Amirkabir University of Technology
(Tehran Polytechnic)

Cloud Computing

Introduction to OpenStack

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https://www.slideshare.net/HaimAteya/an-intrudction-to-openstack-2017

https://docs.openstack.org/security-guide/introduction/introduction-to-openstack.html

Discussion

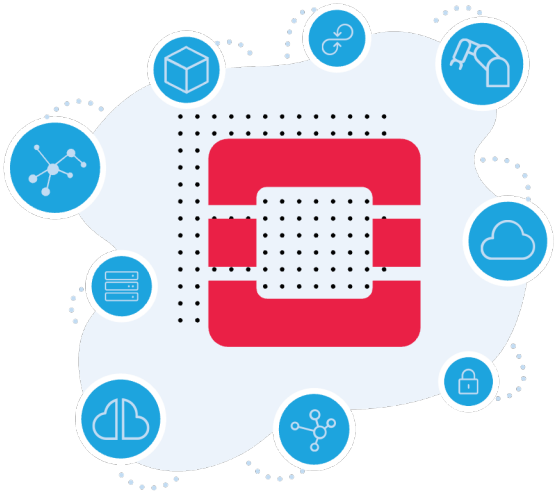
- How challenging is to manage virtual machines in a large cluster?
  - https://gdhinc.com/7-common-virtualization-challenges-and-how-to-overcome-them/

Agenda

- Quick introduction to OpenStack project
- Explain the OpenStack architecture and how its built
- Get you familiar with the different terminology and concepts
- Get you familiar with OpenStack services (components)

What is OpenStack?

- OpenStack is a cloud computing project aimed at providing an Infrastructure as a service (IaaS)
- It's Open Source!



- Cloud Computing platform that will meet the needs of public and private clouds regardless of size, by being simple to implement and massively scalable.

What OpenStack Provides?

- Virtual machines/containers on demand
- Virtual networks management
- Storage for VMs and arbitrary files
- Multi-tenancy
- Metering
- Orchestration

History

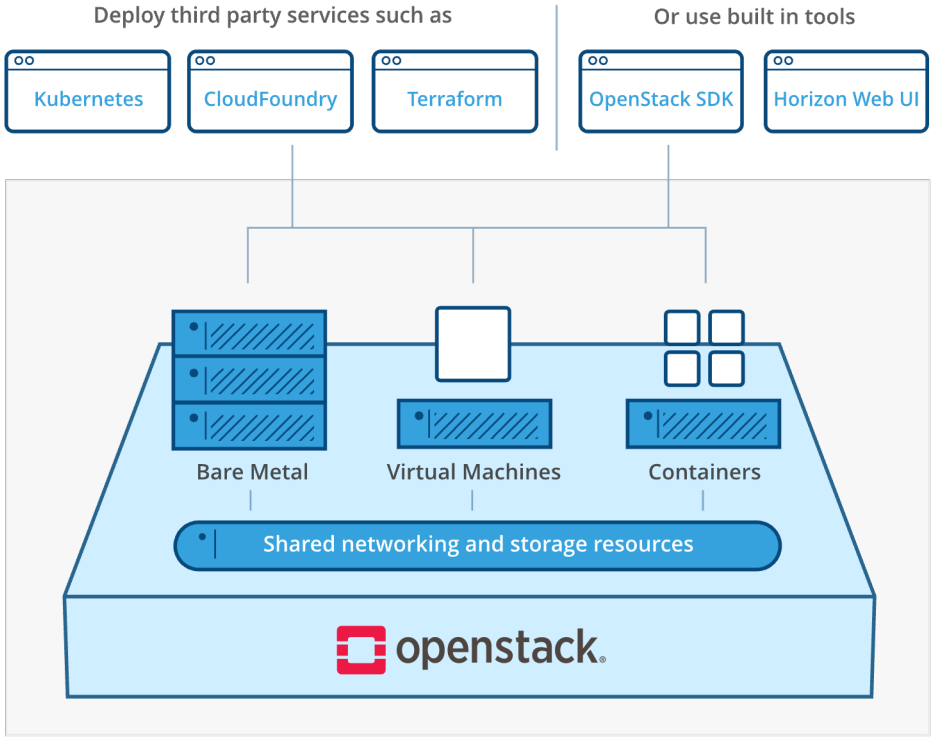
- Begun in 2010 as a joint project of Rackspace and NASA to build cloud-based operating system.
- Actively driven by a strong open-source community with thousands of developers and more than 500 companies that actively contributing to the project: IBM, Red Hat, HP, Cisco, Intel, Google, Oracle, Dell, ….
- 25 releases to this point (Yoga --> zed).

The Most Widely Deployed Open Source Cloud Software in the World

https://www.openstack.org/

OpenStack In A Nutshell

- ***Cloud operating system*** that ***controls large pools*** of compute, storage, and networking resources throughout a datacenter, all managed and provisioned through ***APIs*** with common authentication mechanisms.

