OpenStack Introduction

James Won-Ki Hong, Seyeon Jeong, Jian Li

Dept. of Computer Science & Engineering

POSTECH

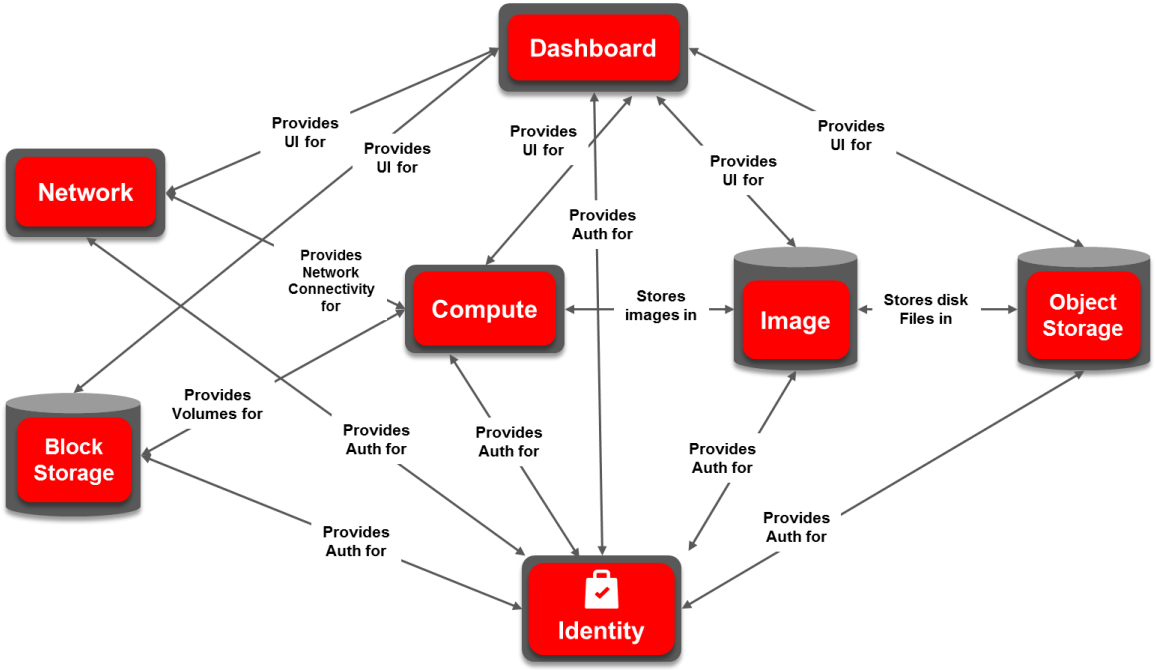
http://dpnm.postech.ac.kr/~jwkhong

jwkhong@postech.ac.kr

OpenStack Introduction

❖ OpenStack Overview

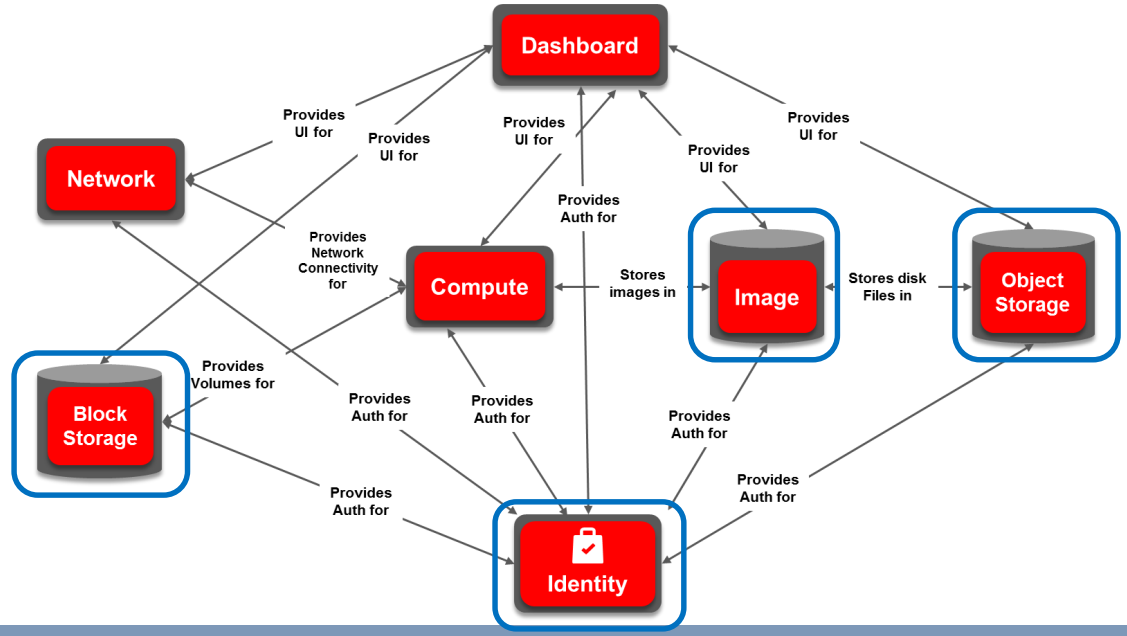
- Began in 2010 as a joint project of Rackspace and NASA
  - Managed by OpenStack Foundation since 2015
- Backed from big power brands such as Intel, HP, RedHat, IBM, etc.
- Cloud management / operating system
  - Virtualizes a set of servers to spawn VMs and manage their connectivity
  - Supports latest cloud technology (Hadoop, bare metal provisioning, etc.)



OpenStack Introduction

