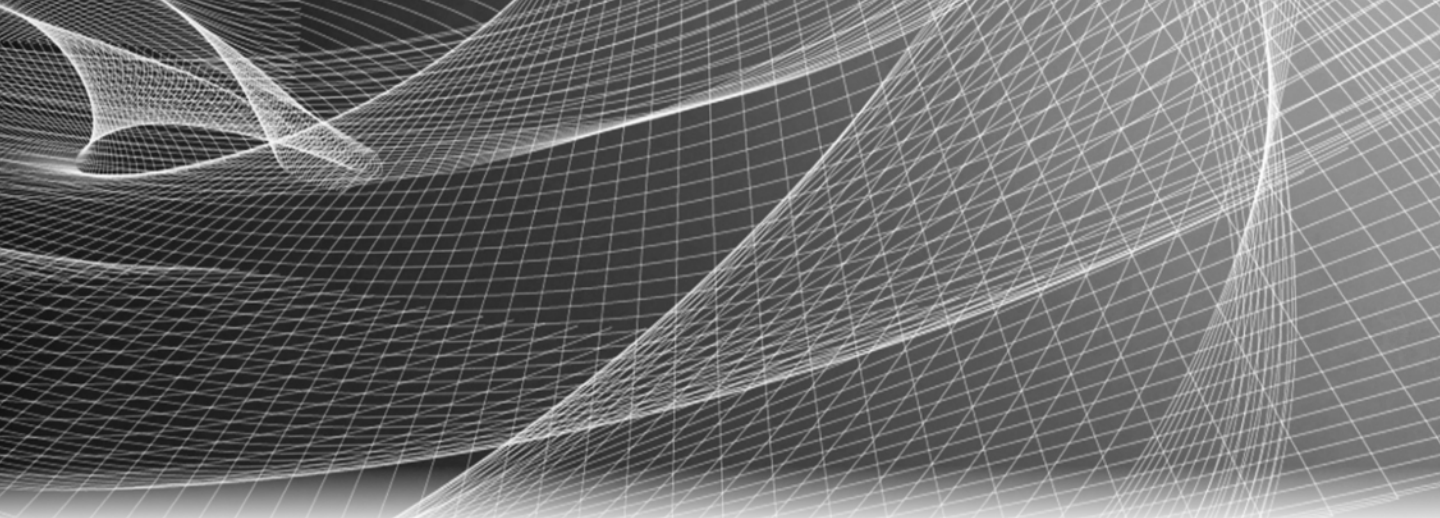




EMC ScaleIO™

V1.31

User Guide

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REV 07

EMC²

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PREFACE

As part of an effort to improve its product lines, EMC periodically releases revisions of its software and hardware. Therefore, some functions described in this document might not be supported by all versions of the software or hardware currently in use. The product release notes provide the most up-to-date information on product features.

Contact your EMC technical support professional if a product does not function properly or does not function as described in this document.

Note: This document was accurate at publication time. Go to EMC Online Support (<https://support.emc.com>) to ensure that you are using the latest version of this document.

Purpose

This document describes the ScaleIO virtual SAN storage system. It describes the architecture, deployment, and use of the system.

Audience

This document is intended for IT professionals-system and storage administrators-who will be involved in deploying and managing ScaleIO.

Related documentation

The following EMC publication provides additional information:

- ◆ *EMC ScaleIO Release Notes*
- ◆ *EMC ScaleIO Quick Start Guide for VMware*
- ◆ *EMC ScaleIO Security Configuration Guide*
- ◆ *EMC ScaleIO Fine-Tuning ESX Performance Guide*
- ◆ *EMC ScaleIO XtremCache 2.1 and ScaleIO 1.31 Guide*
- ◆ *EMC ScaleIO v1.3x Licensing Options Technical Note*

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NOTICE is used to address practices not related to personal injury.

Note: A note presents information that is important, but not hazard-related.

Typographical conventions

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Bold	Use for names of interface elements, such as names of windows, dialog boxes, buttons, fields, tab names, key names, and menu paths (what the user specifically selects or clicks)
<i>Italic</i>	Use for full titles of publications referenced in text and for variables in body text.
Monospace	Use for: • System output, such as an error message or script • System code • Pathnames, file names, prompts, and syntax • Commands and options
<i>Monospace italic</i>	Use for variables.
Monospace bold	Use for user input.
[]	Square brackets enclose optional values
	Vertical bar indicates alternate selections — the bar means “or”
{ }	Braces enclose content that the user must specify, such as x or y or z
...	Ellipses indicate nonessential information omitted from the example

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PART 1

Introduction

The chapters in this part of the guide give an overview of ScaleIO benefits and architecture. Chapters include:

[Chapter 1, “Introduction to EMC ScaleIO”](#)

This chapter describes the benefits and system requirements.

[Chapter 2, “Architecture”](#)

This chapter describes the software and hardware elements of the ScaleIO system, as well as the way to make ScaleIO work in your environment.

CHAPTER 1

Introduction to EMC ScaleIO

This chapter introduces EMC® ScaleIO™. Topics include:

- ◆ [What is ScaleIO?](#) 21
- ◆ [System requirements](#) 22
- ◆ [What’s new in this version?](#) 24
- ◆ [Product limits.....](#) 26

What is ScaleIO?

ScaleIO is a software-only solution that uses existing servers' local disks and LAN to create a virtual SAN that has all the benefits of external storage—but at a fraction of cost and complexity. ScaleIO utilizes the existing local internal storage and turns it into internal shared block storage. For many workloads, ScaleIO storage is comparable to, or better than external shared block storage.

The lightweight ScaleIO software components are installed on the application servers and communicate via a standard LAN to handle the application I/O requests sent to ScaleIO block volumes. An extremely efficient decentralized block I/O flow, combined with a distributed, sliced volume layout, results in a massively parallel I/O system that can scale up to thousands of nodes.

ScaleIO is designed and implemented with enterprise-grade resilience. Furthermore, the software features an efficient distributed self-healing process that overcomes media and node failures, without requiring administrator involvement.

Dynamic and elastic, ScaleIO enables administrators to add or remove nodes and capacity on-the-fly. The software immediately responds to the changes, rebalancing the storage distribution and achieving a layout that optimally suits the new configuration.

Because ScaleIO is hardware agnostic, the software works efficiently with various types of disks, including: magnetic (HDD) and solid-state (SSD) disks, flash PCI Express (PCIe) cards, networks, and hosts.

ScaleIO can easily be installed in an existing infrastructure as well as in green field configurations.

System requirements

The following table lists the requirements for ScaleIO nodes:

Component	Requirement
Processor	One of the following: • Intel or AMD x86 32-bit (for Xen only) • Intel or AMD x86 64-bit (recommended)
Physical memory	• 500 MB RAM for the Meta Data Manager (MDM) • 500 MB RAM for each ScaleIO Data Server (SDS) • 50 MB RAM for each ScaleIO Data Client (SDC) For more information about these ScaleIO software components, see “Software” on page 30 .
Disk space	• 1 GB for each physical node or Xen hypervisor • 10 GB for VMware topologies
Supported operating systems	One of the following (for a complete list, see the EMC Support Matrix): • Linux: CentOS 5.5-7.0, Red Hat 5.5-7.0, or SUSE 11 SP1, SP2, and SP3 Packages required for all components: —numactl —libaio Packages required for MDM components: —mutt (for Call-Home) —bash-completion (for scli completion) —Latest version of Python 2.X —When installing the MDM component on Linux CentOS 6 or RHEL 6 hosts, set the shared memory parameter in the <code>/etc/sysctl.conf</code> file to at least the following value: kernel.shmmax=209715200. To use this value, type the sysctl -p command. Package required for running the GUI: —Java 1.6, or higher • Windows: 2008 R2, 2012, or 2012 R2 Package required for running the GUI: —Java 1.7, or higher Packages required for MDM components: —Install PythonModulesInstall.exe on all MDM nodes. You can download the file from the EMC Online Support site (search for ScaleIO 1.30.0 Python Installation Modules) on https://support.emc.com. • Hypervisors: —VMware ESXi OS: 5.0, 5.1, or 5.5, managed by vCenter 5.1 or 5.5 only —Hyper-V —XenServer 6.1 —RedHat KVM

Connectivity	One of the following: • 1 gigabit or 10 gigabit (recommended) network • IP-over-InfiniBand network Dual-port network interface cards (recommended) Ensure the following: • There is network connectivity between all components • Network bandwidth and latency between all nodes is acceptable. • Ethernet switch supports the bandwidth between network nodes. • MTU settings are consistent across all servers and switches. For jumbo frame support, set the MTU for servers, switches, and vSwitches to 9000. • The following ports are open in the local firewall of the server: —MDM: 6611 and 9011 —SDS: 7072 —Tie-Breaker: 9011 —ScaleIO Gateway and Installation Manager: 80 and 443 —Light Installation Agent (LIA): 9099 —SNMP traps: 162 Note: You can change the default port. For more information, contact EMC Support.
--------------	---

Table 1 System requirements for ScaleIO nodes

The following table lists the requirements for the ScaleIO Gateway server:

Supported operating systems	One of the following: • Windows 7, 2008 R2, or 2012 R2 • Linux RHEL 5.x or 6.x, and SLES 11.2 and 11.3 Every OS requires 2 cores and minimum of 2 GB RAM. Note: To install ScaleIO components onto RHEL 5.x servers, the Installation Manager has different requirements for server RAM and for Java memory. For more information, see “How do I use the Installation Manager to deploy on RHEL 5.x servers” on page 484.
Supported web browsers	The web client is supported on the following browsers: • Internet Explorer 10, or higher • Firefox, version 31, or higher • Chrome, version 36, or higher

Java requirements	• Linux—1.6 or higher, 64-bit • Windows—1.7 or higher, 32 or 64-bit (for better performance) Note: For JDK installations, define JAVA_HOME system variable as C:\Program Files\Java\<JDK_version> For JRE installations, define JRE_HOME system variable as C:\Program Files\Java\<JRE_version>
Other	• For a Windows Installation Manager (IM), the WMI service must be enabled on the IM server and on all Windows ScaleIO nodes. • The IM server must have connectivity to all the nodes that are being installed. If you are using separate networks for management and data, the IM server must be able to communicate with both networks.

Table 2 System requirements for Installation Manager

ScaleIO requires that you use a minimum of three SDS servers, with a combined free capacity of at least 200 GB. These minimum values are true per system and per storage pool. For complete information on the minimum size of components, see “Product limits” on page 26.

NOTICE

Installing ScaleIO requires a valid product license. To obtain a license, open a service ticket with EMC Support at <https://support.emc.com>.

For complete information on licensing, see [Chapter 5, “Licensing.”](#)

What’s new in this version?

ScaleIO v1.31 introduces several new features, listed below. In addition, it includes internal enhancements that increase the performance, capacity usage, stability, and other storage aspects.

- ◆ The **Features Enabler** lets you control use of the ScaleIO Gateway & Installation Manager, and SNMP features.
- ◆ Improved installation efficiency
 - The ScaleIO Gateway Installation Manager validates environment compatibility before performing installation, upgrade, extend, and uninstall operations.

- The vSphere plug-in can install the Installation Manager, which can be used for Get Info and upgrade operations.
- Multiple devices are added in parallel during installation.
- The Linux RPM files are signed.
- Datastore for SVM installation can be selected.

Installation is described in [Chapter 3, “Installation.”](#)

◆ New VMware plug-in features

- Multiple volumes can be created in one operation.
- Existing SVMs can be extended.

The plug-in is described in [Chapter 13, “Using the VMware Plug-in.”](#)

◆ Support has been added for RHEL/CentOS 7.0.

◆ OpenStack enhancements

- Support has been added for OpenStack Juno.
- Better support for multiple networks on the hypervisor.

OpenStack is described in [Appendix F, “Deployment in OpenStack Environments.”](#)

- ◆ The RAM Read Cache feature is now enabled by default on a per-volume basis, and can be configured on per-volume and at the Storage Pool level.
- ◆ Object query enhancements. You can query objects by specific properties.
- ◆ Enhanced security
 - Remote access to the MDM cluster can be restricted to monitoring activities only.
 - Restrict MDM access to authorized SDC nodes only.
 - LIA and Installation Manager passwords are now stored in hashed format. For information about password authentication and hardening of communication to LIA, see the *EMC ScaleIO Security Configuration Guide*.
 - The REST API uses a token-based login instead of passing user credentials on every request.

- ◆ The ScaleIO Gateway includes SNMP v2 functionality, which can send alerts as traps to an SNMP receiver.
SNMP is described in [Appendix H, “SNMP Trap Support.”](#)
- ◆ The REST API has been extended to support all the new features of this version.
The REST API is described in [Appendix G, “REST API Reference.”](#)
- ◆ Enhanced performance and ease of use in VMware environments
 - The SDC can be installed directly on the ESXi 5.5 host.
 - Vsphere plug-in enables switching of SDC mode from SVM to ESXi. This activity can only be performed together with EMC Support.
- ◆ Number of volumes supported by the system increased from 1K to 8K.
- ◆ The GUI window can be maximized to full screen mode.

Product limits

The following table lists product capabilities:

Item	Limit
ScaleIO System raw capacity	300 GB—16 PB
Device size	100 GB—4 TB
Minimum Storage Pool capacity	300 GB
Volume size	8 GB—1 PB
Maximum number of volumes/snapshots in system	32,768 ¹
Maximum number of volumes/snapshots in Protection Domain	32,768
Maximum number of volumes + snapshots in single VTree	32
Maximum capacity per SDS	64 TB
SDSs per system	1024
SDSs per Protection Domain	128 ¹
Maximum devices (disks) per SDS server	64

Item	Limit
Maximum devices (disks) per Storage Pool	300 ¹
Minimum devices (disks) per Storage Pool	3, on different SDSs
Maximum SDCs per system	1024
Maximum volumes that can be mapped to a single SDC	1024
Maximum Protection Domains per system	256
Maximum Storage Pools	1024
Maximum Storage Pools per Protection Domain	64
Maximum Fault Sets per Protection Domain	64
Maximum SCSI Initiators per system	1024
Maximum IP addresses per server (MDM and SDS)	8
RAM Cache	128 MB—128 GB

1. If more are needed, contact EMC Support.

Table 3 Product limits

CHAPTER 2

Architecture

This chapter describes the ScaleIO architecture. Topics include:

- ◆ [System.....](#) 29
- ◆ [Storage definitions.....](#) 31
- ◆ [Implementing ScaleIO.....](#) 35
- ◆ [Other functions](#) 39
- ◆ [Maintenance](#) 39
- ◆ [Snapshots](#) 41
- ◆ [Management tools](#) 43
- ◆ [Configuring direct attached storage \(DAS\)](#) 44
- ◆ [Implementing ScaleIO over a virtual system](#) 45

ScaleIO is a software-only solution. The ScaleIO components are lightweight, highly available software components, installed on new or existing servers alongside your production applications (hypervisors, databases, web applications, etc.). The system can be installed directly on the servers, or over a virtual server system (hypervisor or virtual machines).

This chapter provides a high-level description of building and using a ScaleIO virtual SAN.

ScaleIO provides multiple management tools: CLI, GUI, REST, OpenStack, and a VMware plug-in.

System

The ScaleIO system is based on a hardware and a software component.

Hardware

In general, hardware can be the existing application servers used by the datacenter, or a new set of nodes (if, for example, you want to dedicate all nodes solely for the purpose of running the ScaleIO SAN storage system).

The ScaleIO system refers to the following hardware components:

- ◆ **Nodes**
Nodes or servers are the basic computer unit used to install and run the ScaleIO system. They can be the same servers used for the applications (server convergence), or a dedicated cluster. In any case, ScaleIO is hardware-agnostic, and therefore, aside from performance considerations, the type of server is inconsequential.
- ◆ **Storage Media**
The storage media can be *any* storage media, in terms of the type (HDD, SSD, or PCIe flash cards) and anywhere (DAS, or external).

Software

The ScaleIO virtual SAN consists of the following software components:

- ◆ **Meta Data Manager—MDM**
Configures and monitors the ScaleIO system. The MDM can be configured in redundant *Cluster Mode*, with three members on three servers, or in *Single Mode* on a single server.

NOTICE

It is not recommended to use Single Mode in production systems, except in temporary situations. The MDM contains all the metadata required for system operation. Single Mode has no protection, and exposes the system to a single point of failure.

- ◆ **ScaleIO Data Server—SDS**
Manages the capacity of a single server and acts as a back-end for data access. The SDS is installed on all servers contributing storage devices to the ScaleIO system. These devices are accessed through the SDS.
- ◆ **ScaleIO Data Client—SDC**
A lightweight device driver that exposes ScaleIO volumes as block devices to the application residing on the same server on which the SDC is installed.

Depending on the desired configuration (described later), the software components are installed on the server node and give rise to a virtual SAN layer exposed to the applications residing on the servers.

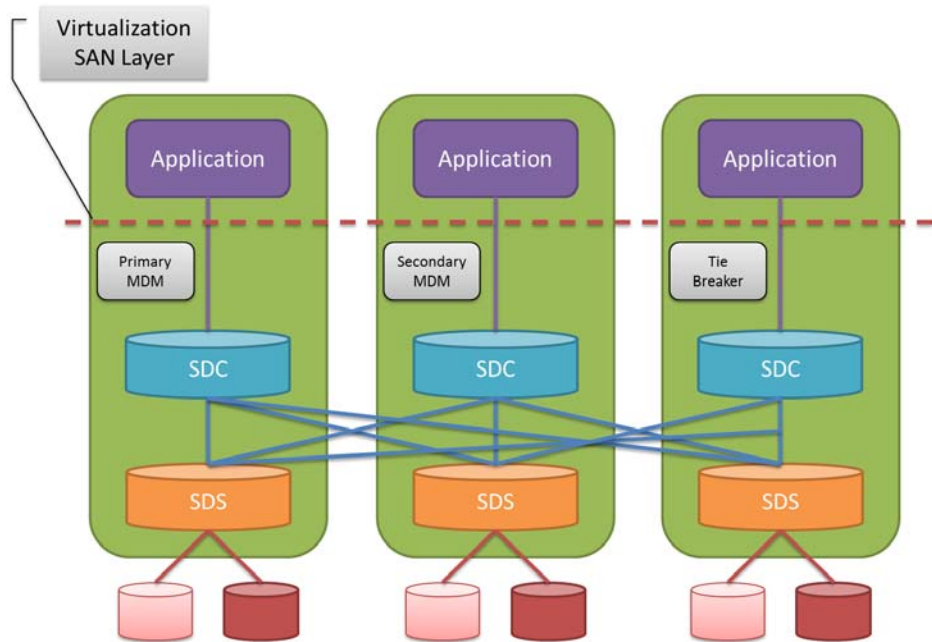


Figure 1 ScaleIO architecture

Storage definitions

When configuring a ScaleIO system, you should take the following concepts into account: Protection Domains, Storage Pools, and Fault Sets. Together, these elements link the physical layer with the virtualization layer.