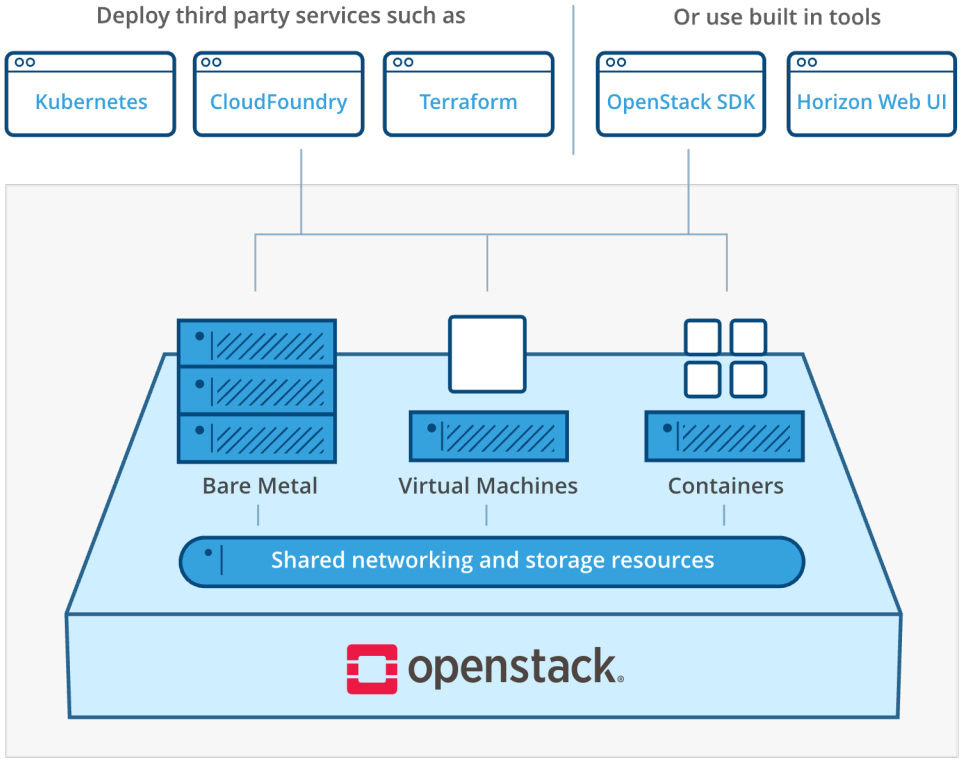


https://www.openstack.org/software/

OpenStack In A Nutshell (cont.)

- Believes in open source, open design, open development, all in an open community that encourages participation by anyone.

- Consists of a series of interrelated projects delivering various components for a cloud infrastructure solution.



OpenStack Statistics

- One of the fastest growing open-source communities in the world with more than 150,000 contributors
- Code submission
- Code reviews
- Testing
- Documentation

Reviews by Company

Show 10 entries Search

#	Company	Reviews
1	Red Hat	1450
2	Ericsson	446
	*independent	285
3	Yovole	185
4	NEC	168
5	Lenovo	154
6	SUSE	74
7	IBM	58
8	Dell EMC	52
9	NetApp	44

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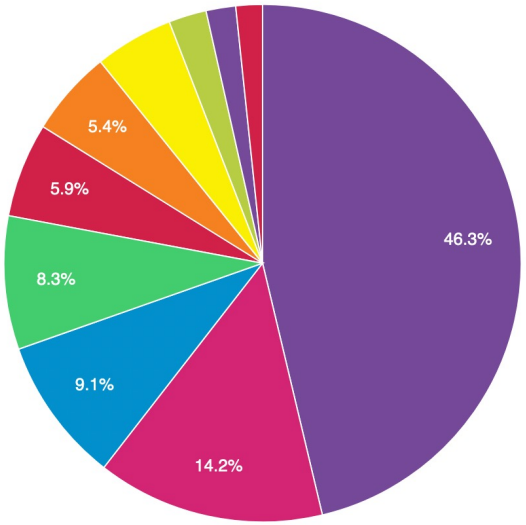


