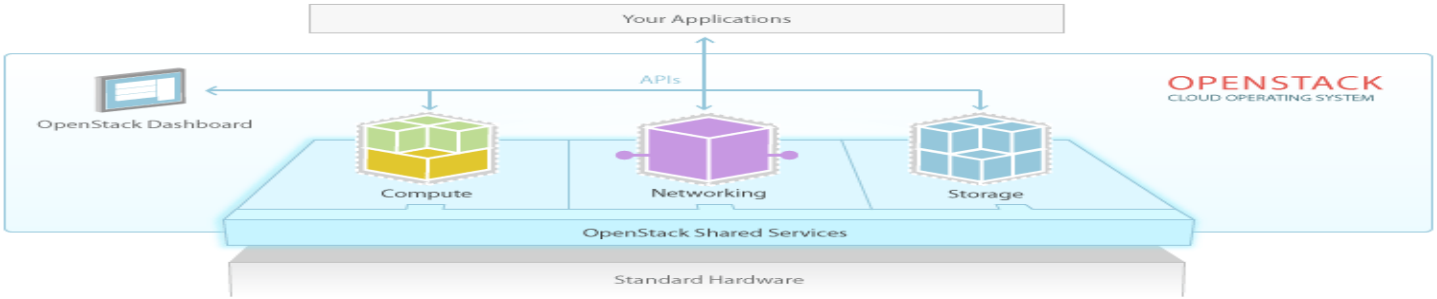
Cloud Computing using openstack™

bd NOG
Bangladesh Network Operators Group



Summary of Content

- Introduction of Cloud Computing
- Cloud Computing vs. Server Virtualization
- Cloud Computing Components Stack
- Public vs. Private Clouds
- Open Source Software for Private Cloud (IaaS)
- OpenStack Architecture
- IT Infrastructure Transformation of BRAC
- Why we choose Openstack for our Private Cloud

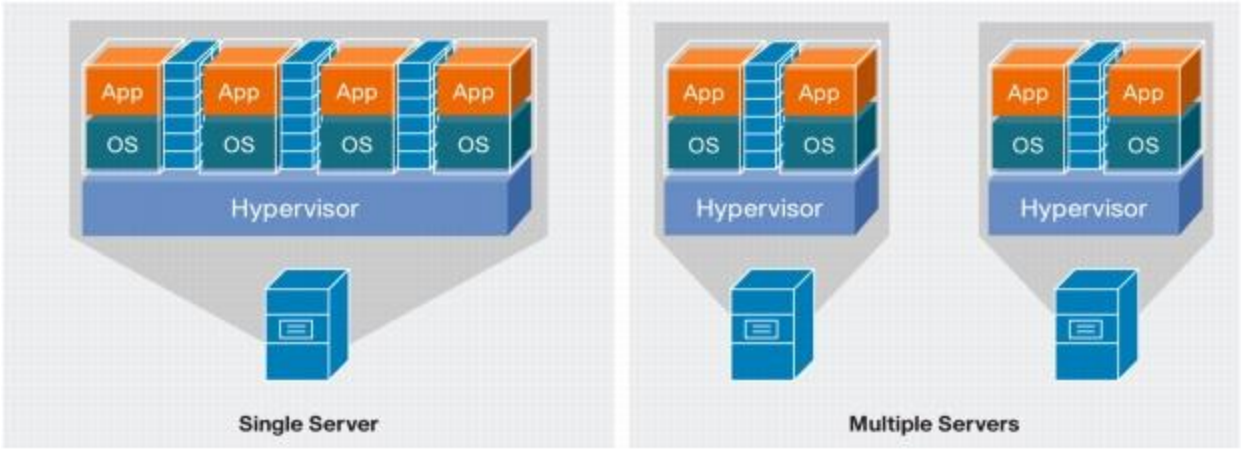
Introduction of Cloud Computing

- **Cloud computing** is a phrase used to describe a **computing** concepts that involve a large number of computers connected through Internet.
- "cloud", can be define as **agility**, **scalability**, **automation**, and **on-demand service delivery**

Cloud Computing vs. Server Virtualization

Server Virtualization

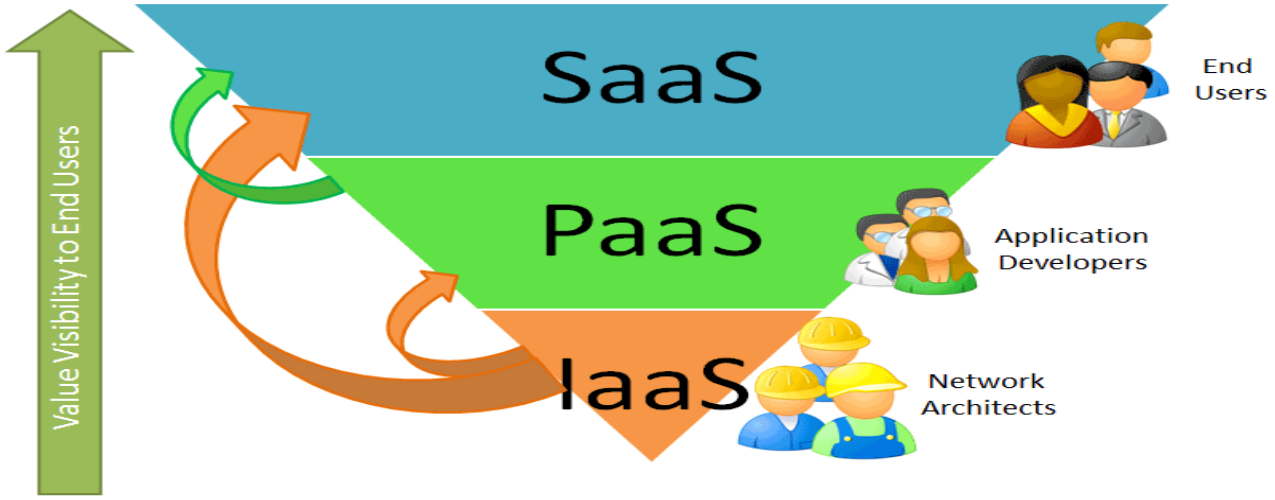
- Virtualization enables multiple instances of infrastructure resources to run on the same hardware, with access to those resources being controlled by a hypervisor.
- Virtualization for maximize the utilization of compute, storage and networking.



Cloud Computing

- Cloud computing is the delivery of shared computing resources, software or data as a service.
- Characteristics of Cloud computing
  - It's virtual resource pool
  - It's flexible and scalable
  - It's Open or Closed
  - It's secure
  - It's affordable

Cloud Computing Components Stack



- SaaS applications are designed for end-users, delivered over the web. Salesforce, Office 365
- PaaS is the set of tools and services designed for developers. OpenShift
- IaaS is the infrastructure service which includes servers, storage, networks, and operating systems. OpenStack, Apachecloudstack, Open Nebula

Public Clouds vs. Private Clouds

Public Clouds

- Public clouds are cloud systems that are available for everyone's use.
- Public clouds services can be both free and subscription based, depending on the user's needs and provider's business policy.

iCloud

Private Clouds

- A private cloud can offer the same services as a public cloud.
- its services are limited to people behind the company's firewall.

OpenStack : Open source IaaS cloud Software

- **Introduction to OpenStack**
  - OpenStack is a cloud operating system that controls large pools of compute, storage, and networking resources throughout a data center.
  - All managed through a dashboard that gives administrators control while empowering users to provision resources through a web interface.

Why Openstack for IaaS Cloud

- **OpenStack Foundation :** The OpenStack Foundation, established September 2012, 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.

