

CLOUD COMPUTING ASSIGNMENT

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Components Of Openstack

- Horizon
- Keystone
- Nova
- Glance
- Swift
- Neutron
- Cinder
- Heat
- Ceilometer

Horizon

Horizon is the canonical implementation of Openstack's Dashboard, which provides a web based user interface to OpenStack services including Nova, Swift, Keystone, etc.

Horizon started life as a single app to manage OpenStack's compute project. As such, all it needed was a set of views, templates, and API calls.

OpenStack Horizon is the official web-based user interface (UI) for managing and interacting with OpenStack cloud services. OpenStack is an open-source cloud computing platform that provides a range of services for building and managing public and private clouds. Horizon is one of the core components of OpenStack and serves as a user-friendly interface for administrators, developers, and end-users to access and control OpenStack resources.

Key features and functionalities of OpenStack Horizon include:

1. **Dashboard:** The primary function of Horizon is to provide a dashboard that offers a visual representation of OpenStack services, resources, and configurations. Users can log in to the Horizon dashboard through a web browser to perform various tasks.
2. **User Management:** Horizon allows administrators to manage user accounts, roles, and permissions within the OpenStack environment. Users can be assigned different roles with specific access rights.
3. **Service Management:** You can use Horizon to manage OpenStack services such as Compute (Nova), Networking (Neutron), Object Storage (Swift), Block Storage (Cinder), and more. Horizon provides a unified interface to interact with these services.
4. **Instance Management:** Users can create, launch, terminate, and manage virtual instances (virtual machines) through Horizon. This includes configuring instance specifications, attaching storage volumes, and managing security groups.
5. **Networking:** Horizon provides tools for configuring and managing networking resources, including networks, subnets, routers, and floating IPs. Users can define network topologies and connectivity.
6. **Image Management:** You can upload, register, and manage images (virtual machine templates) using Horizon. Images are used as the basis for creating virtual instances.

7. **Volume Management:** Users can create and manage block storage volumes using Horizon. These volumes can be attached to virtual instances to provide additional storage capacity.
8. **Identity Management:** Horizon integrates with OpenStack Identity (Keystone) for user authentication and identity management. It allows users to manage their own accounts and passwords.
9. **Orchestration:** Horizon can interact with the OpenStack Orchestration service (Heat) to create and manage stacks of resources defined in Heat templates.
10. **Monitoring and Reporting:** While Horizon primarily focuses on resource provisioning and management, it may integrate with other tools like the OpenStack Dashboard (Monasca) for monitoring and reporting on cloud resources' health and performance.
11. **Customization:** Horizon is highly customizable. Administrators can tailor the dashboard's appearance and available features to meet their organization's specific needs.
12. **Multi-Tenancy:** OpenStack Horizon supports multi-tenancy, allowing different organizations or users to use the same OpenStack cloud infrastructure while keeping their resources isolated.

Keystone

OpenStack Keystone is the identity and access management service at the core of the OpenStack cloud platform. It provides authentication, authorization, and a service catalog, controlling user and service access to OpenStack resources based on roles and permissions. Keystone supports various authentication methods, manages service endpoints, and enhances security in OpenStack environments.

Features

- **Identity Service:** Keystone is the identity and access management service in OpenStack.
- **Authentication:** It verifies user and service identities using various methods.
- **Authorization:** Keystone controls access to OpenStack resources based on defined roles and permissions.
- **Service Catalog:** It maintains a catalog of available OpenStack services and their endpoints.
- **Roles:** Keystone uses roles to determine user and service access levels.
- **Projects/Tenants:** It organizes and isolates resources within projects or tenants.
- **Token Management:** Keystone issues tokens for user and service authentication.
- **Security:** It offers security features like token revocation and SSL/TLS support.
- **Scalability:** Keystone can scale horizontally for large deployments.

- **Backend Support:** It supports multiple backend storage options for user data.

Nova

OpenStack Nova is one of the core components of the OpenStack cloud computing platform. Nova is responsible for providing and managing compute resources, including virtual machines (VMs), also known as instances, in an OpenStack cloud environment.

Key Points

- **Compute Service:** Nova is OpenStack's compute service for managing virtual instances (VMs).
- **Hypervisor-Agnostic:** It works with various hypervisors.
- **Scalable:** Nova scales well for small to large cloud deployments.
- **API-Driven:** Offers a RESTful API for instance management.
- **Scheduling:** Includes a scheduler for optimized resource placement.
- **Integration:** Integrates with Keystone, Neutron, and Cinder for a full cloud infrastructure.
- **Elasticity:** Allows dynamic scaling of compute resources.
- **Live Migration:** Supports live migration of running instances.
- **Security Groups:** Provides firewall control with security groups.
- **Customization:** Users can create custom instance images and flavors.
- **Open Source:** An open-source project under the OpenStack umbrella.

Glance

OpenStack Glance is the image service in the OpenStack cloud computing platform. Its primary function is to manage and provide virtual machine (VM) images. Here are the key points about OpenStack Glance in a concise format:

- **Image Service:** Glance is OpenStack's image service, used for storing, cataloging, and sharing VM images.
- **Image Repository:** It acts as a repository for VM images, including operating system images, snapshots, and custom images.
- **Format Support:** Supports various image formats, such as RAW, VMDK, QEMU, and more, making it versatile for different hypervisors.