Protection Domains

A Protection Domain is a set of SDSs. Each SDS belongs to one (and only one) Protection Domain. Thus, by definition, each Protection Domain is a unique set of SDSs. In [Figure 2 on page 32](#) there are three protection domains. The one in the middle (fully depicted) consists of seven SDSs, each with two storage devices.

The recommended number of nodes in a protection domain is a 100. This enables the following:

- ◆ optimal performance
- ◆ reduction of theoretical *mean time between failure* issues
- ◆ ability to sustain multiple failures in different Protection Domains

You can add Protection Domains during installation. In addition, you can modify Protection Domains post-installation with all the management clients (except for OpenStack).

Storage Pools

Storage Pools allow the generation of different storage tiers in the ScaleIO system. A Storage Pool is a set of physical storage devices in a Protection Domain. Each storage device belongs to one (and only one) Storage Pool. When a Protection Domain is generated, by default it has one Storage Pool. In [Figure 2](#), there are 2 Storage Pools depicted.

When a volume is configured over the virtualization layer (see [“SAN virtualization layer” on page 37](#)), the volume is distributed over all devices residing in the same Storage Pool. This allows more than one failure in the system without losing data. Since a Storage Pool can withstand the loss of one of its members, having two failures in two different Storage Pools will not cause data loss.

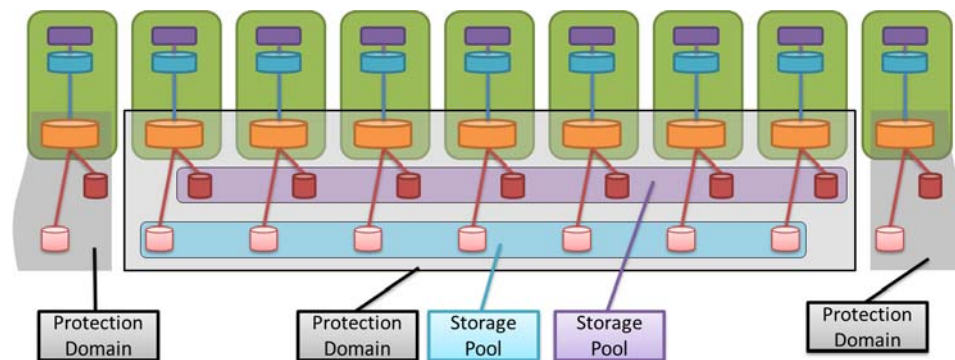


Figure 2 Protection domains and storage pools

To provide consistent performance it is recommended that all devices in the Storage Pool will have similar storage properties.

For example, consider [Figure 2](#). If all SDSs in a Protection Domain have two physical drives associated with them—one HDD (**RED**) and the other SSD (**PINK**)— then you should define two Storage Pools:

- ◆ **Capacity Storage Pool**
Consists of all HDDs in the Protection Domain
- ◆ **Performance Pool**
Consists of all SSDs in the Protection Domain

Note: Mixing different types of media in the same pool is allowed, but be aware that due to the distribution of the data, performance will be limited to the least-performing member of the Storage Pool.

You can add Storage Pools during installation. In addition, you can modify Storage Pools post-installation with all the management clients (except for OpenStack).

Fault Sets

A Fault Set is a logical entity that contains a group of SDSs within a Protection Domain, that have a higher chance of going down together, for example if they are all powered in the same rack. By grouping them into a Fault Set, you are telling ScaleIO that the data mirroring for all devices in this Fault Set, should take place on SDSs that are outside of this Fault Set.

When defining Fault Sets, we refer to the term fault units, where a fault unit can be either of the following:

- ◆ a Fault Set
- ◆ an SDS not associated with a Fault Set (you may think of it as a Fault Set of a single SDS)

To create Fault Sets, you must have a minimum of three fault units, and there must be enough capacity within the other fault units to enable mirroring, for example:

- ◆ SDS1, SDS2, SDS3
- ◆ FS1, SDS1, SDS2
- ◆ FS1, FS2, SDS1
- ◆ FS1, FS2, FS3

Figure 3 illustrates the same configuration as Figure 2, with the addition of Fault Sets.

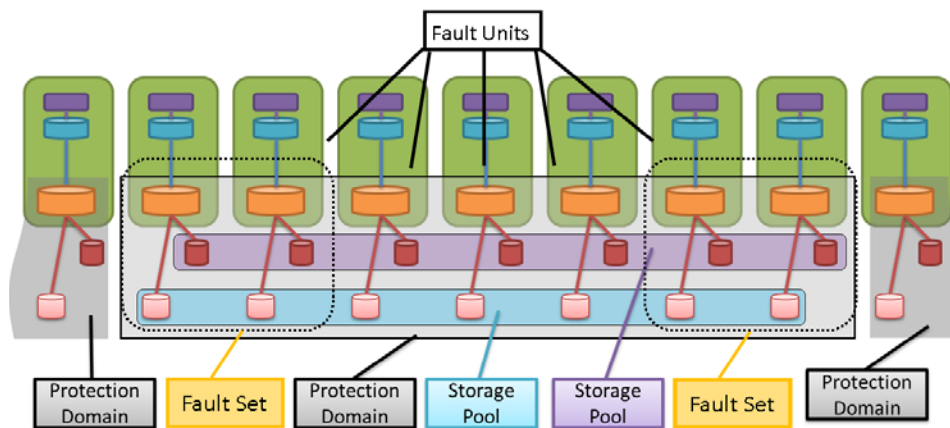


Figure 3 Protection Domains, Storage Pools, and Fault Sets

NOTICE

You can only create and configure Fault Sets before adding SDSs to the system, and configuring them incorrectly may prevent the creation of volumes. An SDS can only be added to a Fault Set during SDS creation.

You define fault sets and add SDSs to them during installation, using the following management tools:

- ◆ Installation manager
- ◆ CLI
- ◆ REST
- ◆ Plug-in

In addition, you can also add Fault Sets when adding SDS nodes after initial installation.

Naming

It is recommended to name all ScaleIO objects with meaningful names. This will make it easier when defining volumes, associating them with applications, etc.

From the previous example, the Storage Pools can be named **Capacity_Storage** and **Performance_Storage**, which allows you to identify the different tiers.

As for Protection Domains, one example would be separating the SDSs used by the finance department from those used by the engineering department. This segregation of different departments is very beneficial in many aspects (security being one of them). Thus, one might name the domains as **Financial-PD** and **Engineering-PD**.

The Fault Sets could be called **FS_Rack01** and **FS_Rack02**.

Implementing ScaleIO

Implementing a ScaleIO system is, in general, a two-step process: first build the physical storage layer, then configure the virtual SAN layer on top of it.

Physical layer

The physical layer consists of the hardware (servers with storage devices and the network between them) and the ScaleIO software installed on them.

To implement the physical layer, perform the following steps:

1. **Install the MDM component** on the MDM nodes, either three nodes (two MDM and one Tie-Breaker) for a redundant management cluster in Cluster MDM, or a single node in case of a Single MDM.

NOTICE

It is not recommended to use Single Mode in production systems, except in temporary situations. The MDM contains all the metadata required for system operation. Single Mode has no protection, and exposes the system to a single point of failure.

2. **Install the SDS component** on all nodes that will contribute some, or all, of their physical storage.

Divide the SDS nodes into Protection Domains. Each SDS can be a member of only one Protection Domain.

Per Protection Domain, divide the physical storage units into Storage Pools, and optionally, into Fault Sets.

3. **Install the SDC component** on all nodes on which the application will access the data exposed by the ScaleIO volumes.



Figure 4 Physical layout example

Communication is done over the existing LAN using standard TCP/IP. The MDM and SDS nodes can be assigned up to eight IP addresses, enabling wider bandwidth and better I/O performance and redundancy.

You can perform physical layer setup using the following methods:

- ◆ ScaleIO Installation Manager
A CLI or web-client based tool, described in [“Installing with the Installation Manager” on page 57.](#)
- ◆ ScaleIO VMware plug-in
A VMware plug-in, described in [“Installation on VMware” on page 71.](#)
- ◆ Manual installation
Manual installation procedures, described in [Appendix A, “Manual Installation.”](#)

After completing this installation, the physical layer is ready, and it exposes a virtual storage layer.

SAN virtualization layer

The MDM cluster manages the entire system. It aggregates the entire storage exposed to it by all the SDSs to generate a virtual layer - virtual SAN storage. Volumes can now be defined over the Storage Pools and can be exposed to the applications as a local storage device using the SDCs.

To expose the virtual SAN devices to the your servers (the ones on which you installed and configured SDCs), perform the following:

- ◆ **Define volumes**

Each volume defined over a Storage Pool is evenly distributed over all members using a RAID protection scheme. By having all SDS members of the Storage Pool participate, ScaleIO ensures:

- Highest and most stable and consistent performance possible
- Rapid recovery and redistribution of data
- Massive IOPS and throughput

You can define volumes as *thick*, where the entire capacity is provisioned for storage, or *thin*, where only the capacity currently needed is provisioned.

- ◆ **Map volumes**

Designate which SDCs can access the given volumes. This gives rise to the following:

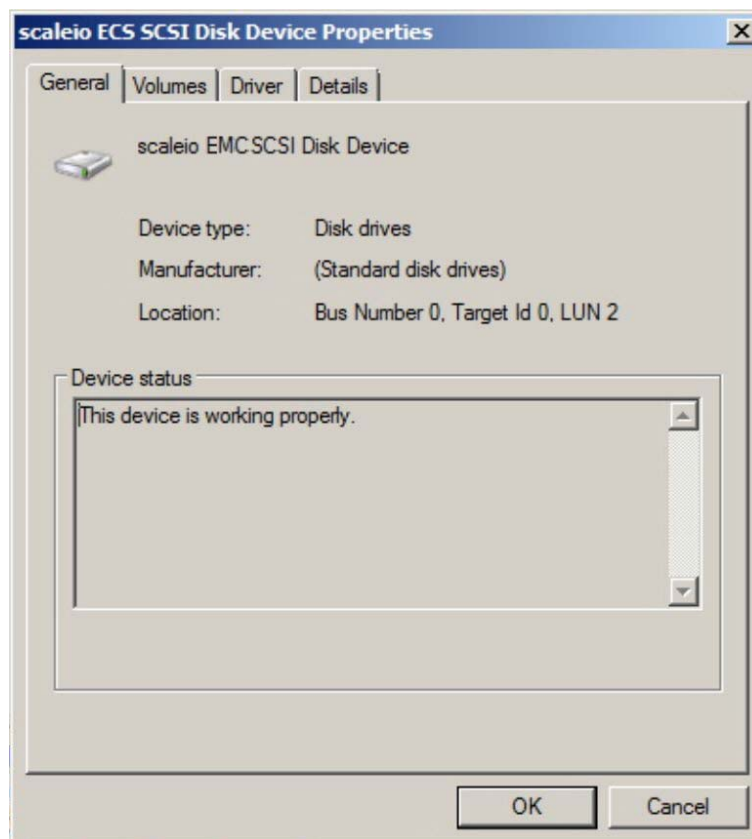
- Access control per volume exposed
- Shared nothing or shared everything volumes

Once an SDC is mapped to a volume, it immediately gets access to the volume and exposes it locally to the applications as either a standard block device or as an iSCSI device for VMware configurations. The devices appear as `/dev/sciniX` where X is a letter, starting from “a.”

For example:

- ◆ `/dev/scinia`
- ◆ `/dev/scinib`

In a Windows environment, the device looks like any other local disk device, as shown in the following figure:



You can map up to 1,024 volumes to each SDC.

Note: SDC mapping is similar to LUN mapping, in the sense that it only allows volume access to clients that were explicitly mapped to the volume.

This is the end of the system setup.

Other functions

ScaleIO includes the following functions:

- ◆ **Call Home**

Call Home sends notification of events, via email or syslog. Call Home enables support technicians to receive troubleshooting information in the fastest way. You install and configure this feature during installation via the Installation Manager, using the CLI or the web client interface, or with the VMware deployment wizard.

Note: Before using Call Home, you must enter a valid license.

- ◆ **Get Info**

Get Info enables you to assemble a ZIP file of system logs for troubleshooting. You can run this function from a local node for its own logs, or by using the Installation Manager to assemble logs from all MDM and SDS nodes in the system.

- ◆ **Quality of Service (QoS)**

You can adjust the amount of bandwidth and storage that any given SDC can use. You can configure this with the CLI and the REST interface, on a per client/per volume basis.

Note: The QoS feature is enabled only in the Enterprise license.

- ◆ **Obfuscation**

Data on ScaleIO volumes can be obfuscated for higher data protection. You can configure this with the CLI and the REST interface, on a per VTree basis.

Note: The obfuscation feature is enabled only in the Enterprise license.

Maintenance

Maintenance of ScaleIO is primarily limited to configuration changes of the physical and virtual layers. It requires minimal user attention.

Maintaining the physical layer

In the physical layer, maintenance is limited to adding and removing hardware units and configuring them into the ScaleIO system. These operations are usually a result of:

- ◆ **Scaling out**
When there is a need for additional capacity. This usually results in adding more storage media to the existing nodes, or adding additional nodes.
- ◆ **Upgrading or re-purposing hardware**
When system servers are being replaced, either as a result of application needs, ScaleIO needs (where the storage capacity is limited and you would like to add more), or a system refresh.
- ◆ **Hardware failure**
When there is a hardware (storage media, nodes) failure, and it needs to be replaced.

In all of the above cases, the operation will require adding or removing storage capacity from the system. In some cases, it may include adding or removing an entire node, and its associated storage media, from the configuration. As far as ScaleIO is concerned, all of these activities translate to SDS reconfigurations.

If the removed is an SDC node, or the node to be added requires exposing storage locally, SDC reconfiguration will happen as well.

- ◆ **Adding or removing storage media**
Add or remove the media from the SDS with which it is associated. ScaleIO will redistribute the data accordingly and seamlessly.
- ◆ **Adding or removing a node**
Add or remove the SDC and SDS residing on the node. ScaleIO will redistribute the data accordingly and seamlessly.

Maintaining the virtualization layer

The following operations may be done to volumes that are exposed by the ScaleIO virtual SAN:

- ◆ **Add or remove a volume**
Create or delete a volume in the system.

- ◆ **Increase volume size**
Add capacity to a given volume, as needed. The change in volume size occurs seamlessly without interrupting I/O.
- ◆ **Map and unmap volumes to an SDC**
This enables or disables access to a volume by an SDC, and thus by an application residing on the same node.

Snapshots

The ScaleIO storage system enables you to take snapshots of existing volumes, up to 31 per volume. The snapshots are thinly provisioned and are extremely quick. Once a snapshot is generated, it becomes a new, unmapped volume in the system. You can manipulate it in the same manner as any other volume exposed by the ScaleIO storage system.

Snapshots are enabled as part of the Enterprise license.

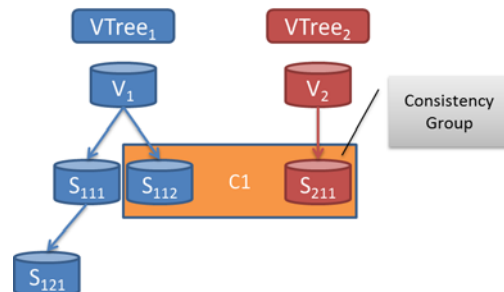


Figure 5 Snapshot operations

The structure related to all the snapshots resulting from one volume is referred to as a **VTree** (short for Volume Tree). It's a tree spanning from the source volume as the root, whose siblings are either snapshots of the volume itself or descendants of it. Thus, some snapshot operations are related to the VTree, and may affect parts of it. In [Figure 5](#) in [BLUE](#), S_{111} and S_{112} are snapshots of V_1 . S_{121} is a snapshot of snapshot S_{111} . Together, V_1 and S_{1xy} are the VTree of V_1 .

When taking a snapshot in the system, you can specify more than one volume. All snapshots taken together form a *consistency group*. They are consistent in the sense that they were all taken at the same time. So if there is a contextual relationship between the data contained by all the snapshot members, then that set is meaningful. The consistency group allows manipulation of the entire set.

If you remove an entire consistency group, all of the snapshots that were taken together will be removed. Back to [Figure 5](#), in **RED**, S_{211} is a snapshot of V_2 . Since S_{112} and S_{211} were taken together, they compose a consistency group (in **ORANGE**) designated as C1.

Note: The consistency group is only for convenience purposes. There are no protection measures done by ScaleIO to conserve the consistency group. For example, you can remove a snapshot which is a member of a consistency group.

Snapshot operations

The following operations are snapshot related. Since all snapshots are volumes in the system, all volume operations are applicable to snapshots.

- ◆ Take a snapshot of a volume

The **snapshot_volume** command allows a snapshot of a given volume. When specifying more than one volume (a list), a consistency group is generated.

- ◆ Map volume to an SDC

The **map_volume_to_sdc** command maps the snapshot volume to an SDC and thus exposes it to the applications. This is no different than any other volume mapping operation.

- ◆ Remove a volume

The **remove_volume** command affects snapshots in several ways. Since snapshots are volumes, the way to delete a snapshot is exactly the same as removing a volume from the system.

Management tools

You can provision, maintain, and monitor ScaleIO with the following management clients:

- ◆ **Command Line Interface (CLI)**

The CLI enables you to perform the entire set of configure, maintain, and monitor activities in a ScaleIO system.

For details, see [Chapter 6, “Command Quick Reference.”](#)

- ◆ **Graphical User Interface (GUI)**

The GUI enables you to perform standard configure and maintain activities, as well as to monitor the storage system’s health and performance. You can use the GUI to view the entire system, and then drill down to different elements. The GUI cannot be used for frontend, i.e., volume management.

For details, see [Chapter 12, “Using the Graphical User Interface.”](#)

- ◆ **VMware plug-in (plug-in)**

The plug-in enables you to perform basic provision and maintain activities in the VMware environment. In addition, the plug-in provides a wizard to deploy ScaleIO in the VMware environment, as described in [“Installation on VMware” on page 71.](#)

For details, see [Chapter 13, “Using the VMware Plug-in.”](#)

- ◆ **REST API**

A REST API can be used to expose monitoring and provisioning via the REST interface. The REST API is installed as part of the ScaleIO Gateway.

For details, see [Appendix G, “REST API Reference.”](#)

- ◆ **OpenStack**

ScaleIO provides Cinder and Nova drivers, which enable interoperation between a ScaleIO system and an OpenStack cloud operating system.