- **Who's behind OpenStack?** Founded by Rackspace Hosting and NASA, OpenStack has grown to be a global software community of developers collaborating on a standard and massively scalable open source cloud operating system. It's mission to enable any organization to create and offer cloud computing services running on standard hardware.

- **Who uses OpenStack?** Corporations, service providers, SMBs, researchers, and global data centers looking to deploy large-scale cloud deployments for private or public clouds

Who's Behind Openstack

Platinum Members

AT&T

Canonical

HP

IBM

Nebula

Rackspace

Red Hat, Inc.

SUSE

Gold Members

Aptira

CCAT

Cisco

Cloudscaling

Dell

DreamHost

Ericsson

Hitachi

Huawei

Intel

Juniper Networks

Mirantis

NEC

NetApp

Piston Cloud Computing, Inc.

VMware

Yahoo!

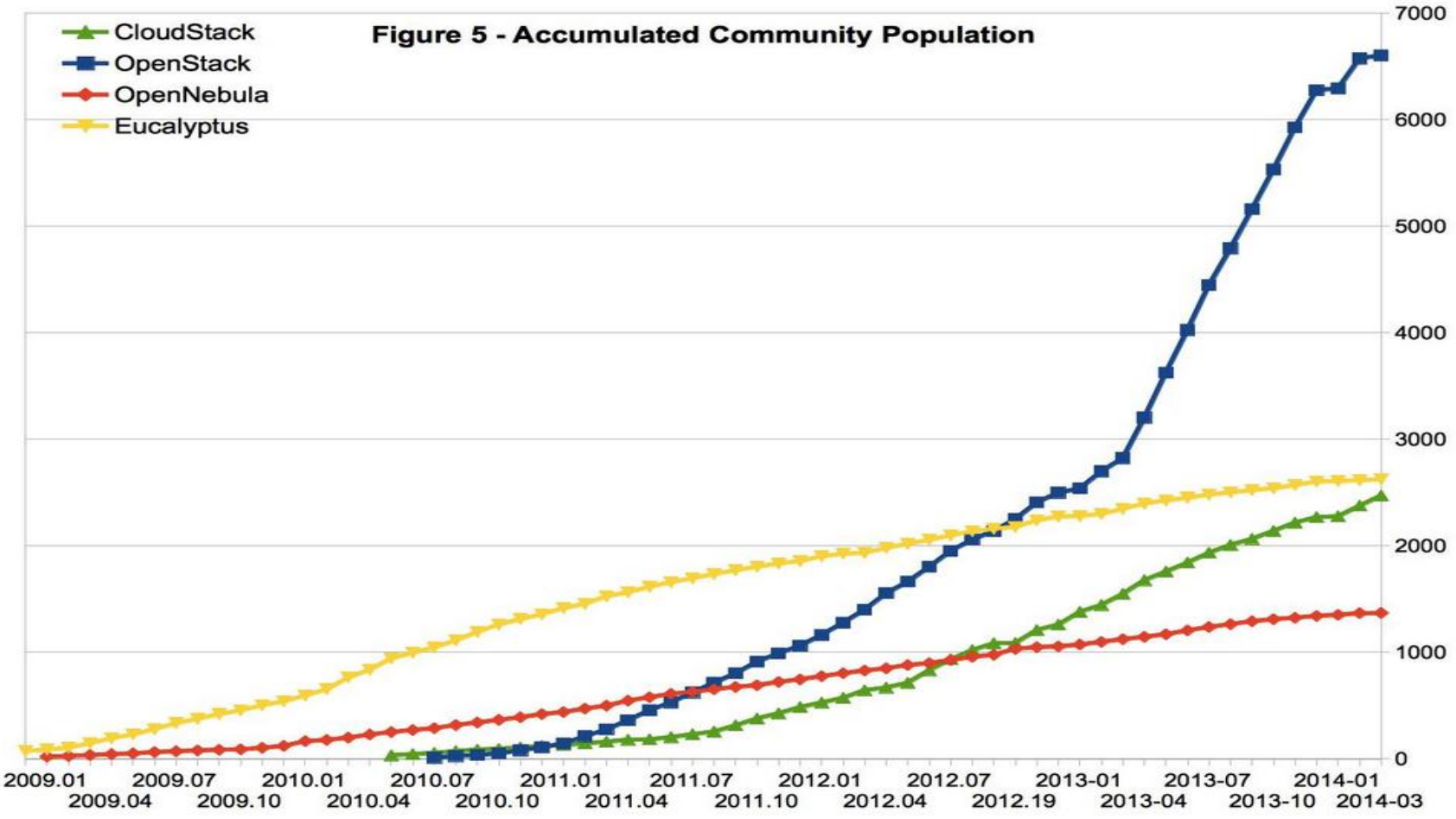
Why Openstack for IaaS Cloud

- **It's Open Source :** All of the code for OpenStack is freely available under the Apache 2.0 license. Anyone can run it, build on it, or submit changes back to the project.

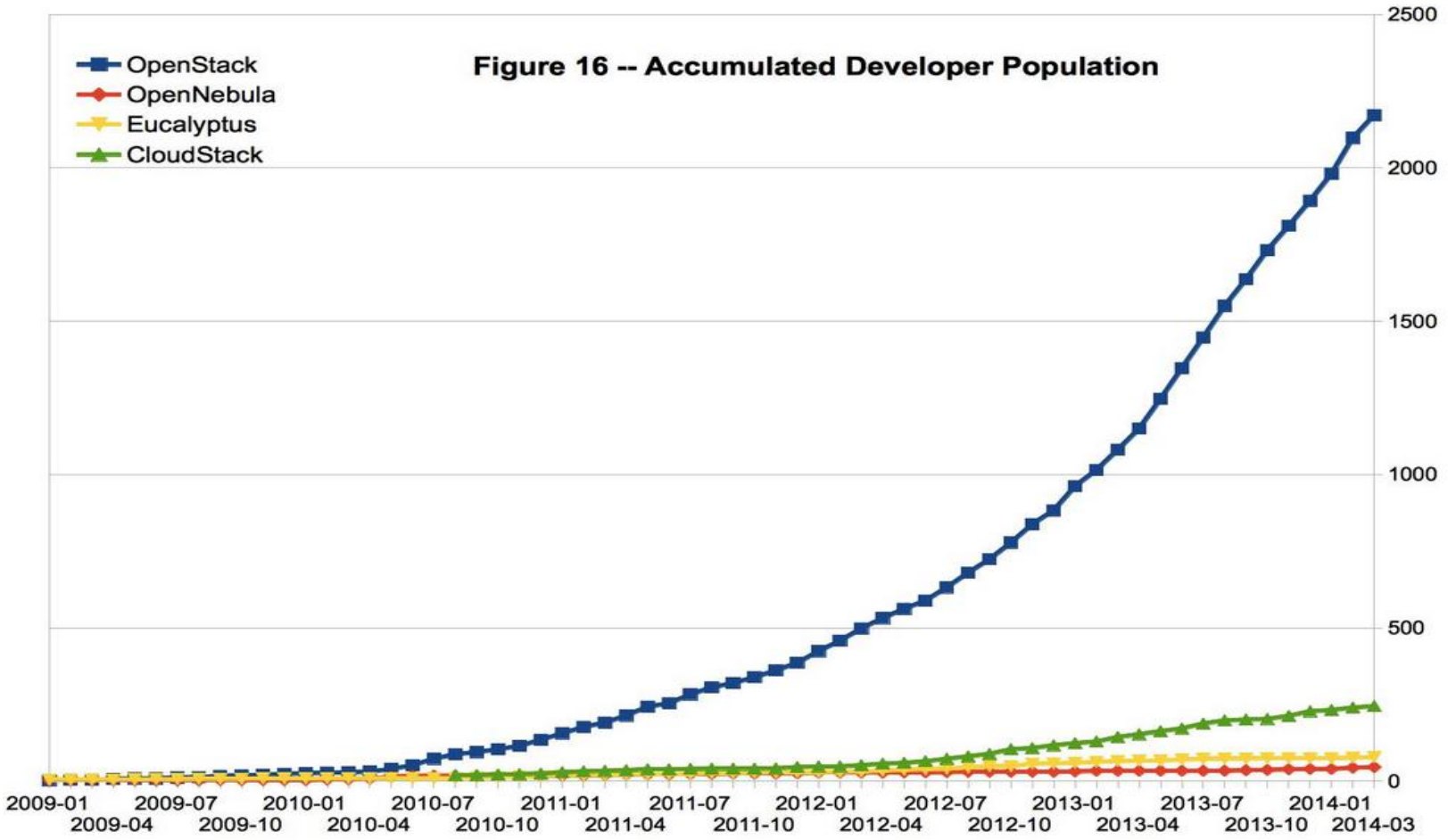
- **Who it's for:** Enterprises, service providers, government and academic institutions with physical hardware that would like to build a public or private cloud.