https://www.stackalytics.com/

OpenStack Contributors



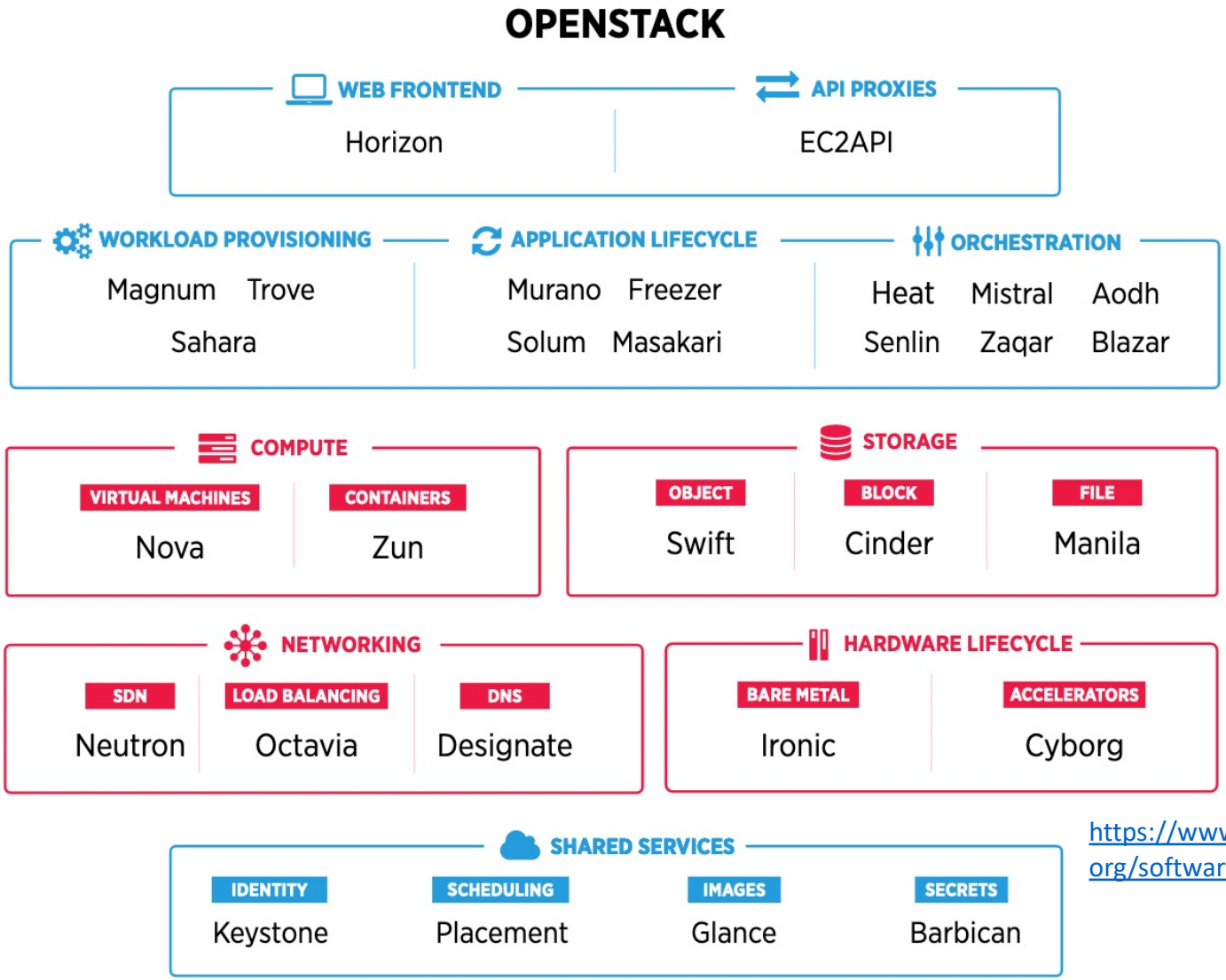









OpenStack Projects



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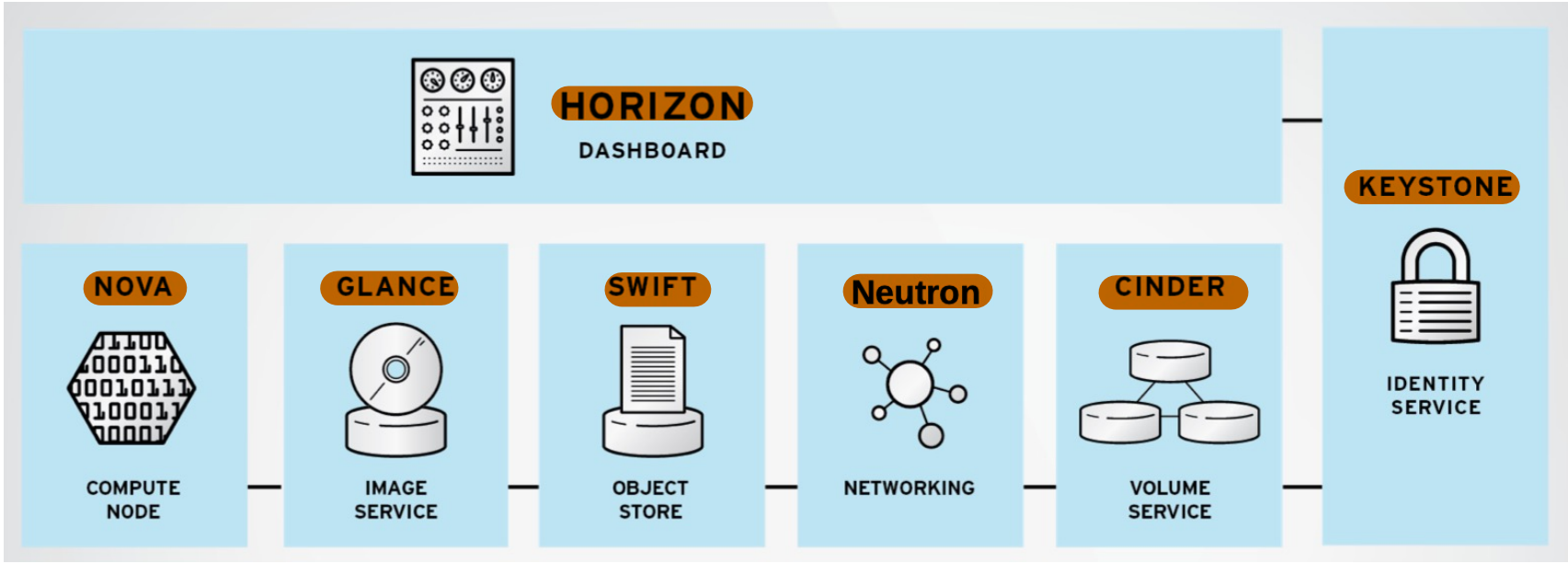
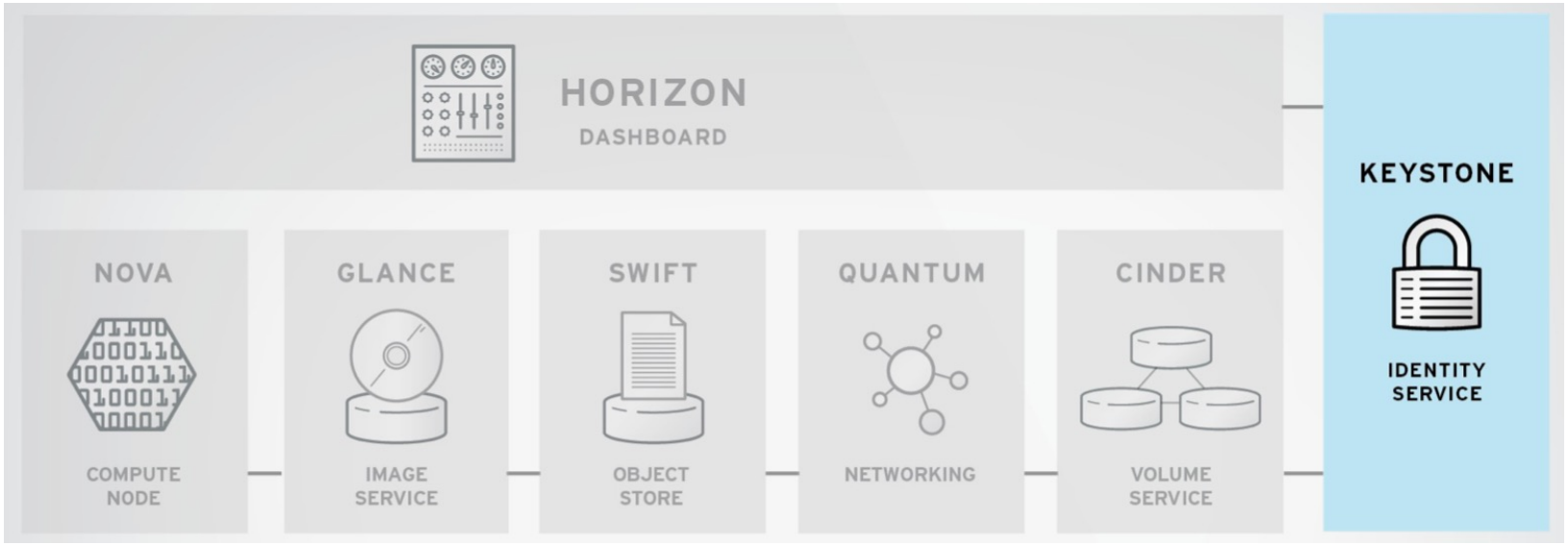
OpenStack Architecture