❖ OpenStack Core Components / Services

- Keystone (Authentication)
  - A master component that only allows other components to operate after getting the required “authentication token”
  - Creation of “users” with different level of “credential”
- Glance (Image service)
  - A common image repository for storing virtual machine ISO images
- Cinder (Block storage)
  - Storage options for providing hard disk space (volume) to created virtual machines
- Swift (Object storage)
  - Storage options for providing data replication into different machines to keep the data safe by distribution



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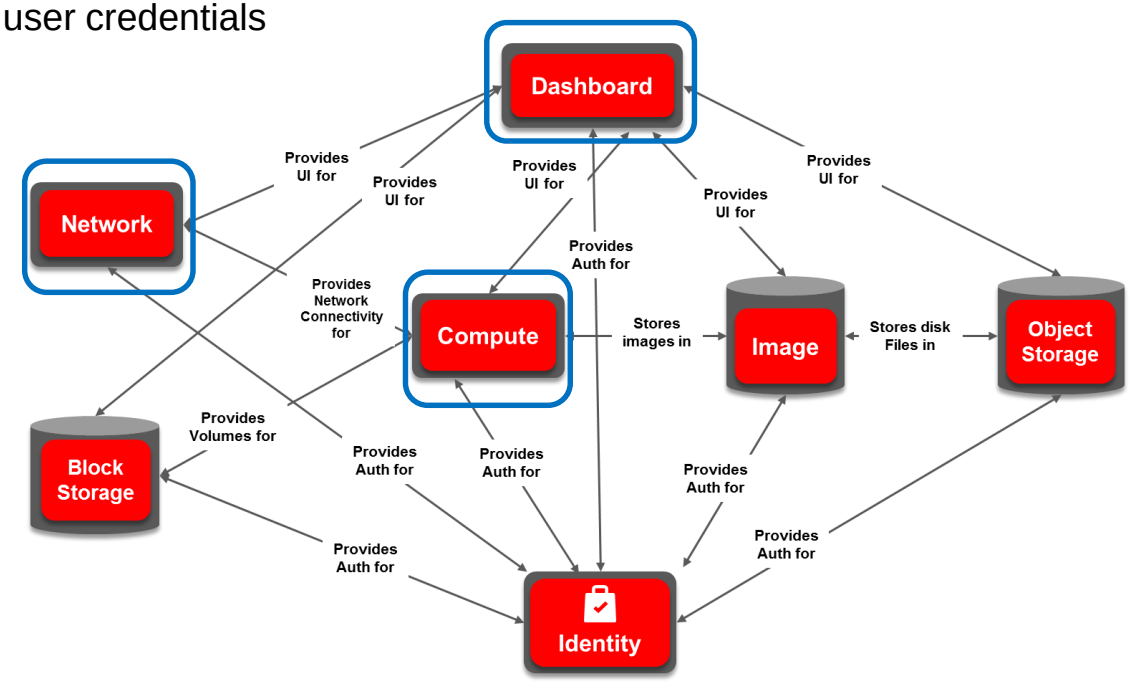
❖ OpenStack Core Components / Services