- **How it's being used today:** Organizations like Cisco WebEx, DreamHost, eBay, The Gap, HP, MercadoLibre, NASA, PayPal, Rackspace and University of Melbourne have deployed OpenStack clouds to achieve control, business agility and cost savings without the licensing fees and terms of proprietary software.

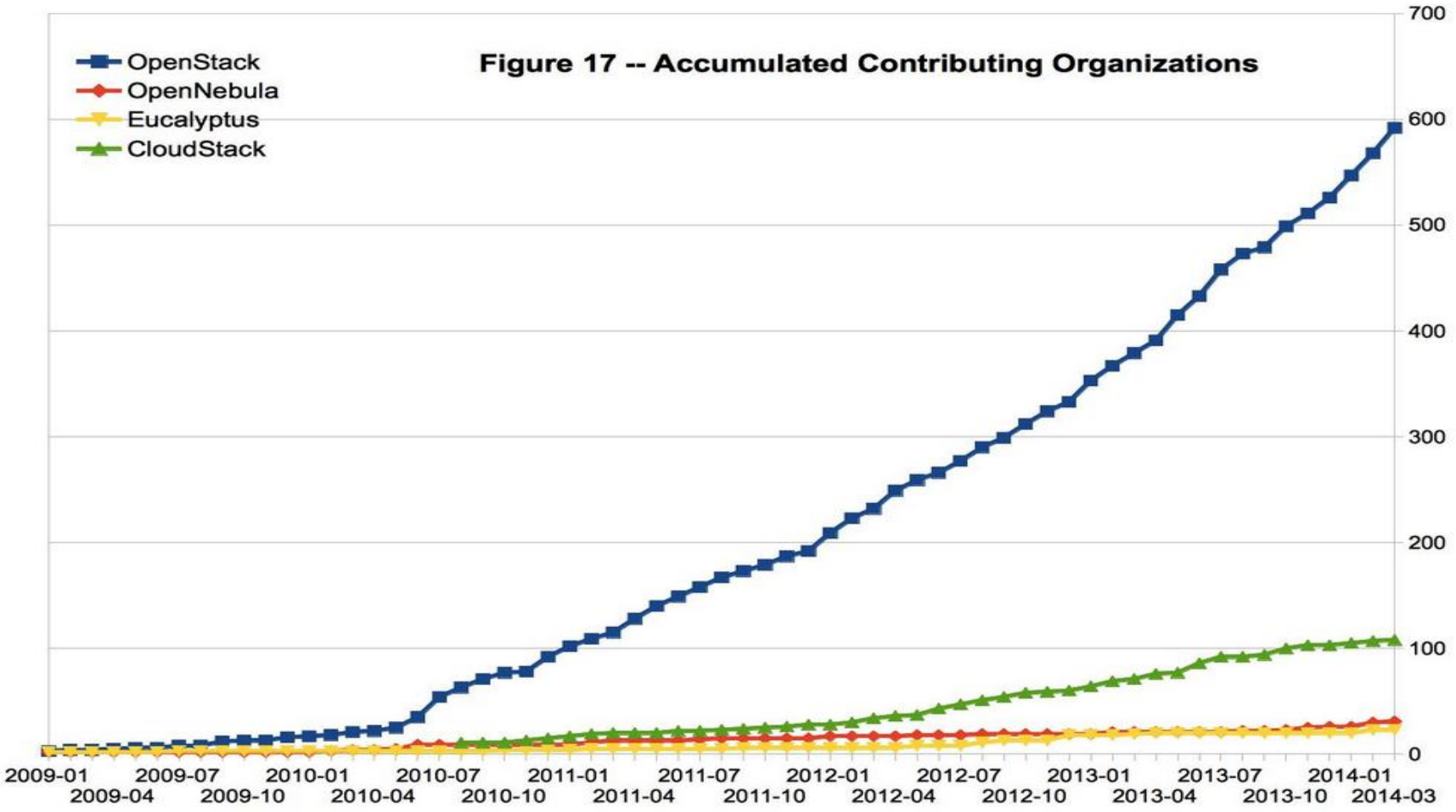
Community population on Open Cloud Technologies



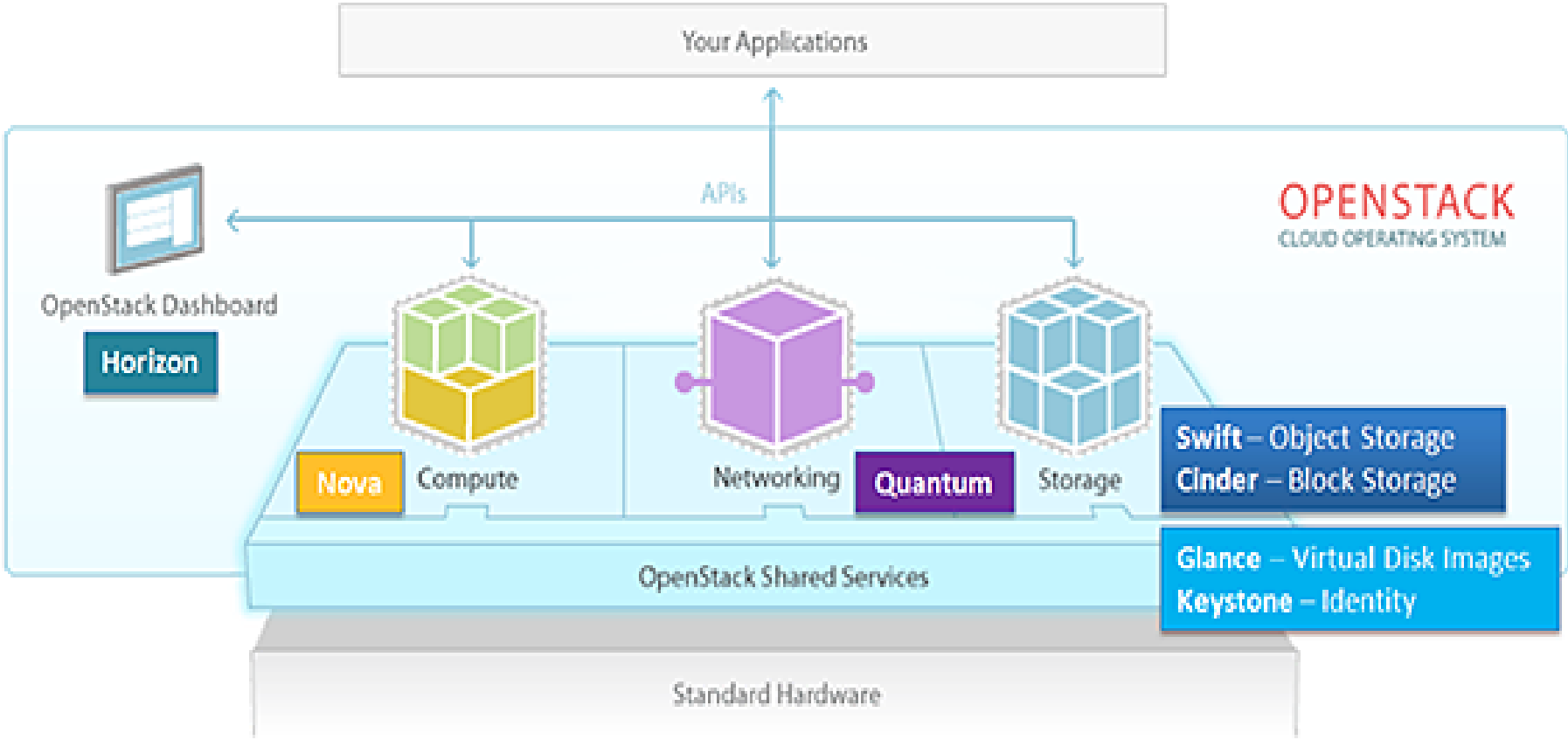
Developer population on Open Cloud Technologies



