MODULE 2
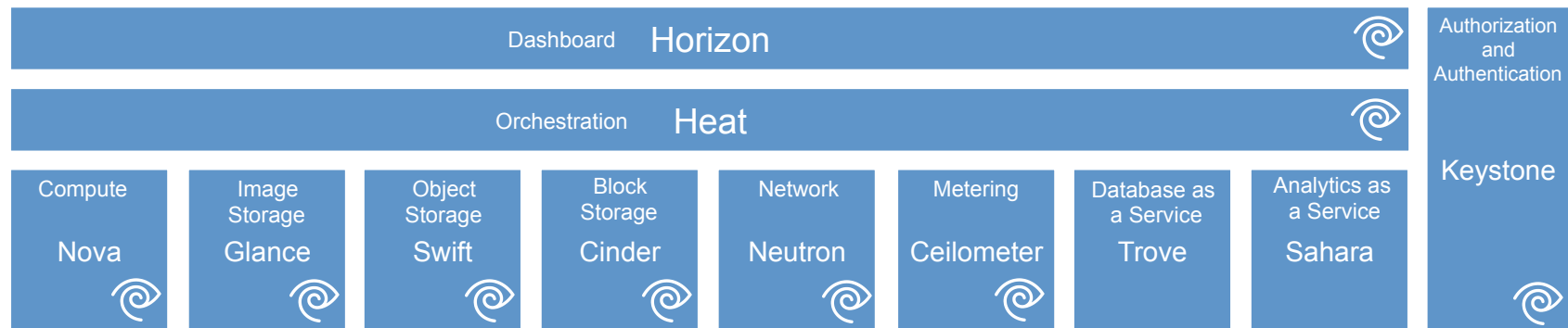
OpenStack Project Overview

Module 3 Objectives

- Understand the basic underlying pieces of OpenStack
- Understand their function relative to IaaS uses
- Learn the basic access tools for each function
  - UI interface
  - CLI overview

OpenStack Architecture

Dashboard	Horizon								Authorization and Authentication
Orchestration	Heat								
Compute Nova	Image Storage Glance	Object Storage Swift	Block Storage Cinder	Network Neutron	Metering Ceilometer	Database as a Service Trove	Analytics as a Service Sahara		Keystone

- OpenStack is made up of individual projects
- Largely written in Python and is heavily dependent on Linux

OpenStack Identity Service (Keystone)

Horizon								Keystone
Heat								
Nova	Glance	Swift	Cinder	Neutron	Ceilometer	Trove	Sahara	
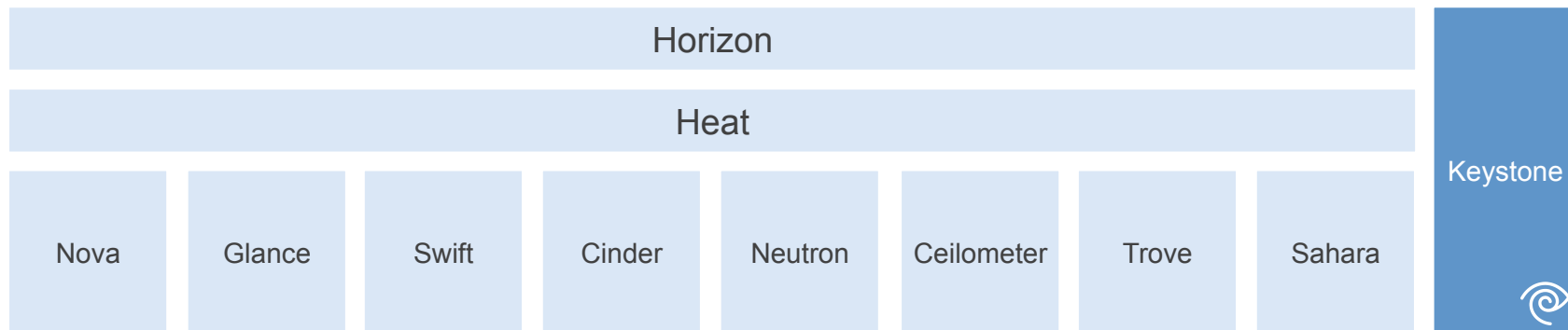
What is it?

- Authentication/Authorization for all OpenStack services
- Endpoint access catalog
- Tenant and User management
- Central policy repository

What can it do?