- Neutron (Network management)
  - Creation of desired network configuration for virtual machines' connectivity
  - Creation of virtual NIC, virtual switch, virtual router, etc.
- Nova (Compute)
  - Lifecycle management of virtual machines
  - Finding suitable host machine and interfacing with Cinder, Neutron, Glance, etc.
- Horizon (Dashboard)
  - A common web interface to provide user-friendly and comprehensive way to access and manage the virtual data center
  - Accessible from anywhere through a web browser with a URL and user credentials



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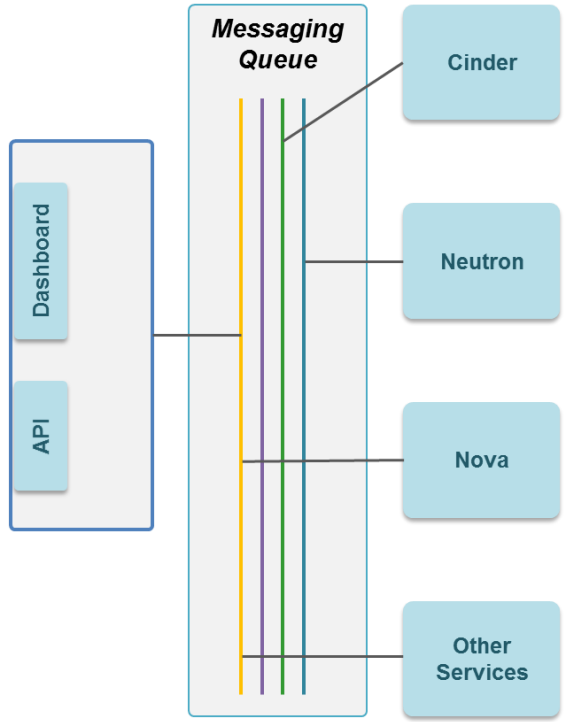
External Access

- REST API
  - Openstack CLI clients Internally use REST API
    - python-novaclient, python-neutronclient, …
  - REST client
    - curl -i -X GET http://{Controller Node}/v2.0/tenants -H "User-Agent: python-keystoneclient" -H …
- Dashboard
  - Access to Horizon through a client web browser