Organization population on Open Cloud Technologies



OpenStack Architecture



Latest Few Release of OpenStack

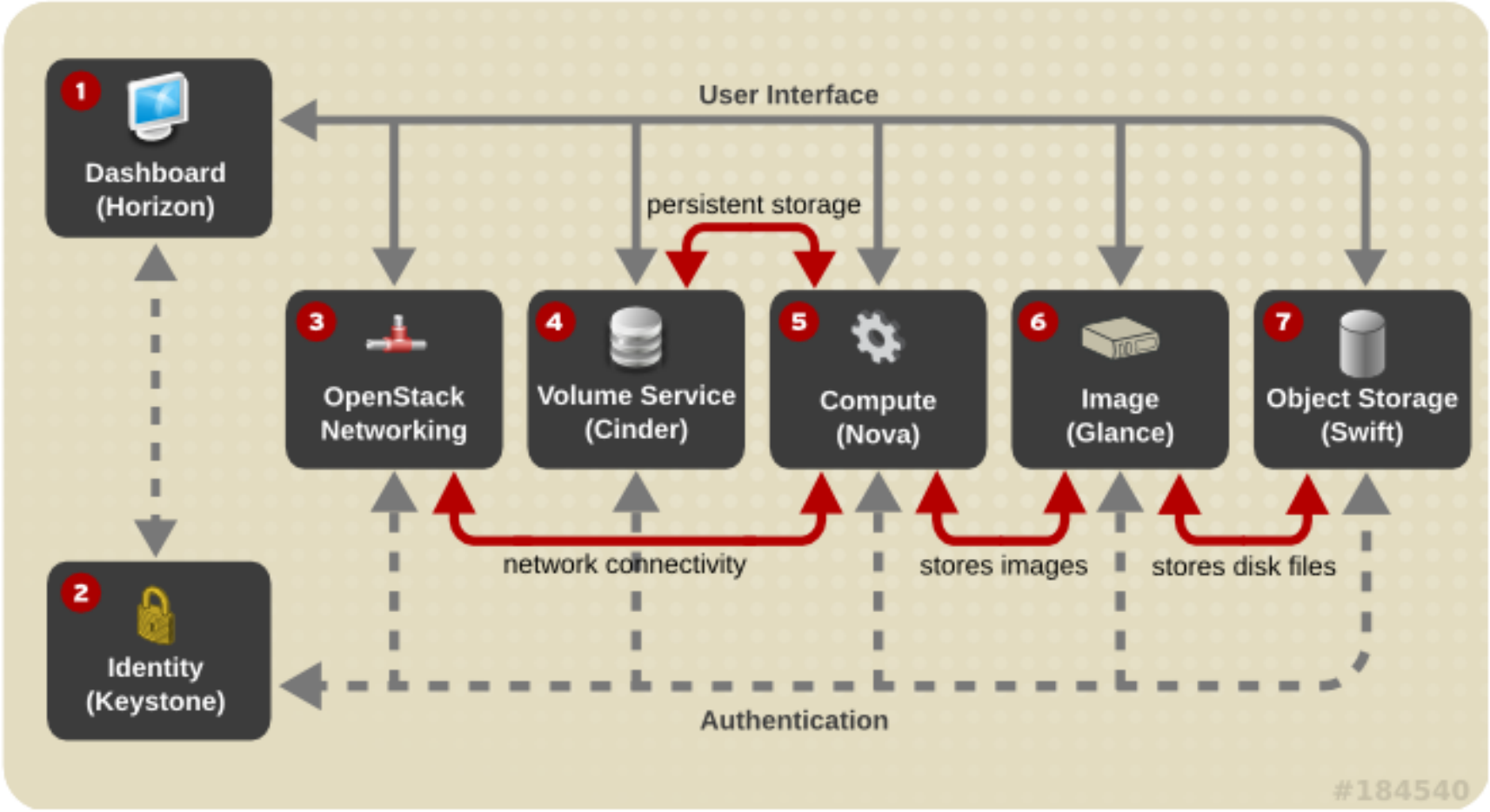
10th Release of Openstack, Released on October 2014

9th Release of Openstack, Released on April, 2014

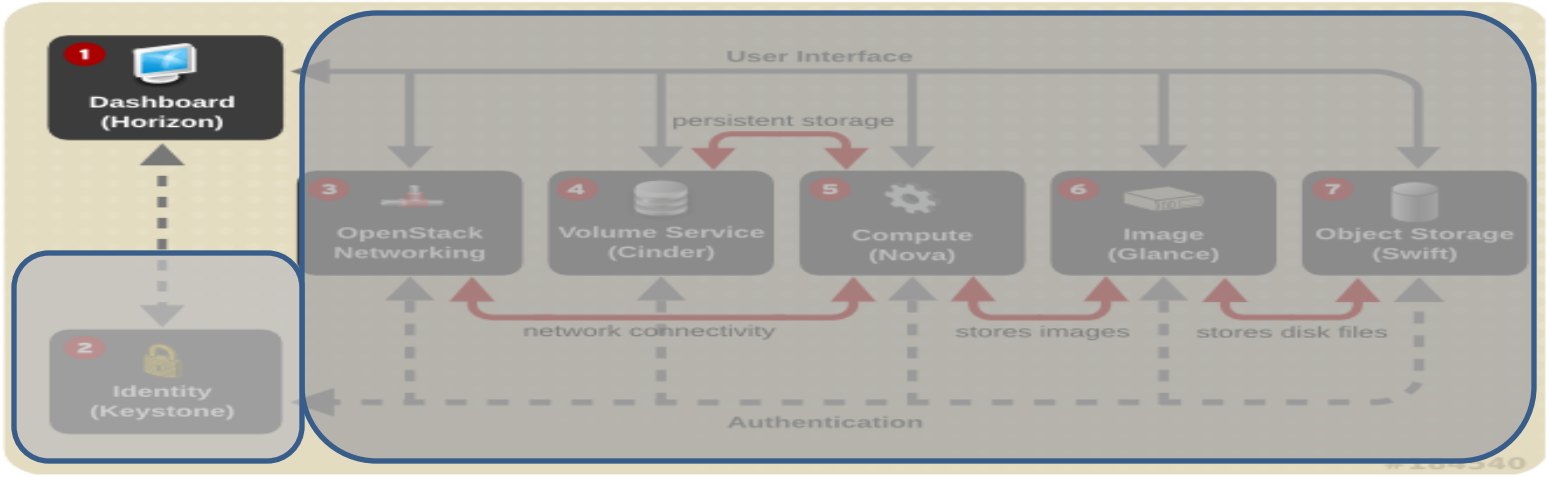
8th Release of Openstack, Released on October, 2013