For details, see [Appendix F, “Deployment in OpenStack Environments.”](#)

Many ScaleIO activities can be performed in an option of various management tools. You can see the entire matrix of commands, and the choices of how to perform them in [Appendix A, “Command Matrix Quick Reference.”](#)

The following tool is also provided:

◆ **Installation Manager (IM)**

The IM is used for installing ScaleIO, as well as post-installation for upgrading and uninstalling components, described in [“Maintaining a ScaleIO installation” on page 106](#), as well as running the get-info operation, described in [“Troubleshooting” on page 477](#).

Configuring direct attached storage (DAS)

ScaleIO works with any free capacity—internal or direct-attached devices, either magnetic hard disk drives (HDD) or flash-based devices such as solid state drive (SSD) and PCIe cards. Although ScaleIO can work with any device topology, it is recommended to configure the raw devices as stand-alone devices.

If the server has a RAID controller, ScaleIO prefers to use the controller’s caching abilities for better performance, but is better utilized when all devices are configured as stand-alone (i.e. setting each of the devices to RAID-0 separately). For HDD devices, it is recommended to enable RAID-controller caching. As for flash devices, it depends on the device behavior.

For Windows, when using a physical disk drive, it is recommended to generate a single, unformatted partition over the entire disk.

Note: For HDDs: It is recommended to use RAID-controller caching when available as follows:

READ/WRITE: if cache is battery-backed

READ ONLY: if cache is NOT battery-backed

For flash devices (e.g. SSD): Depends on the device

Implementing ScaleIO over a virtual system

This section provides an overview of how ScaleIO is implemented in virtual environments.

VMware

In the VMware environment, you can deploy in either of the following ways:

- ◆ All ScaleIO components (MDM, SDS, and SDC), as well as an iSCSI target, are installed on dedicated ScaleIO virtual machines (SVM). The SDS adds the ESX physical devices to the ScaleIO to be used for storage, thus enabling the creation of volumes.

Using iSCSI targets, the volumes are exposed to the ESX, via an iSCSI adapter.

ScaleIO volumes must be mapped both to the SDC and to iSCSI initiators. This ensures that only authorized ESXs can see the targets. Reliability is enhanced by enabling multi-pathing, either automatically or manually.

This implementation is illustrated in [Figure 6 on page 46](#).

- ◆ Only the MDM and SDS components are installed on a dedicated SVM. The SDC is installed directly on the ESX host, thus eliminating any need for iSCSI. This is the recommended method of deployment, and is an option only for ESXi 5.5.

Note: Installing the SDC on the ESX host requires a restart of the ESX host.

This implementation is illustrated in [Figure 7 on page 46](#).

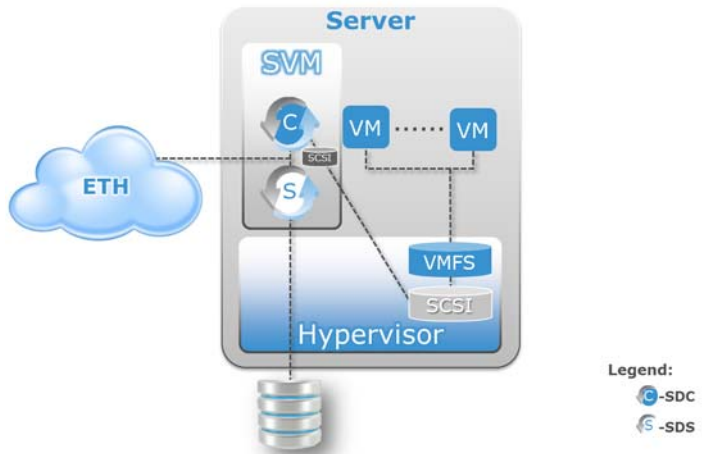


Figure 6 ScaleIO implementation with SDC installed on the SVM

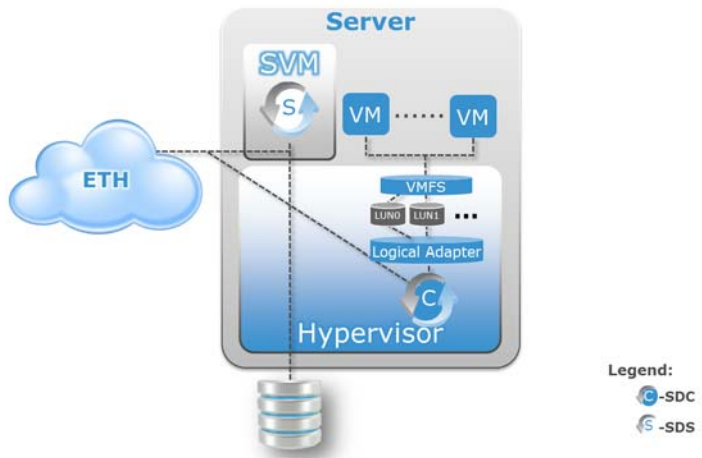


Figure 7 ScaleIO implementation with SDC installed directly on the ESX

Note: The LUNs in [Figure 7](#) can be formatted with VMFS, and then exposed using the ESXi host to the virtual machine, or can be used as RDM devices. When the LUNs are used as RDM devices, the VMFS layer is omitted.

Installation in a VMware environment is enabled via the VMware plug-in. For more information, see [“Installation on VMware” on page 71](#).

Xen implementation

In a Xen environment, both the SDC and SDS are installed in Dom0 as would be on a physical node. Dom0 accesses the storage media through the SDS and exposes volumes based on ScaleIO through the SDC.

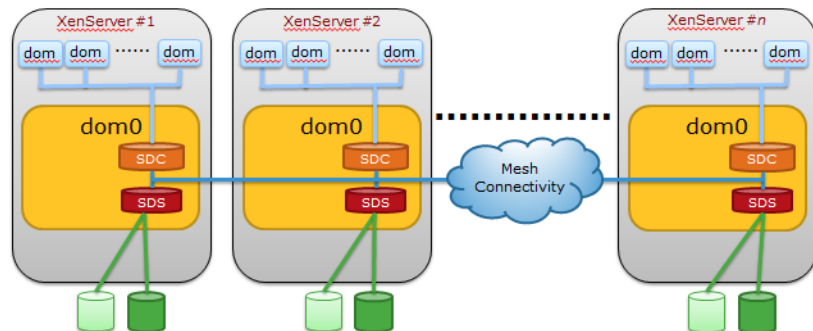


Figure 8 ScaleIO Xen virtual machine architecture

For information on installing and provisioning in a Xen environment, see [“ScaleIO on Xen” on page 495](#).

PART 2

Getting Started

The chapters in this part of the guide describe how to get ScaleIO started in your environment, from installation through licensing. Chapters include:

[Chapter 3, “Installation”](#)

This chapter describes how to deploy ScaleIO components in Windows, Linux, and VMware environments. Also described is how to upgrade, remove, and get information about installed components.

[Chapter 4, “Creating and Mapping Volumes”](#)

This chapter describes how to create volumes and map them so they can be accessed by your application servers.

[Chapter 5, “Licensing”](#)

This chapter describes how to get and install the license key that is required for ongoing ScaleIO operation.

CHAPTER 3

Installation

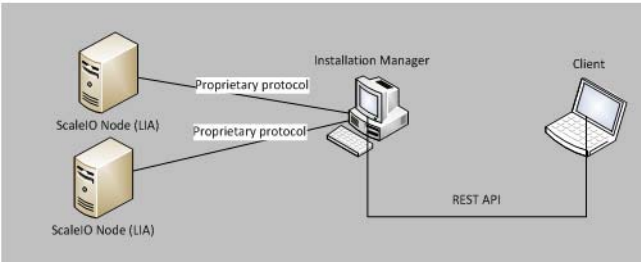
This chapter describes how to install, deploy, and perform initial configuration of ScaleIO software components. Topics include:

- ◆ [Installation on physical servers](#) 52
- ◆ [Installation on VMware](#)..... 71
- ◆ [Installing the ScaleIO GUI](#) 96
- ◆ [Maintaining a ScaleIO installation](#) 106
- ◆ [Upgrading from a previous version](#) 97

Note: ScaleIO installations are enabled to be fully functional for the first ten days after installation, after which the system will continue to operate, but no configuration changes will be allowed until a permanent license is installed. For information on licensing, see [Chapter 5, “Licensing,”](#) on [page 121](#).

ScaleIO provides you with automated tools to install and configure all ScaleIO components from one workstation, in both physical and virtual environments.

In physical environments, and in non-VMware virtual environments, you use the ScaleIO Installation Manager (IM) to install and configure the ScaleIO components on multiple nodes from one central server, via a CLI interface or a web client.



As part of the installation process, it is highly recommended to install and configure the ScaleIO Lightweight Installation Agent (LIA). The LIA’s seamless communication enables future upgrades, the *Get Info* operation, as well as uninstalling, without the need for an updated CSV topology file. During initial installation, the IM establishes trust with the LIA, which facilitates its operation.

Hint: To make changes to the LIA configuration file, see Appendix D, “Troubleshooting, FAQ, and Other Tasks.”

You can limit the operations that LIA can perform by making changes to its configuration file. In Windows environments, LIA will only install and upgrade packages that are signed by ScaleIO and associated with the ScaleIO system.

The Installation Manager can be used to install numerous ScaleIO systems, from one central workstation.

In VMware, you use the ScaleIO vSphere plug-in deployment wizard to install the ScaleIO components either entirely on a ScaleIO virtual machine (SVM), or in a combination of the SVM and directly on the ESX host. These options are fully described in [“Implementing ScaleIO over a virtual system” on page 45](#).

Proceed to the section that matches your environment.

- ◆ [“Installation on physical servers” on page 52](#)
- ◆ [“Installation on VMware” on page 71](#)

Installation on physical servers

This section describes how to use the Installation Manager (IM) to upload, install, upgrade, and configure ScaleIO components on physical nodes, and in non-VMware virtual environments (Xen, Hyper-V, and KVM virtual environments).

Hint: You can install in automated, non-interactive mode, for scripting. For more information, see [“Automated installation of ScaleIO components” on page 491](#).

Before installation, ensure that your IM server meets the system requirements described in [“System requirements” on page 22](#).

The IM can be installed on the same node as other ScaleIO components. Ensure that the node has adequate memory to run the IM (2GB required) and any other applications.

The first step of the installation is preparing the installation spreadsheet.

Preparing the installation spreadsheet

Before installing, you must prepare the configuration/topology information in a CSV file. This file is used by the IM to set up and configure all the nodes. To add additional servers after the initial installation, you will also use the combination of topology file and IM.

Hint: The CSV can also be used for removing installed components. If you always use the CSV to configure, you will be able to use it to remove components, too.

This section describes how to prepare the spreadsheet. After preparing the spreadsheet, you will upload it to the IM server, using the CLI or web client.

The following spreadsheet templates are provided in the installation:

◆ **Complete**

This spreadsheet template contains all available fields, both required and optional.

◆ **Minimal**

This spreadsheet template contains only the required fields. The optional fields (those that are in the complete spreadsheet, but not in the minimal one) will be assigned default values.

You only need to use one spreadsheet for the installation, as follows:

- ◆ To manually enter all configuration details, use the Complete spreadsheet.
- ◆ To use default values for the non-mandatory fields, use the Minimal spreadsheet.
- ◆ To configure non-default values for columns that are not in the Minimal spreadsheet, either use the Complete spreadsheet, or copy the column heading from there into the minimal spreadsheet and enter your custom values into the minimal spreadsheet.

You can use either spreadsheet to assign as many as eight IP addresses per MDM and SDS.

The following examples portray a CSV for adding several Linux nodes, and the same nodes in Windows. You can use the same spreadsheet to define nodes of multiple operating systems.

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q
	Operating	Is	MDM	MDM	MDM	Is	SDS	SDS	SDS	SDS	Protection	Fault	SDS Device List	SDS Pool List	Optimize	Is	
1	Password	System	MDM/TB	Mgmt IP	IPs	SDS	Name	IPs	Only IPs	Only IPs	Domain	Set			IOPS	SDC	
2	admin	linux	Primary	9.4.4.211	9.4.4.11	Yes	SDS1	9.4.4.11			domain1		/dev/sdb,/dev/sdc,/dev/sdd,/dev/sde	pool1,pool1,pool2,pool2	Yes	No	
3	admin	linux	Secondary	9.4.4.212	9.4.4.12	Yes	SDS2	9.4.4.12			domain1		/dev/sdb,/dev/sdc,/dev/sdd,/dev/sde	pool1,pool1,pool2,pool2	Yes	No	
4	admin	linux	TB		9.4.4.13	Yes	SDS3	9.4.4.13			domain1		/dev/sdb,/dev/sdc,/dev/sdd,/dev/sde	pool1,pool1,pool2,pool2	Yes	No	
5	password	linux				Yes	SDS4	9.4.4.10			domain1		/dev/sdb,/dev/sdc,/dev/sdd,/dev/sde	pool1,pool1,pool2,pool2	No	No	
6	password	linux				No				9.4.4.9						Yes	
7																	

Figure 9 CSV—Linux example

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R
	Domain	Username	Password	Operating System	Is MDM/TB	MDM Mgmt IP	MDM IPs	Is SDS	SDS Name	SDS All IPs	SDS-SDS	SDS-SDC	Protection	Fault	SDS Device List	SDS Pool List	Optimize IOPS	Is SDC
1	SIO	domain_admin	admin	Windows	Primary	9.4.4.211	9.4.4.11	Yes	SDS1	9.4.4.11			domain1		/dev/sdb,/dev/sdc,/dev/sdd,/dev/sde	pool1,pool1,pool2,pool2	Yes	No
2	SIO	domain_admin	admin	Windows	Secondary	9.4.4.212	9.4.4.12	Yes	SDS2	9.4.4.12			domain1		/dev/sdb,/dev/sdc,/dev/sdd,/dev/sde	pool1,pool1,pool2,pool2	Yes	No
3	SIO	domain_admin	admin	Windows	TB		9.4.4.13	Yes	SDS3	9.4.4.13			domain1		/dev/sdb,/dev/sdc,/dev/sdd,/dev/sde	pool1,pool1,pool2,pool2	Yes	No
4	localhost	administrator	password	Windows				Yes	SDS4	9.4.4.10			domain1		/dev/sdb,/dev/sdc,/dev/sdd,/dev/sde	pool1,pool1,pool2,pool2	No	No
5	localhost	administrator	password	Windows				No										Yes
6																		
7																		

Figure 10 CSV—Windows example

Note: The only difference between the Linux example and the Windows example is the first two columns in the Windows example, *Domain* and *username*, that are not relevant in the Linux environment.

The following table describes the fields in the spreadsheets. The *required* fields appear in both spreadsheets.

Table 4 CSV topology spreadsheets

Field	Description	Required
Domain	If using a domain user, the name of the domain (not relevant for Linux)	
Username	The name of the user. In Linux, this value is always <i>root</i> ; in Windows, the default value is <i>administrator</i> .	
IPs	IP of the node	Yes
Password	Password used to log in to the node. In Linux, the <i>root</i> password. In Windows, the <i>administrator</i> password.	Yes
Operating System	The server's OS: linux or windows	Yes
Is MDM/TB	Primary, Secondary, TB, or blank	Yes
MDM Mgmt IP	The IP for the management-only network	
MDM IPs	MDM IP addresses used to communicate with other ScaleIO components. Comma-separated, no spaces.	
Is SDS	Yes or No	Yes
SDS Name	The name for the SDS node	

Table 4 CSV topology spreadsheets

Field	Description	Required
SDS All IPs	SDS IP addresses to be used for communication among all ScaleIO nodes. Comma-separated, no spaces.	
SDS-SDS Only IPs	SDS IP addresses to be used for communication among ScaleIO SDS nodes only. Comma-separated, no spaces.	
SDS-SDC Only IPs	SDS IP addresses to be used for communication among ScaleIO SDS and SDC nodes only. Comma-separated, no spaces. Note: For SDC-only nodes, enter the IP in this column.	
Protection Domain	The Protection Domain to which to assign this SDS.	
Fault Set	The Fault Set to which to assign this SDS. Note: When using Fault Sets, you must assign a minimum of three, and follow the guidelines described in “Fault Sets” on page 33 .	
SDS Device List	The devices to add to the SDS, for example: Linux <code>/dev/sdb</code> , <code>/dev/sdc</code> or Windows <code>d,e,f</code> . Comma-separated, no spaces. Note: On Windows SDS nodes, to add several devices, see the note ¹ .	Yes
SDS Device Names	Sets user-defined device names. When using this field, the device names will be appropriated to the devices in the device list, respectively. The amount of names must equal the amount of devices. Comma-separated, no spaces.	
SDS Pool List	Sets Storage Pool names. When using this field, the Storage Pools will be appropriated to the devices in the device list, respectively. The amount of Storage Pools must equal the amount of devices. Comma-separated, no spaces.	
Optimize IOPS	Optimize SDS parameters when using fast devices, such as SSD. Yes or No	
Is SDC	Yes or No	Yes

1. When the amount of devices to add is greater than the amount of available drive letters for raw devices (a-z, less previously-allocated drives), use the following notation to refer to the devices: PhysicalDriveX, where X is the disk number from the Windows Disk Manager.

For example: a,b,PhysicalDriveX,f,z

The PhysicalDriveX must be on-line and initialized.

Note: All fields are case-sensitive; the order of the columns is not significant.

Installation process overview

This section describes the installation process. The tasks are described in greater detail in the following sections.

1. Task 1—Install the ScaleIO Gateway
 - a. Upload the ScaleIO Gateway package (includes the ScaleIO Gateway, the Installation Manager, and the SNMP alerts functionality) to the server that is to act as the IM server.

To install to Linux nodes, the IM server can be a Windows or Linux server. To install to Windows nodes, or to install in a mixed-OS environment, your IM server *must be a Windows server*. In addition, the IM server must have connectivity to both the data and management ScaleIO networks.
 - b. Install the package uploaded in the previous step.
2. Task 2—Use the IM server to install
 - a. Using the CLI
 1. Log in to the web client.
 2. Download and launch the CLI.
 3. Upload the ScaleIO RPM/MSI packages to the IM server.
 4. Use the IM, together with the CSV file, to upload, install, and configure RPM/MSIs to the target nodes.
 - b. Using the web client
 1. Log in to the web client.
 2. Upload the ScaleIO RPM/MSIs packages to the IM server.
 3. Upload the CSV file to the IM server.
 4. Use the IM to upload, install, and configure RPM/MSIs to the target nodes.

Installing with the Installation Manager

This section describes the steps required to install ScaleIO components with the Installation Manager (IM). The IM is installed as part of the ScaleIO Gateway.

