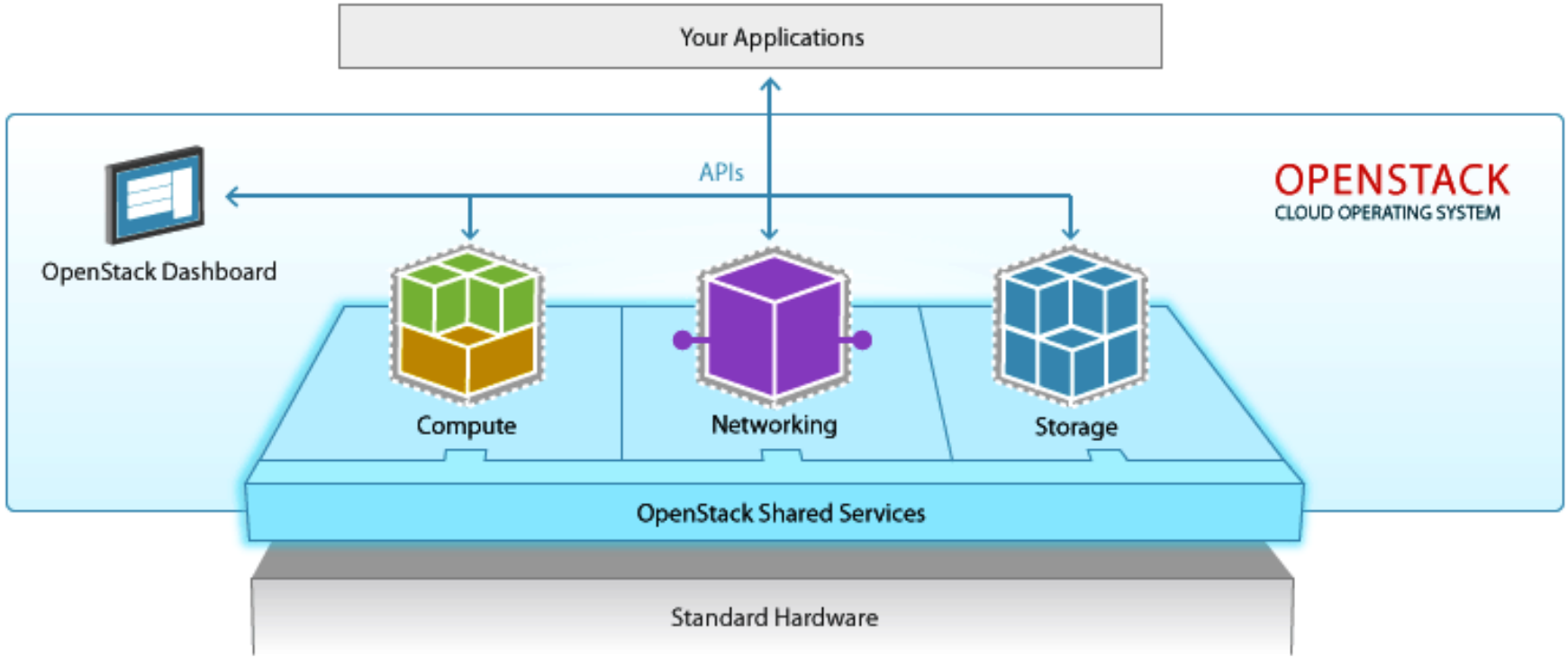
OpenStack Architecture

OpenStack

- OpenStack is an open source IaaS cloud operating system which consists of a series of allied projects controlling large pools of computing, storage, and network resources in a data center while managing through a dashboard.
- It is designed to run on commodity hardware such as ARM and x86.

