

# SGI® + SUSE® OpenStack Cloud Reference Architecture

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SGI® + SUSE® OpenStack Cloud Reference Architecture helps an organization's IT professionals create and deploy an on-premise private cloud instance that is contained within its own network space, using computing and storage resources under its direct control. The Reference Architecture provides guidance for integrating SGI Rackable® scale-out servers or (optional) SGI UV™ specialized scale-up computing hardware with SUSE OpenStack Cloud software. Following these recommendations and best practices allows organizations to quickly and confidently deploy the required infrastructure that yields a secure, scalable, performant and highly available private cloud instance for High-Performance Computing (HPC) workloads, whether the design targets testing, development or production.

The Reference Architecture includes guidance for preparing the cloud infrastructure, setting up solution components, and operational advice and references. Considerations for preparing infrastructure include networking, computing and storage platform, and software components. Solution component guidance includes setup and configuration of SUSE OpenStack Cloud Administration Server, SUSE OpenStack Cloud Control Nodes and SUSE OpenStack Cloud Compute Nodes. Detailed operational guidance includes references and samples for testing and managing the private cloud.

### The Challenges

Private cloud solutions can be helpful in solving a variety of issues in large organizations. Private clouds can offer:

- Support for multiple individual servers spread throughout the data center running persistent workloads (web pages, wikis, support infrastructure and so on).
- Workloads with large numbers of users that stretch the boundaries of a traditional HPC infrastructure.
- Economical options for development and testing.
- Stable, repeatable infrastructure that is flexible enough to run a variety of workloads.
- The benefits of a cloud for an organization that can't use a public cloud, either because regulations prohibit it or the organization isn't willing to tolerate the unpredictable downtime that can accompany public cloud processes (such as updates that occur without notice).

### The Solution

SGI + SUSE OpenStack Cloud Reference Architecture helps IT professionals create and deploy an on-premise private cloud instance contained within its own network space, using computing and storage resources under its direct control (see Figure 1). Private cloud resources—which are fully contained behind an organization's firewall—can be used across many groups, delivering access to IT resources and abstracting complex internal infrastructures from DevOps personnel in addition to end users. This abstraction allows individual virtual machines or workloads to be easily provisioned on demand (subject to allowed quotas) from predefined templates. Services, consisting of many workloads, can be provisioned for use in minutes and then scaled appropriately to meet service demands.

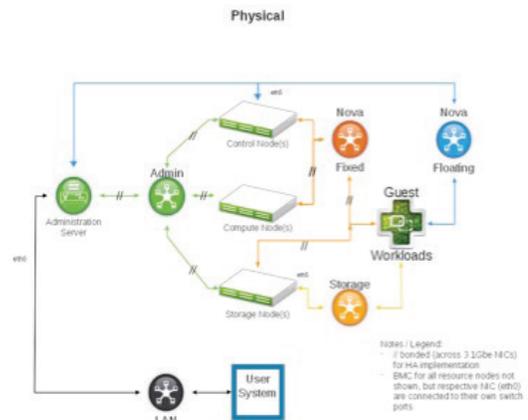


Figure 1: Example private cloud based on the SGI + SUSE OpenStack Cloud Reference Architecture

### OpenStack for IaaS:

The Reference Architecture explains how enterprises can establish an infrastructure-as-a-service (IaaS) private cloud that delivers on-demand access to pools of compute, storage and networking resources for use within their organization, as shown in Figure 2.

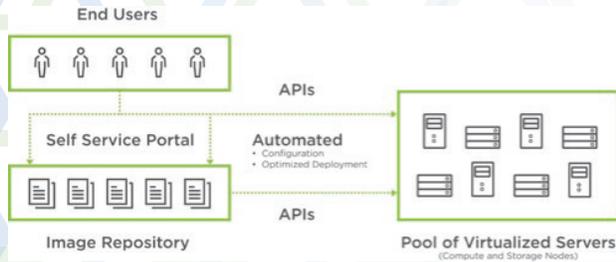


Figure 2: IaaS private cloud delivers on-demand access to pools of compute, storage and networking resources

The underlying network, compute and storage resources can be pre-provisioned as necessary to meet the overall design requirements for applications and services to be deployed later in the cloud instance. Compute resources are provided via physical servers by using a hypervisor to run virtual machine workloads. Storage resources are provided via distributed, resilient file systems across industry-standard hardware with local storage devices. Networking ties the compute, storage and management elements of the private cloud together. Private cloud software provides the user interface for setup, configuration and maintenance as well as the long-term operation of the cloud by bonding these three core components into a cohesive service offering.

#### Preparation guidance:

The Reference Architecture provides preparation guidance on:

- Facilities. This includes heating, ventilation and air conditioning (HVAC) and power requirements.
- Networking. Specific recommendations are given for the networking topology typically used in HPC environments, and equipment that meets both scale and performance requirements. The guidance includes specific network subnets and virtual LAN designations needed to satisfy the design requirements.
- Computing and storage platform. SGI Rackable scale-out servers can fulfill many of the needs for various roles. This can be a general-purpose hardware set that allows for a wide range of configuration options yet still meets the demands of the design.
- Software components SUSE OpenStack Cloud provides an enterprise-grade implementation of OpenStack components and includes other tools necessary for a complete private cloud implementation.

#### Solution component guidance:

To coordinate all user-facing functionality and abstraction of infrastructure resources, a private cloud instance requires some dedicated administrative and control resources in addition to the storage and compute resources used by specific workloads. The Reference Architecture should be used as a companion guide to the official network, system and software product deployment documentation.

Processes for setting up and applicable settings are included for the following components:

- SUSE OpenStack Cloud Administration Server: To consolidate various administrative services, a Solution Admin Host (SAH) is used.
- SUSE OpenStack Cloud Control Nodes. These nodes—managed and deployed through the SUSE OpenStack Cloud Administration Server web interface—act as a provider of persistent cloud-based storage elements and offer a management interface.
- SUSE OpenStack Cloud Compute Nodes. The compute node is managed and deployed through the SUSE OpenStack Cloud Administration Server web interface. More nodes can be added as needed to increase workload hosting, and availability zones can be added to allow selective workloads to be spread across servers.

#### Operational advice and references:

After following the processes in the Reference Architecture, organizations will be able to upload images for deployment, launch workloads and manipulate data volumes in the private cloud instance. IT professionals can also perform a basic functionality and API test of the overall installation by using the OpenStack Integration Test Suite (Tempest) to exercise the “smoke” tests that are part of the OpenStack gate process as described in the OpenStack documentation.

The Reference Architecture includes appendices that list all products (including SKUs) and configurations needed for the private cloud deployment. In addition, it provides a Crowbar batch export of the nodes and roles deployed in the private cloud.

#### About SGI

SGI is a global leader in high performance solutions for compute, data analytics and data management that enable customers to accelerate time to discovery, innovation, and profitability.

#### For More Information

Please contact an SGI sales representative at 1-800-800-7441 or visit [www.sgi.com](http://www.sgi.com).

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