- Modular architecture
- Designed to easily scaled out
- Based on (growing) set of core services



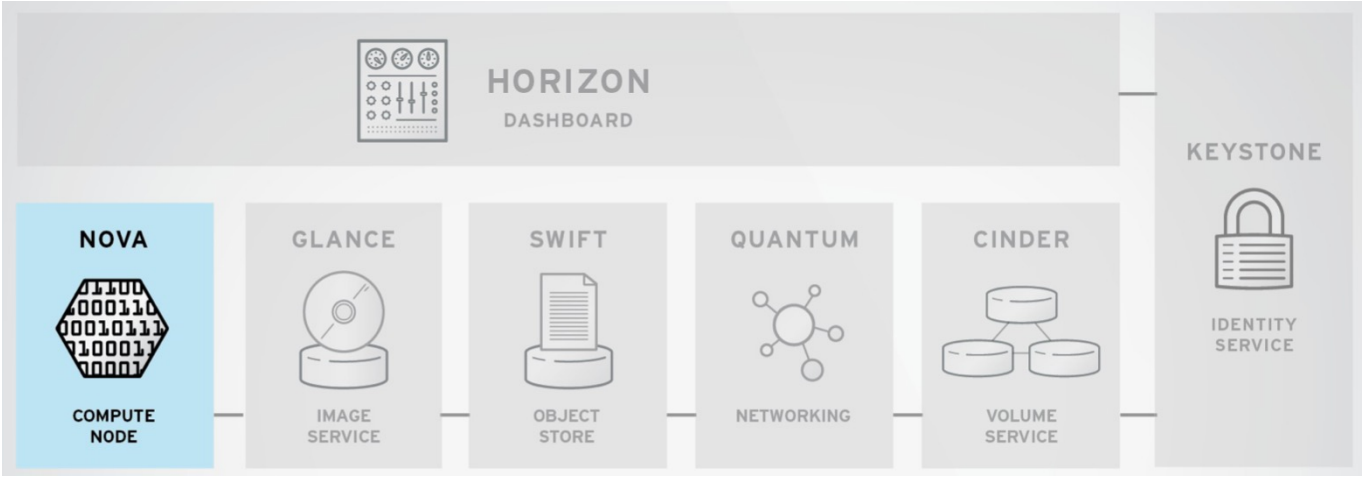
Keystone (Identity Service)

- Common authorization framework
- Manages users, tenants and roles
- Pluggable backends (SQL, PAM, LDAP, IDM, etc)



