



SUSE Enterprise Storage

2020



What Is SUSE Enterprise Storage?

SUSE Enterprise Storage is an intelligent software-defined storage management solution, powered by Ceph technology that enables IT to transform their enterprise storage infrastructure to seamlessly adapt to changing business and data demands by delivering cost-efficient, highly scalable and resilient storage using off-the-shelf servers and disk drives.

Why Base SUSE Enterprise Storage On Ceph?

Ceph is the most popular OpenStack distributed storage solution. It is extensively scalable, from a storage appliance to a cost-effective cloud solution. With the Nautilus release, Ceph provides industry-leading storage functionality such as unified block, object and file storage, thin provisioning, erasure coding and cache tiering. It is self-healing and self-managing.

What Is CephFS And How Does It Work?

With CephFS, SUSE Enterprise Storage provides a traditional file system interface with POSIX semantics. Object storage systems are a significant innovation, but they complement rather than replace traditional file systems. As storage requirements grow for legacy applications, organizations can configure their legacy applications to use the Ceph file system too! This means customers can run one storage cluster for object, block and file-based data storage.

- It provides stronger data safety for mission-critical applications.
- It provides virtually unlimited storage to file systems ideal for “Large Data” file storage.
- Applications that use file systems can use CephFS with POSIX semantics. No integration or customization is required.
- Ceph automatically balances the file system to deliver maximum performance.



Storage Interface Options

Storage Type	Storage Type	Storage Type
Block Storage	Linux clients mount the cluster directly as a block device	RBD
	Linux virtualization host makes Ceph block storage available to virtual guest systems	Qemu over RBD
	Clients access Ceph as a network-based iSCSI block device	iSCSI gateway
	VMware or Windows-based virtualization host makes Ceph block storage available to virtual guest systems	iSCSI gateway
	Block storage with OpenStack environment	RBD—each storage pool is mapped to an OpenStack Cinder back end
Filesystem	Linux clients mount the cluster as a POSIX-complaint filesystem	CephFS
	NFS clients on the network access Ceph as a network filesystem	NFS to CephFS (Ganesha gateway)
	CIFS/SMB clients on the network access Ceph as a network filesystem	CIFS/Samba gateway
Object Storage	RESTful gateway for remote or cloud access through S3	RGW with S3 API
	Object storage with Open-Stack	RGW with Open-Stack Swift API
	NFS network clients access Ceph through an object interface	NFS gateway (NFS to RGW)

How Is SUSE Enterprise Storage Different From Ceph?

While SUSE Enterprise Storage is powered by Ceph technology, it is different because we further test the solution to ensure that our distribution is enterprise-ready and then we back that with SUSE Support. And since everything we do is open source, any issues we do help to resolve are contributed upstream to Ceph, ensuring that those fixes are maintained in the Ceph technology.

Additionally, we test and certify SUSE Enterprise Storage on a number of hardware configurations with major IHVs so that customers can be assured that the certified configurations will meet their expectations.

Has The Pricing For SUSE Enterprise Storage Changed?

No, there is no change to pricing:

- Base Configuration – \$13,000 (Priority Subscription)

SES and limited use of SLES to provide:

- 4 SES storage OSD nodes (1-2 sockets)
- 6 SES infrastructure nodes
- Expansion Node – \$3250 (Priority Subscription)

SES and limited use of SLES to provide:

- 1 SES storage OSD node (1-2 sockets)
- 1 SES infrastructure node

SUSE Enterprise Storage list price is \$13,000 (US) for a 4 data node cluster, 1-year support subscription. Pricing includes support for the management node, monitoring nodes and any gateway nodes (iSCSI, CephFS, NFS, CIFS, etc.). Additional data nodes are \$3,250 (US) per year. This pricing is designed to enable customers to deploy data storage solutions on-premises with pricing comparable to public cloud storage.

How Is SUSE Enterprise Storage Delivered?

We deliver SUSE Enterprise Storage:

- As software only
- With reference architectures from major IHVs
- As certified reference architectures from major IHVs (These reference architectures go through extensive validation testing.)
- As an appliance from several IHVs

What Are The Common Use Cases For SUSE Enterprise Storage?

Backup, Cloud object services, Cloud VM storage, archive and Tier 2 & 3 bulk storage. Some specific examples of data that our customers are storing on SUSE Enterprise Storage include: backup to disk, video surveillance data, medical image archive, high-resolution images and others.

What Is New In SUSE Enterprise Storage?

SUSE Enterprise Storage, based on the Ceph Nautilus release and built on SUSE Linux Enterprise Server 15 SP1, enables IT organizations to seamlessly adapt to changing business demands while reducing IT operational expense. New features are focused on containerized and cloud workload support, improved integration with public cloud and enhanced data protection.

SUSE Enterprise Storage continues the SUSE ethos of making Ceph enterprise consumable to:

- **Seamlessly adapt to changing business demands** by accelerating innovation, maximizing application availability and easily leveraging cloud resources.
- **Accelerate Innovation** by further removing storage silos—giving you easier access to different types of data and enabling you to quickly extract information from your data using cutting-edge search and analytics tools.
- **Maximize application availability** with faster and more granular backups that can now leverage low-cost public cloud resources for improved data protection.
- **Respond to changing business demands faster** with the ability to quickly and easily leverage public cloud resources as part of your storage infrastructure.