OpenStack



https://dzone.com/articles/openstack-core-components

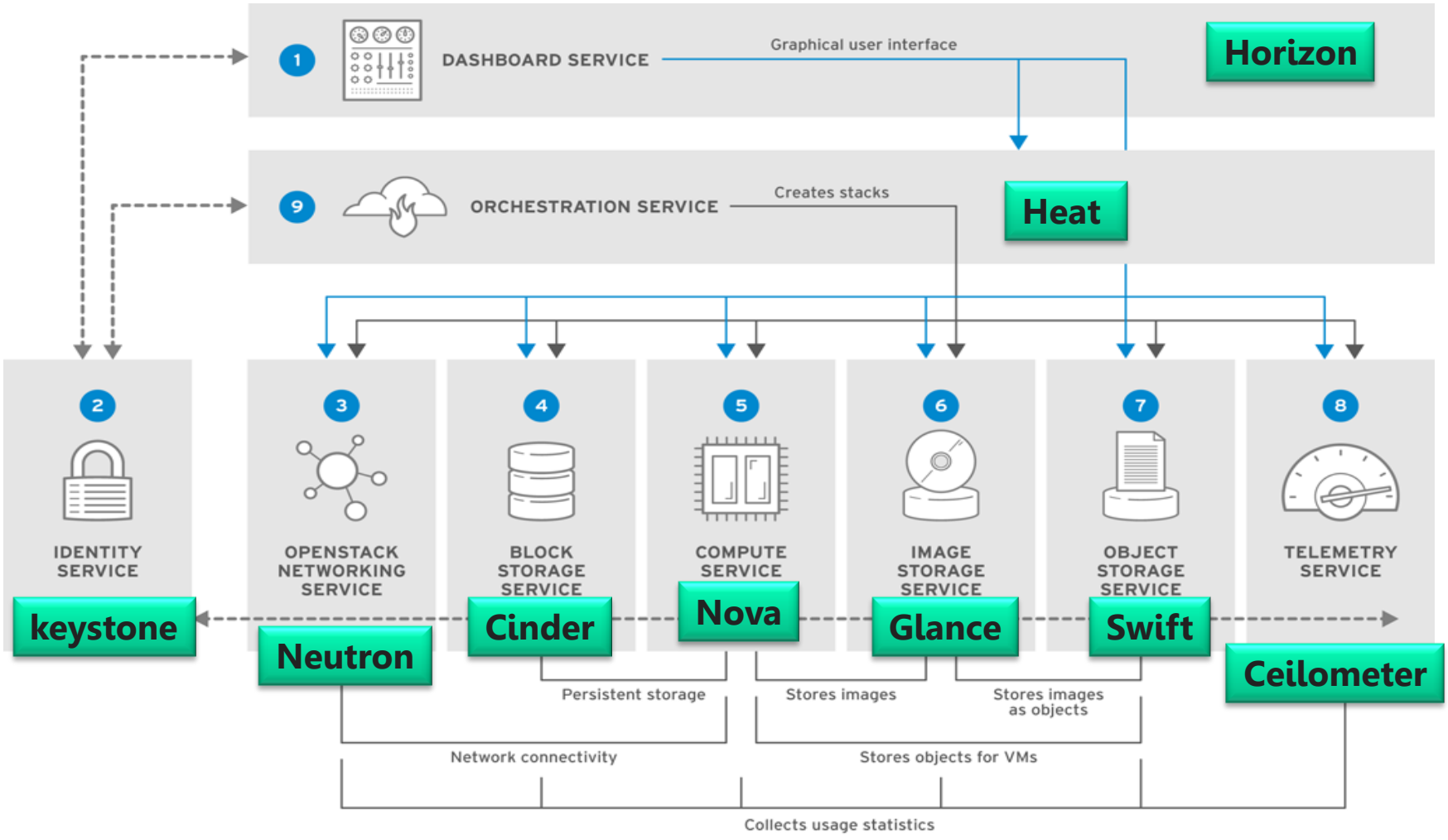
OpenStack

- OpenStack has grown into a large community with over 9000 contributors and nearly 500 companies since its initial release in 2010, by NASA and Rackspace.
- OpenStack.org released it under the Apache license 2.0.

OpenStack

- The cloud can be managed with a web-based dashboard or command-line clients, which allow administrators to control, provision, and automate OpenStack resources.
- OpenStack also has an **extensive API**, which is also available to all cloud users.

Architecture



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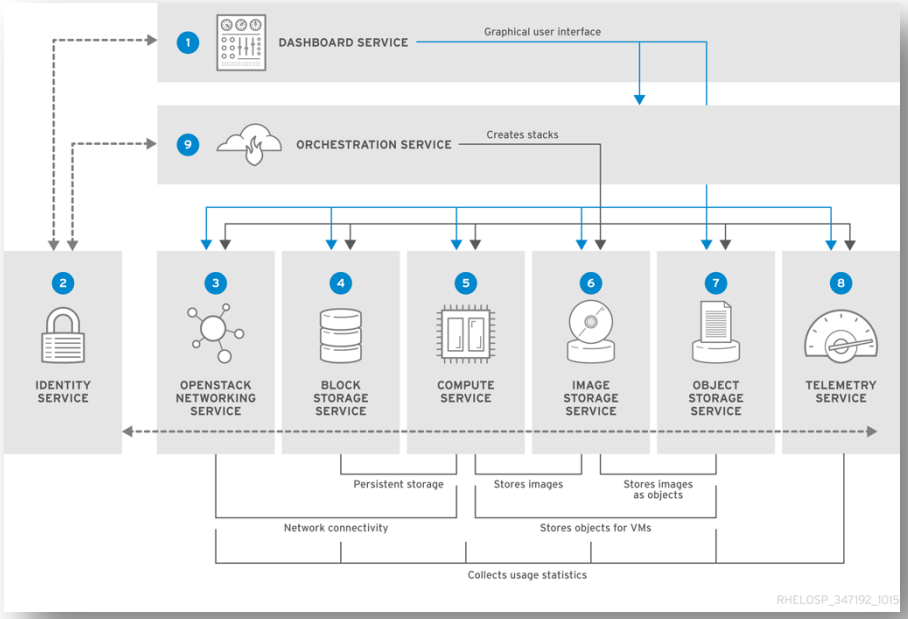
OpenStack: Compute (Nova)



A cloud computing fabric controller, which manages pools of computer resources and work with virtualization technologies, bare metals, and high-performance computing configurations

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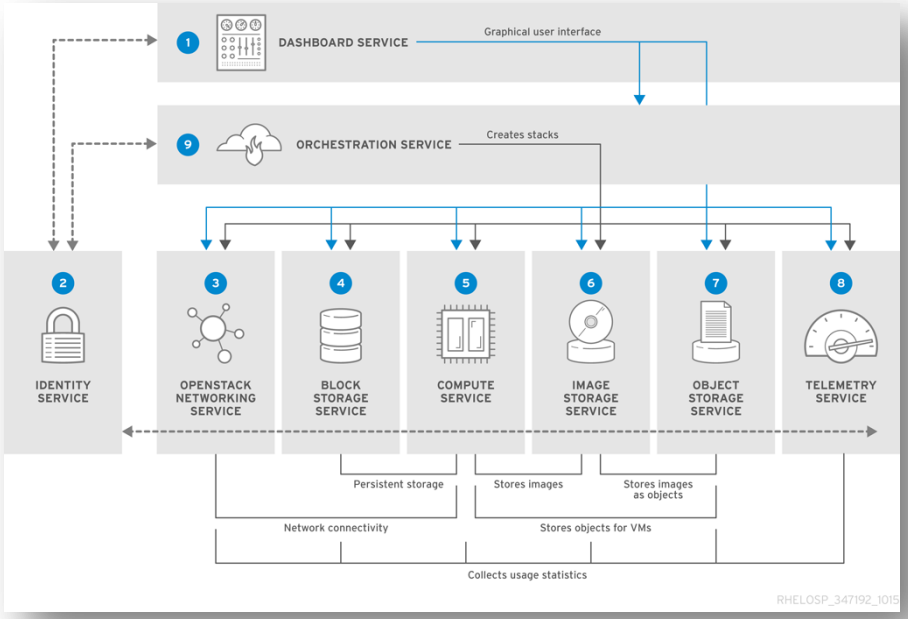
OpenStack: Compute (Nova)



- provides flexibility to design the cloud with no proprietary software or hardware requirements and also delivers the ability to integrate the legacy systems and third-party products.
- Nova can be deployed using hypervisor technologies such as KVM, VMware, LXC, XenServer, etc.