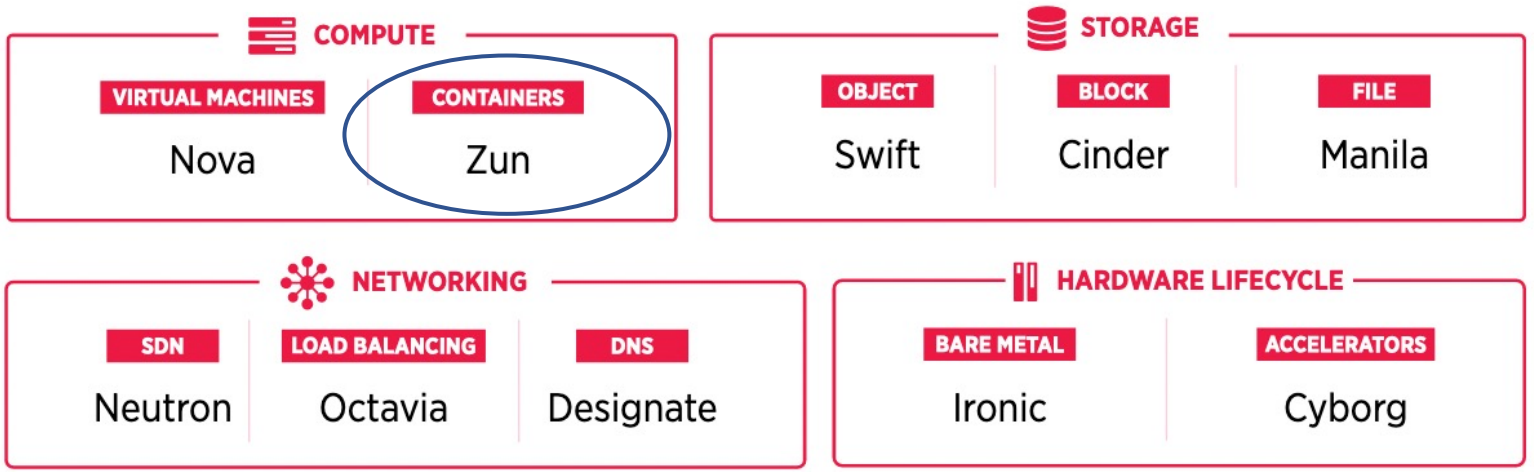
Nova (Compute Service)

- Compute nodes– hypervisors that run virtual machines
  - Supports multiple hypervisors KVM, Xen, LXC, Hyper-V and ESX
- Distributed controllers that handle scheduling, API calls, etc
  - Native OpenStack API and Amazon EC2 compatible API



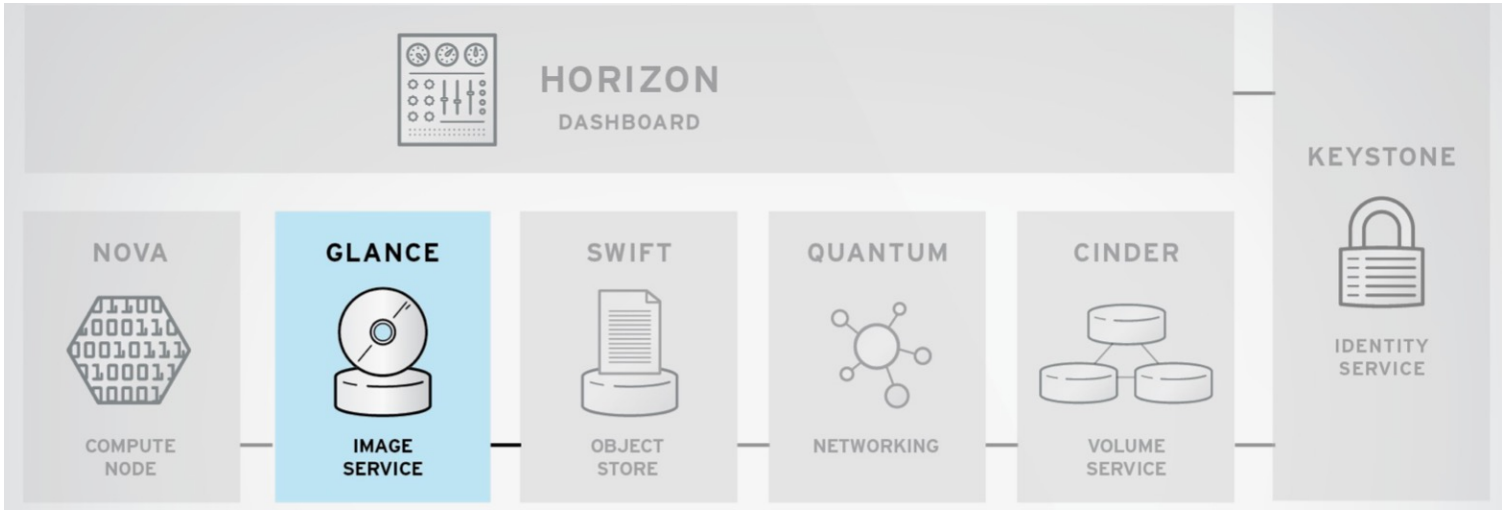
Zun (Containers Service)

- Launching and managing containers backed by different container technologies.
- For users who want to treat containers as OpenStack-managed resource.
- Users are provided a simplified APIs to manage containers without the need to explore the complexities of different container technologies.