- Provide token based validation to all projects
- CRUD for tenants/users
- Provide Endpoint catalog list (e.g. where do I go to get access to nova API)
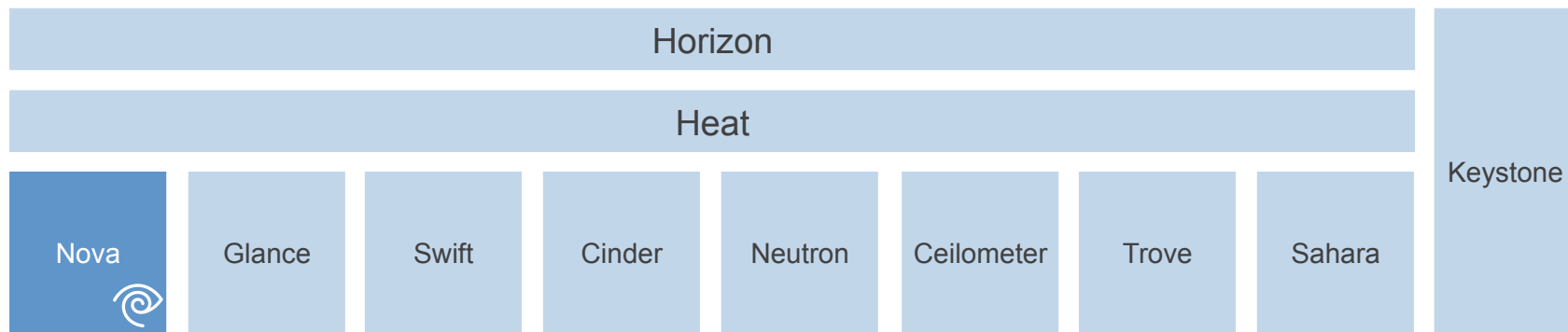
Keystone - Horizon

Common Keystone CLI Commands

Explanation of commands and additional optional arguments are available at:
http://docs.openstack.org/cli-reference/content/keystoneclient_commands.html

- CLI tool: keystone or openstack

- User commands:

password-update
token-get
ec2-credentials-create
catalog

OpenStack Compute (Nova)

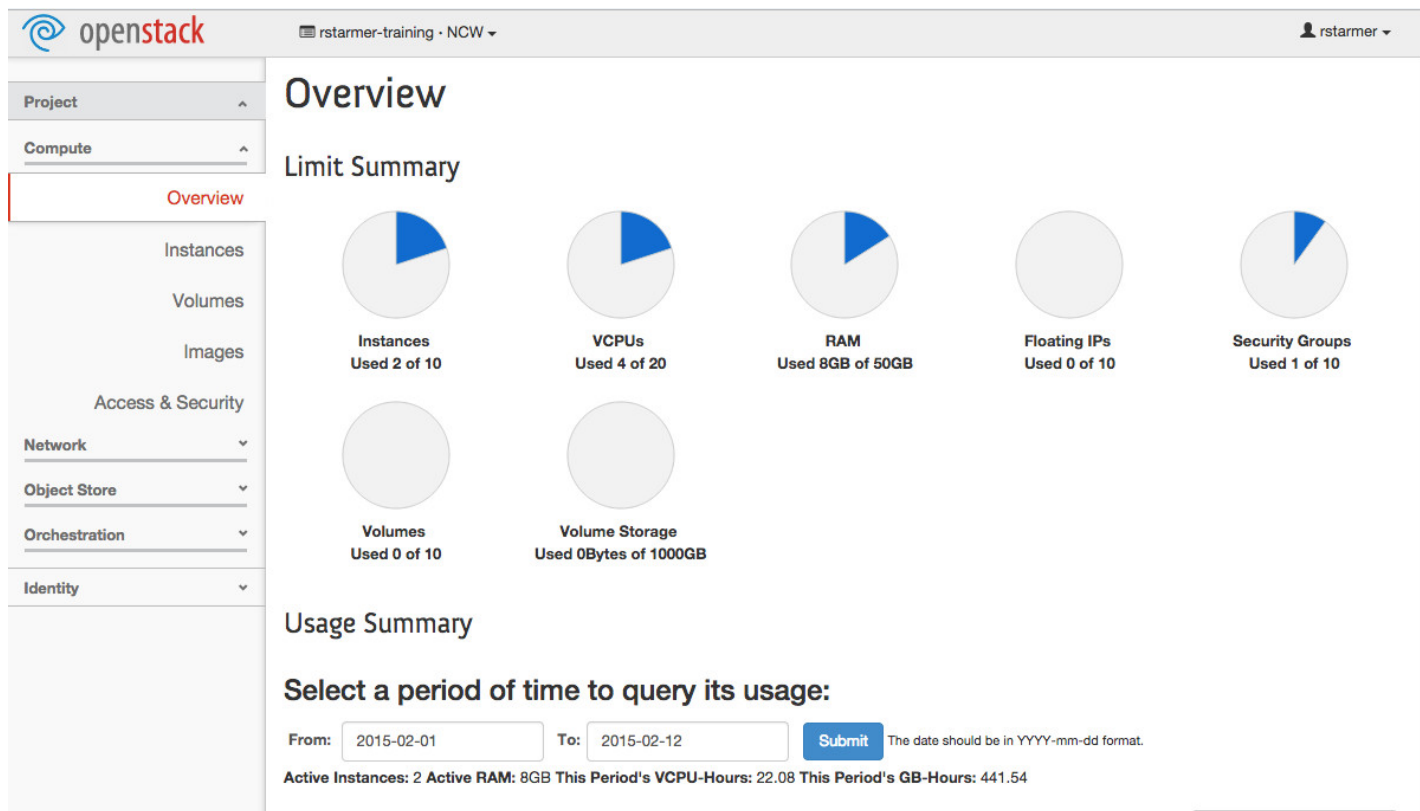| Horizon								Keystone
Heat								
Nova	Glance	Swift	Cinder	Neutron	Ceilometer	Trove	Sahara	

What is it?

- Manages VM deployment workflow on associated hypervisor(s)
- Manages integration with:
  - Image Management (glance)
  - Networks (neutron)
  - Storage (cinder)

What can it do?