7h Release of Openstack, Released on April, 2013

OpenStack Architecture

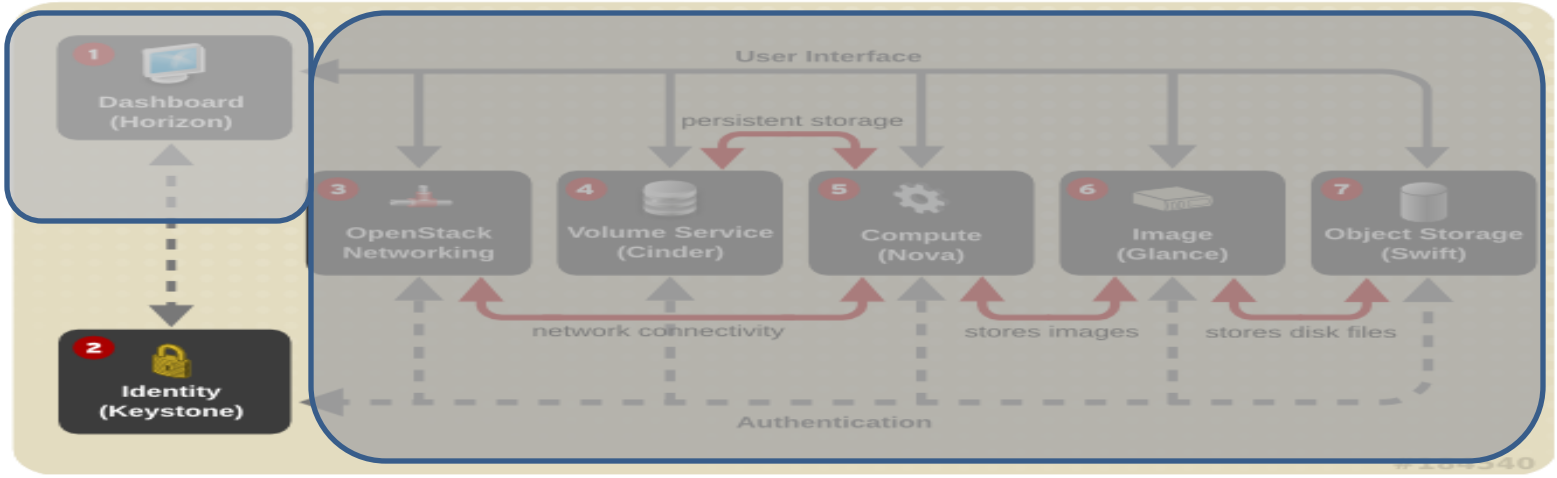


Horizon (Dashboard)



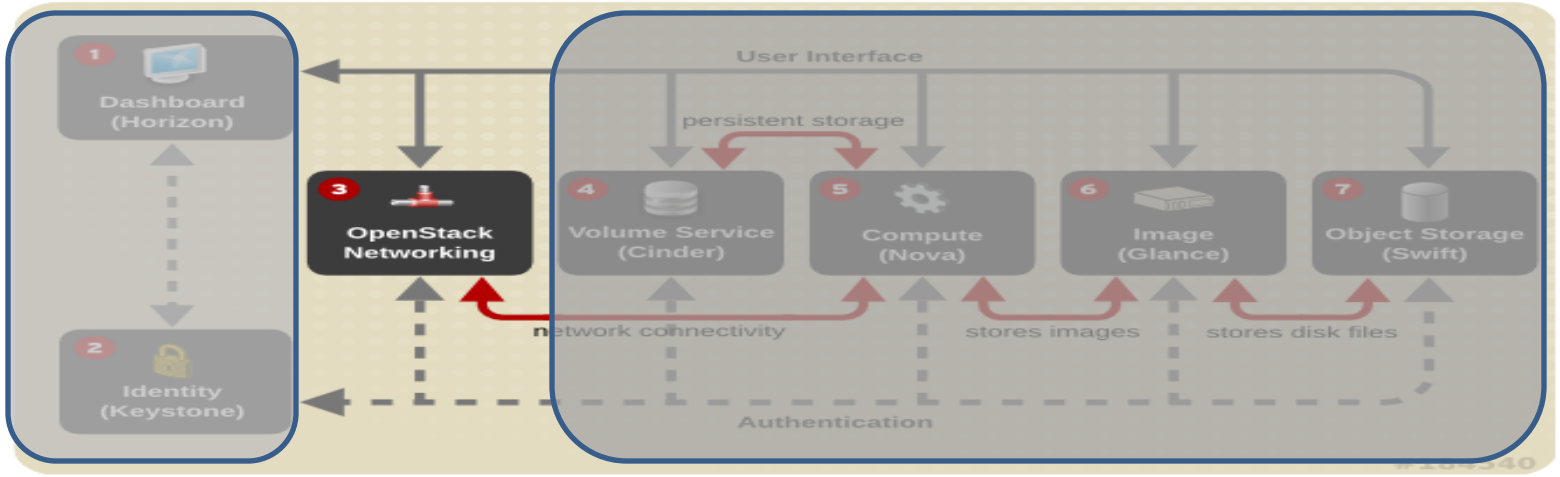
- Horizon is a web-based interface for managing OpenStack services.
- It provides a graphical user interface for operations such as launching instances, managing networking and setting access controls.
- Its modular design allows interfacing with other products such as billing, monitoring and additional management tools.

Keystone (Identity)