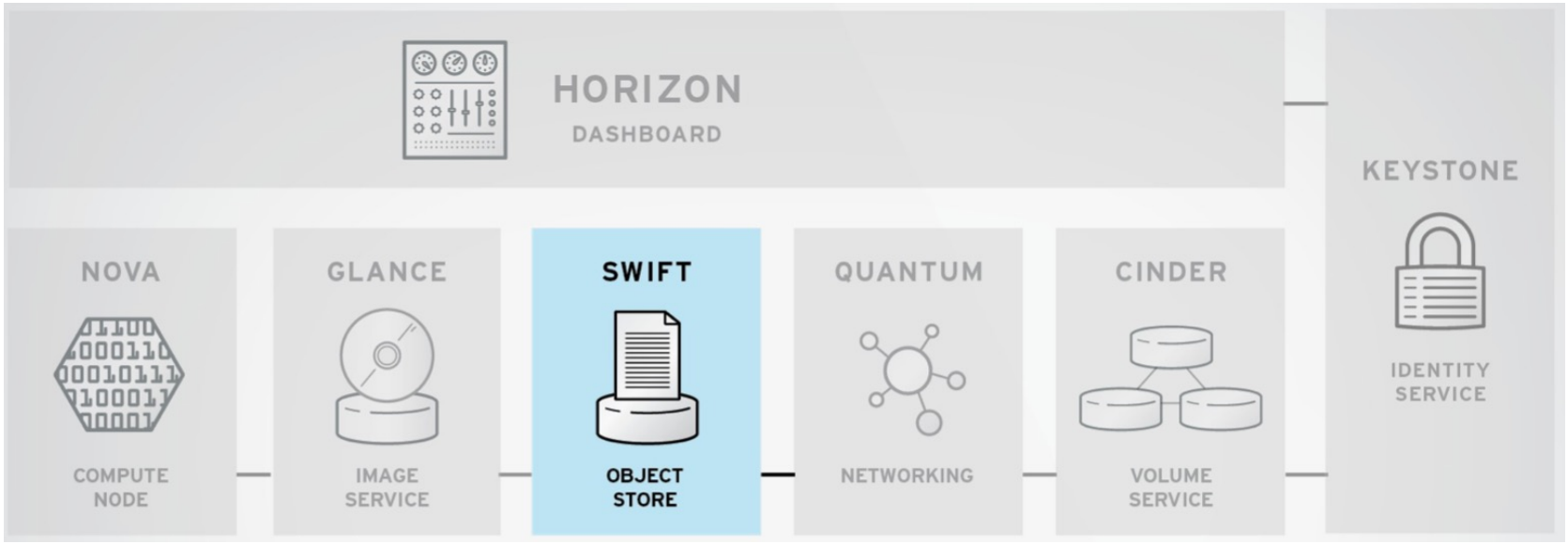
Glance

- Image service
- Stores and retrieves disk images (virtual machine templates)
- Supports Raw, QCOW, VMDK, VHD, ISO, OVF&AMI/AKI
- Backend storage: Filesystem, Swift, Gluster, Amazon S3



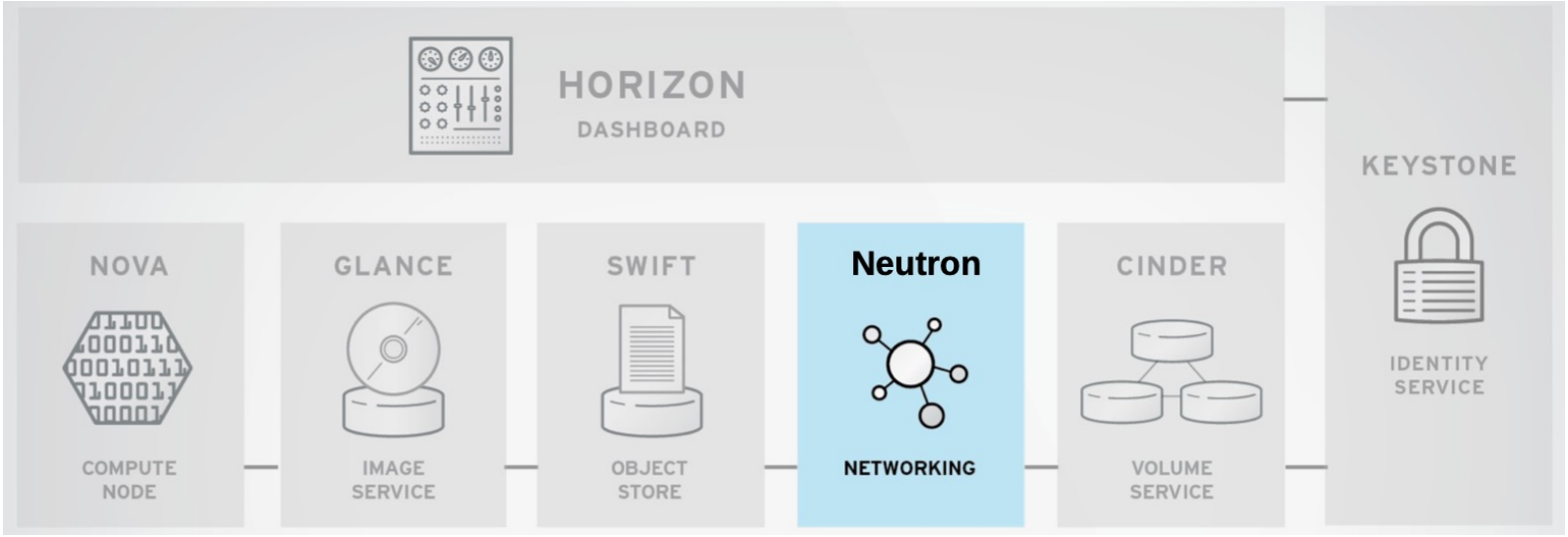
Swift

- Object Storage Service
- Provides simple service for storing and retrieving arbitrary data
- Modeled after Amazon's S3 service
- Native API and S3 compatible API