- CRUD on VMs
- Start/Re-start/Pause/Snapshot
- Sometimes Migrate
- (de)Attach storage

Nova - Horizon

Common Nova CLI Commands

Explanation of commands along with additional commands and optional arguments are available at: http://docs.openstack.org/cli-reference/content/novaclient_commands.html

- CLI Tool: nova or openstack

- VM CRUD:

boot, delete, stop, pause, reboot, rebuild, resize {UP, forces a reboot}

- System Groups (affinity or anti-affinity)

- Image management (connects to glance)

- Security Groups (connects to neutron)

- Volume management (via cinder)

- Image to Volume mapping (via cinder and glance)

- DNS (near term enhancement)

OpenStack Image Service (Glance)
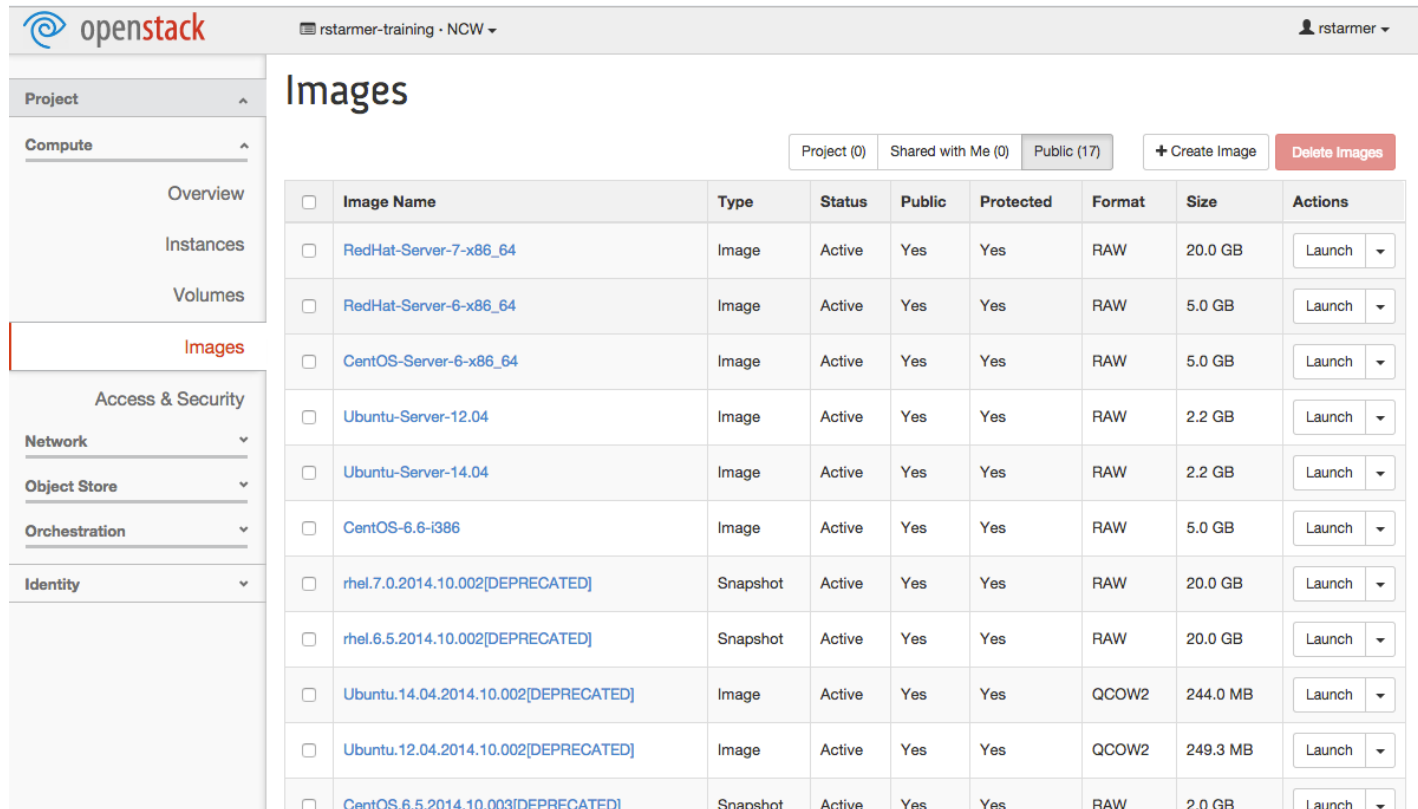
Horizon								Keystone
Heat								
Nova	Glance	Swift	Cinder	Neutron	Ceilometer	Trove	Sahara	
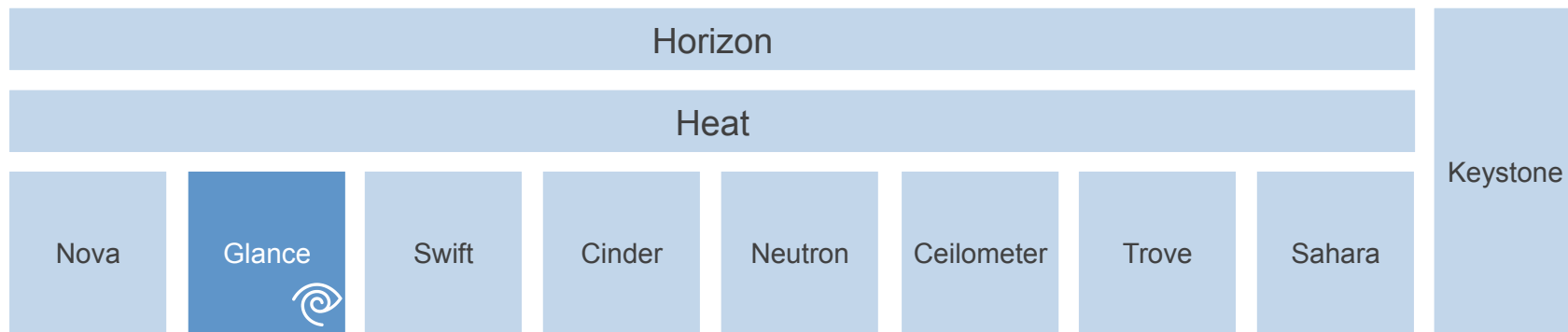
What is it?

