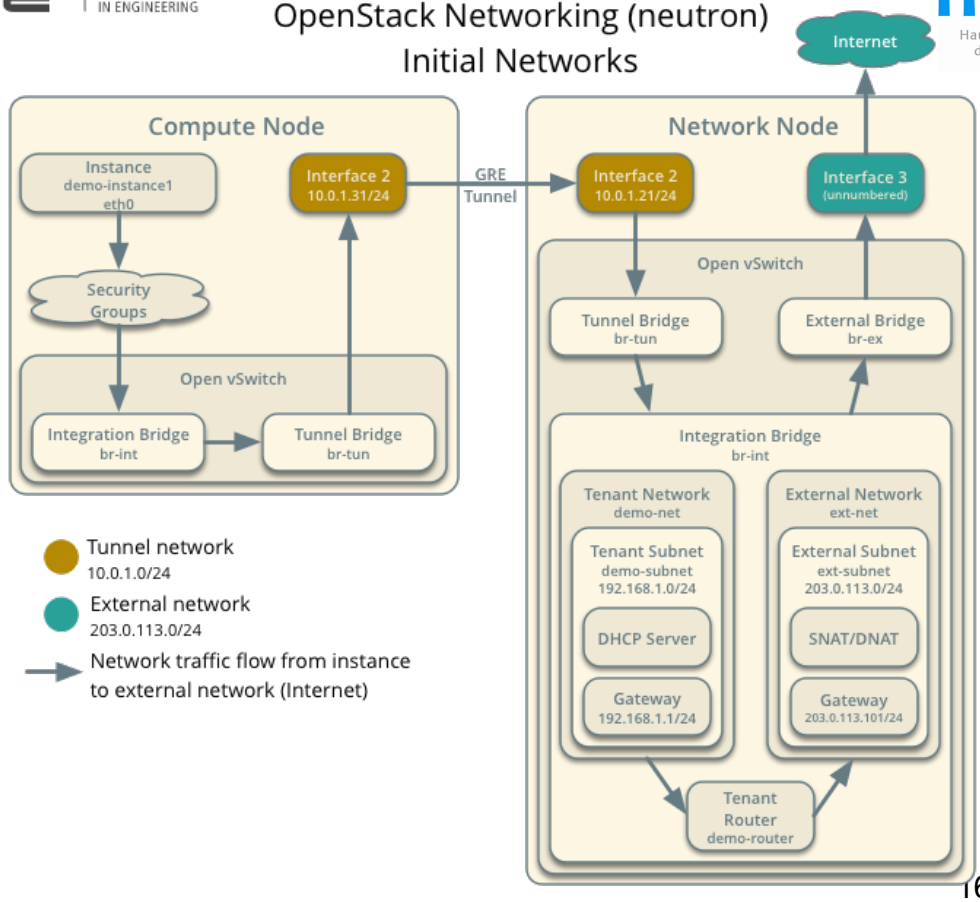
Minimal Architecture Example - Hardware Requirements
OpenStack Networking (neutron)



Minimal Architecture Example - Network Layout
OpenStack Networking (neutron)