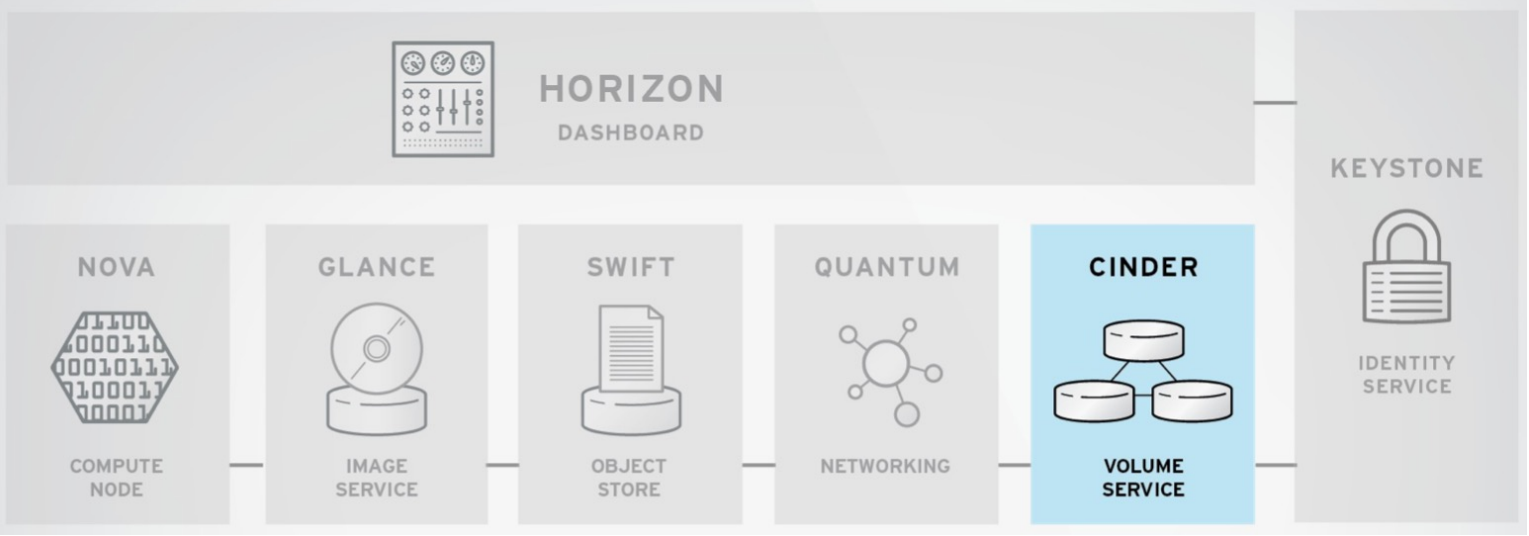
Neutron

- Network Service
- Provides framework for Software Defined Network(SDN)
- Plugin architecture
  - Allows integration of hardware and software based network solutions
    - Open vSwitch, Cicso UCS, Standard Linux Bridge, Nicira NVP



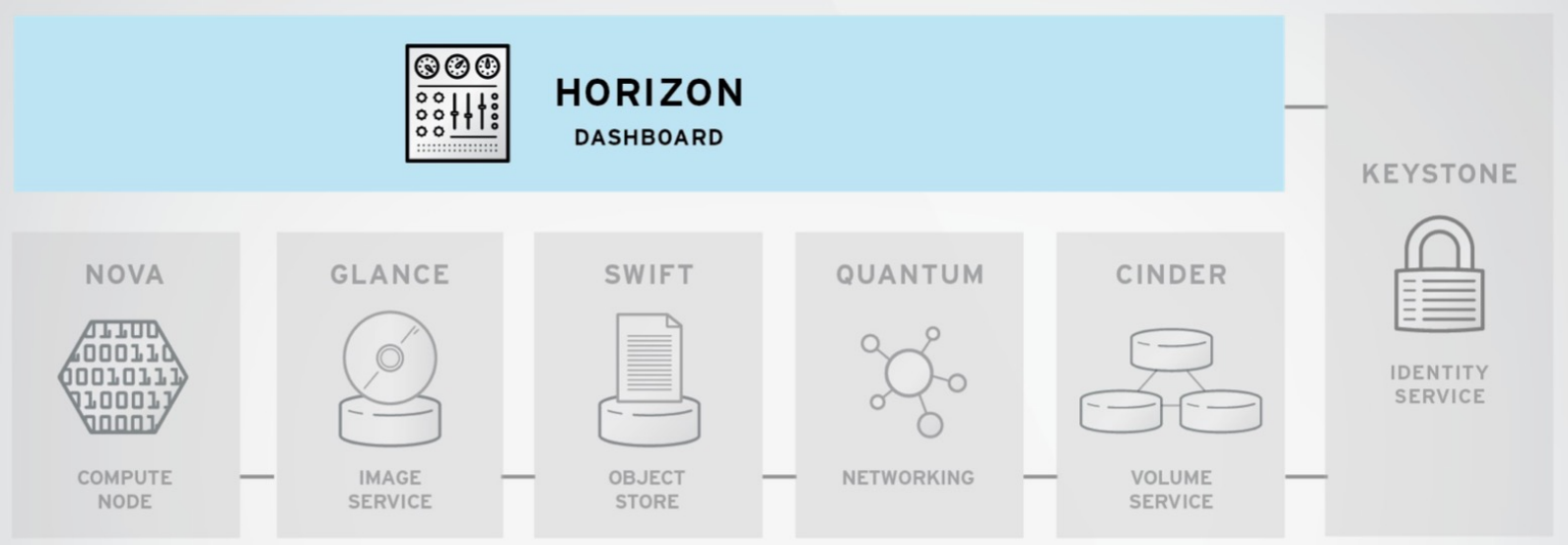
Cinder

- Block storage (volume) service
- Provides block storage for virtual machines (persistent disks)
- Similar to Amazon EBS service
- Plugin architecture for vendor extensions
  - eg. NetApp driver for Cinder