- Manager of virtual machine images
- Handles root disk snapshots
- Hypervisor based image cache manager

What can it do?

- Manage and share Images
- Convert snapshots to images
- Integrates with Cinder to migrate images to Volumes

Glance - Horizon

Common Glance CLI Commands

Explanation of commands and additional optional arguments are available at:
http://docs.openstack.org/cli-reference/content/glanceclient_commands.html

- CLI Tools: glance or openstack

- Image Management

create, delete, download, update

- Add Memebers (other tenants with access to uploaded images)

OpenStack Object Store (Swift)

Horizon								Keystone
Heat								
Nova	Glance	Swift	Cinder	Neutron	Ceilometer	Trove	Sahara	
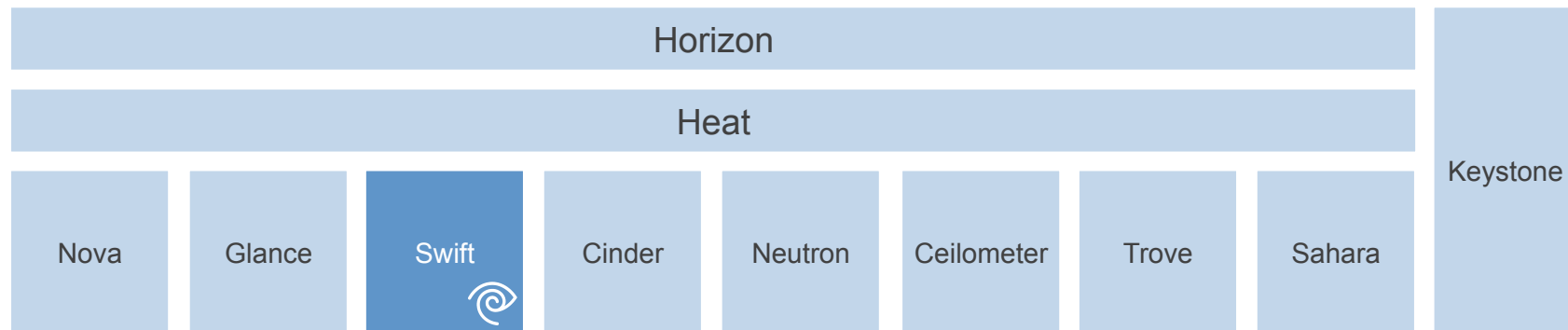
What is it?

- Object Storage System
- VM free access to files
- "unlimited" per file uploads
- HTTP/S based interface

What can it do?

- Store any files (blobs of data)
- Provide both authenticated and non-authenticated "containers" for files
- Replicate content across geographic regions

Swift - Horizon

openstack   rstarmer-training · NCW ▾   👤 rstarmer ▾

Project ⌃

Compute ⌄

Network ⌄

Object Store ⌃

Containers

Orchestration ⌄

Identity ⌄

Containers

+ Create Container

Select a container to browse.

images   Object Count: 1
Size: 569.8 KB
Access: Private   **View Details** ▾

Displaying 1 item   Displaying 0 items

Common Swift CLI Commands

Explanation of commands along with additional commands and optional arguments are available at: http://docs.openstack.org/cli-reference/content/swiftclient_commands.html

- CLI Tools: swift

- Create, delete, update, download
- Manage metadata (pub/priv, TTL, etc.)
- Manage temporary URLs

OpenStack Volume Service (Cinder)