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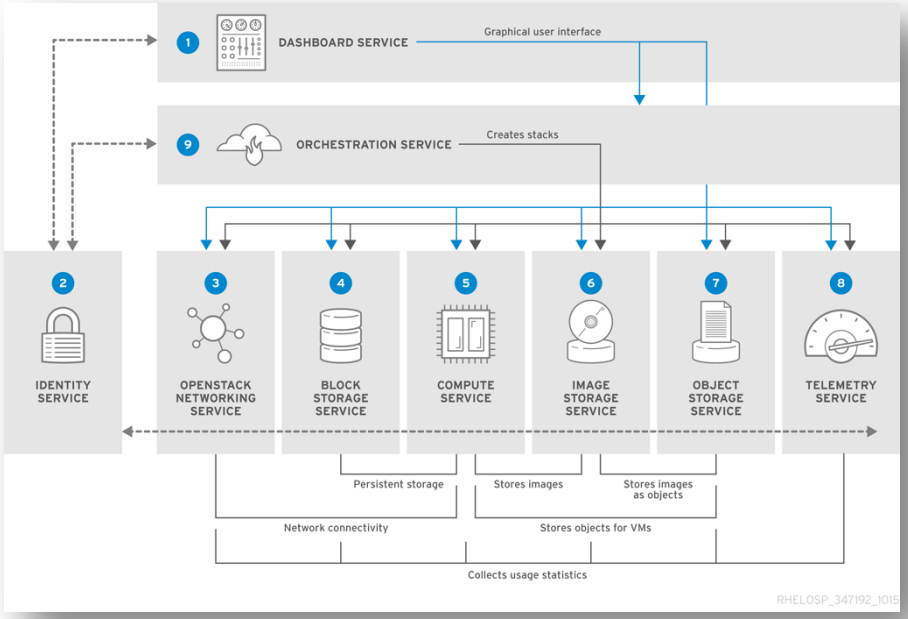
OpenStack: Image Service (Glance)



- OpenStack image service offers discovering, registering, and restoring virtual machine images.
- Glance has client-server architecture and delivers a user REST API, which allows querying of virtual machine image metadata and also retrieval of the actual image

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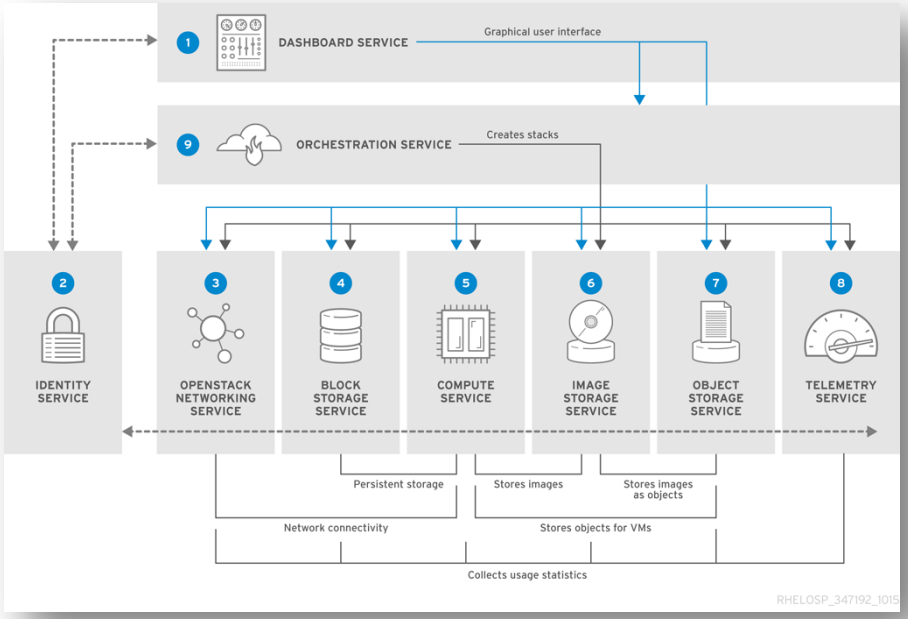
OpenStack: Image Service (Glance)



- While deploying new virtual machine instances, Glance uses the stored images as templates.
- OpenStack Glance supports Raw, VirtualBox (VDI), VMWare (VMDK, OVF), Hyper-V (VHD), and Qemu/KVM (qcow2) virtual machine images.

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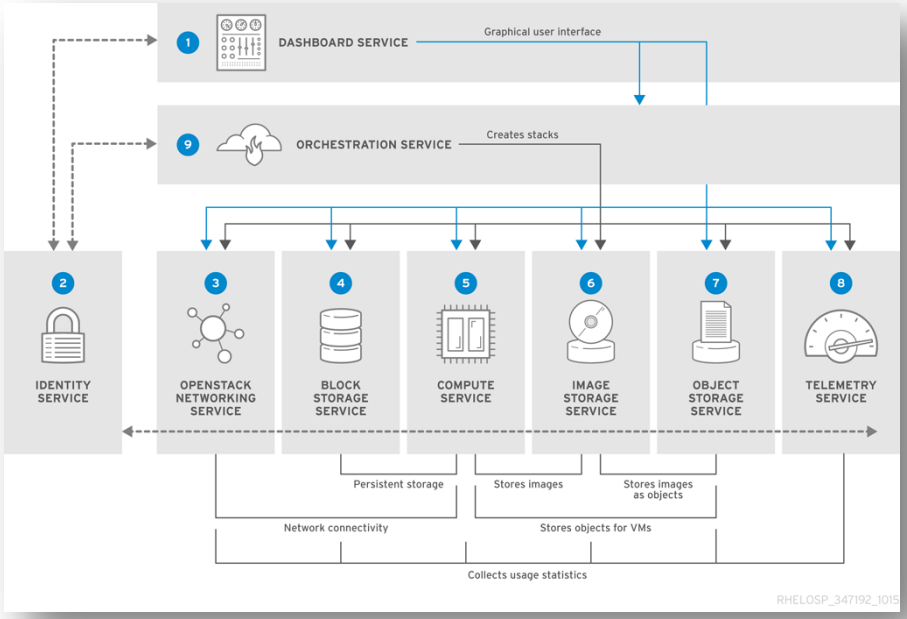
OpenStack: Object Storage (Swift)



- The OpenStack Object Storage service provides support for storing and retrieving arbitrary data in the cloud.
- The Object Storage service provides both a native API and an Amazon Web Services S3-compatible API.