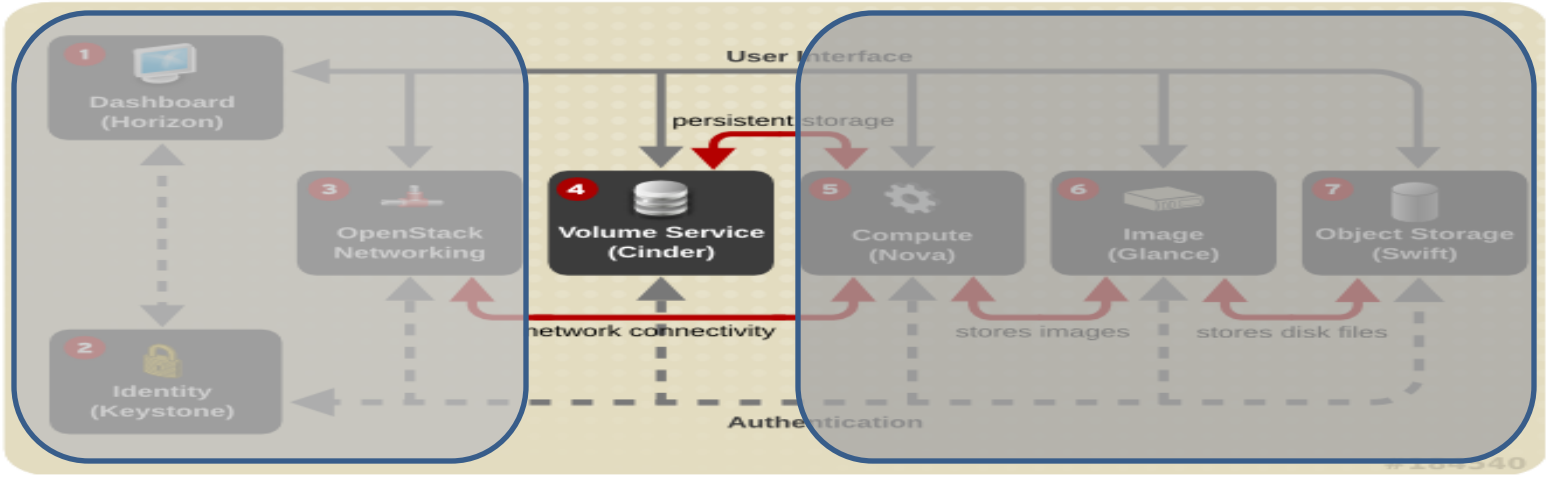
- Keystone is the centralized identity service that provides authentication and authorization for other services.
- Keystone also provides a central catalog of services running in a particular OpenStack cloud.
- It supports multiple forms of authentication including user name and password credentials, token-based systems, and Amazon Web Services style logins.

Neutron (OpenStack Networking)



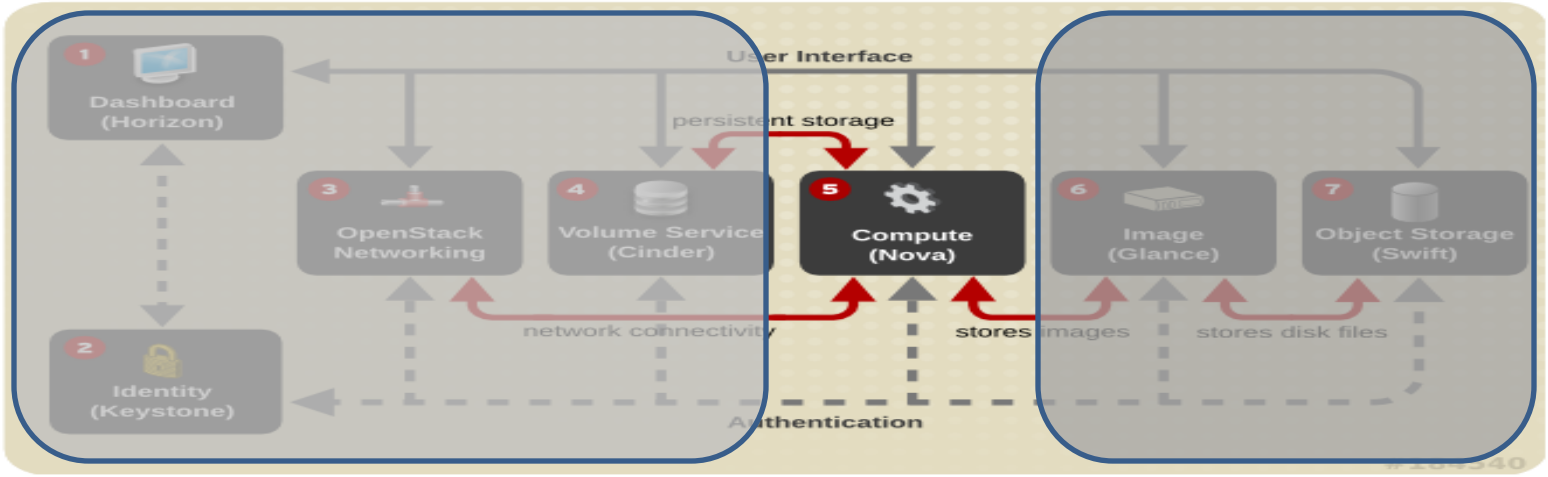
- OpenStack Networking provides connectivity between the interfaces of other OpenStack services, such as Nova.
- OpenStack Networking is a pluggable architecture, users can create their own networks, control traffic, and connect servers to other networks.
- A software defined networking service. Includes many plugins like Open vSwitch, Cisco UCS/Nexus, QoS are possible.

Cinder (Block Storage)



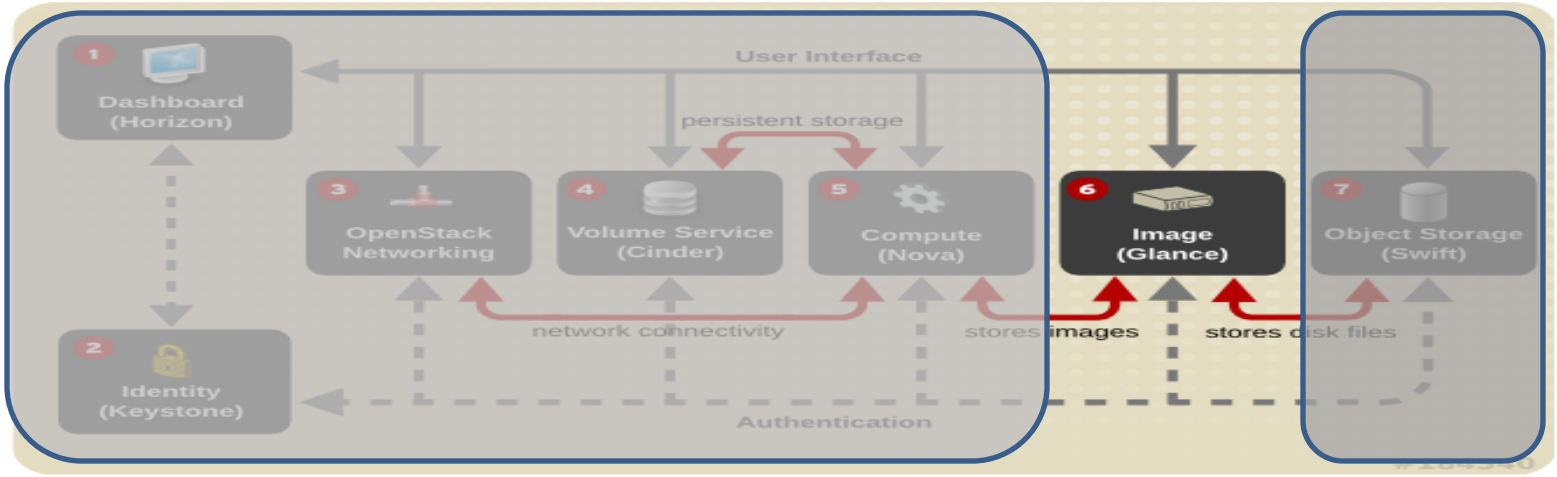
- Cinder is a service that manages storage volumes for virtual machines.
- This is persistent block storage for the instances running in Nova.
- Snapshots can be taken for backing up and data, either for restoring data, or to be used to create new block storage volumes.