Horizon								Keystone
Heat								
Nova	Glance	Swift	Cinder	Neutron	Ceilometer	Trove	Sahara	
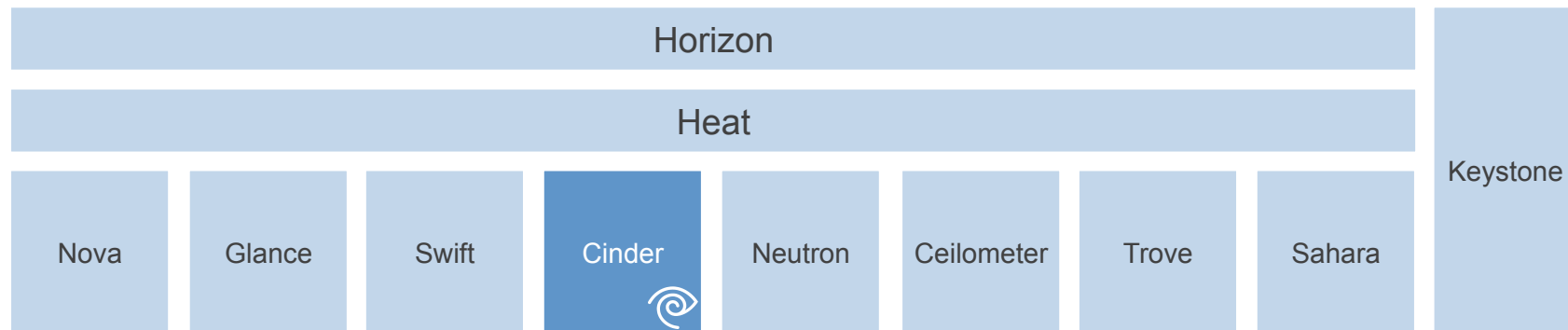
What is it?

- Manages block storage access and creation
- Supports storage transport configuration
- Integrates with Nova to support boot from volume or associate volume to VM

What can it do?

- CRUD a block device
- Establish connectivity endpoint (e.g., iSCSI storage termination)
- Access "local" as well as 3rd party storage

Cinder - Horizon

Common Cinder CLI Commands

Explanation of commands along with additional commands and optional arguments are available at:
http://docs.openstack.org/cli-reference/content/cinderclient_commands.html

- CLI Tools: cinder and openstack

- Volume create, delete, update
- Volume transfer (to another tenant, needs to accept)
- Volume image mapping (managing glance)

OpenStack Networking (Neutron)

Horizon	Keystone
Heat	

Nova	Glance	Swift	Cinder	Neutron	Ceilometer	Trove	Sahara

What is it?
- Network Services manager
- Supports L2, L3, and L4 services
- Interacts with Nova to support network functions for VMs

What can it do?
- CRUD L2, L3 (subnet), IPAM
- Extensions provide:
  - L3 service (router, fw, slb)
  - NAT/Floating IP
  - Access to Physical/Virtual services (e.g. VLAN/VXLAN on a switch)