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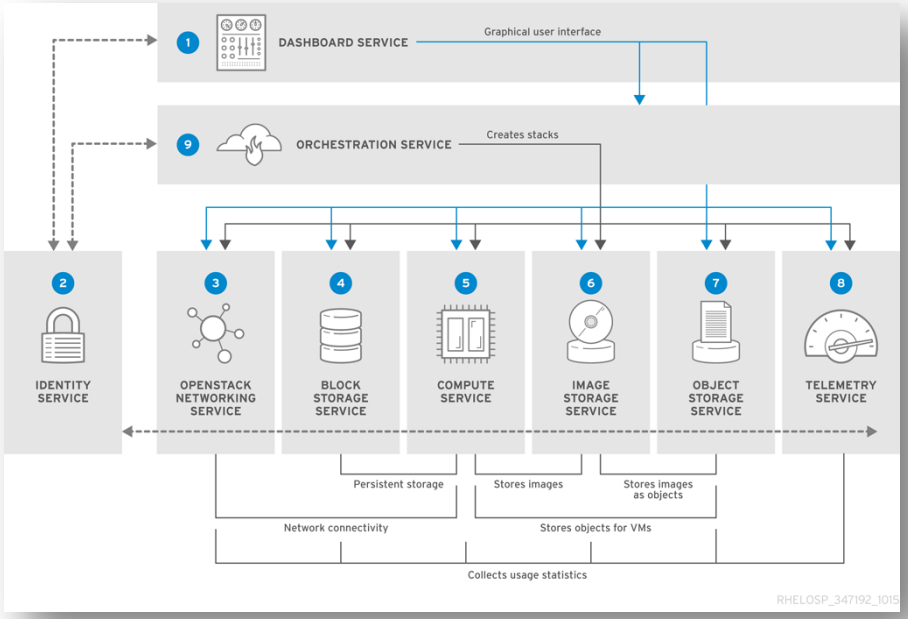
OpenStack: Object Storage (Swift)



- The service provides a high degree of resiliency through data replication and can handle petabytes of data.
- *It is important to understand that object storage differs from traditional file system storage.*

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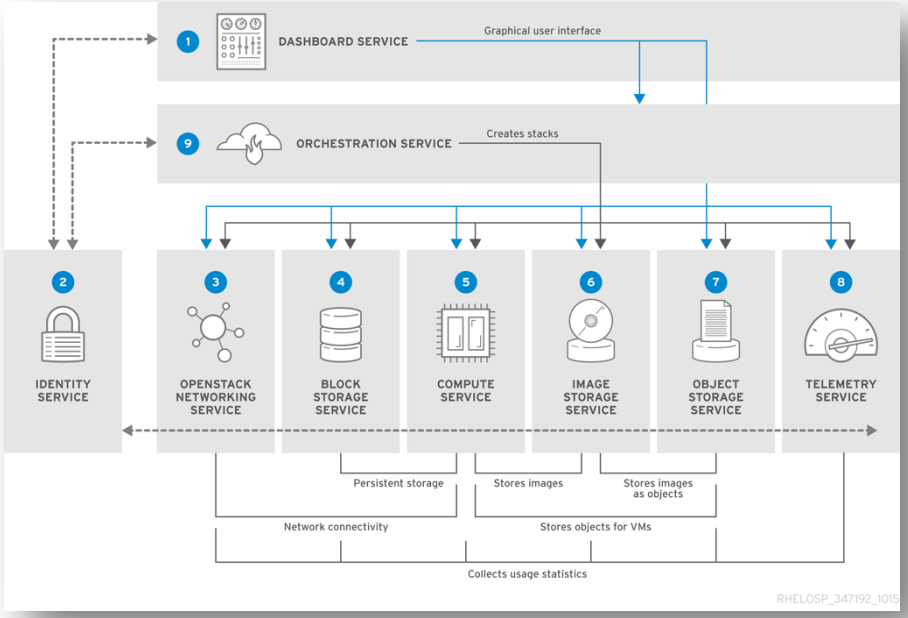
OpenStack: Object Storage (Swift)



- Object storage is best used for static data such as media files (MP3s, images, or videos), virtual machine images, and backup files.

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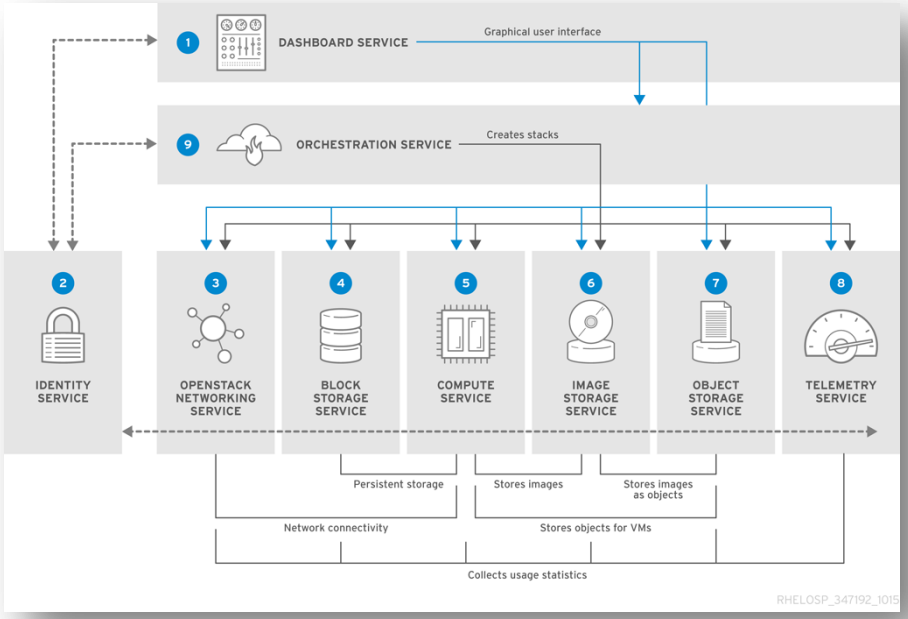
OpenStack: Block Storage (Cinder)



- OpenStack Cinder delivers determined block-level storage devices for application with OpenStack compute instances.
- A cloud user can manage their storage needs by integrating block storage volumes with Dashboard and Nova.