Task 1: Installing the ScaleIO Gateway

The ScaleIO Gateway package includes the ScaleIO Gateway, the Installation Manager, and the SNMP alerts functionality. Install it as follows:

Windows

1. Ensure that Java is in the system path:
 - 32 bit—C:\Program Files (x86)\Java\jre7\bin
 - 64 bit—C:\Program Files\Java\jre7\bin
2. Copy the ScaleIO Gateway MSI to the IM server:
 - 32-bit: **EMC-ScaleIO-gateway-1.31-XXX.X-x86.msi**
 - 64-bit: **EMC-ScaleIO-gateway-1.31-XXX.X-x64.msi**
3. Run the file, and enter a new **Gateway Admin password** that will be used to access the IM.

The IM server is ready to continue.
4. Continue with [“Task 2: Use the IM server to install” on page 58.](#)

Linux

1. Ensure that Java is in the system path, /usr/bin/java
2. Copy the ScaleIO Gateway package to the IM server, by running the following command:


```
#GATEWAY_ADMIN_PASSWORD=<new_GW_admin_password>
rpm -U /tmp/EMC-ScaleIO-gateway-1.31-XXX.X.noarch.rpm
```

 where <new_GW_admin_password> is a password that you define to access the IM

Note: If your Linux IM server has JRE 1.7 or higher, add the --nodeps flag.

To install with a customized Java configuration, see [“Linux” on page 514.](#)

3. When installing on XEN servers, add the following changes to the `/opt/emc/scaleio/gateway/conf/server.xml` file:
 - a. Edit the Connector `port="80" protocol="HTTP/1.1` class, as follows:
Change `redirectPort` from 443 to 8443.
 - b. Edit the Connector `port="443" protocol="org.apache.coyote.http11.Http11NioProtocol"` header, as follows:
Change `Connector port` from 443 to 8443.
 - c. Restart the *scaleio-gateway* service.
4. Continue with [“Task 2: Use the IM server to install” on page 58](#).

Task 2: Use the IM server to install

This section describes how to use the IM server to install ScaleIO components. Proceed with the section that describes which method of installation you are using:

- ◆ [“Installing with the CLI” on page 58](#)
- ◆ [“Installing with the web client” on page 63](#)

Installing with the CLI

This section describes how to install and configure ScaleIO components using the IM via the CLI.

Note: This section describes a subset of the IM CLI commands. For a full list, see [“Installation manager CLI commands” on page 493](#), or run the **help** command. For detailed help on any command, type `help <command>`.

The installation performs the following phases:

- ◆ **Validate**
Validates that there are no previously-installed ScaleIO components on the nodes
- ◆ **Upload**
Uploads the installation packages to the IM

◆ **Install**

Installs the installation packages on the nodes

◆ **Configure**

Configures the installed ScaleIO components

To install, perform the following:

1. Download and launch the CLI:

Note: You can download the CLI from the IM server, and run it from any PC.

- a. Open web browser with the following URL:
https://<IM_server_IP>
- b. Log in as *admin* with the *admin* password created in the previous step.
- c. Click **Download CLI** and save the .jar file.
- d. Launch the CLI by running **java -jar install-CLI.jar** from the directory to which you downloaded the .jar file.

The IM CLI window appears. You issue all CLI installation commands in this window.

To see the complete list of commands, type **help**, or see [“Installation manager CLI commands” on page 493](#).

To see the format of a specific command, type the command without flags.

Note: All commands processed through the IM CLI are written to a log file, ScaleIO Installation Manager CLI.log, which is located in the same folder as the `install-CLI.jar` file. After the session completes, you can delete the log file.

2. Log in to the IM, by running the following command:

```
im login --host <hostname/ip> --port <443> --username <user  
name> --password <admin_password> --cer <certificate_path>
```

Where *certificate_path* is the path to the certificate file of the gateway you want to connect. You can export this file from the browser, or copy it from the Gateway server <gateway installation folder>\temp\certificates\ScaleIO.cer

Hint: You can change the port, as described in Appendix D, “Troubleshooting, FAQ, and Other Tasks.”

Example:

```
im login --host 10.76.60.189 --port 443 --username admin
--password Scaleio123
--cer /opt/emc/scaleio/gateway/temp/certificates
/ScaleIO.cer
```

You can also use the following flags:

- `--no_certificate_validation`
When set to true, the CLI doesn't validate the certificate when connecting to the Gateway

Example:

```
im login --host 10.76.60.189 --port 443 --username
admin --password Scaleio123 --no_certificate_validation
true
```

- `--java_path`
If the Java path isn't set, the CLI will attempt to locate it

3. Upload installation packages:

- From the CLI window, upload packages to IM server by running the following command:

```
im upload_package --path <path to package>
```

Examples:

- Windows (one MSI per component)

```
im upload_package --path
c:\Scaleio\packages\EMC-ScaleIO-<component>-1.31-XXX.X.msi
```

where component is the name of the component to upload

- Linux (one package per component)

```
im upload_package --path
c:\Scaleio\packages\EMC-ScaleIO-<component>-1.31-XXX.X.el6
.x86_64.rpm
```

where component is the name of the component

- Repeat the previous step for each component package to upload:

- mdm
- tb

- callhome
- sds
- sdc
- lia

- c. After the upload completes, verify that the upload succeeded, by running the following command:

```
im list_packages
```

A list of uploaded packages, similar to the following, appears:

```
Uploaded packages:
Filename: EMC-ScaleIO-lia-1.31-1.2.el6.x86_64.rpm - Type: lia
- OS: linux, size: 9261062
Filename: EMC-ScaleIO-lia-1.31-1.2.el5.x86_64.rpm - Type: lia
- OS: linux, size: 8757264
Filename: EMC-ScaleIO-callhome-1.31-1.2.el6.x86_64.rpm -
Type: callhome - OS: linux, size: 21409
Filename: EMC-ScaleIO-callhome-1.31-1.2.el5.x86_64.rpm -
Type: callhome - OS: linux, size: 22385
Filename: EMC-ScaleIO-tb-1.31-1.2.el5.x86_64.rpm - Type: tb -
OS: linux, size: 8342550
...
Filename: EMC-ScaleIO-mdm-1.31-1.2.el5.x86_64.rpm - Type: mdm
- OS: linux, size: 26768499
Filename: EMC-ScaleIO-tb-1.31-1.2.el6.x86_64.rpm - Type: tb -
OS: linux, size: 8826981
Filename: EMC-ScaleIO-setup-1.31-1.2.msi - Type: setup - OS:
windows, size: 4410674
Filename: EMC-ScaleIO-mdm-1.31-1.2.el6.x86_64.rpm - Type: mdm
- OS: linux, size: 28159278
```

Note: In the example above, there are packages for RHEL 5, RHEL 6, and Windows.

4. Start the installation from the CLI window, by running the following command:

```
im install --path <path to CSV file> --mdm_password <New MDM login password> [--lia_password <LIA password>] [--non-interactive]
```

where *New MDM login password* is a new password for the MDM that will be automatically configured, during the installation

where *LIA password* is the password that will be used to authenticate communication between the IM and the LIA

Note: If you do not enter a LIA password, the LIA will not be installed.

The passwords must meet the following criteria:

- Between 6 and 31, ASCII-printable characters
- No blank spaces
- Include at least 3 of the following groups: [a-z], [A-Z], [0-9], special chars (!@#\$...)

Example:

```
im install --path c:\installationmanager\new_local.csv
--mdm_password Scaleio123 --lia_password ScaleioLIA456
```

Note: You can use the **--non_interactive** flag to install in non-interactive mode. In this mode, which enables automated installation, you progress from one installation stage to the next by entering one of the following commands, instead of pressing a key:

```
installation set_install_state
installation set_configure_state
```

For an example of how to use this mode for automated installation, see [“Automated installation of ScaleIO components” on page 491](#).

The installation progress appears on the screen, similar to the following:

```
Running...
7 commands remaining
..
1 commands remaining
All commands completed successfully
Press (r) to retry failed or aborted commands (if any), or (p) to
proceed and finish
Done
```

The installation performs the following phases: *validate*, *upload*, *install*, and *configure*.

5. Follow the installation progress, and press a key to proceed from stage to stage, as follows:
 - ◆ Press **p** to proceed to the next stage.

- ◆ If any tasks failed or were aborted, you can press **x** to retry. After you proceed to the next installation phase, you will not be able to use the IM to retry failed tasks.

When the installation completes, the following message appears:

```
All commands completed successfully
Press (r) to retry failed or aborted commands (if any), or (p) to
proceed and finish
Done
```

ScaleIO installation is complete. Proceed to [Chapter 4, “Creating and Mapping Volumes.”](#)

Installing with the web client

This section describes how to install and configure ScaleIO components using the Installation Manager via the web client.

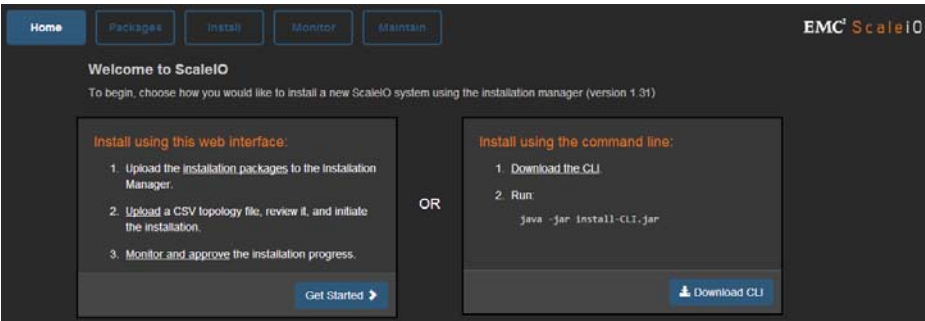
You need to do the following steps:

- ◆ [“Log in to the IM server” on page 63](#)
- ◆ [“Upload installation packages” on page 64](#)
- ◆ [“Upload CSV file” on page 65](#)
- ◆ [“Initiate the installation” on page 66](#)
- ◆ [“Complete the installation” on page 68](#)

Log in to the IM server

1. Log in to: **https://<IM_Server_URL>**
where <IM_Server_URL> is the URL of the server where you installed the IM package
2. Accept the certificate warning; alternatively, install your own certificate for the Tomcat server.
3. Enter the default user name, *admin*, and the password defined in [“Task 1: Installing the ScaleIO Gateway” on page 57](#), and click **Login**.

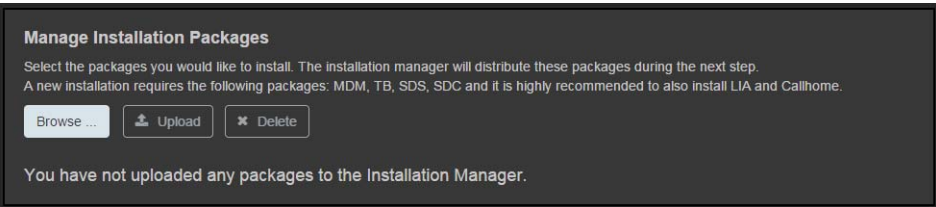
The **Welcome** screen appears:



Upload installation packages

1. Click **Packages**. You may need to re-authenticate with your login credentials.

The **Manage Installation Packages** window appears:



2. Browse to where the ScaleIO packages are located, select files, and click **Open**.

The file name appears in place of the **Browse** button.

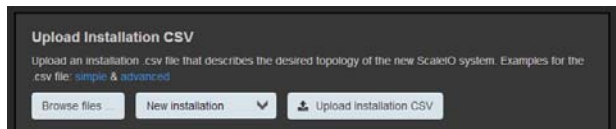
3. Click **Upload**.

The uploaded installation packages appear in the file table.

Type	OS	Linux Flavor	Version	Latest	Filename
TB	Linux	RHEL6	1.30-0.91	✓	scaleio-tb-1.30-0.91.el6.x86_64.rpm
SLA	Linux	RHEL5	1.30-0.91	✓	scaleio-sla-1.30-0.91.el5.x86_64.rpm
INSTALLER	Windows	N/A	1.30-0.91	✓	ScaleIO-Installer-1.30-0.91.msi
TB	Linux	RHEL5	1.30-0.91	✓	scaleio-tb-1.30-0.91.el5.x86_64.rpm
SLA	Linux	RHEL6	1.30-0.91	✓	scaleio-sla-1.30-0.91.el6.x86_64.rpm
MDM	Linux	RHEL6	1.30-0.91	✓	scaleio-mdm-1.30-0.91.el6.x86_64.rpm
Callhome	Linux	SLES11_2	1.30-0.91	✓	scaleio-callhome-1.30-0.91.sle11.2.x86_64.rpm

When the files have been uploaded, click **Proceed to Install** to proceed to the next step.

The **Upload Installation CSV** screen appears:



Upload CSV file

If you have not created the CSV file yet, you can download a template by clicking **Minimal** or **Complete** on this screen.

1. From the **Upload Installation CSV** screen, browse to where the installation CSV file is located, select the file, and click **Open**.
2. For a new installation, select **New installation**. To update an existing installation, select **Add to existing sys**.
3. Click **Upload Installation CSV**.

After successfully uploading the file, the configuration table appears:

Review Installation Configuration

Review the configuration, enter passwords and other options, then start the installation.

Credentials Configuration

MDM Password

password

confirm password

?

LIA Password

password

confirm password

?

Advanced

☐ Set advanced options

☐ Configure the sending of syslog events (optional)

☒ Configure call home (optional)

Call Home Configuration

SMTP Server

host name

Port

25

☐ Use TLS

SMTP Creds.
(optional)

user name

password

MDM Creds.

user name

password

?

Details

email from

email to

customer name

Severity

>= Error

MDMs and Tie Breaker

Role +	Management IP(s)	MDM IPS(s)	OS	User name
Primary	10.103.110.246	192.168.1.246	Linux	root
Secondary	10.103.110.247	192.168.1.247	Linux	root
Tie Braker	N/A	192.168.1.237	Linux	root

Initiate the installation

- 1. Enter and confirm the **MDM Password**.

The MDM password is a new password that is configured for the MDM during the installation.

The MDM and LIA passwords must meet the following criteria:

- Between 6 and 31, ASCII-printable characters
- Include at least 3 of the following groups: [a-z], [A-Z], [0-9], special chars (!@#\$...)
- No white spaces

2. Enter and confirm the **LIA password**.

The LIA password is the password that will be used to authenticate communication between the IM and the LIA.

You can use the Installation Manager to configure Syslog event reporting and the Call Home feature. You can also configure these features after installation, via the CLI.

3. To configure Syslog reporting, select **Configure MDM to send messages to syslog server**, and enter the following parameters:
 - **Syslog Server**
The host name or IP address of the syslog server to where the messages are to be sent. Enter up to two servers, comma-separated.
 - **Port**
The port of the syslog server (default 1468)
 - **Syslog Facility**
The facility level (default: Local0)
4. To configure the Call Home feature, select **Configure callhome (optional)**, and enter the following parameters:
 - **SMTP Server**
SMTP server that will send the Call Home messages
 - **SMTP Credentials**
SMTP credentials, if necessary
 - **MDM Credentials**
MDM credentials to be used by a new user, with a monitor role, that will be created for the purpose of Call Home functions
 - **Email from**
The email address that will be shown in the FROM field
 - **Email to**
The email address where the messages are to be sent
 - **Customer name**
Name of the customer
 - **Severity**
Choose the minimum event severity for call home messages
5. Review the displayed information, then click **Start Installation**.

Complete the installation

The installation performs the following phases: *validate*, *upload*, *install*, and *configure*. At the end of each phase, you need to approve moving to the next phase.

The **Validation** screen appears:

Operation Progress

Server: install - query phase

Start upload phase

Abort

Retry failed

Progress of this phase: completed: 0, pending: 5, aborted: 0, failed: 0 (5:56:08 PM)

Phase	IP	Command	Status	Start time	Details
1: Query	Installation Manager	validate and orchestrate new comm	pending	not started	Details
1: Query	10.76.61.35	validate node	pending	not started	Details
1: Query	10.76.61.34	validate node	pending	not started	Details
1: Query	10.76.61.33	validate node	pending	not started	Details
1: Query	10.76.61.32	validate node	pending	not started	Details

Page 1 of

View 1 - 5 of 5

☒ Auto Refresh

☐ Hide Completed Successfully

☐ Show All Phases

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The IM verifies that there are no previously installed ScaleIO components on any of the requested installation nodes.

You can change the display by selecting the following:

- Auto Refresh (default)
- Hide Completed Successfully
- Show All Phases

1. When the Validate phase is completed, click **Start upload phase**.

The **Monitor** screen appears:

Operation Progress

Server: install - upload phase

Start install phase

Abort

Retry failed

Progress of this phase: completed: 1, pending: 10, aborted: 0, failed: 0 (11:59:15 AM)

Phase	IP	Command	Status	Start time	Details
1: Upload	10.103.110.247	upload SDS	pending	not started	Details
1: Upload	10.103.110.246	upload MDM	running	about a minute ago	Details
1: Upload	10.103.110.246	upload SDS	pending	not started	Details
1: Upload	10.103.110.246	upload SDC	pending	not started	Details
1: Upload	10.103.110.246	upload LIA	pending	not started	Details
1: Upload	10.103.110.247	upload MDM	running	about a minute ago	Details
1: Upload	10.103.110.247	upload Callhome	pending	not started	Details
1: Upload	10.103.110.246	upload Callhome	pending	not started	Details
1: Upload	10.103.110.247	upload SDC	pending	not started	Details
1: Upload	10.103.110.247	upload LIA	pending	not started	Details
1: Upload	10.103.110.237	upload TB	completed	about a minute ago	Details
1: Upload	10.103.110.237	upload SDS	running	less than a minute ago	Details
1: Upload	10.103.110.237	upload SDC	pending	not started	Details
1: Upload	10.103.110.237	upload LIA	pending	not started	Details

Auto Refresh

Hide Completed Successfully

Show All Phases

Page 1 of 1

100

View 1 - 14 of 14

In this upload status screen, you can see which packages are being updated and the status of each command.

When all commands are complete, a message, similar to the following, appears:

Home

Packages

install

in

Upload phase completed

All 14 commands completed successfully.

Waiting for user approval to proceed to the next phase.

Start install phase

Abort

Operation Progress

Server: install - upload phase

Progress of this phase: completed: 14, pending: 0, aborted: 0, failed: 0 (12:02:56 PM)

Phase	IP	Command	Status	Start time
1: Upload	10.103.110.247	upload SDS	completed	3 minutes ago
1: Upload	10.103.110.246	upload MDM	completed	5 minutes ago
1: Upload	10.103.110.246	upload SDS	completed	3 minutes ago
1: Upload	10.103.110.246	upload SDC	completed	3 minutes ago

The installation process waits for your approval before moving on to the next stage.