OpenStack Networking (neutron)
Initial Networks

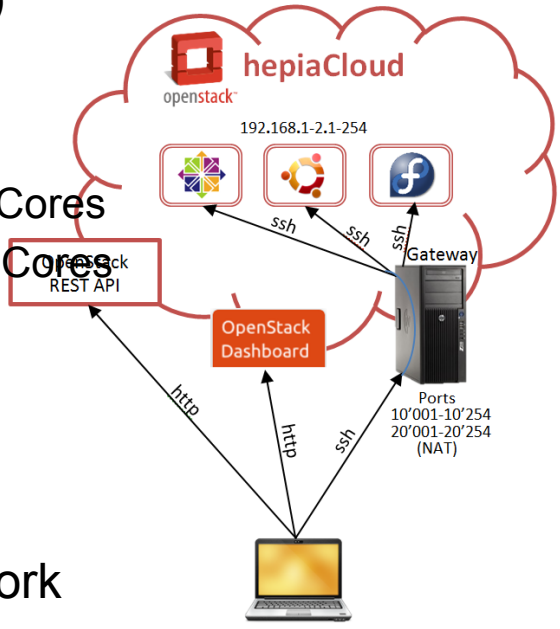


- OpenStack
- **hepiaCloud**
- SWITCHEngines

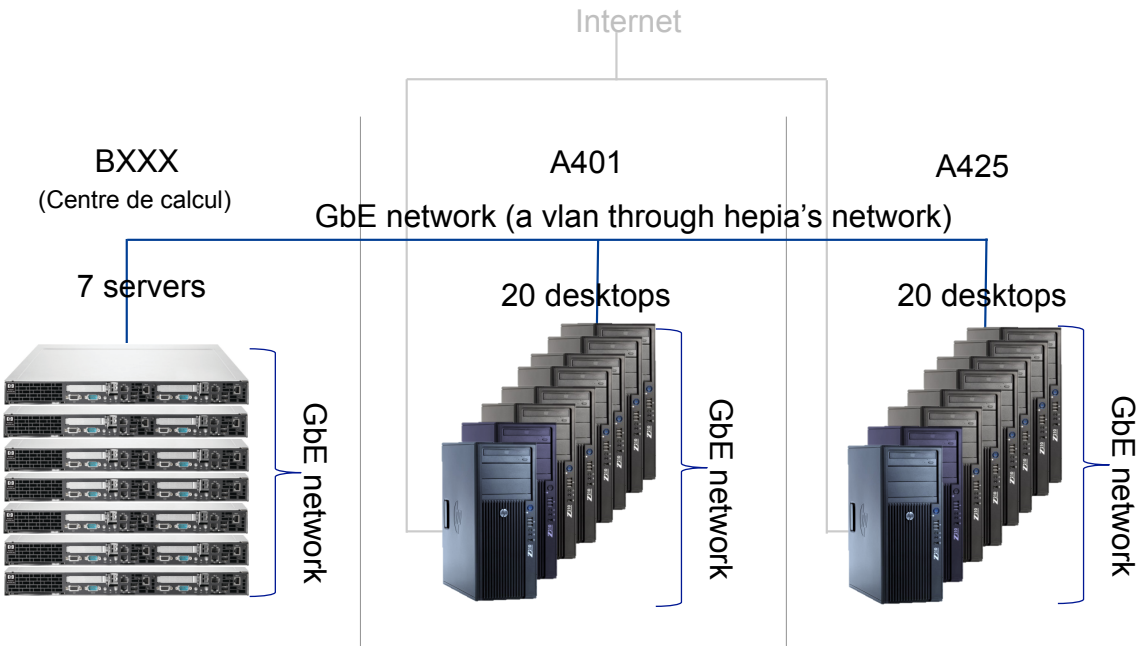
hepiaCloud

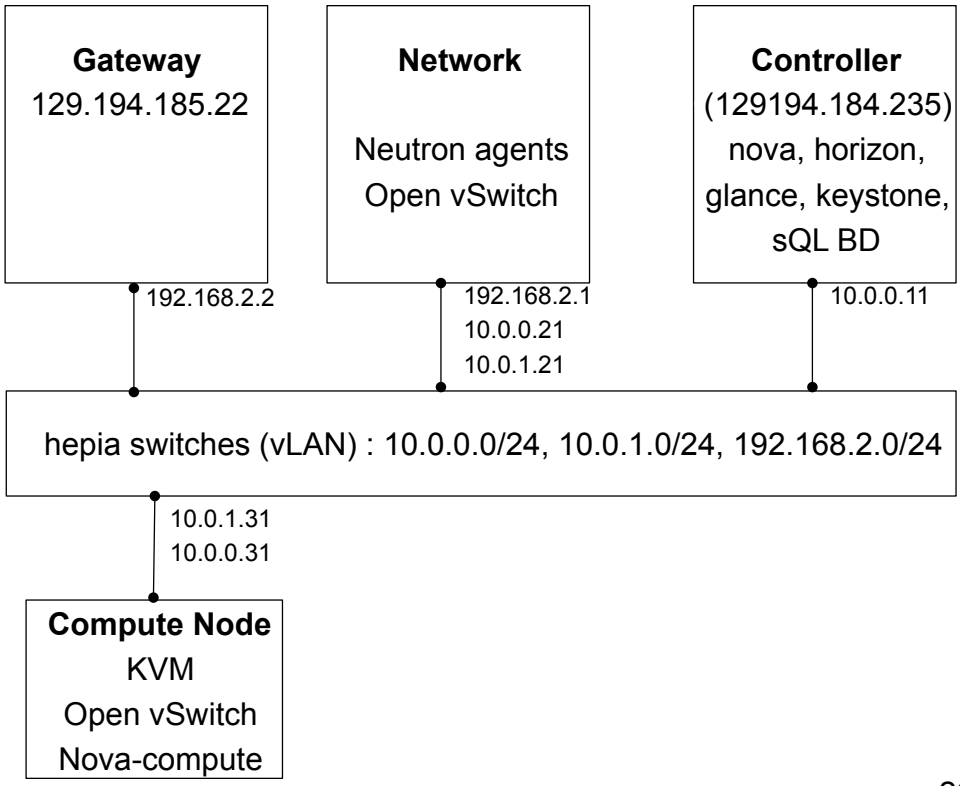
hepiacloud

- Based on OpenStack (Kilo)
- Hypervisor: Linux-KVM
- Heterogeneous resources
  - 6 servers: 128 GB RAM, 24 Cores
  - 40 desktops: 32 GB RAM, 4 Cores
- hepiaCloud provides
  - ~300 vCPU
  - ~2 TB of RAM
  - ~10 To of HDD
- Instances in a private network



hepiaCloud


Internet
BXXX
(Centre de calcul)
A401
A425
GbE network (a vlan through hepia's network)
7 servers
20 desktops
20 desktops
GbE network
GbE network
GbE network


Gateway
129.194.185.22
Network
Neutron agents
Open vSwitch
Controller
(129194.184.235)
nova, horizon,
glance, keystone,
sQL BD
192.168.2.2
192.168.2.1
10.0.0.21
10.0.1.21
10.0.0.11
hepia switches (vLAN) : 10.0.0.0/24, 10.0.1.0/24, 192.168.2.0/24
10.0.1.31
10.0.0.31
Compute Node
KVM
Open vSwitch
Nova-compute