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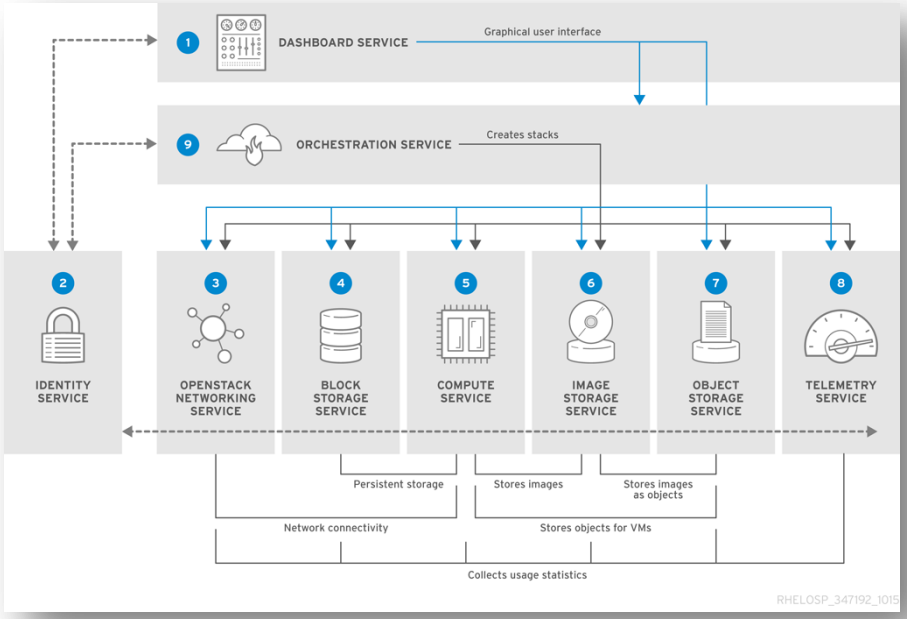
OpenStack: Block Storage (Cinder)



- Cinder can use storage platforms such as Linux server, EMC (ScaleIO, VMAX, and VNX), Ceph, Coraid, CloudByte, IBM, Hitachi data systems, SAN volume controller, etc.
- It is appropriate for expandable file systems and database storage.

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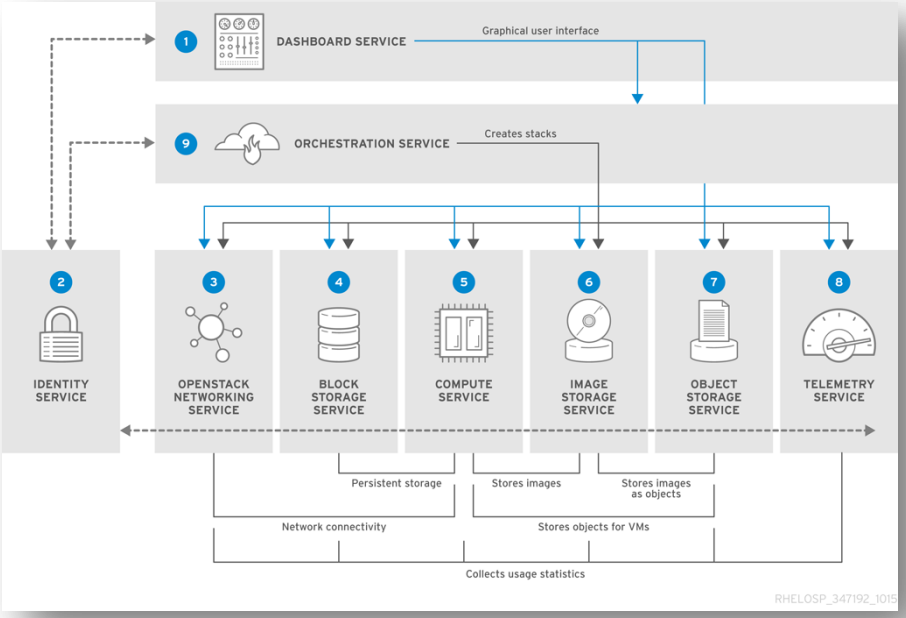
OpenStack: Dashboard (Horizon)



- Horizon is the authorized implementation of OpenStack's Dashboard, which is the only graphical interface to automate cloud-based resources.

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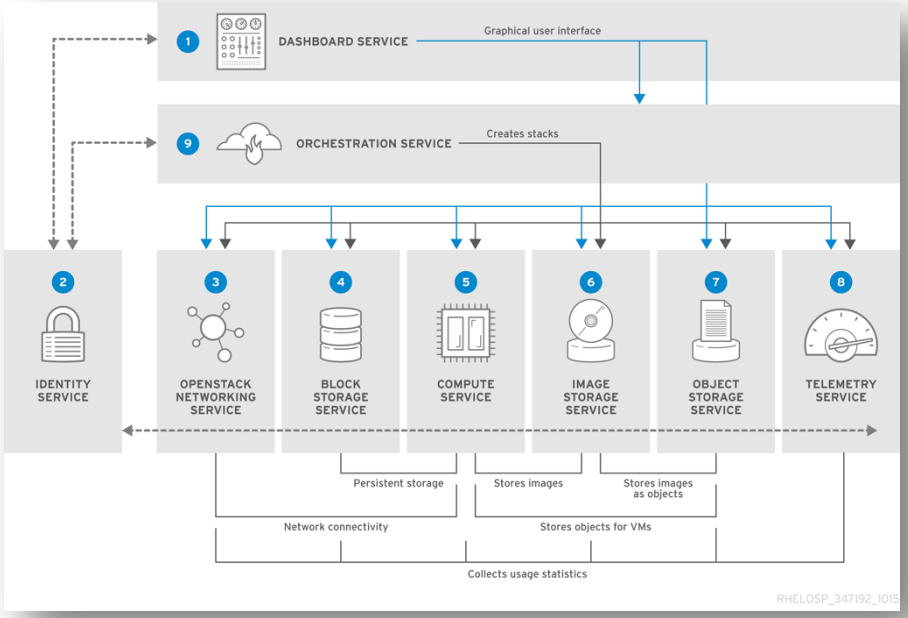
OpenStack: Dashboard (Horizon)



- To service providers and other commercial vendors, it supports with third party services such as monitoring, billing, and other management tools.