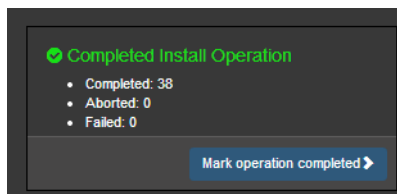
- Click **Start install phase** to proceed to the next stage.

3. When all *Install* commands rows are in *Completed* status, click **Start configure phase**.

If you get an error message during the process, you can continue to the next phase, abort, or retry the installation.

Note: If you proceed to the next stage, you will not be able to use the IM to retry failed tasks.

When all processes are finished, the following message appears:



Hint: Marking the operation completed signals to the IM that it can now be used for other installations, upgrades, etc.

4. Click **Mark operation completed**.

ScaleIO is now installed.

Best practice suggestion

For optimal performance on Linux SDS servers, type the following on each server, for each SDS device:

`/sys/block/<device_name>/queue/scheduler`

For more information, see [“Modify the device scheduler \(Linux guests only\)” on page 372](#).

Where to go from here

Now that your ScaleIO system is up and running, the next task is to create volumes. The SDCs expose these volumes as local storage devices to the applications servers. For more information, see [“SAN virtualization layer” on page 37](#).

You can create and map volumes using the CLI, as described in [“Creating and mapping volumes” on page 182](#).

Installation on VMware

In the VMware environment, you can install the ScaleIO components in either of the following scenarios:

- ◆ All ScaleIO components (MDM, SDS, and SDC), as well as an iSCSI target, are installed on dedicated ScaleIO virtual machines (SVM).
- ◆ Only the MDM and SDS components are installed on a dedicated SVM; the SDC is installed directly on the ESX host.

For a complete explanation, see [“Implementing ScaleIO over a virtual system” on page 45](#).

The ScaleIO vSphere VMware deployment wizard enables you to perform all of these activities in a simple, efficient manner, over all the machines in a vCenter. The plug-in can also be used for provisioning ScaleIO nodes.

You can also use the deployment wizard with existing ScaleIO systems, to register them to vSphere, and to add SDS server nodes.

Note: It is highly recommended to use the deployment wizard for deployment and provisioning. If the need arises, you can perform these tasks manually, or in a combination with the wizard. For more information, see [“Deploying ScaleIO on ESX” on page 365](#).

Before you begin

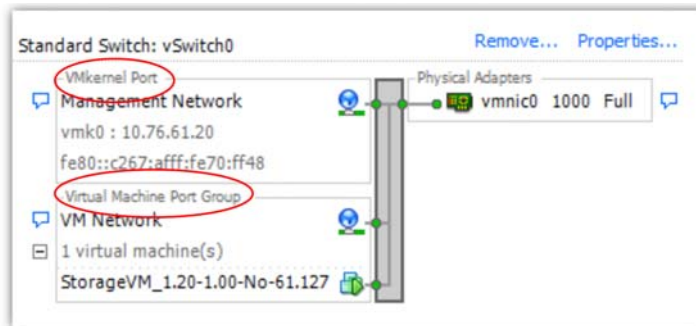
This section describes deployment prerequisites and other issues to consider before deploying ScaleIO.

Deployment prerequisites

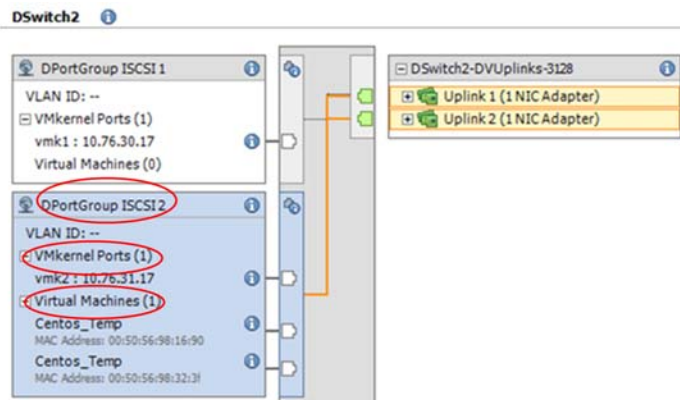
Before you deploy ScaleIO, ensure that the following prerequisites are satisfied:

- ◆ The plug-in is downloaded and registered, and the OVA template has been uploaded, as described in [“Task 1: Registering the ScaleIO plug-in and uploading the OVA template” on page 74](#).
- ◆ For ESXi 5.5, the SDC component must be installed on every ESX host, as described in [“Task 3: Installing the SDC on ESX hosts” on page 77](#).

- ◆ If using the SVM deployment, all ESX hosts taking part in the system must have a defined datastore, with a minimum of 10 GB free space. If the ESX is only being used as an SDC, which is being installed directly on the ESX, then there is no need for the datastore.
- ◆ The management network on all of the ESXs that are part of the ScaleIO system must have the following items configured:
 - Virtual Machine Port Group (the name *must* be the same on all of the ESX hosts)



- When using distributed switches, the vDS must have the following items configured:
 - VMKernel port (necessary only if using a single network)
 - dvPortGroup for virtual machines



- ◆ Devices that are to be added to SDS must be free of partitions.

- ◆ If using only a single network (management), you must manually configure the following:
 - vSwitch
 - VMKernel Port
 - Virtual Machine Port Group
 - iSCSI Software adapter
 - VMKernel Port Binding
 - ◆ The host from which you run the PowerShell (.ps1) script must have the following prerequisites:
 - Runs on Windows, with Java installed
 - PowerCLI is installed
 - Has incoming and outgoing communication access to the vCenter
-
- Note:** If your vCenter runs on Windows OS, it is recommended to use it.
-
- ◆ The Virgo server must have access to the host on which the PowerShell script will be used.

Other deployment considerations

During deployment, you will need to address the following items:

- ◆ Will the ScaleIO SDC be installed directly on the ESX (recommended) or on an SVM?
- ◆ How are the ESX devices going to be added to the SVM:
 - RDM (highly recommended)

Using RDM mapping, a device is created on the SVM that points to the physical disk on the ESX.
 - VMDK

A new datastore is created, with a VMDK, and the VMDK is added to the SVM. ScaleIO requires thick provisioning, so this process can take a long time.

In almost all cases, RDM is the preferred method to add physical device. Use the VMDK method only in the following scenarios:

 - The physical device does not support RDM.

- The device already has a datastore, and the device isn't being completely used. The excess area that is not already being used will be added as a ScaleIO device.
- ◆ Do you want to use separate networks for data and management (recommended), and which IP addresses will you use for the SVMs and VMkernels?
- ◆ Are there flash devices that will be added to the SDS?
- ◆ Do you want to create Storage Pools (in addition to the default) and Fault Sets?

Deploying ScaleIO in the VMware environment entails the following tasks:

- ◆ [“Task 1: Registering the ScaleIO plug-in and uploading the OVA template” on page 74](#)
- ◆ [“Task 2: Accessing the plug-in” on page 77](#)
- ◆ [“Task 3: Installing the SDC on ESX hosts” on page 77](#)
- ◆ [“Task 4: Deploying ScaleIO” on page 78](#)

Note: After deployment completes, set all SVMs to start automatically with the system.

Task 1: Registering the ScaleIO plug-in and uploading the OVA template

This section describes how to use PowerCLI to register the ScaleIO plug-in on a vCenter and to upload the OVA template.

Note: To use your own web server, see [“Manual registration of the ScaleIO plug-in” on page 489](#).

Before you begin, ensure that there is communication between the vSphere web client server (usually installed on the vCenter) and the web server storing the plug-in.

1. Copy the following files to your designated host (preferably your vCenter):
 - ScaleIOVM_1.31.XXX.X.ova
 - EMC-ScaleIO-vSphere-plugin-installer-1.31.XXX.X.zip
2. Extract the contents of the zip file.

3. Using PowerCLI for VMware, set to *Run as administrator*, run **Set-ExecutionPolicy AllSigned**
4. From PowerCLI, run the following script:
`ScaleIOPluginSetup-1.31.XXX.X.ps1`
 - a. Enter the vCenter name or IP address, user name, and password.
 - b. For **Select Mode**, choose option **1, Register SIO plugin**.
 - c. For **Select Registration Mode**, choose **Standard** (simplified, using embedded Tomcat).

Hint: You can also use this script to unregister a plug-in or to create an SVM template.

Note: You can use the **Advanced** option to install the plug-in using a ScaleIO Gateway from a previous installation or using your own web service. In either case, you must place this version's **plugin.zip** file (EMC-ScaleIO-vSphere-web-plugin-1.31.XXX.X.zip) in your resources folder before running the installation. To use a previous ScaleIO Gateway, the resource folder is ScaleIO Gateway installation folder\webapps\root\resources.

- d. If necessary, accept the thumbprint.
5. If you selected Advanced options, log out, and log back in to the vSphere web client.
6. In the PowerCLI, press **Enter** to finish the plug-in download and return to the menu.
7. From the vSphere **Home** tab, verify that the ScaleIO (SIO) icon is visible in the **Inventories** section.

Note: If the SIO icon is missing, the Virgo server failed to download/register the plug-in, due to one of the following reasons:

A connectivity problem (for example, network/firewall etc.) between the vSphere web client server and the web server storing the plug-in. *Resolution:* Verify that there is communication between the vSphere web client server and the web server that is storing the plug-in.

URL problem. *Resolution:* Verify that the URL is `https://` and is pointing to the correct web server IP (i.e. ScaleIO Gateway).

For information on how to use the Virgo log to troubleshoot problems that may arise, see [“Troubleshooting plug-in registration issues” on page 490](#).

To upload the OVA template, perform the following:

1. From the PowerCLI script, select **3** to **Create SVM template**.
2. Enter the parameters described in the following table:

Parameter	Description
vcenter	vCenter name or IP address
user name	vCenter user name
password	vCenter password
datacenter	The name of the data center where the datastore that will store the template resides
ova_path	The path of the SVM's OVA
datastores	A list of datastores, up to eight, on which the templates will be created. Press ENTER to stop specifying datastores.

Hint: The number of datastores you use defines the number of VM clonings that will take place, in parallel, during the ScaleIO deployment.

For faster deployment in large-scale environments, you can upload the OVA to as many as eight datastores. To do so, enter the datastore names, and when you are done, leave the next line blank. The following example shows how to enter two datastores:

```
datastores[0]: datastore1
datastores[1]: datastore1 (1)
datastores[2]:
```

The upload procedure can take several minutes, during which time a temporary SVM is created, the templates are created, then the temporary SVM is deleted.

When each templates is created, a message, similar to the following, appears:

The template EMC ScaleIO SVM Template (v1.31.XXX.X) 1 was successfully created.

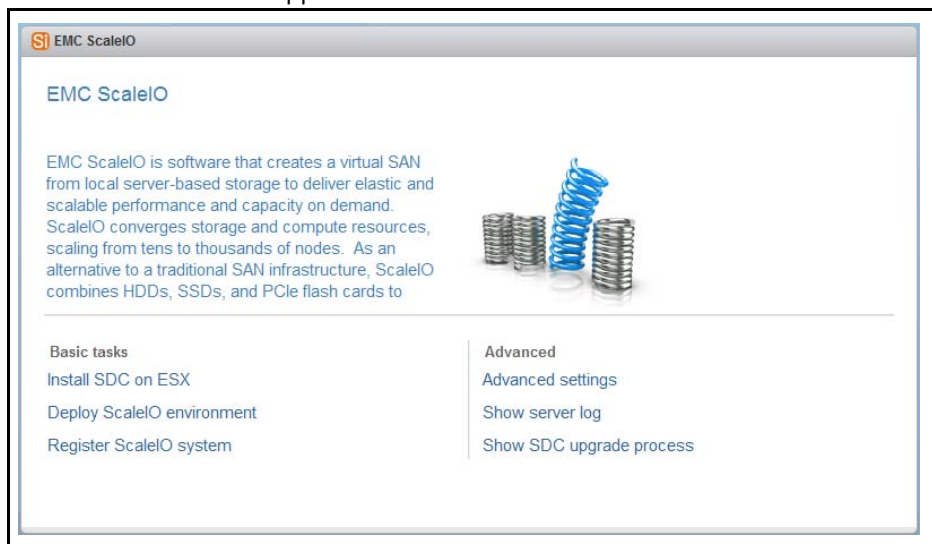
- When the process is complete, enter **4** to exit the plug-in script.

Task 2: Accessing the plug-in

This section describes how to access the plug-in from the vSphere Web Client home screen.

From the vSphere Web Client home tab, click .

The **EMC ScaleIO** screen appears.



Task 3: Installing the SDC on ESX hosts

This section describes how to install the SDC component on ESX hosts. This is a prerequisite for deploying a new ScaleIO system, and it must be applied to every ESX host that will be in the ScaleIO system, regardless of what role it is playing.

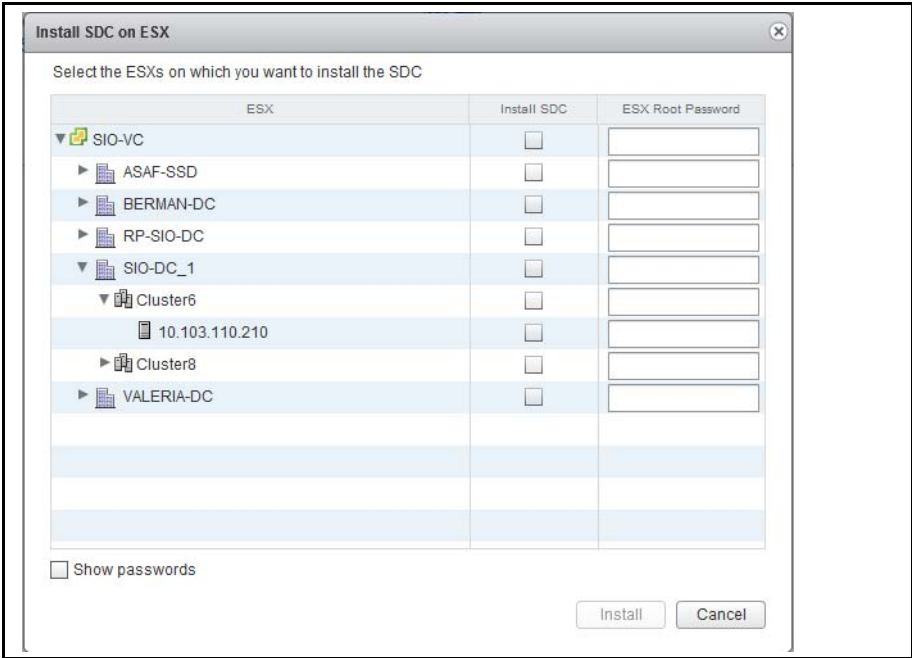
Note: This task is only required on ESXi 5.5 hosts.

This process installs the SDC on the ESX host, after which you must restart the ESX host.

To install the SDC component directly on the ESX host, perform the following:

- From the ScaleIO screen, click **Install SDC on ESX**.

The **Install SDC on ESX** screen appears, showing all the ESX hosts on all the connected vCenters:



2. Select the ESX hosts that are expected to be part of this ScaleIO system, and enter the root password for each host.
3. Click **Install**. The status appears in the dialog.
4. When finished, click **Finish**.
5. Restart each ESX host.

Note: You must restart the ESX hosts before proceeding.

Proceed with the ScaleIO deployment.

Task 4: Deploying ScaleIO

This section describes how to use the deployment wizard to deploy ScaleIO in the VMware environment.

You can use the wizard to deploy ScaleIO from the beginning, or to register a ScaleIO system that has already been deployed, but not registered with vSphere.

To register an existing system, click **Register ScaleIO system**, and enter the credentials.

To deploy a new system, perform the following:

1. From the **EMC ScaleIO** screen, click **Deploy ScaleIO Environment**.

The ScaleIO VMware Deployment Wizard begins. If you exited the previous deployment before completion, you will be able to return from where you left off.

2. Review and approve the license terms, then click **Next**.

NOTICE

The deployment wizard assumes that you are using the provided ScaleIO OVA template to create the ScaleIO virtual machines.

The **Select Installation** screen appears:

Select an installation option:

☒ Create new ScaleIO system.

☐ Add servers to a registered ScaleIO system: 10.76.61.114 ▼

☐ Prepare environment without configuring ScaleIO.

3. In the **Select Installation** screen, select from the following, then click **Next**:
 - ◆ **Create a new ScaleIO system**
Create a new system
 - ◆ **Add servers to a registered ScaleIO system**
Add additional servers to a system that was created previously. Select the existing system from the drop-down list.
 - ◆ **Prepare environment without configuring ScaleIO**
Select this option to use the wizard to prepare the environment *without* performing ScaleIO configuration (Protection Domains, Storage Pools, etc.).

If you selected **Create a new ScaleIO system**, the **Create New System** screen appears:

Enter a name for the new ScaleIO system:

System Name:

Enter a password for the "admin" user:

Enter a password

Confirm the password

Password must meet the following criteria:

- Between 6 and 31 chars
- Include at least 3 of the following groups: [a-z], [A-Z], [0-9], special chars (!@#\$...)
- No white spaces

4. In the **Create New System** screen, enter the following, then click **Next**:

- **System Name**
Enter a unique name for this system.
- **Admin Password**
Enter a password for the ScaleIO *admin* user. The password must meet the listed criteria.

The **Add ESX Hosts to Cluster** screen appears.

Select the vCenter on which to install the ScaleIO system:

FV

Select ESX hosts for the ScaleIO system:

▼ FV

▼ Cluster10

▼ Cluster10

☒ 10.76.100.65

☒ 10.76.100.64

▼ Cluster2

☒ 10.76.100.46

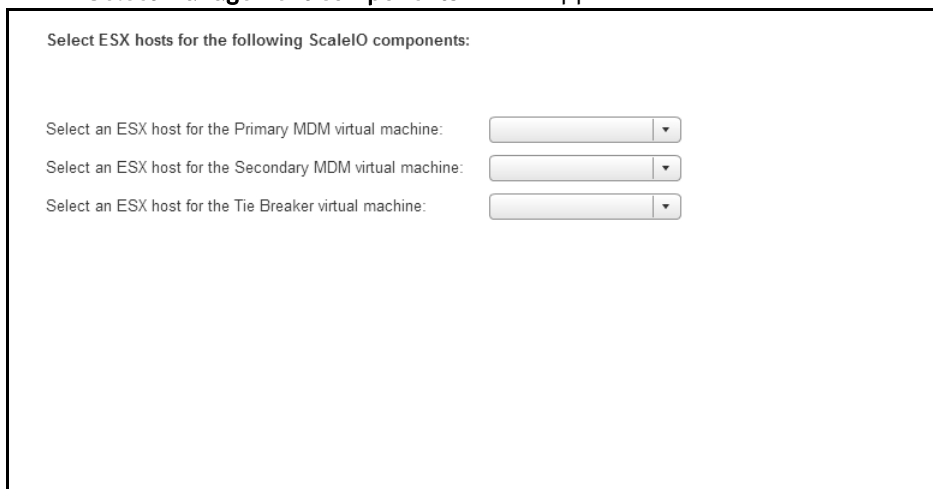
5. In the **Add ESX Hosts to Cluster** screen, select the vCenter on which to deploy the ScaleIO system.