- Reduce IT operational expense with new capabilities that optimize data placement and improve IT efficiency.
- **Optimize data placement** with the ability to automatically and efficiently move data between all tiers of storage based on policy, ensuring access to critical data when you need it.
- **Improve IT efficiency** with a single, scalable storage solution that meets all storage requirements for containerized and cloud workloads no matter where they live.

What Is AppArmor?

AppArmor or “Application Armor” is a Linux kernel security module that enables the storage administrator to granularly select the actions that can be made with the Ceph Cluster.

Are There Any Recommended Minimum Cluster Configurations For SUSE Enterprise Storage?

Yes, we have minimum cluster configuration requirements. Please review these minimum configuration details:

- Four Object Storage Nodes
- 10 GB Ethernet (four interfaces)
- 32 OSDs per storage cluster
- Dedicated OS disk for each Object Storage Node
- Total RAM required = OSD count times (1 GB+ OSD memory target [default 4 GB]) + 16 GB
- Ceph Monitors, gateway and Metadata Servers can reside on Object Storage Nodes if additional CPU and RAM requirements are accommodated
- Three Ceph Monitor nodes (requires SSD for cated OS drive)
- Object Gateways and Metadata Servers nodes require redundant deployment
- iSCSI Gateways, Object Gateways and Metadata Servers require minimum incremental 4 GB RAM and four cores
- Separate management node with 4 GB RAM, four cores, 1 TB HDD capacity

How Does A Customer Increase Storage Capacity When Using SUSE Enterprise Storage?

For SUSE Enterprise Storage, capacity can be expanded by adding disk drives/Ceph OSDs to existing storage nodes in the cluster if space is available (scale up) OR by adding additional storage nodes to the cluster (scale out). Both operations are performed online.

SUSE Enterprise Storage disk drives/Ceph OSDs peer with each other and will recognize the additional capacity. All data (block, file or object) is stored as an object with SUSE Enterprise Storage. These objects are stored on the disk devices/Ceph OSDs in “containers” or “buckets” called placement groups. SUSE Enterprise Storage uses a computed data placement algorithm that takes the number of disk devices/Ceph OSDs as input to determine where these placement groups should reside. The disk drives/Ceph OSDs will automatically rebalance some placement groups onto the new disk drives/Ceph OSDs, ensuring an even distribution of data across the cluster.

What Is The Maximum Production Storage Capacity/Storage Nodes Deployed In A Single Cluster?

Currently we know of no limitations as Ceph was designed for limitless scalability. Multiple Ceph customers have deployed production clusters in the tens of petabytes, some in the hundreds of petabytes.

How Does SUSE Enterprise Cluster Rebalance Stored Data As Nodes And Capacity Are Added?

By default, the system will redistribute based on the capacity of added devices while honoring failure domains to ensure even access patterns and utilization. This is, however, highly configurable through the CRUSH map to keep data distribution stable.

How Does The SUSE Enterprise Storage Cluster Rebalance Stored Data As Nodes And Capacity Are Removed?

By default, the system will redistribute the load to the remaining storage during a graceful removal or recreate replicas as needed in response to failures—all while honoring failure domains to ensure even access patterns and utilization. This is, however, highly configurable through the CRUSH map to keep data distribution stable.

What Tiering Capabilities Does SUSE Enterprise Storage Have?

The SUSE Enterprise Storage cache tiering capability is based on Ceph cache tiering. The product supports both read-only and write-back cache tiering. Configuration parameters dictate what causes an object to be promoted to the cache tier, usually defined by some number of reads or writes and access patterns. Similarly, data whose temperature falls below a configurable threshold will be demoted to the backing tier. Of course, the cache tier can also be bounded by size and number of objects. The number of working threads that perform demotion and promotion can also be configured to limit impact.

What About SUSE Enterprise Storage And Containers?

SUSE Enterprise Storage can be used as the persistent storage for containers. Container Storage Interface (CSI) is supported and enables SUSE Enterprise Storage to work with Kubernetes.

Can SUSE Enterprise Storage Be Installed As A VM?

It can be installed as a VM for testing and staging. However, it is not supported for production, due to the need to access the raw node's storage and network for performance. Non-storage providing nodes (infrastructure nodes) can be installed as VMs.

How Do Users Manage Storage With SUSE Enterprise Storage?

The new Ceph Dashboard is being introduced in SUSE Enterprise Storage. This new functionality was recently added as part of the upstream codebase and is the standard management GUI for all Ceph distributions. It is a browser-based interface that enables you to easily manage and monitor components such as Pools, Object storage daemons (OSDs), Ceph nodes, iSCSI targets and portals, Ceph block devices, NFS shares (CephFS and S3) and Ceph object gateways. It also includes easy-to-use Prometheus-based widgets that display graphs and information about the health and performance of the storage cluster. A command line interface is also provided. The installation, deployment and orchestration of tasks can be performed on the command line via DeepSea, a Saltbased configuration management tool.