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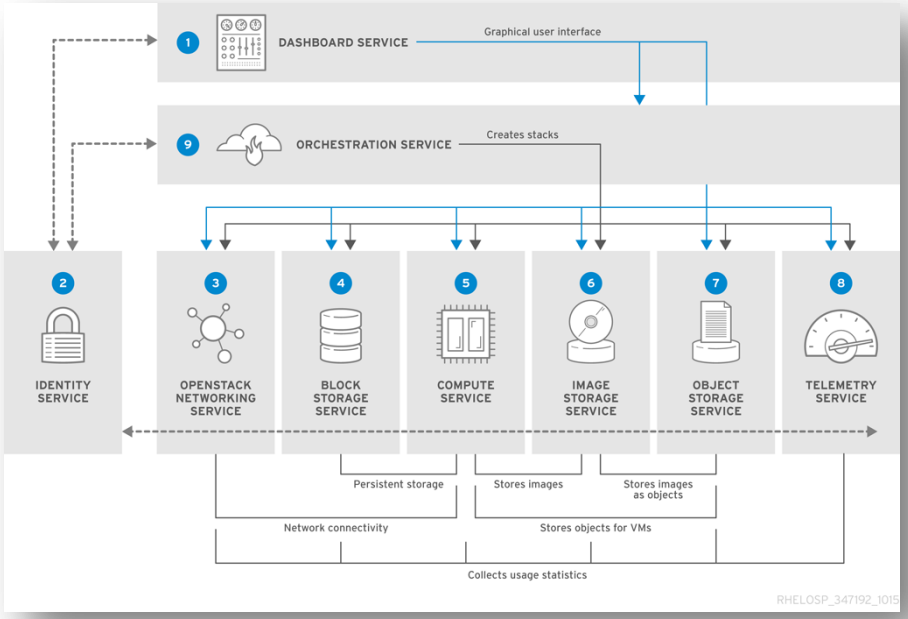
OpenStack: Dashboard (Horizon)



- Developers can automate tools to manage OpenStack resources using EC2 compatibility API or the native OpenStack API

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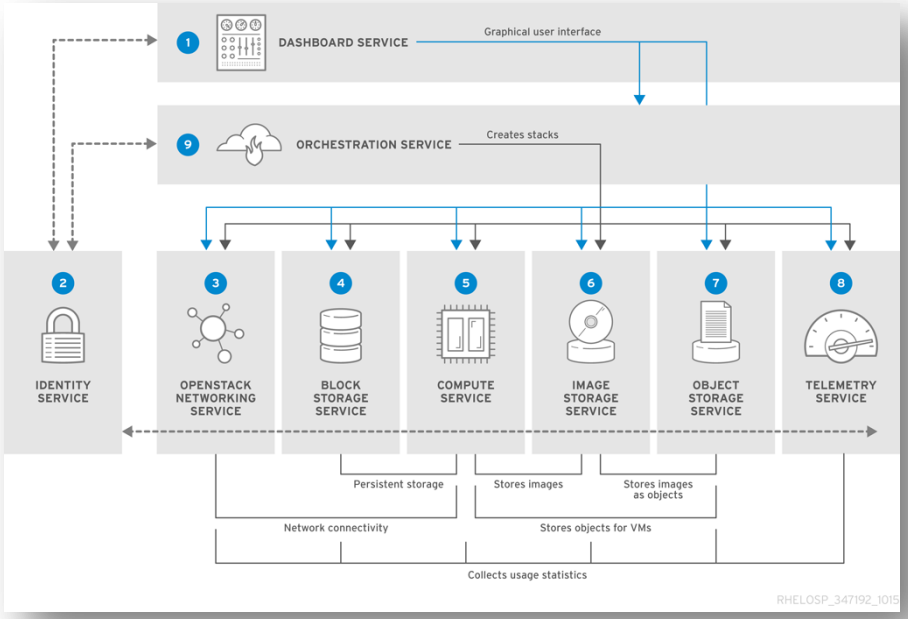
OpenStack: Identity Service (Keystone)



- Keystone provides a central list of users, mapped against all the OpenStack services, which they can access.
- It integrates with existing backend services such as LDAP while acting as a common authentication system across the cloud computing system.

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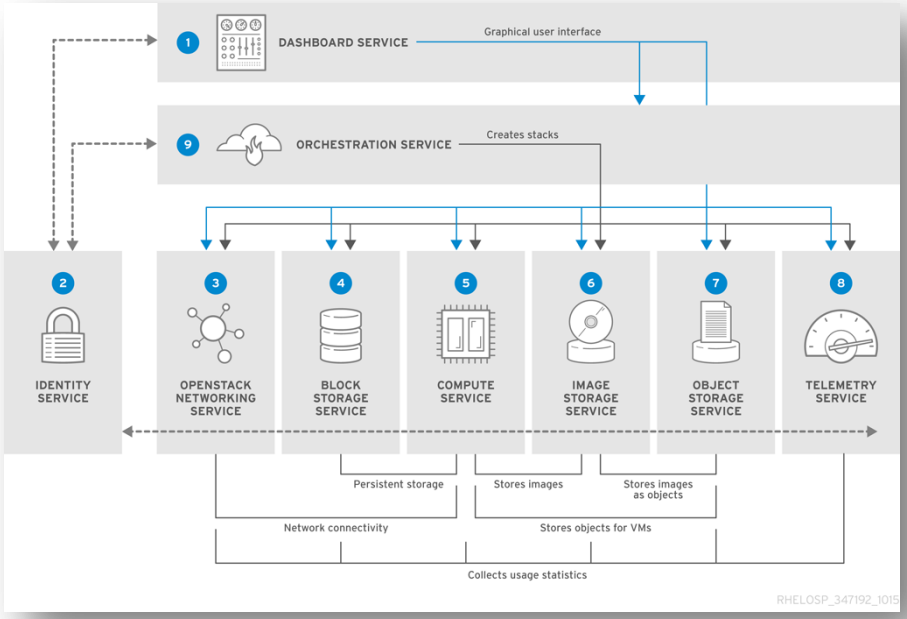
OpenStack: Identity Service (Keystone)



- Keystone supports various forms of authentication like standard username & password credentials, AWS-style logins and token-based systems.
- Additionally, the catalog provides an endpoint registry with a queryable list of the services deployed in an OpenStack cloud.