The vCenter information is populated in the lower part of the screen.

6. Open the vCenter, select the ESX hosts to add to the ScaleIO system, then click **Next**.

Note: To configure ScaleIO, you must select a minimum of three ESX hosts.

The **Select Management Components** screen appears:



Select ESX hosts for the following ScaleIO components:

Select an ESX host for the Primary MDM virtual machine:

Select an ESX host for the Secondary MDM virtual machine:

Select an ESX host for the Tie Breaker virtual machine:

7. In the **Select Management Components** screen, match the ScaleIO management components to ESX hosts, then click **Next**.

The **Configure Call Home** screen appears:

Configure Call Home and DNS servers:

Call Home Configuration

☒ **Configure Call Home**

SMTP server: Port: ☐ Use TLS

SMTP credentials:

ScaleIO credentials:

Email details:

Severity:

DNS Server Configuration

DNS Servers:

8. Configure the following settings (optional), then click **Next**:

- To configure Call home, select **Configure Call Home**, enter the email settings, and select a minimum severity level for call home events.
- To configure syslog reporting, select **Configure syslog**, and enter the syslog server, port (default: 1468), and facility (default: 0).
- To configure DNS servers, enter their details.

The **Configure Protection Domains** screen appears:

Add new Protection Domain to ScaleIO system:

Protection Domain name:

Add

Existing Protection Domains in ScaleIO system:

Protection Domain Name

Remove

In the **Configure Protection Domains** screen, you can create (or remove) a Protection Domain (PD). You must create at least one PD.

9. To create a PD, enter the following, then click **Add**:

- **Protection Domain name**
It is recommended to use a meaningful name.
- **RAM Read Cache size per SDS**
Minimum 128 MB

Added PDs appear in the lower section of the screen, together with existing PDs. You can remove a newly created PD by selecting it and clicking **Remove**.

10. Repeat to create additional PDs, then click **Next**.

The **Configure Storage Pools** screen appears:

Create a new Storage Pool in ScaleIO system (optional):

Storage Pool name:

Assign the new Storage Pool to the Protection Domain: PD_01 ▼

Add

New and existing Protection Domains and Storage Pools:

▶ PD_01

Remove

A default Storage Pool (SP) is automatically created. You can use this screen to add additional SPs (or click **Next** to continue).

11. To create a SP, enter the name, select to which PD to add the SP, then click **Add**. It is recommended to use meaningful names.

Added SPs appear in the lower section of the screen, inside the folder of the parent PD. You can remove a newly created SP by selecting it and clicking **Remove**.

12. Repeat to create additional SPs, then click **Next**.

The **Create Fault Sets** screen appears:

Create new fault sets for the ScaleIO system (optional):

Fault set name:

Select protection domain: PD_01 ▼

Add

New and existing fault sets in ScaleIO System:

PD_01

Remove

You can use this screen to create Fault Sets (optional).

Note: When defining Fault Sets, you must follow the guidelines described in [“Fault Sets” on page 33](#). Failure to do so may prevent creation of volumes.

13. To create a Fault Set, enter the name, select to which PD to add the Fault Set, then click **Add**. It is recommended to use meaningful names.

Added Fault sets appear in the lower section of the screen, inside the folder of the parent PD. You can remove a newly created Fault Set by selecting it and clicking **Remove**.

14. Repeat to create additional Fault Sets (minimum of three), then click **Next**.

The **Add SDSs** screen appears:

[illegible]

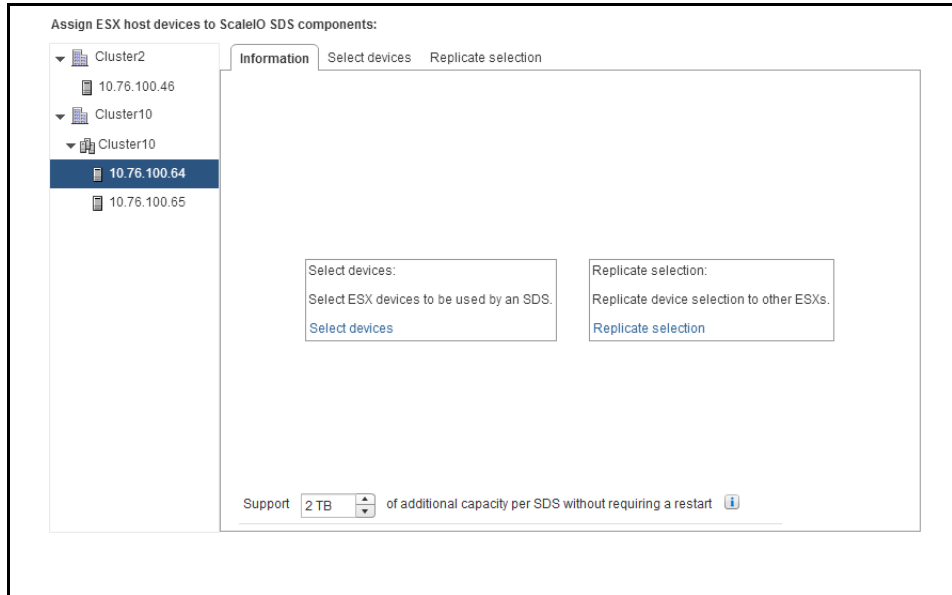
Hint: To make the same selections for every ESX in a cluster, you can make your selections per cluster or datacenter.

15. Enter the following for every ESX host/SVM, then click **Next**:
 - Whether it is acting as an SDS.
 - If the SVM is an SDS, select a Protection Domain (required) and Fault Set (optional).
 - If the SDS has flash devices, select **Optimize for Flash** to optimize ScaleIO efficiency for the flash devices.

When the **Assign devices to SDSs** screen appears, only the clusters are displayed.

Open the clusters, and select an ESX host.

The **Add devices to SDSs—Information tab** appears:



From this screen, you can perform the following:

- **Select devices (from the Select devices tab)**
Select storage devices to add to a single SDS.
- **Replicate selections (from the Replicate selections tab)**
Select devices for other SDSs, by replicating selections made in the **Select devices** tab. This can be very useful if your ESXs have identical attached devices.

Once you teach the deployment wizard what kind of selections you made for one SDS, the source, in the **Select devices** tab, you can use this option to easily select all of the same type of devices for other target SDSs. For example, if you select an SSD device for the source ESX, and then replicate this selection to the targets, the deployment wizard can automatically select all other SSD devices on the target SDSs.

Note: Device matching is performed based on the device runtime name.

- **Support ... additional capacity per SDS without requiring a restart**
Allocate additional RAM for this future need

To use replication, all of the following conditions must be met:

- The number of devices on each ESX must be identical.
- Source and target devices must be identical in the following ways: a) both are SSD or non-SSD, b) both have datastores on them or do not, c) both are roughly the same size (within 20%), and d) both are connected via a RAID controller or directly attached.
- At least one of the following conditions must be met: a) both SDSs are in the same Protection Domain, b) both SDSs are in different Protection Domains, but with the same list of Storage Pools, or c) the target SDS is in a Protection Domain with only one Storage Pool.

16. Click **Select devices**.

The **Select devices** tab appears:

Assign ESX host devices to ScaleIO SDS components:

Cluster2

10.76.100.46

Cluster10

Cluster10

10.76.100.64

10.76.100.65

Information

Select devices

Replicate selection

Device Name	Free (GB)	SSD	Add Device	Storage Pool
t10.ATA____EMC_P320h2DMTFD GAR350	326	✓	* ☒	default (k)
naa.600605b004830420173c979f1083f891	378		☐	default (k)
naa.60000970000194900415533030344537	201		☐	default (k)
naa.60000970000194900415533030344438	75		☐	default (k)
naa.60000970000194900415533030344636	79		☐	default (k)
naa.60000970000194900415533030353041	346		☐	default (k)
naa.60000970000194900415533030353040	453		☐	default (k)

* Starred devices has partitions on them. They will be deleted once added to ScaleIO

Select all empty devices

Unselect all devices

This screen shows the devices whose free space can be added to the selected ESX host/SDS. It is recommended to balance the capacity over the selected SDS.

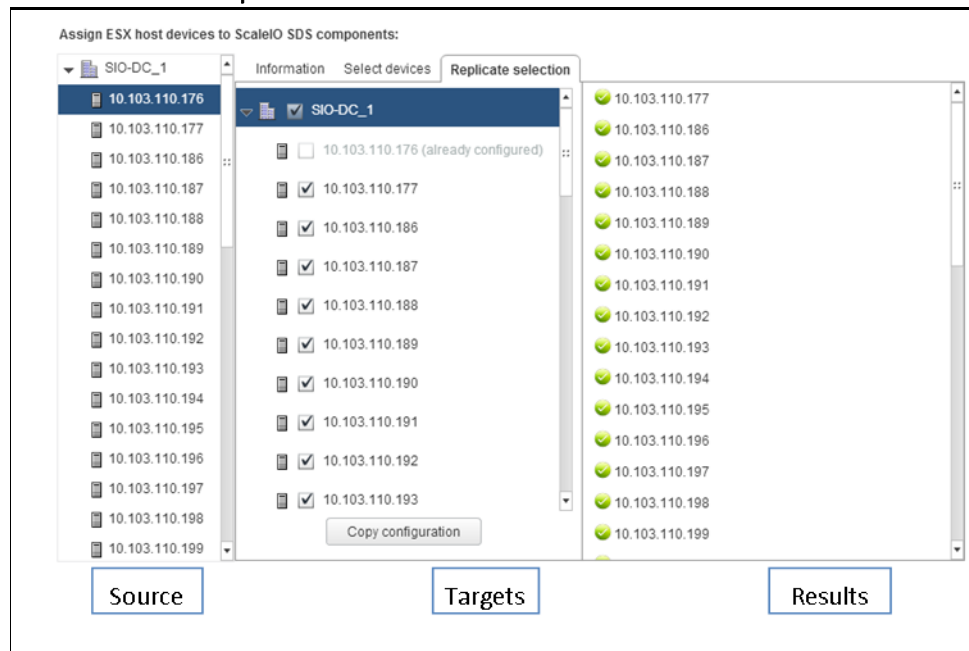
17. To add a device's space to an SDS, select the device's **Add Device** box and choose a **Storage Pool**.

Note: If you selected to create VMDK before the deployment, the following options appear:

- Create VMDK** box. Select this for all relevant devices.
- Select all available devices**. Click this to select all devices with a VMFS, and with unused capacity that can be added to the ScaleIO system.

18. To replicate selections to other SDSs, perform the following:

a. Select the **Replicate selection** tab.



b. Select the targets to which you want to replicate the selection of the ESX source.

c. Click **Copy configuration**.

The results are displayed in the right pane of the screen.

19. When you have selected devices for all SDSs, click **Next**.

Note: You must select at least one device for each SDS.

The **Add SDCs** screen appears:

Select ESXs to add as SDCs to ScaleIO system:

Select ESXs to add as SDCs:

Cluster/ESX	SDC	ESX root passw...	SDC mode
▶ RP-SIO-DC	☒		ESX ▼
▶ VALERIA-DC	☒		SVM ▼

☐ Show passwords

Enable/Disable SCSI LUN number comparison for hosts: ▼ ◆

20. Enter the SDC settings, as follows:
- a. For each ESX which should be added as an SDC, perform the following:
 - 1. Select the **SDC** check box.
 - 2. Type the ESX root password.
 - 3. Select an SDC mode:
 - **ESX**
Install the SDC on the ESX host.
 - **SVM**
Install the SDC on a ScaleIO SVM.
 - b. To show the entered ESX passwords, select **Show passwords**.
 - c. Choose whether to enable or disable the LUN comparison for ESX hosts. In general, in environments where the SDC is installed on ESX and also on Windows/Linux hosts (or SVM), you should set this to **Disabled**.

Note: Before selecting this setting, consult your environment administrator.

The **Configure ScaleIO Gateway** dialog appears:

ScaleIO Gateway configuration:

The ScaleIO Gateway is used to collect logs and upgrade ScaleIO elements.

Select an ESX host for the ScaleIO Gateway virtual machine:

Enter a password for the Gateway admin user:

Confirm the password

LIA Configuration

The LIA agent is installed on the SVMs and is used for communicating with the ScaleIO Gateway.

The LIA password must be the same across all ScaleIO elements in the same ScaleIO system.

Enter a password

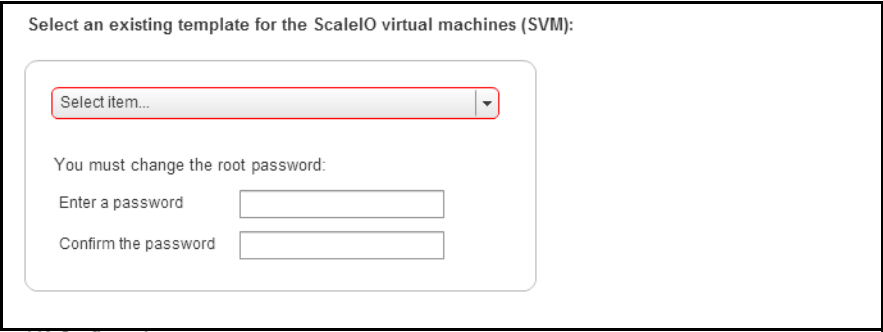
Confirm the password

Password must meet the following criteria:

- Between 6 and 31 characters
- Include at least 3 of the following groups: [a-z], [A-Z], [0-9], special chars (!@#\$...)
- No white spaces

21. Configure the ScaleIO Gateway, by performing the following, then click **Next**:
 - a. Select an ESX to host the Gateway virtual machine. A unique SVM will be created for the Gateway.
 - b. Enter and confirm a password for the Gateway *admin* user.
22. Configure the Lightweight Installation Agent (LIA) on the SVMs, by entering and confirming the password. The password must be the same across all SVMs in the system.

The **Select OVA Template** screen appears:

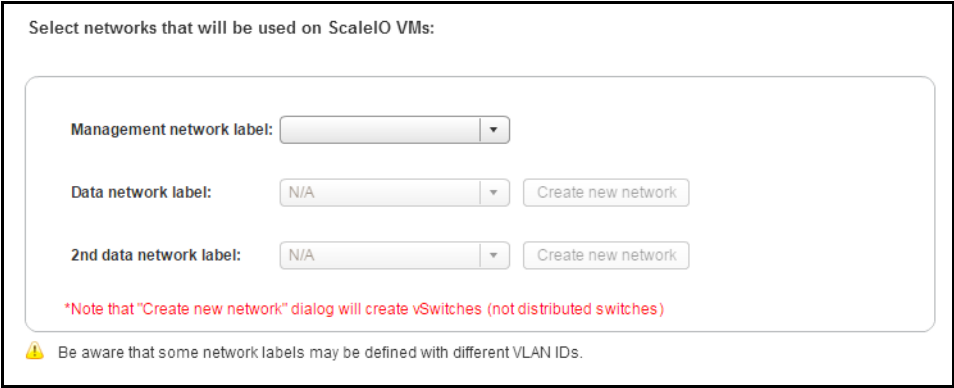


23. In the **Select OVA Template** screen, perform the following, then click **Next**:
- a. Select the template to use to create the ScaleIO virtual machines (SVM). The default is **EMC ScaleIO SVM Template**. If you uploaded a template to multiple datastores, you can select them all, for faster deployment.

Note: If you select a custom template, ensure that it is compatible with the VMware plug-in and the ScaleIO MDM.

- b. Enter and confirm a new root password, that will be used for all SVMs to be created.

The **Configure Networks** screen appears:



In the **Configure Networks** screen, you choose to use either a single network for management and data transfer, or to use separate networks. Separating the networks is recommended for security and increased efficiency. You can select one data network or two.

The management network, used to connect and manage the SVMs, is normally connected to the client management network, a 1 GB network.

The data network is internal, enabling communication between the ScaleIO components, and is generally a 10GB network.

Note: The selected networks must have communication with all of the system nodes. In some cases, while the wizard does verify that the network names match, this does not guarantee communication, as the VLAN IDs may have been manually altered.

24. Enter the following information:

- To use one network, select a management network, then proceed to [step 25](#) .
- To use separate networks, select a management network label and one or two data network labels. If the data network already exists, select it from the drop-down box. Otherwise, configure the data network by clicking **Create new network**.

Hint: For best results, it is highly recommended to use the plug-in to create the data networks, as opposed to creating them manually.

The **Create New Data Network** screen appears:

Network name:

VMkernel name:

VLAN ID:

ESX Name	Data NIC  	VMkernel IP  	VMkernel Subnet Mask
10.76.100.46			
10.76.100.64			
10.76.100.65			

* This NIC has port groups; it may already be in use.

In the **Create New Data Network** screen, enter the following information:

- **Network name**
The name of the VMware network

- **VMkernel name**
The name of the VMkernel (used to support multipathing)
- **VLAN ID**
Network ID
- For each listed ESX, select a **Data NIC**, a **VMkernel IP**, and a **VmKernel Subnet Mask**.

Hint: You can click  to auto-fill the values for **Data NIC** and **VMkernel IP**.