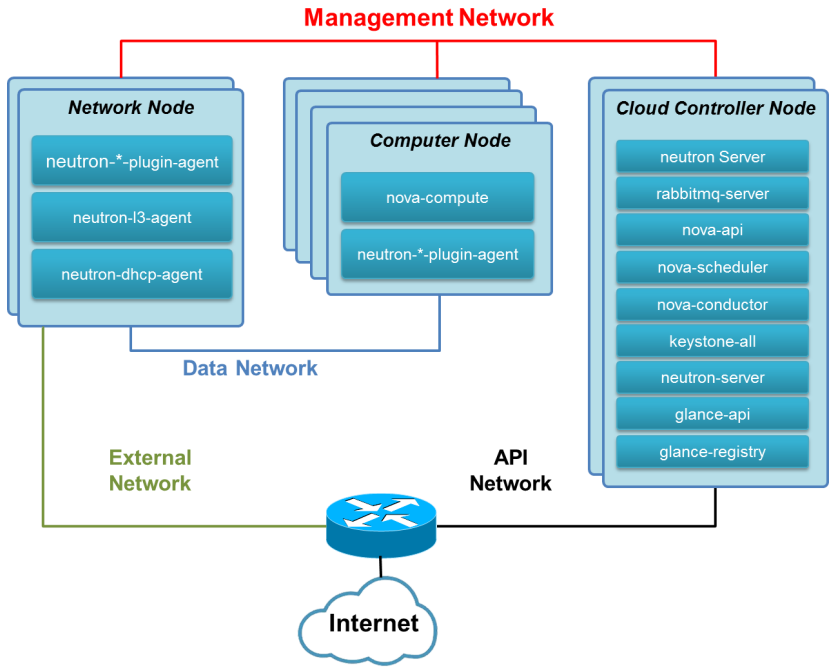
Internal Communication

- AMQP (Advanced Message Queuing Protocol)
  - Uses RabbitMQ as a message broker for message-based internal interaction with each OpenStack component
  - Each component has its messaging channel
- SQL
  - Stores metadata, instance flavor, network configuration, project profiles, etc. into a central DB (MySQL / MariaDB)

OpenStack Introduction

❖ General Architecture

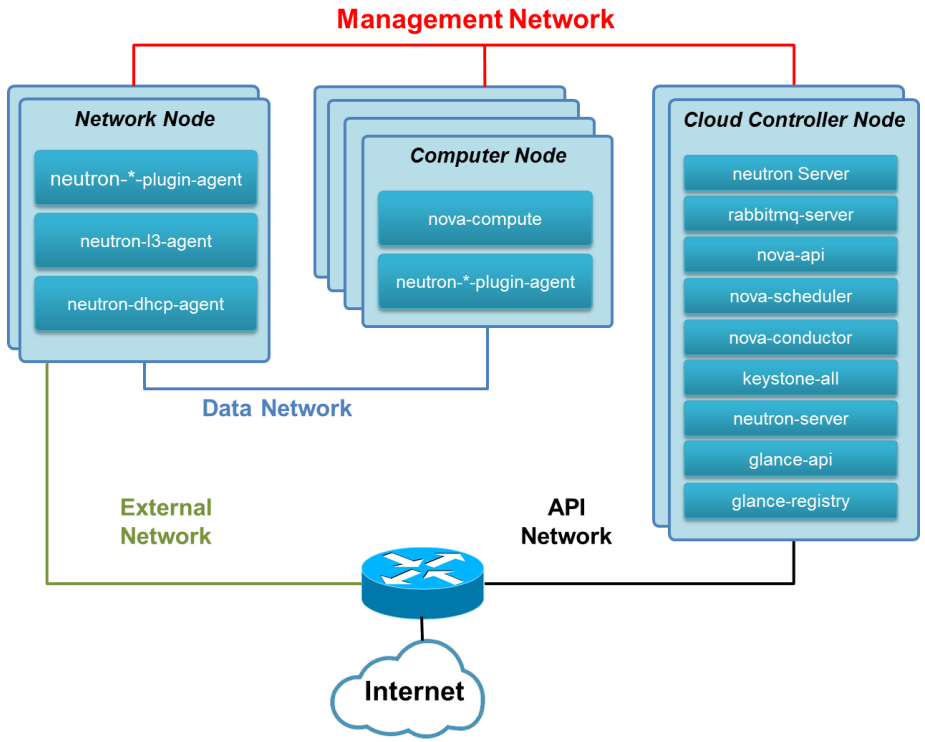
- Controller node
  - A physical machine that runs OpenStack core components
  - Includes a message broker, central DB, etc.
- Network node
  - A Physical machine that provides networking services to cloud users (tenants)
- Compute node
  - A physical machine that is capable of (computing) resource virtualization



OpenStack Introduction

❖ General Architecture

- Management network
  - Exposes each component API which can be invoked by remote nodes
- Data (guest) network
  - Provides VM data communication links
  - Provides isolated tenant networking through tunneling (VXLAN, GRE, VLAN, etc.)
- External network
  - Provides external network connectivity to VMs
- API network
  - E.g., Horizon access from admin or clients



* According to admin's choice, some OpenStack components can be deployed on the same physical machines
  - Controller/network node on the same host
  - API/external network on the same L2 link


THANK
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