Nova (Compute)



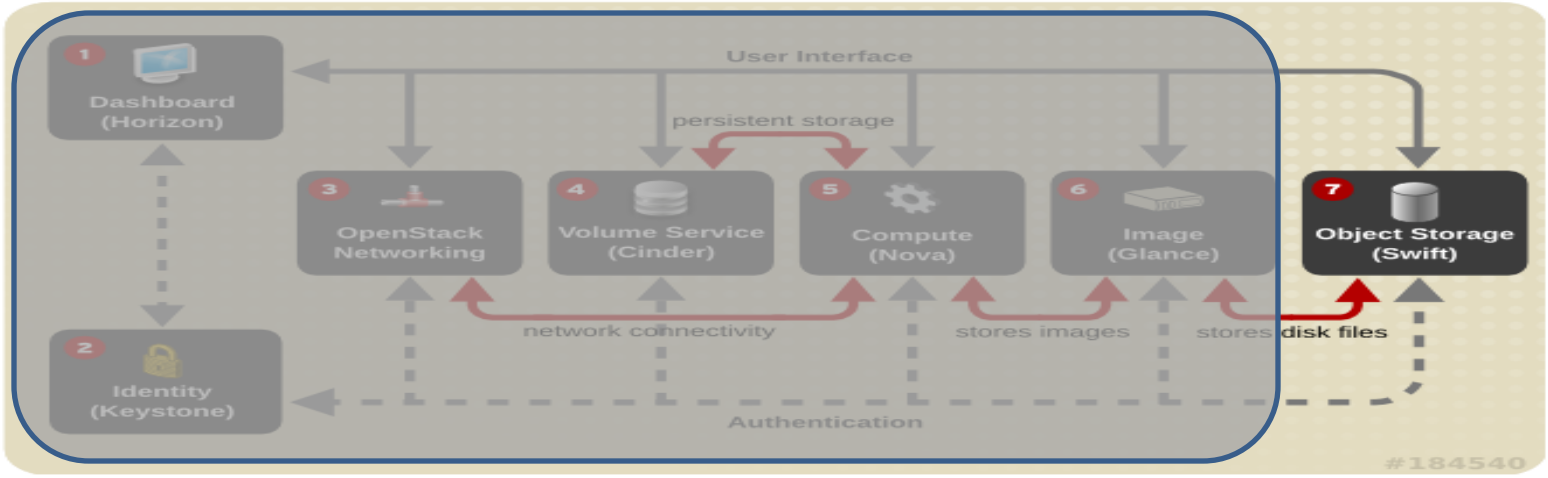
- Compute nodes form the resource core of the OpenStack Compute cloud, providing the processing, memory, network and storage resources to run instances
- Nova is a distributed component and interacts with Keystone for authentication, Glance for images and Horizon for web interface.
- Nova is designed to scale horizontally on standard hardware, downloading images to launch instances as required.

Glance (Image Service)



- Glance service that acts as a registry for virtual machine images to allowing users to copy server images for immediate storage.
- Images can be used as templates when setting up new servers.
- Usually the images are stored in the Swift (Object) service.

Swift (Object Storage)



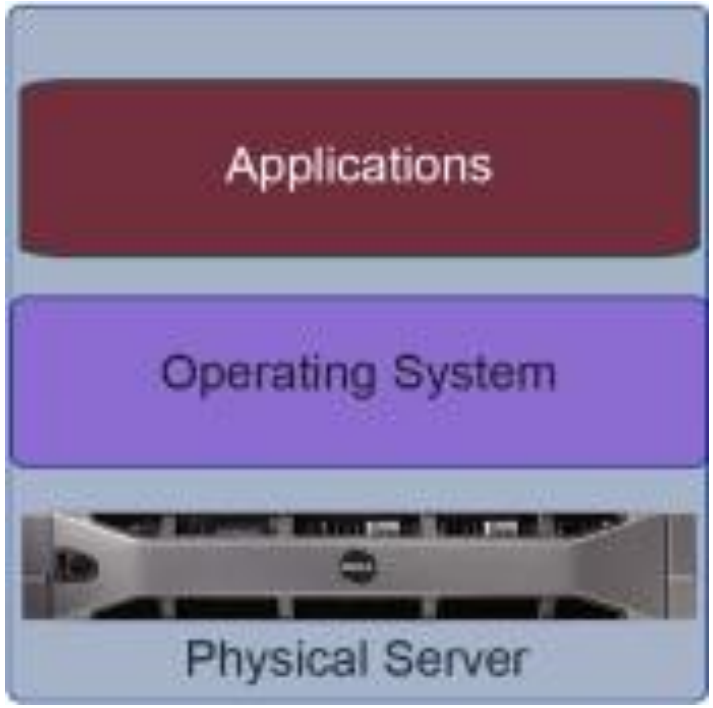
- Swift service providing object storage which allows users to store and retrieve files.
- Swift architecture is distributed to allow for horizontal scaling, and to provide redundancy as failure-proofing.
- Data replication is manage by software, allowing greater scalability and redundancy than dedicated hardware.

brac in ICT technologies

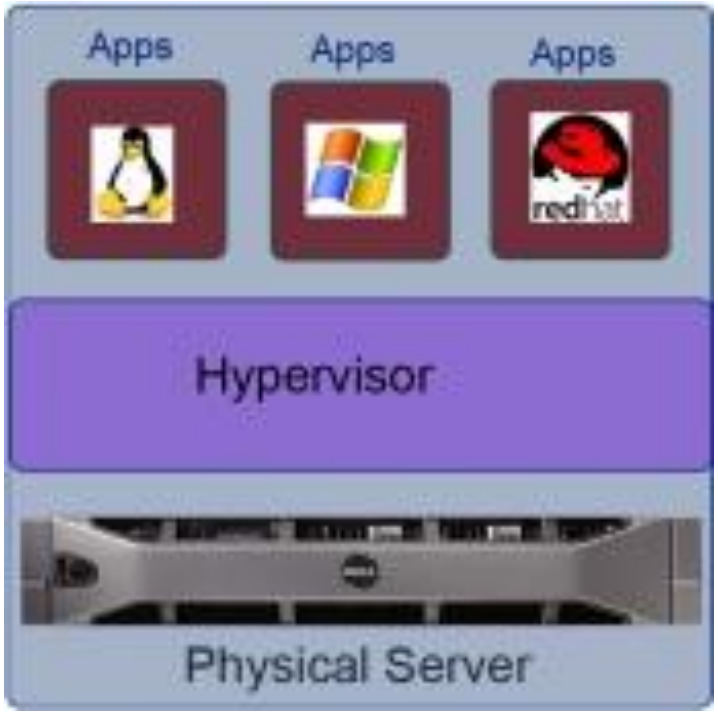
- BRAC founded on 1972 by Sir Fazle Hasan Abed
- BRAC become the largest NGO in the world
- BRAC is continuing it's operation in 12 countries
- BRAC has operation in all upozelas in Bangladesh and trying to use ICT technologies to efficiently manage the operation and reduce operation cost & time
- BRAC has strong foot print on ICT4D
- BRAC using ICT technologies for Health, Education, etc.
- BRAC reaches an estimated 135 million people with over 100,000 employees worldwide.