- Click **OK**. The data network is created.
The wizard will automatically configure the following for the data network:
 - vSwitch
 - VMkernel Port
 - Virtual Machine Port Group
 - iSCSI Initiator Software adapter
 - VMkernel Port Binding

25. Click **Next**.

The **Configure SVM** screen appears:

Configure ScaleIO Virtual Machine IP addresses and hosting Datastore

ESX Name	IP  	Subnet Mask	Default Gateway	Datastore
10.103.110.82 				Automatic
10.103.110.82 				Automatic
10.103.110.83 				Automatic
10.103.110.84 				Automatic

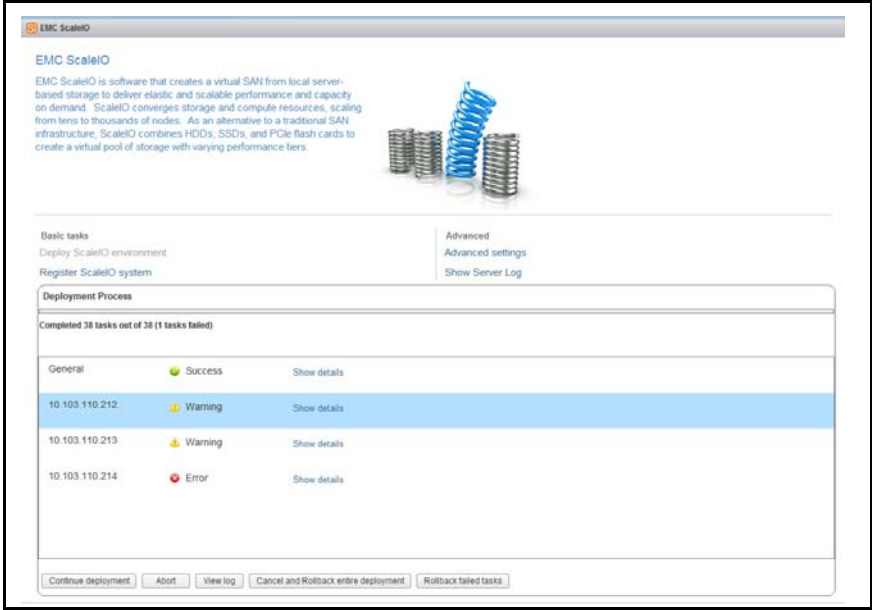
Note: This screen will look slightly different if you chose to use multiple networks.

Hint: You can click  to auto-fill the values for IP.

26. For each SVM, perform the following, then click **Next**:
 - a. Enter the **IP address**, **Subnet mask**, and **Default Gateway**.
SVMs that are members of the MDM cluster are indicated by .
 - b. You can select a datastore, or allow automatic selection.

The **Review Summary** screen appears.
27. Review the configuration. Click **Finish** to begin deployment or **Back** to make changes.
28. Enter the vCenter user name and password, then click **OK**, to begin the deployment.

The **Deployment Progress** screen appears:



During the deployment process you can view progress, pause the deployment, and view logs.

To pause the deployment, click **Pause**. Steps that are already in progress will pause after they complete.

After pausing, you can do the following:

- Continue—Click **Continue deployment**.

- Abort—Click **Abort**.
 - Roll back all deployment activities—Click **Cancel and Rollback**. Rollback cannot be canceled once started.
 - Roll back failed tasks only—Click **Rollback failed tasks**. Rollback cannot be canceled once started.
29. When the deployment is complete, click **Finish**.
- If a task failed, click **Continue deployment** to try again.
30. After deployment completes, set all ScaleIO VMs to start automatically:
- a. Right-click the SVM, and choose **Virtual Machine Startup and Shutdown**.
 - b. In the dialog box, select **Allow virtual machines to start and stop automatically with the system**.
 - c. Click **OK**.

Where to go from here

Now that your ScaleIO system is up and running, the next task is to create volumes.

You can create and map volumes in the following ways:

- ◆ To use the CLI, see [Chapter 4, “Creating and Mapping Volumes.”](#)
- ◆ To use the VMware plug-in, see [“Creating and mapping volumes” on page 344.](#)

Installing the ScaleIO GUI

This section describes how to install the ScaleIO GUI. You can install the GUI on a Windows or Linux workstation.

To install the GUI, run the following command:

- ◆ Windows
EMC-ScaleIO-gui-1.31-XXX.X.msi
- ◆ RHEL
rpm -U EMC-ScaleIO-gui-1.31-XXX.X.noarch.rpm
- ◆ Debian
sudo dpkg -i EMC-ScaleIO-gui-1.31-XXX.X.deb

Upgrading from a previous version

This section describes how to upgrade from ScaleIO v1.30 to v1.31.

To upgrade from versions prior to v1.30, contact EMC Support.

It is highly recommended to perform upgrades using the ScaleIO v1.31 Installation Manager, a part of the ScaleIO Gateway. Manual upgrades are described in [“Manually upgrading ScaleIO components” on page 373](#).

The upgrade procedure for your environment is determined by your current configuration. Proceed to the section that matches your configuration:

- ◆ [“Upgrading non-VMware servers from v1.30” on page 97](#)
- ◆ [“Upgrading VMware servers from v1.30” on page 100](#)
- ◆ [“Upgrading the ScaleIO GUI” on page 105](#)
- ◆ [“Upgrading the SDC” on page 106](#)

Upgrading non-VMware servers from v1.30

This section describes how to upgrade ScaleIO nodes from v1.30 to v1.31.

The upgrade process is performed with the Installation Manager (IM) and the Light Installation Agent (LIA) from v1.31.

If the v1.30 LIA is already installed, you must upgrade it to v1.31. If it is not yet installed, the v1.31 LIA is installed. This is described in the following sections.

To begin upgrading, proceed to the section that matches your environment.

- ◆ [“Upgrading if the v1.30 LIA is already installed” on page 97](#)
- ◆ [“Upgrading if the v1.30 LIA is not installed” on page 99](#)

Upgrading if the v1.30 LIA is already installed

This section describes how to upgrade components using the IM web client. It is assumed that the LIA is installed on all ScaleIO nodes.

First, you will export a system-generated CSV file, then use that file to upgrade the LIA to v1.31. This enables you to benefit from the power of the v1.31 Installation Manager.

Note: It is required that you use the system-generated CSV file, and not rely on a manually-created file.

To upgrade, perform the following:

1. Install the ScaleIO Gateway package, as described in [“Task 1: Installing the ScaleIO Gateway” on page 57](#).
2. Log in to the IM server, and upload the v1.31 installation packages to the IM, as described in [“Installing with the web client” on page 63](#).
3. When the files have been uploaded to the IM, from the IM web client main menu, click the **Maintain** tab.
4. Upgrade the currently installed (v1.30) LIA:
 - a. From the **Maintenance Operation** screen, perform the following:
 1. Type the Primary MDM IP address and password.
 2. Select **Use the LIA**, and type the LIA password.
 3. Click **Retrieve system topology**.
 - b. In the **System Topology** screen, click **Export to CSV**.
 - c. Open the CSV file, enter the **Node access password** and **OS type** for each node, then save the file.
 - d. From the **Maintenance Operation** screen, perform the following:
 1. Type the Primary MDM IP address and password.
 2. Select **Use native SSH/WMI**, and browse to the updated CSV file.
 3. Click **Retrieve system topology**.
 - e. Click **Upgrade LIA**.

The LIA is now upgraded to v1.31 on all nodes.
5. Upgrade the ScaleIO components:
 - a. From the **Maintenance Operation** screen, perform the following:
 1. Type the Primary MDM IP address and password.
 2. Select **Use the LIA**, and type the LIA password.
 3. Click **Retrieve system topology**.
 - b. Click **Upgrade**, then confirm the operation by entering the MDM password.
 - c. Click the **Monitor** tab to follow the upgrade operations.

NOTICE

Upgrading an SDC component requires a machine restart. If you are upgrading SDC components on Windows servers, select to enable automatic restart (on those servers only). Alternatively, you can manually restart these servers after removing the SDC.

On Linux servers, if the kernel module is busy, perform a manual restart.

Upgrading if the v1.30 LIA is not installed

This section describes how to upgrade components using the IM web client. It is assumed that the LIA is *not installed* on any ScaleIO nodes.

First, you will export a system-generated CSV file, then use that file to install the v1.31 LIA. This enables you to benefit from the power of the v1.31 Installation Manager.

Note: It is required that you use the system-generated CSV file, and not rely on a manually-created file.

To upgrade, perform the following:

1. Install the ScaleIO Gateway package, as described in [“Task 1: Installing the ScaleIO Gateway” on page 57](#).
2. Log in to the IM server, as described in [“Installing with the web client” on page 63](#).
3. Install the v1.31 LIA:
 - a. Click the **Maintain** tab, and from the **Maintenance Operation** screen, perform the following:
 1. Type the Primary MDM IP address and password.
 2. Select **Use the LIA**, and type the LIA password.
 3. Click **Retrieve system topology**.
 - b. In the **System Topology** screen, click **Export to CSV**.
 - c. Open the CSV file, enter the **Node access password** and **OS type** for each node, then save the file.
 - d. Click the **Install** tab, and from the **Install CSV screen**, perform the following:
 1. Select **Add to an existing system**.
 2. **Browse** to the updated CSV.

3. Click **Upload Installation CSV**.
- e. In the **Review Installation Configuration** screen, perform the following:
 1. Type the MDM credentials.
 2. Type the LIA password.
 3. Clear the selections for the syslog server and Call home.
 4. Click **Start Installation**.
- f. Click the **Monitor** tab to follow the operations.
4. Upgrade the ScaleIO components:
 - a. From the **Maintenance Operation** screen, perform the following:
 1. Type the Primary MDM IP address and password.
 2. Select **Use the LIA**, and type the LIA password.
 3. Click **Retrieve system topology**.
 - b. Click **Upgrade**, then confirm the operation by entering the MDM password.
 - c. Click the **Monitor** tab to follow the upgrade operations.

NOTICE

Upgrading an SDC component requires a machine restart. If you are upgrading SDC components on Windows servers, select to enable automatic restart (on those servers only). Alternatively, you can manually restart these servers after removing the SDC.

On Linux servers, if the kernel module is busy, perform a manual restart.

Upgrading VMware servers from v1.30

This section describes how to upgrade ScaleIO v1.30 components in the VMware environment to v1.31.

The upgrade process is performed with the Installation Manager component of the ScaleIO v1.31 Gateway. The Gateway runs in a dedicated ScaleIO virtual machine (SVM).

If the Gateway *was installed* in v1.30, you'll need to upgrade it to v1.31. If the Gateway *is not yet installed*, you'll use the VMware plug-in to create a new one in your current ScaleIO system. These processes are described in the following sections.

To begin upgrading, proceed to the section that matches your environment:

- ◆ [“Upgrading if the v1.30 Gateway is installed” on page 101](#)
- ◆ [“Upgrading if the v1.30 Gateway is not installed” on page 103](#)

Upgrading if the v1.30 Gateway *is* installed

This section describes how to upgrade the currently installed v1.30 Gateway to v1.31. First, you need to upgrade the VMware plug-in, then register the Gateway to the new plug-in. When the Gateway is registered, you will use it, together with the previously-installed LIA, to upgrade the other ScaleIO components.

Note: The Gateway can only be upgrade on Linux servers. If your Gateway is installed on a Windows server, use the upgrade procedure described in [“Upgrading if the v1.30 Gateway is not installed” on page 103](#).

To upgrade, perform the following:

1. Upgrade the plug-in:
 - a. Remove the previous version plug-in, as described in [“Removing the VMware plug-in” on page 112](#). The file name will have the previous version number in it, not 1.31.
 - b. Register the current version’s plug-in and upload the template, as described in [“Task 1: Registering the ScaleIO plug-in and uploading the OVA template” on page 74](#).

Note: For ESX 5.5i servers, it is highly recommended to install the SDC component directly on the ESX host. This will be done *after* completing the upgrade.

- c. Verify that the SIO icon appears on the **vSphere Home tab > Inventories** section.
2. Upgrade and register the Gateway:
 - a. Copy the v1.31 Gateway package to the IM virtual machine.
 - b. Upgrade the Gateway package by typing the following command:


```
rpm -Uvh <path to v1.31 rpm>
```
 - c. From the ScaleIO plug-in main window, right-click the desired ScaleIO system, and select **Register a ScaleIO Gateway**.

- d. Enter the credentials of the server on which the v1.30 Gateway is installed.
 - e. Click OK. The Gateway is now registered to the v1.31 plug-in.
3. Upload v1.31 packages:
 - a. From the plug-in **ScaleIO Systems** screen, launch the Gateway's Installation Manager (IM) by clicking **Open ScaleIO Gateway**.

Note: Opening the Gateway can take some time. During an upgrade, you should allow it to continue, and not to skip it.

 - b. From the IM, enter the default IM credentials, then upload the v1.31 installation packages, as described in ["Upload installation packages" on page 64](#).
 4. Upgrade the currently installed (v1.30) LIA:
 - a. Click the **Maintain** tab, and from the **Maintenance Operation** screen, perform the following:
 1. Type the Primary MDM IP address and password.
 2. Select **Use the LIA**, and type the LIA password.
 3. Click **Retrieve system topology**.
 - b. In the **System Topology** screen, click **Export to CSV**.
 - c. Open the CSV file, enter the **Node access password** and **OS type** for each node, then save the file.
 - d. From the **Maintenance Operation** screen, perform the following:
 1. Enter the MDM credentials.
 2. In the Connection field, choose Use native SSH/WMI, then browse to the updated CSV file.
 3. Click Retrieve Topology.

The updated topology appears.
 - e. Click the **Maintain** tab, and from the **Maintenance Operation** screen, click **Upgrade LIA**.

The LIA is now upgraded to v1.31 on all nodes.

5. Upgrade the current nodes to v1.31:
 - a. From the **Maintenance Operation** screen, perform the following:
 1. Type the Primary MDM IP address and password.
 2. Select **Use the LIA**, and type the LIA password.
 3. Click **Retrieve system topology**.
 - b. Click **Upgrade**, then confirm the operation by entering the MDM password.
 - c. Click the **Monitor** tab to follow the upgrade operations.

The upgrade process is complete.

Note: For ESXi 5.5 servers, it is highly recommended to install the SDC component directly on the ESX servers. For more information, contact EMC Support.

NOTICE

Upgrading an SDC component requires a machine restart (if the kernel module is busy). Restart these servers manually after the upgrade process is complete.

Upgrading if the v1.30 Gateway *is not* installed

This section describes how to install the v1.31 Gateway. First, you need to upgrade the VMware plug-in, then you will use it to install the v1.31 Gateway. When the Gateway is installed, you will use it, together with the previously-installed LIA, to upgrade the other ScaleIO components.

To upgrade, perform the following:

1. Upgrade the plug-in:
 - a. Remove the previous version plug-in, as described in [“Removing the VMware plug-in” on page 112](#). The file name will have the previous version number in it, not 1.31.
 - b. Register the current version’s plug-in and upload the template, as described in [“Task 1: Registering the ScaleIO plug-in and uploading the OVA template” on page 74](#).

Note: For ESX 5.5i servers, it is highly recommended to install the SDC component directly on the ESX host. This will be done *after* completing the upgrade.

- c. Verify that the SIO icon appears on the **vSphere Home** tab › **Inventories** section.
2. Install the Gateway:
 - a. Start the plug-in Deployment Wizard, as described in [“Task 4: Deploying ScaleIO” on page 78](#).
 - b. In the **Select Installation** screen, select **Add servers to a registered ScaleIO system**, select the ESX on which to run the Gateway virtual machine, then click **Next**.

You can skip steps that do not need to be changed.
 - c. When you reach the **Configure ScaleIO Gateway** screen, enter the details for the Gateway and the LIA, as described in [step 21 on page 91](#) , then click **Next**.
 - d. Complete the deployment.
3. Upload v1.31 packages:
 - a. From the ScaleIO screen, launch the Gateway’s Installation Manager (IM) by clicking **Open ScaleIO Gateway**.

Note: Opening the Gateway can take some time. During an upgrade, you should allow it to continue, and not to skip it.

 - b. From the IM, enter the default IM credentials, then upload the v1.31 installation packages, as described in [“Upload installation packages” on page 64](#).
4. Upgrade the currently installed (v1.30) LIA:
 - a. Click the **Maintain** tab, and from the **Maintenance Operation** screen, perform the following:
 1. Type the Primary MDM IP address and password.
 2. Select **Use the LIA**, and type the LIA password.
 3. Click **Retrieve system topology**.
 - b. In the **System Topology** screen, click **Export to CSV**.
 - c. Open the CSV file, enter the **Node access password** and **OS type** for each node, then save the file.
 - d. From the **Maintenance Operation** screen, perform the following:

1. Enter the MD credentials.
2. In the Connection field, choose Use native SSH/WMI, then browse to the updated CSV file.
3. Click Retrieve Topology.

The updated topology appears.

- e. Click the **Maintain** tab, and from the **Maintenance Operation** screen, click **Upgrade LIA**.

The LIA is now upgraded to v1.31 on all nodes.

5. Upgrade the current nodes to v1.31:
 - a. From the **Maintenance Operation** screen, perform the following:
 1. Type the Primary MDM IP address and password.
 2. Select **Use the LIA**, and type the LIA password.
 3. Click **Retrieve system topology**.
 - b. Click **Upgrade**, then confirm the operation by entering the MDM password.
 - c. Click the **Monitor** tab to follow the upgrade operations.

The upgrade process is complete.

Note: For ESXi 5.5 servers, it is highly recommended to install the SDC component directly on the ESX servers. For more information, contact EMC Support.

NOTICE

Upgrading an SDC component requires a machine restart (if the kernel module is busy). Restart these servers manually after the upgrade process is complete.

Upgrading the ScaleIO GUI

This section describes how to upgrade the GUI.

To upgrade the GUI, type the following command:

- ◆ Windows
EMC-ScaleIO-gui-1.31-XXX.X.msi
- ◆ RHEL
rpm -UvH EMC-ScaleIO-gui-1.31-XXX.X.noarch.rpm

- ◆ Debian (log in as root)
dpkg -i EMC-ScaleIO-gui-1.31-XXX.X.deb

Upgrading the SDC

You can upgrade an SDC that is installed directly on an ESXi 5.5 server. This is done with the VMware plug-in, and is described in [“Upgrading an SDC” on page 350](#).

Maintaining a ScaleIO installation

This section describes how to perform the following maintenance activities to an existing ScaleIO installation:

- ◆ [“Extending an existing ScaleIO system” on page 106](#)
- ◆ [“Removing components” on page 109](#)
- ◆ [“Performing the Get Info operation” on page 107](#)
- ◆ [“Getting the Installation Manager logs” on page 109](#)

The tools used to perform these tasks can vary depending on your environment.

Extending an existing ScaleIO system

This section describes how to add components to an existing ScaleIO installation.

In physical environments, you add components with the Installation Manager CLI or web client. In VMware environments, you add components with the VMware deployment wizard.

Adding components with the Installation Manager

This section describes how to add components with the Installation Manager.

To add components, you first need to update the CSV topology file with the new components, then you can use the CLI or the web client to add them.

Adding components with the CLI

To add components with the CLI, use the updated CSV, together with the procedure described in [“Installing with the CLI” on page 58](#).

Adding components with the web client

To add components with the web client, perform the following:

1. Follow the procedure described in [“Installing with the web client” on page 63](#).
2. In the Upload CSV stage, browse to the updated CSV file, and select **Add to existing sys.**
3. Upload the CSV, and continue as normal.