Neutron - Horizon
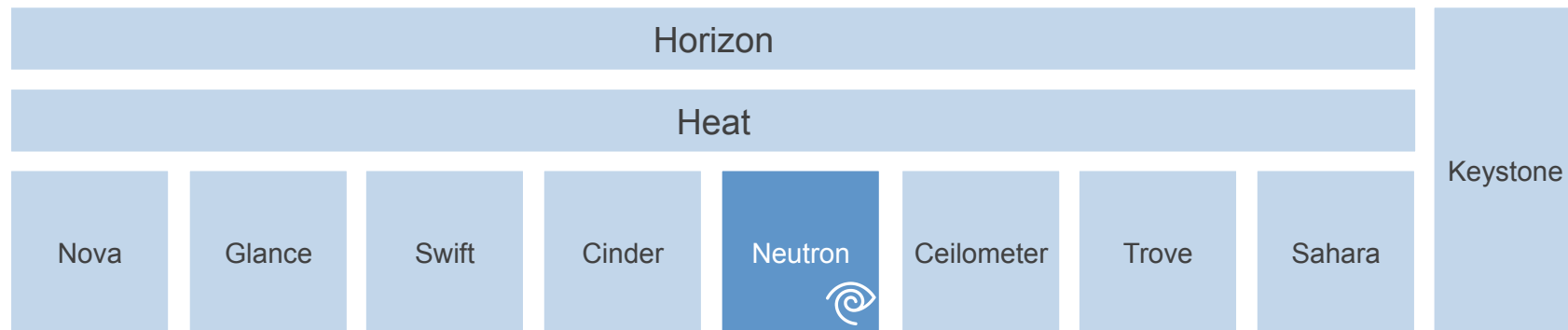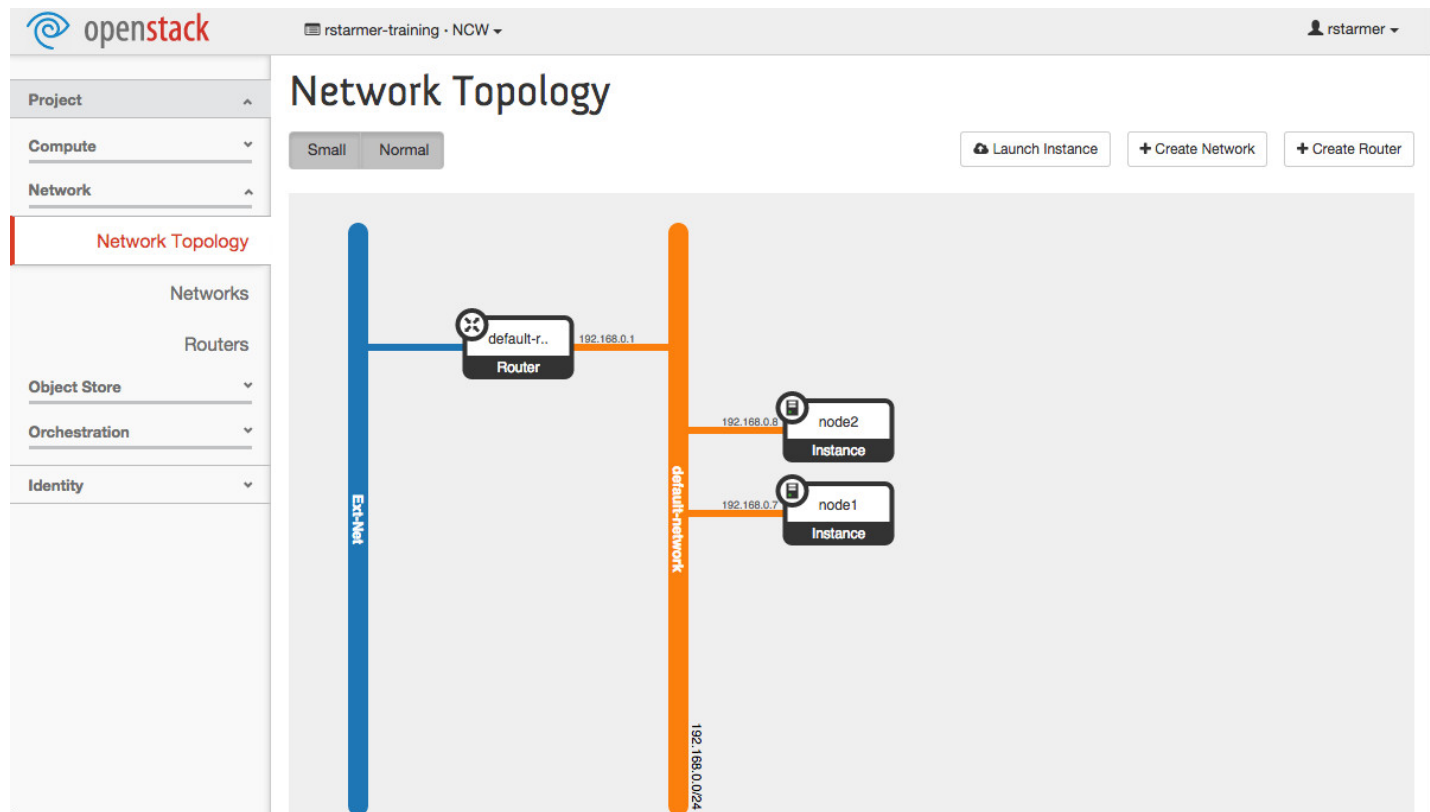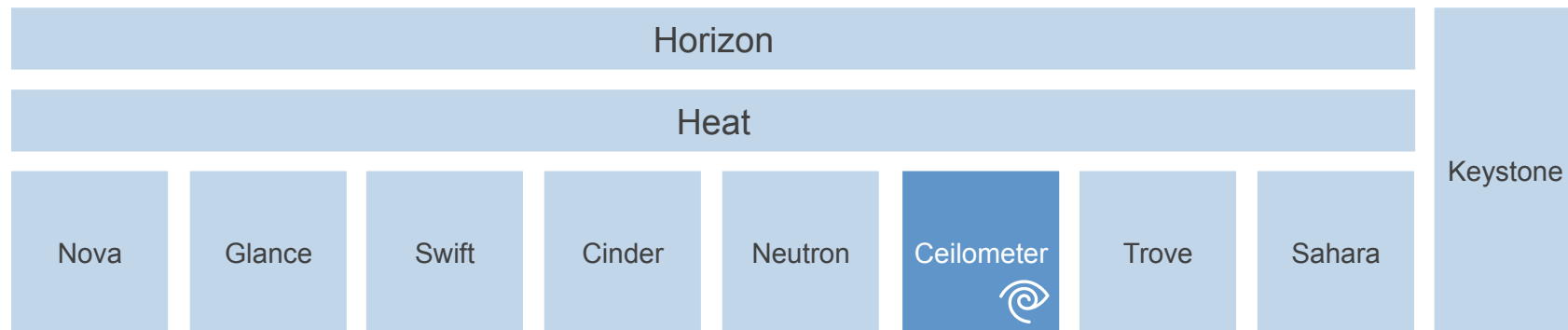
Common Neutron CLI Commands

Explanation of commands along with additional commands and optional arguments are available at:
http://docs.openstack.org/cli-reference/content/neutronclient_commands.html

- CLI Tools: neutron and openstack

- Networks (L2), create, delete
- Subnets (L3 on L2), create, delete
- L3-Router (L3 service), create
- LBaasS (coming soon)
- Port create, delete, update

OpenStack Telemetry (Ceilometer)

Horizon	Keystone
Heat	

Nova	Glance	Swift	Cinder	Neutron	Ceilometer	Trove	Sahara

What is it?
- Metering and statistics collection
- A datastore of metered statistics