Transformation of BRAC IT Infrastructure

- Transformation of BRAC IT Infrastructure from Physical server to VM



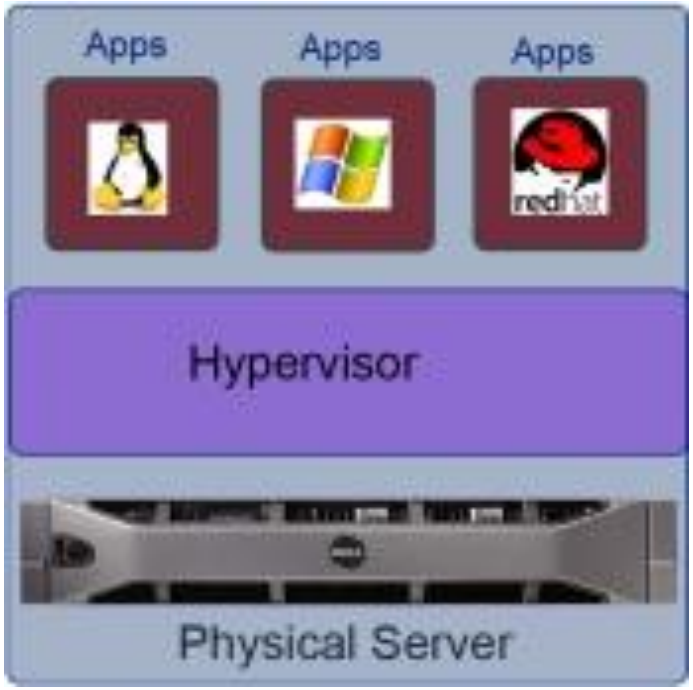
Traditional Architecture Up to 2010

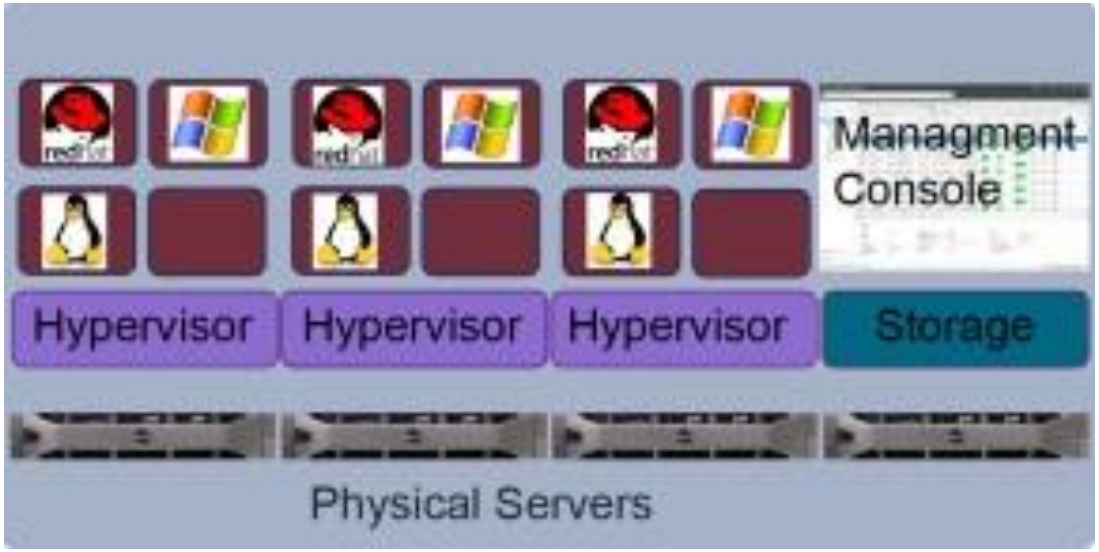


Traditional Hardware Virtualization from 2010

Transformation of BRAC IT Infrastructure

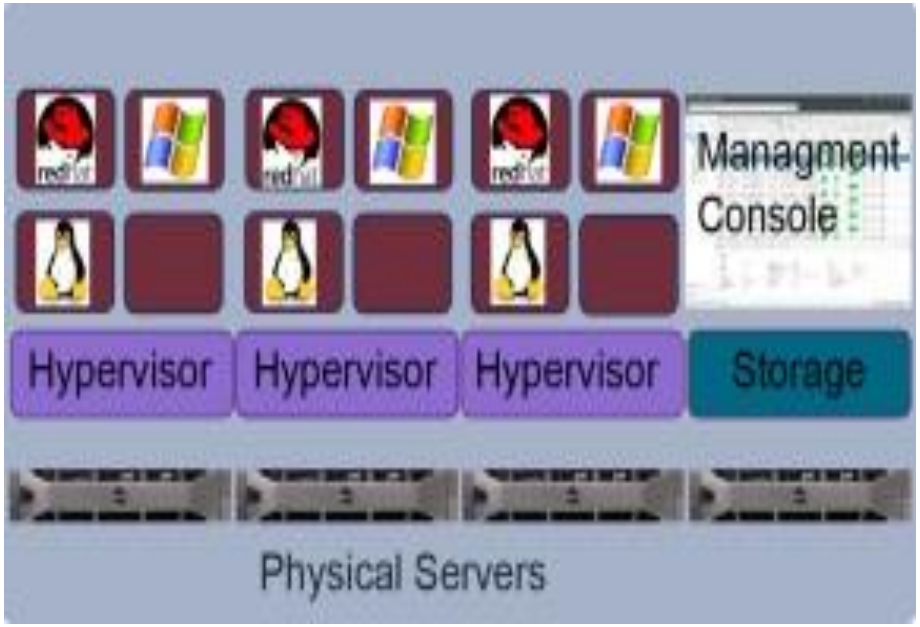
- Transformation of BRAC Server Infrastructure from single server VM to Enterprise Virtualization

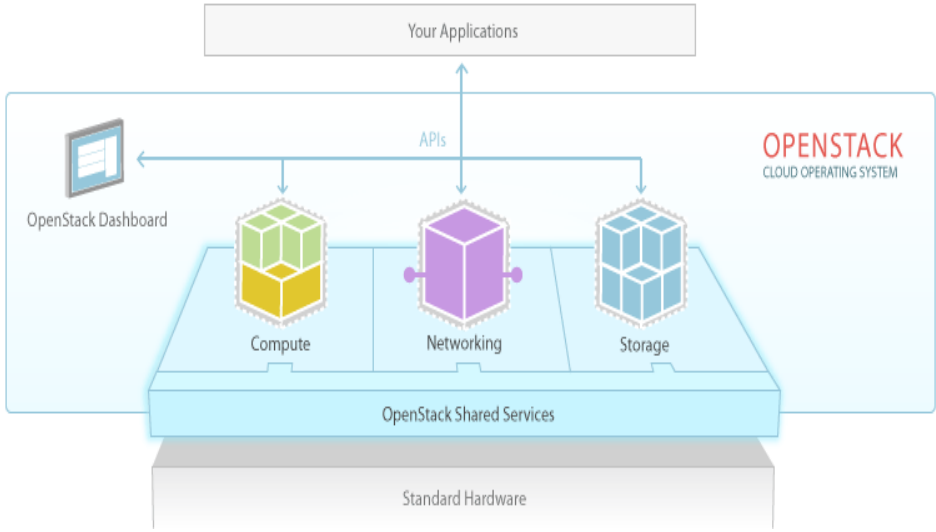




Movement from traditional hardware virtualization to enterprise virtualization from 2012

Transformation of BRAC IT Infrastructure





- Transformation of BRAC Server Infrastructure from Enterprise Virtualization to OpenStack Cloud (IaaS) by December of 2014 .

Why we choose OpenStack

- Platform independent (Hardware, OS, Hypervisor)
- Open source, Open Architecture, massively scalable
- Large number of developers involved on this project
- Large size of community
- Industry proven and dependable organizations are behind the project
- No Licensing charge

Questions ?

Thank you !

bdNOG
Bangladesh Network Operators Group

Md. Jobayer Almahmud Hossain
(RHCDS, RHCSS, RHCVA,RHCE, Redhat Certified Openstack Administrator, SCSA)
Sr. Lead system Administrator
(In-charge infrastructure and support)
BRAC, ICT

Reference

- http://www.openstack.org
- http://docs.openstack.org
- https://openstack.redhat.com
- http://www.qyjohn.net/?p=3522
- http://en.wikipedia.org/wiki/OpenStac
- http://www.brac.net