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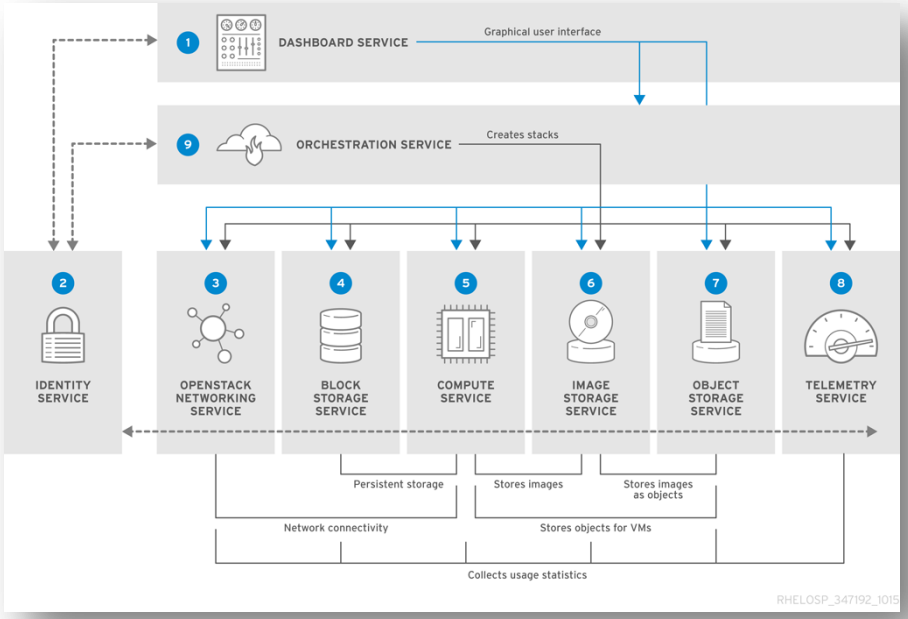
OpenStack: Networking (Neutron)



- Neutron provides networking capability like managing networks and IP addresses for OpenStack.
- It ensures that the network is not a limiting factor in a cloud deployment and offers users with self-service ability over network configurations.

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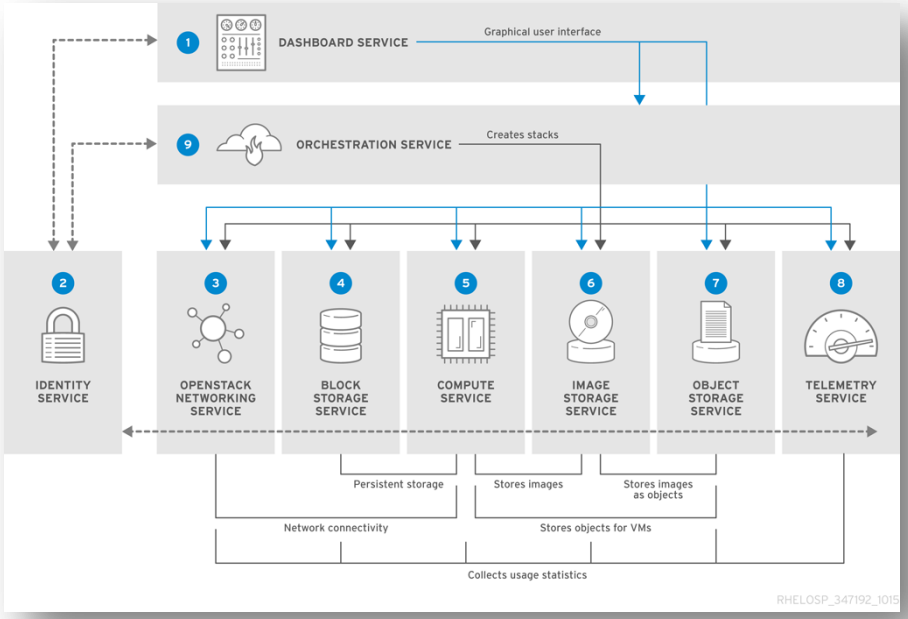
OpenStack: Networking (Neutron)



- OpenStack networking allows users to create their own networks and connect devices and servers to one or more networks.
- Developers can use SDN technology to support great levels of multi-tenancy (vs provider netwoks) and massive scale.

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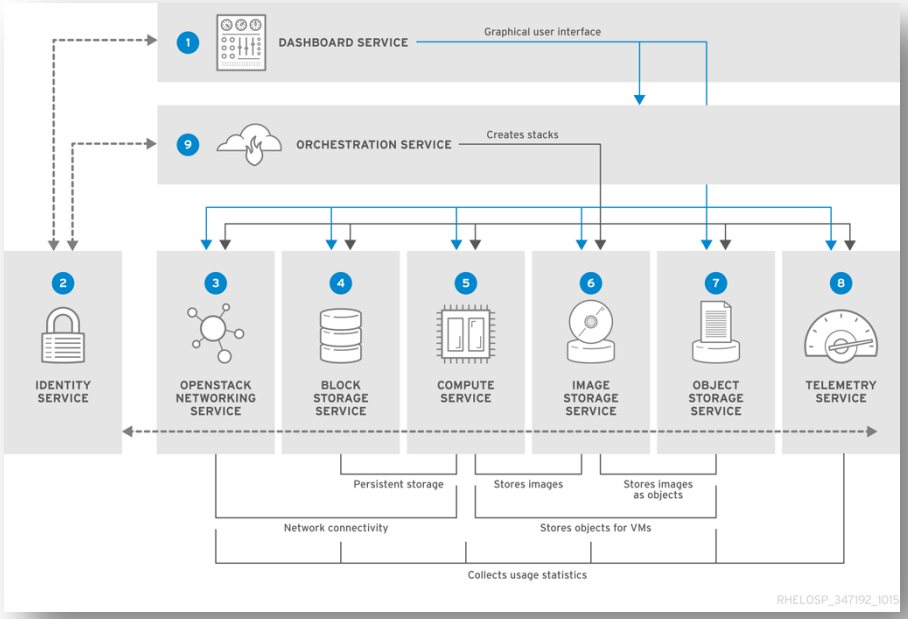
OpenStack: Networking (Neutron)



- Neutron also offers an extension framework, which supports deploying and managing of other network services such as virtual private networks (VPN), firewalls, load balancing, and intrusion detection system (IDS)