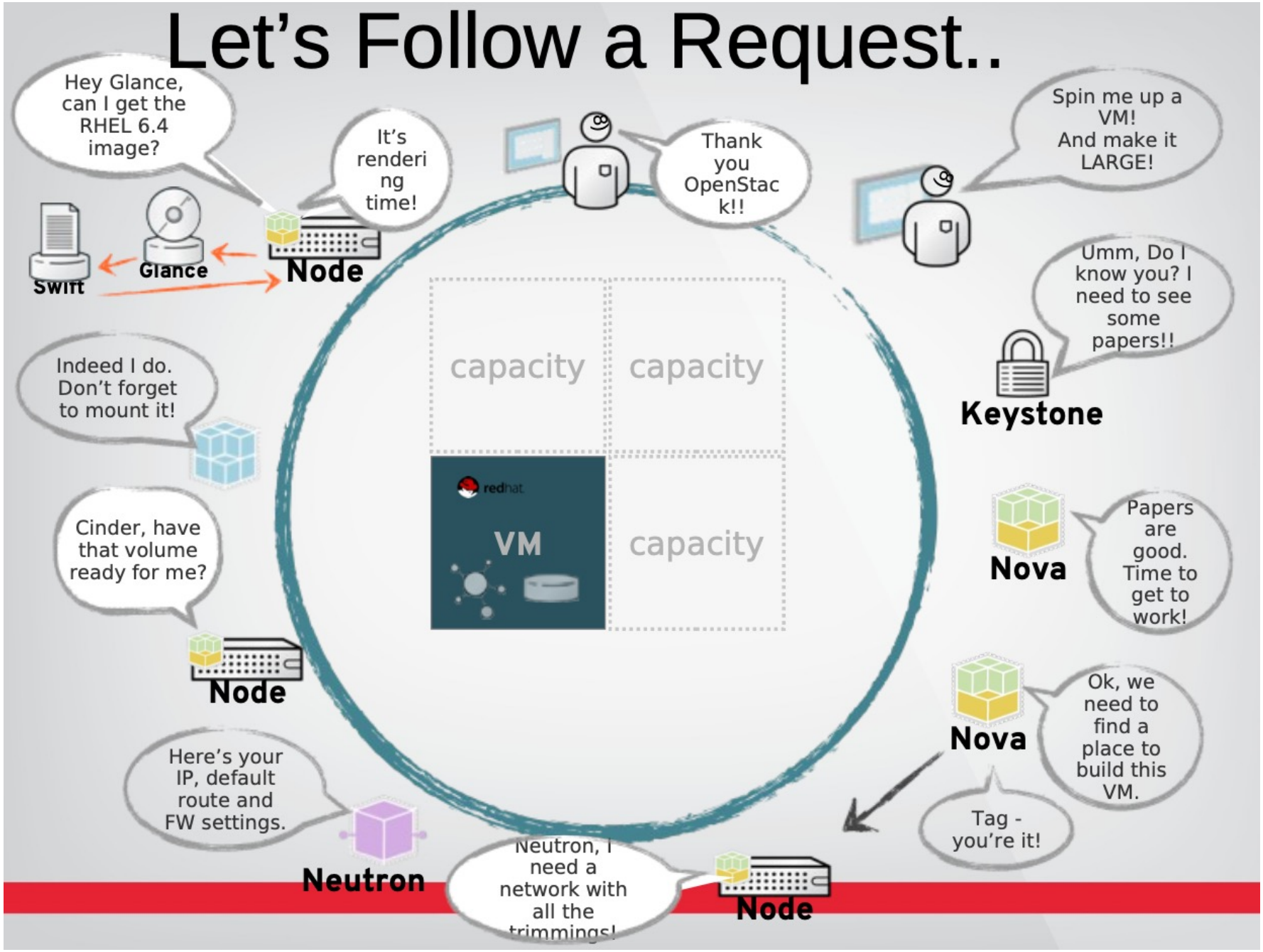


Horizon

- Dashboard
- Provides simple self service UI for end-users
- Basic cloud administrator functions
  - Define users, tenants and quotas
  - No infrastructure management



Let's Follow a Request..



Run Kubernetes Cluster on OpenStack

- Check slides and watch the video
  - https://object-storage-ca-ymq-1.vexxhost.net/swift/v1/6e4619c416ff4bd19e1c087f27a43eea/www-assets-prod/summits/27/presentations/24157/slides/OpenInfra-Summit-Shanghai-OpenShift-on-OpenStack.pdf
  - https://www.youtube.com/watch?v=DuBYWXTnnsg
  - https://www.youtube.com/watch?v=uiplRQ2pQfc&t=176s

- This reading is optional and it is not questioned in the final exam