What can it do?
- Capture statistics and metered data from all OpenStack services
- Create a callback in conjunction with Heat to support automatic scale up/down of applications
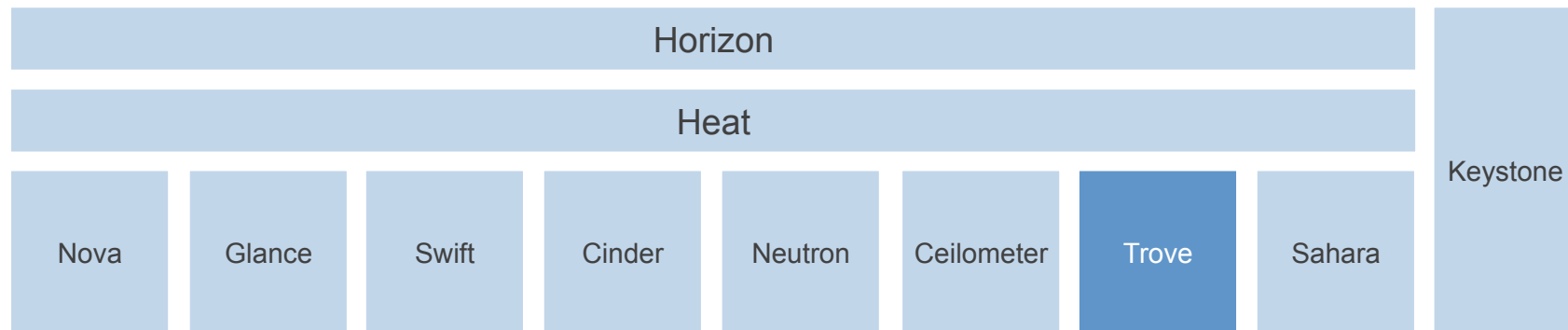
Will be replaced by Monasca later in 2015

Ceilometer CLI Commands

Explanation of commands along with additional commands and optional arguments are available at:
http://docs.openstack.org/cli-reference/content/ceilometerclient_commands.html

- CLI Tool: ceilometer

- Meter list, metric display

OpenStack Database (Trove)

Horizon									Keystone
Heat									
Nova	Glance	Swift	Cinder	Neutron	Ceilometer	Trove	Sahara		

What is it?
- Database as a Service interface for OpenStack
- API interface into managing SQL and NO-SQL based databases

What can it do?
- Provide CRUD operations for databases via an HTTP/S API
- Abstract the management of databases for simplified application consumption
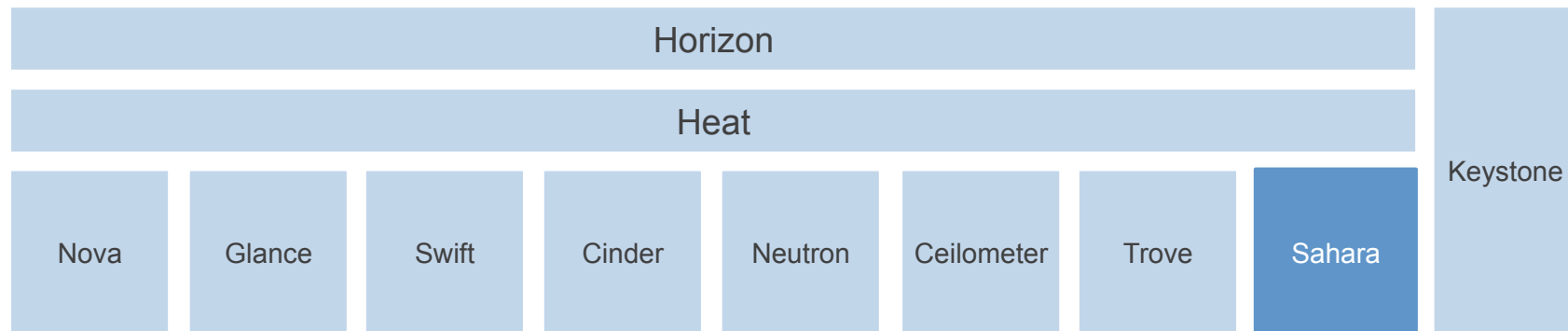
Available later in 2015

Common Trove CLI Commands

Explanation of commands along with additional commands and optional arguments are available at: http://docs.openstack.org/cli-reference/content/troveclient_commands.html and http://docs.openstack.org/cli-reference/content/trove-manageclient_commands.html

- CLI Tools: trove

- Database create, update, delete
- Backup create, copy, update
- Database cluster create,modify, delete
- Database configure
- Database user create, delete, update
- Database user acces control

OpenStack Analytics (Sahara)

Horizon								Keystone
Heat								
Nova	Glance	Swift	Cinder	Neutron	Ceilometer	Trove	Sahara	

What is it?

- Analytics-as-a-Service interface for OpenStack
- API interface into managing Hadoop clusters

What can it do?