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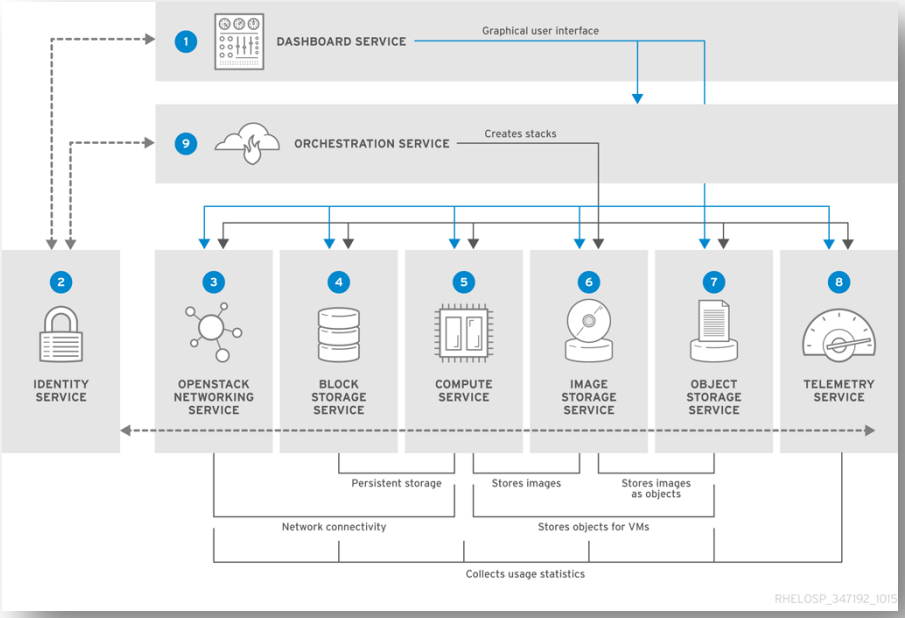
OpenStack: Telemetry (Ceilometer)



- Ceilometer delivers a single point of contact for billing systems obtaining all of the measurements to authorize customer billing across all OpenStack core components

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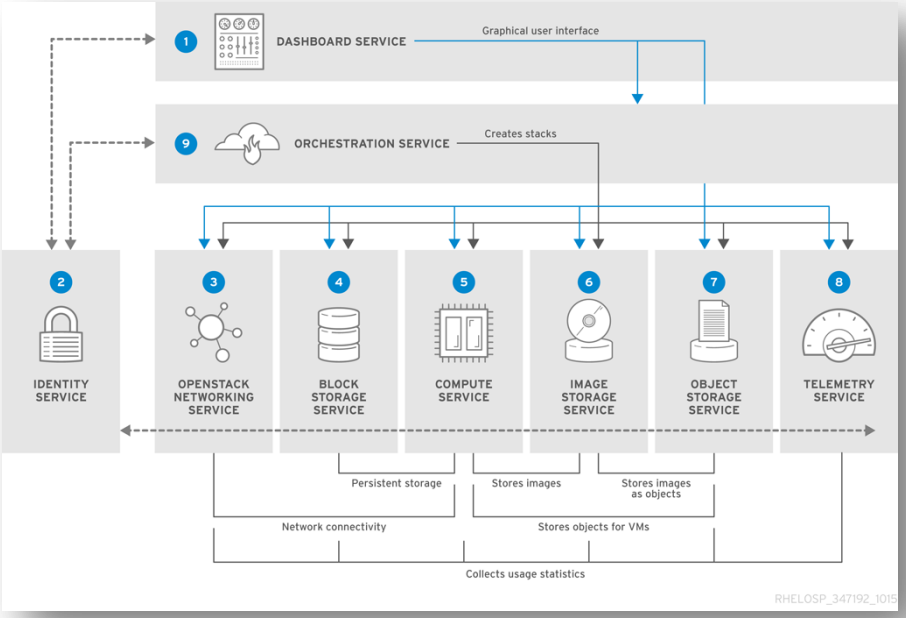
OpenStack: Telemetry (Ceilometer)



- By monitoring notifications from existing services, developers can collect the data and may configure the type of data to meet their operating requirements.

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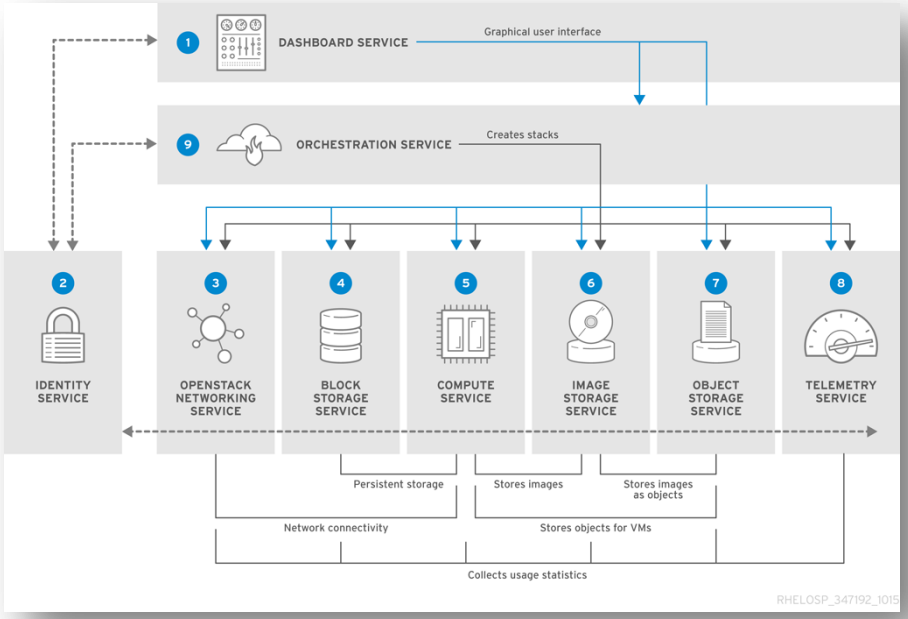
OpenStack: Orchestration (Heat)



- Heat is a service to orchestrate multiple composite cloud applications through both the CloudFormation-compatible Query API and OpenStack-native REST API, using the AWS CloudFormation template format..

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