- **API Access:** Provides a RESTful API for image management, allowing users to create, browse, and retrieve images programmatically.
- **Metadata:** Allows users to add metadata to images, making it easier to search and categorize them.
- **Image Sharing:** Enables image sharing across different projects or tenants within the OpenStack cloud.
- **Caching:** Supports image caching to improve performance and reduce network bandwidth when launching instances.
- **Integration:** Integrates with other OpenStack services like Nova (compute) and Cinder (block storage) to facilitate instance creation.
- **Image Import/Export:** Allows importing images from external sources and exporting images for backup or migration purposes.
- **Security:** Offers access control and security features to manage who can view and use specific images.
- **Distributed Storage:** Can be configured to use various storage backends, including Swift object storage and Ceph.
- **Open Source:** Like other OpenStack components, Glance is open-source, enabling customization and contributions from the community.

Swift

OpenStack Swift is an ideal solution for storing and managing large amounts of unstructured data in a scalable, reliable, and highly available manner.

KeyPoints

- **Object Storage Service:** OpenStack Swift is the object storage service component of OpenStack.
- **Scalable and Distributed:** It is designed for scalable, distributed storage of unstructured data.
- **Data Redundancy:** Swift replicates data across multiple storage nodes to ensure data durability and availability.
- **API Access:** Offers a RESTful API for easy integration with applications and services.
- **Data Storage:** Stores data in containers, which are analogous to folders, and objects, similar to files.
- **Data Security:** Provides access control and supports container-level ACLs (Access Control Lists).

- **Data Lifecycle:** Swift can manage data lifecycle policies for automatic data expiration and archiving.
- **Swift Ring:** Utilizes a component called the "Swift Ring" for managing data placement and distribution across storage nodes.
- **Object Versioning:** Supports versioning of objects, allowing retrieval of previous versions if needed.
- **Data Encryption:** Offers data encryption options for enhanced security.
- **Use Cases:** Commonly used for backup, data archiving, media storage, and content delivery.
- **Resilience:** Designed to withstand hardware failures and provide data integrity.
- **Highly Available:** Can be configured for high availability and data replication across geographically dispersed locations.

OpenStack Swift is an ideal solution for storing and managing large amounts of unstructured data in a scalable, reliable, and highly available manner.

Neutron

- **Network Service:** Neutron is the networking service in OpenStack, responsible for managing network resources.
- **Virtual Networking:** It enables the creation of virtual networks, subnets, routers, and floating IPs for virtual instances (VMs).
- **Integration:** Neutron integrates with other OpenStack services like Nova (compute) and Cinder (block storage) to provide comprehensive networking solutions.
- **API-Driven:** Neutron exposes an API for programmatically defining and managing network configurations.
- **Plug-ins:** It supports plug-ins that allow for flexibility and integration with various networking technologies and SDN controllers.
- **Security Groups:** Provides security group functionality for controlling network traffic to and from VMs.
- **Load Balancing:** Neutron offers load balancing services through plug-ins or extensions.
- **Floating IPs:** Allows VMs to have publicly accessible IP addresses.
- **Software-Defined Networking (SDN):** Neutron supports SDN concepts and can be integrated with SDN solutions for advanced network management.
- **Open Source:** Neutron is an open-source project within the OpenStack ecosystem, enabling customization and community contributions.

Cinder

- **Block Storage Service:** Cinder is OpenStack's block storage service.
- **Persistent Storage:** It provides persistent block storage for virtual machines.
- **Volume Management:** Allows users to create, attach, and manage block storage volumes.
- **Snapshots:** Supports creating point-in-time snapshots of volumes for backup and cloning.
- **Integration:** Integrates with other OpenStack services like Nova and Glance.
- **Storage Backends:** Offers support for various storage backends and drivers.
- **Scalability:** Designed to scale horizontally to handle growing storage needs.
- **Open Source:** An open-source component of the OpenStack cloud platform.

Heat

- **Orchestration Service:** OpenStack Heat is the orchestration service within the OpenStack ecosystem.
- **Infrastructure as Code:** It allows users to define and manage cloud infrastructure using templates.
- **Automation:** Heat automates the deployment and scaling of resources.
- **Templates:** Users create templates (written in YAML or JSON) to describe the desired infrastructure.
- **Stacks:** Templates are used to create stacks, which consist of interconnected resources.
- **Lifecycle Management:** Heat handles resource provisioning, updating, and deletion.
- **Integration:** It integrates with other OpenStack services like Nova, Neutron, and Cinder.
- **Scalability:** Heat is suitable for managing complex, multi-resource deployments.

Ceilometer

OpenStack Ceilometer is the telemetry and monitoring component of the OpenStack cloud platform. Here are the key points about Ceilometer in a concise format:

- **Telemetry Service:** Ceilometer is OpenStack's telemetry and metering service.
- **Resource Monitoring:** It tracks and meters resource usage, including CPU, memory, storage, and network.
- **Billing and Reporting:** Used for billing, auditing, and generating usage reports.
- **Data Collection:** Collects data from various OpenStack services, including Nova, Cinder, Neutron, and Swift.
- **Alarms:** Allows setting up alarms based on predefined thresholds for resource monitoring.
- **Events:** Monitors and captures events related to OpenStack resources and services.
- **Data Storage:** Stores collected data in a database for historical analysis.
- **Integration:** Integrates with other OpenStack services for comprehensive cloud monitoring.
- **Scalability:** Can scale horizontally to handle large-scale cloud deployments.
- **Open Source:** Ceilometer is an open-source project that enhances visibility and control in OpenStack environments.