- Provision Hadoop clusters
- Scale already provisioned cluster
- Allows use of templates with the ability to modify parameters

Available later in 2015

Common Sahara CLI Commands

Explanation of commands along with additional commands and optional arguments are available at:
http://docs.openstack.org/cli-reference/content/saharaclient_commands.html

- CLI Tool: sahara

- Cluster create update, delete
- Template (cluster) create delete
- Data source create, delete
- Cluster image manage
- Job create, delete
- Job binary data create, delete
- Job template create, delete
- Job node group template, create, delete

OpenStack Orchestration (Heat)

Horizon	Keystone
Heat	

Nova	Glance	Swift	Cinder	Neutron	Ceilometer	Trove	Sahara
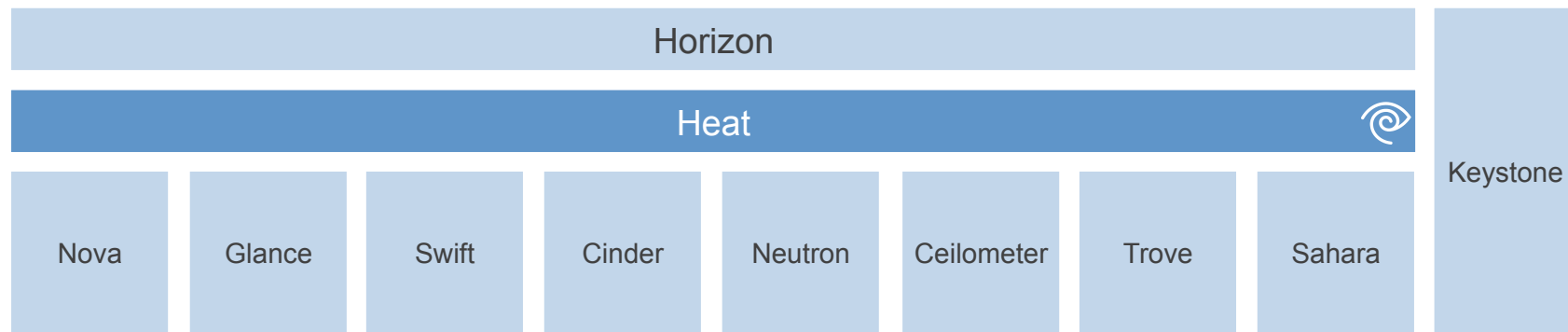
What is it?

- Template-based Automation for OpenStack Services
- The "next" level of automation

What can it do?

- Deploy Compute, Network, Storage, Images, etc.
- Pass application deployment logic to instances
- Monitor deployed VMs and Add capacity to a Load balancer

Heat - Horizon

Heat CLI Commands

Explanation of commands along with optional arguments are available at:
http://docs.openstack.org/cli-reference/content/heatclient_commands.html

- CLI Tools: heat

- Stack create, update, delete
- Tempalte validate
- Stack abandon, adopt
- Stack resource list
- Stack event list
- Stack output

OpenStack Dashboard (Horizon)

Horizon									Keystone
Heat									
Nova	Glance	Swift	Cinder	Neutron	Ceilometer	Trove	Sahara		
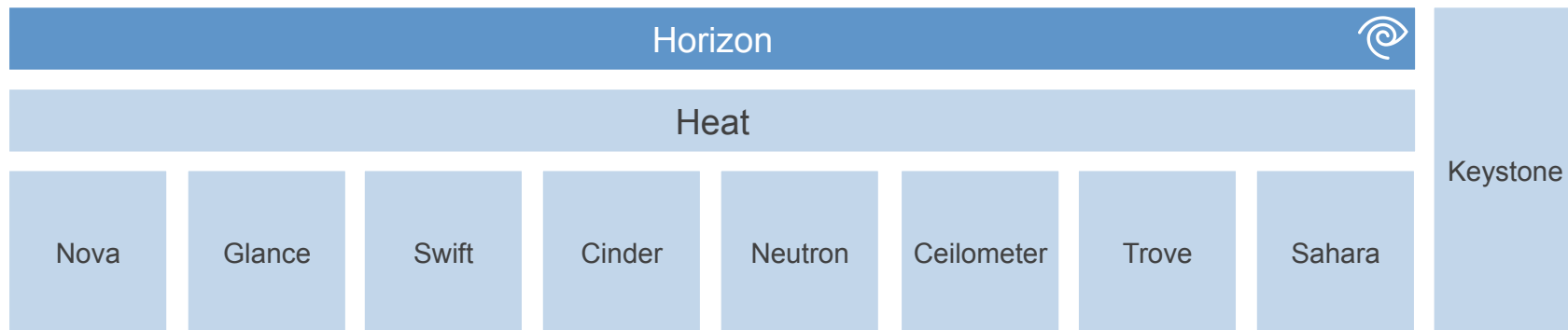
What is it?
- GUI for OpenStack services

What can it do?
- Deploy Compute, Network, Storage, Images, etc.
- Provide overview of resource utilization
- Pass application deployment logic to instances

Horizon GUI

TWC OpenStack Architecture 2016

								Authorization and Authentication
Dashboard **Horizon**								
Orchestration **Heat**								**Keystone**
Compute	Image Storage	Object Storage	Block Storage	Network	Monitoring (as a Service)	Database as a Service	Analytics as a Service	
Nova	Glance	Swift	Cinder	Neutron	Monasca	Trove	Sahara	
KVM						**mySQL and Oracle RAC**		**LDAP and local**
Ironic	Ceph	← Cinder Backup →	Ceph	LBaaS				
			Tier 1	Designate				

Current Feature: Cinder and Glance are backed by Ceph

Coming to TWC Portal:

- Neutron-LbaaS, Designate, Sahara and Ironic are planned additions
- Monasca is expected to replace Ceilometer and include MaaS
- Additional Tier 1 (Fast SSD) Block Storage a second system to back Cinder