Adding components with the VMware deployment wizard

This section describes how to add ScaleIO components to an existing system with the VMware deployment wizard.

Note: The following procedure *cannot* be used to add an SDS component to an existing SVM. To do so, contact EMC Support.

1. To add components, begin the deployment, starting with [step 1 on page 79](#).
2. In the **Select Installation** screen, select **Add servers to a registered ScaleIO system**, and select the system you want to extend.
3. Continue with the deployment steps, adding the new nodes. You can skip steps that do not need to be changed.
4. Complete the deployment.

Performing the Get Info operation

You can use the Get Info operation, from the Installation Manager, to gather the logs of all MDM and SDS nodes in the system. This operation is supported via the CLI as well as the Maintain window of the web client interface.

Note: Running the Get Info operation from the VMware plug-in requires that the ScaleIO Gateway server was installed, as described in [“Registering the ScaleIO plug-in and uploading the OVA template” on page 74](#).

The logs are collected into a ZIP file.

To run Get Info from the CLI, log in, as described in [“Installing with the CLI” on page 58](#), then use the **im get_info** command.

To run Get Info from the web client, perform the following:

Note: Using Get Info via the web client requires that the LIA is installed on every node from where the logs are to be retrieved.

1. Open the ScaleIO Gateway Installation Manager:
 - a. From the plug-in **ScaleIO Systems** screen, right-click the system for which you want to perform this operation.
 - b. Select **Open ScaleIO Gateway**.

Note: Opening the Gateway can take some time.

- c. From the IM, enter the default IM credentials.
2. From the IM web client main menu, click **Maintain**.

The **Maintenance Operation** screen appears.
3. Enter the Primary MDM IP address and password, then click **Retrieve system topology**.

The system topology screen appears.
4. Enter the MDM password, select from the following options, then click **Get Info**:

- **Copy repositories**

Includes the repository from the installed components.
- **Collect exceptions only**

Includes memory dumps, but not logs, configuration, etc.
- **Light version**

Includes the most recently-created log file from each component

Note: The Get Info operation may take some time, depending on your system topology. This operation cannot be rolled back.

-
5. When the process completes, click **Download logs** to download the log files.
6. Click **Mark operation completed** to indicate that the Installation Manager process is complete.

Getting the Installation Manager logs

This section describes how to use the web client of the Installation Manager to retrieve the Installation Manager log files. The logs can be downloaded, in the form of a single ZIP file.

1. From the IM web client main menu, click **Maintain**.

The **Maintenance Operation** screen appears.

2. Click **Download Installation Manager logs**.

Removing components

This section describes how to remove ScaleIO components and the VMware plug-in.

You can uninstall ScaleIO components using the Installation Manager in the following ways:

- ◆ **With a CSV topology file**

Use an updated CSV file to tell the IM which components to uninstall.

- ◆ **With the LIA**

Use the LIA, in communication with the MDM, to tell the IM which components to uninstall. This requires that the LIA be installed in all nodes to be changed.

Proceed to the appropriate section:

- ◆ [“Removing ScaleIO components with the IM—CLI” on page 109](#)
- ◆ [“Removing ScaleIO components using the IM—web client” on page 110](#)
- ◆ [“Removing the VMware plug-in” on page 112](#)

Removing ScaleIO components with the IM—CLI

This section describes how to use the Installation Manager CLI to remove all installed ScaleIO components.

You can use the CLI to uninstall with a CSV topology file or with the LIA.

To uninstall with the CLI, run one of the following commands from the Installation Manager CLI window:

- ◆ Using a CSV topology file

- `im uninstall --path <Full_Path_To_CSV> [--allow_reboot true]`

◆ Using the LIA

- `im uninstall --mdm_ip <IP_Primary_MDM> --mdm_password <MDM_Password> [--allow_reboot true]`

NOTICE

Uninstalling an SDC component requires a machine restart. If you are uninstalling SDC components on Windows servers, you must add the `--allow_reboot` flag to enable automatic restart (on those servers only). Alternatively, you can manually restart these servers after removing the SDC.

On Linux servers, if the kernel module is busy, perform a manual restart.

Removing ScaleIO components using the IM—web client

This section describes how to use the Installation Manager web client to remove installed ScaleIO components. The list of components to remove is obtained either from a CSV file, or by the LIA that is installed on every node.

Note: Using the LIA assumes that the LIA is installed on every node from where an uninstallation is to take place. If the LIA is not installed, you must uninstall with a CSV file.

To uninstall with the web client, perform the following:

1. Log in to the web client, as described in [“Log in to the IM server” on page 63](#).
2. From the IM web client main menu, click **Maintain**.

The **Maintenance Operation** screen appears:

Hint: You can download the Installation Manager logs by clicking **Installation Manager logs**.

3. Enter the Primary MDM IP address and password.
4. In the **Connection** section, choose one of the following:
 - **Use LIA**
Use the LIA installed on all relevant nodes. Enter the LIA password.
 - **Use native SSH/WMI**
Use a CSV file. Browse to the file.
5. Click **Retrieve system topology**.

The system topology appears:

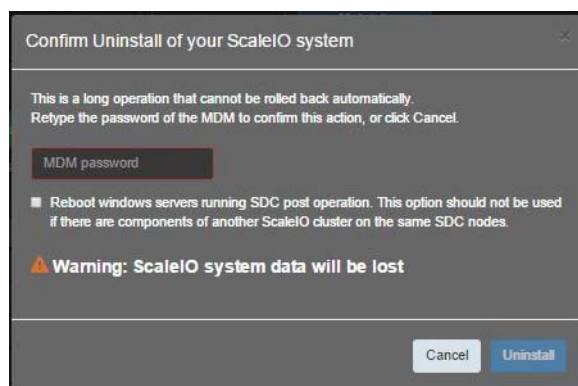
IP	MDM/TB	SDS	SDC
10.76.60.48			✓
10.76.60.44			✓
10.76.30.35	✓	✓	
10.76.30.34	✓	✓	✓
10.76.30.33		✓	✓
10.76.30.32	✓	✓	✓

6. Click the **Show Uninstall button** link, and confirm enabling this option.

NOTICE

The uninstall operation may take some time, depending on your system topology. This operation cannot be rolled back.

- Click **Uninstall**. A confirmation dialog appears:



NOTICE

Uninstalling an SDC component requires a machine restart. If you are uninstalling SDC components on Windows servers, select to enable automatic restart (on those servers only). Alternatively, you can manually restart these servers after removing the SDC.

On Linux servers, if the kernel module is busy, perform a manual restart.

- Enter the MDM password, select to reboot servers (optional), and click **Uninstall**.
- To monitor the uninstallation progress, click **Monitor**.
- When the uninstallation is complete, click **Mark operation completed**.

Removing the VMware plug-in

To remove the plug-in, perform the following:

- Run the script to remove the plug-in:
 - To remove the v1.30 plug-in:**
 - Perform [step 1 on page 74](#) through [step 3 on page 75](#).
 - From PowerCLI, run the following script:
`ScaleIOPluginSetup-1.31.XXX.X.ps1`
 - Enter the vCenter name or IP address, user name, and password.
 - For **Select Mode**, select option **2, Unregister ScaleIO plugin**.
 - Continue to [step 2](#).

- **To remove the v1.31 plug-in:**
 - a. From the folder where you extracted the `EMC-ScaleIO-vSphere-web-plugin-package-1.31-XXX.X.zip` file, use PowerCLI to run the `ScaleIOPluginSetup-1.31-XXX.X.ps1` script.
 - b. Select option **2, Unregister ScaleIO plugin**.
 - c. Continue to [step 2](#).
 - 2. Enter the vCenter credentials.
 - 3. Confirm the script actions.
 - 4. Log out, then log back in to the vSphere web client.
- The plug-in is no longer registered.

CHAPTER 4

Creating and Mapping Volumes

This chapter describes how to create volumes from devices added to SDS nodes, and then to map the volumes to SDC nodes. Devices may have been added during, or after, the installation process.

You can create and map volumes using various management tools. This chapter describes how to do so with the CLI, and provides references to the other tools.

The creating and adding volume process described in this section is necessary, as part of the *getting started* process, before applications can access the volumes. In addition, you may create additional volumes and map them as part of the maintenance of the virtualization layer.

Managing existing volumes is described in [“Managing volumes” on page 217](#).

Creating and mapping volumes

This section describes the CLI commands used to create and map volumes. Topics include:

- ◆ [“Creating volumes” on page 116](#)
- ◆ [“Mapping a volume to an SDC” on page 118](#)
- ◆ [“Detecting new volumes” on page 119](#)

Managing existing volumes is described in [“Managing volumes” on page 217](#).

Note: Before running CLI commands, you must be logged-in with a user name that has the right to perform the desired commands.

For more information on the login procedure, default credentials, and user roles, see [“Authenticating with the MDM” on page 155](#).

Creating volumes

Command

`add_volume`

Syntax

```
scli --add_volume(--protection_domain_id <ID> |
--protection_domain_name <NAME>) [--storage_pool_id
<ID> | --storage_pool_name <NAME>] --size_gb <SIZE>
[--volume_name <NAME>] [Options] [Obfuscation Options]
[Cache Options]
```

Description/Notes

Add a volume.

You can create a volume when the requested capacity is available. To start allocating volumes, the system requires that there be at least three SDS nodes.

Note: For the minimum size of an SDS, see [“Product limits” on page 26](#).

The created volume cannot be used until it is mapped to (at least) one SDC. For more information, see [“Mapping a volume to an SDC” on page 118](#).

Hint: You can change the default using the `set_obfuscation_properties` command, as described in [“Setting data obfuscation” on page 172](#).

By default, volume data is not obfuscated. You can use the obfuscation options in this command to override the default setting, per volume.

By default, volume caching is used. You can use the caching options in this command to override the default setting, per volume. For more information about caching, see [“Managing RAM read cache” on page 247](#).

User-defined names are optional. You can define object names, according to the following rules:

1. Contain less than 32 characters
2. Contain only alphanumeric and punctuation characters
3. Be unique within the object type

When a name has not been defined, the system may display default system-defined names, as follows:

- ◆ SDS—its first IP address
- ◆ Device—the path to the device
- ◆ All other objects—the object’s ID

ScaleIO objects are assigned a unique ID that can be used to identify the object in CLI commands. You can retrieve the ID via a query, or via the object's property sheet in the GUI.

Note: It is highly recommended to give each volume a meaningful name associated with its operational role.

Parameters

Parameter	Description
--protection_domain_id <ID>	Protection Domain ID
--protection_domain_name <NAME>	Protection Domain name
--storage_pool_id <ID>	Storage Pool ID
--storage_pool_name <NAME>	Storage Pool name
--size_gb <SIZE>	Volume size, in GB. Basic allocation granularity is 8 GB.
--volume_name <NAME>	Name to be associated with the added volume
Options:	
--thin_provisioned	The specified volume will be thin provisioned
--thick_provisioned	The specified volume will be thick provisioned (default)
Cache Options: CHOOSE ONE (override the default setting)	
--use_cache	The specified volume will use caching (default)
--dont_use_cache	The specified volume will not use caching
Obfuscation Options: CHOOSE ONE (override the default setting)	
--use_obfuscation	Enable data obfuscation for this volume.
--dont_use_obfuscation	Disable data obfuscation for this volume.

Example

```
scli --mdm_ip 192.168.1.200 --add_volume
--size_gb 5000 --volume_name vol_1
--protection_domain_name rack_1.1
```

Mapping a volume to an SDC

Command

map_volume_to_sdc

Syntax

```
scli --map_volume_to_sdc (--volume_id <ID> |
--volume_name <NAME>) (--sdc_id <ID> |
--sdc_name <NAME>|--sdc_ip <IP>) [--allow_multi_map]
```

Description/Notes

Map a volume to an SDC node.

The command exposes the volume to the specified SDC, effectively creating a block device on the SDC.

Parameters

Parameter	Description
--volume_id <ID>	Volume ID
--volume_name <NAME>	Volume name
--sdc_id <ID>	SDC ID
--sdc_name <Name>	SDC name
--sdc_ip <IP>	SDC IP address
--allow_multi_map	Allow this volume to be mapped to more than one SDC. To use this option, the flag is mandatory on the first host and optional on the others.

Example

```
scli --mdm_ip 192.168.1.200 --map_volume_to_sdc
--volume_name vol_1 --sdc_ip 192.168.1.3
```

Detecting new volumes

Command

```
drv_cfg --rescan
```

Note: This is not a CLI command, but rather an executable that is run on the SDC server.

Syntax

```
/opt/emc/scaleio/sdc/bin/drv_cfg --rescan
```

Description/Notes

Volumes are always exposed to the operating system as devices with the prefix `scini` (such as `/dev/scinia`, `/dev/scinib` and so on). Unique names can be found under `/dev/disk/by-id/`.

ScaleIO periodically scans the system to detect new volumes. You can initiate a scan for the most up-to-date status on a particular SDC node. This command is unique because it is not a CLI command, but rather a command issued on the specific SDC.

For further details on how to set the mounting options see [Appendix D, “Troubleshooting, FAQ, and Other Tasks.”](#)

Parameters

Not applicable.

CHAPTER 5

Licensing

This chapter describes how to obtain and activate the electronic license for your ScaleIO software. Topics include:

- ◆ [Overview.....](#) 121
- ◆ [Activating entitlements and installing a license file](#) 124
- ◆ [License file example.....](#) 131
- ◆ [Error messages](#) 132

Overview

Using ScaleIO requires a license. The license is installed on the MDM cluster, using the **set_license** command. ScaleIO installations are enabled to be fully functional, at the enterprise level, for the first ten days after installation, after which the system will continue to operate. After this time elapses, no configuration changes will be allowed until a permanent license is installed.

ScaleIO supports the following license options:

- ◆ **Basic**
Enables all basic functionality
- ◆ **Enterprise**
Enables advanced features

For more information, see the *ScaleIO Licensing Options Technical Note*, available for download from EMC Online Support.

ScaleIO licenses are purchased by physical device capacity (in TB). You can activate your licensed capacity over multiple ScaleIO systems—each system with its unique installation ID.

You download ScaleIO licenses from the EMC Powerlink Licensing website, using the procedures described in [“Activating entitlements and installing a license file” on page 124](#). Then, you install the licenses on your ScaleIO system, as described in [“Installing the license” on page 130](#).

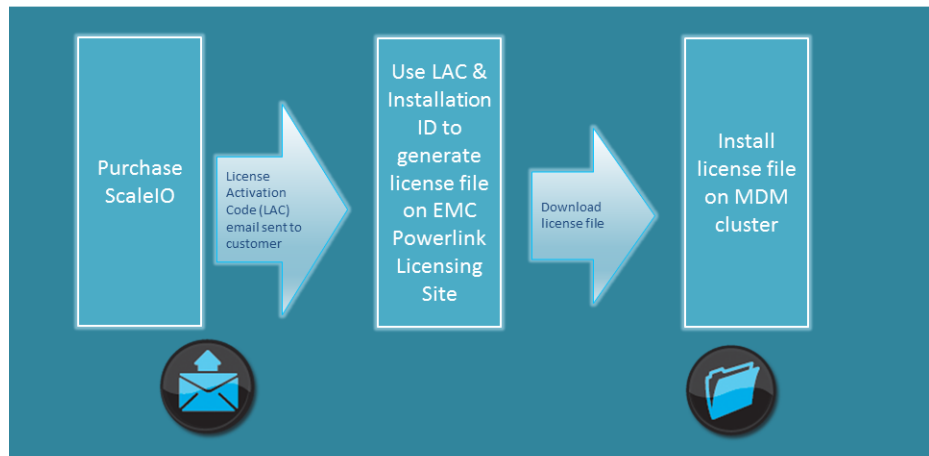
You can view current license information using the CLI or the GUI.

The following steps summarize the licensing process:

1. Purchase ScaleIO, and receive a License Authorization Code (LAC) email with a link to the licensing site.

If you do not have the LAC email, you can search for the LAC number from the EMC Powerlink Licensing website, by entering the Sales Order number and using the **Search Entitlements** option.

2. Retrieve the installation ID from your ScaleIO system.
3. Click the link in the LAC email, and use the online wizard to complete the entitlement activation process.
4. Save the license file, and install it using the CLI.



The following table describes ScaleIO eLicensing terminology.

Table 5 eLicensing terminology

Term	Description
EMC Online Support	The EMC online support portal, http://support.emc.com , contains product support information and links to the Powerlink Licensing web site.
Entitlements	The EMC Powerlink Licensing web site lists the entitlements (usage rights) that you have purchased, that you can activate for a specific host machine.
LAC email	Email sent to a customer who has purchased an EMC product, containing a License Authorization Code (LAC), which is needed to complete the entitlement activation process on the EMC Powerlink Licensing web site.

When you purchase a license entitlement for ScaleIO, a License Authorization Code (LAC) email is sent to you, or to your purchasing department. If you cannot find the LAC email, you can use the Powerlink Licensing website to find your license entitlements.

The following figure shows a sample LAC email:

Dear EMC Software User,
 Thank you for choosing EMC software. Your EMC Software License Authorization Code (LAC) is [REDACTED].
 You must redeem this LAC for license keys to activate your software. Please protect your LAC like you would any other license key to prevent anyone from improperly activating your software.

Activating Your Software

1. [Click here](#) or copy and paste the following URL (<https://ngtest-ci.emc.com/downloads/>) into a web browser to activate your entitlements.
2. You will be prompted to log in. (New users should follow the new member registration steps).
3. Follow the on-screen instructions.

Downloading Your Software

1. [Click here](#) or copy and paste the following URL (<https://ngtest-ci.emc.com/downloads/>) into a web browser to download your software.
2. You will be prompted to log into EMC's Online Download Service Center (New users should follow the new member registration steps).
3. Enter the product name in the search field to find the software you wish to download.

License Authorization Code: RR91DYQLF9RTXZT9RMQH

Product #	Title	Quantity
456-106-154	EMC SCALEIO SOFTWARE CAPACITY=CB	250
456-106-155	EMC SCALEIO ENTERPRISE FEATURES=CB	250

If you have any questions about your sales order please contact your EMC Account Representative or your Authorized Reseller.

Figure 11 Licensing LAC email

Activating entitlements and installing a license file

ScaleIO licenses are assigned to ScaleIO systems, each of which is identified by a unique installation ID.

You use the ScaleIO installation ID, together with your LAC, to activate the entitlement and then download the license file. Then, you install this file in your MDM cluster.

Activating an entitlement and downloading the license file

This section describes how to activate the entitlement that was purchased.

ScaleIO is procured by *total* capacity, but you can activate portions of this total capacity over multiple ScaleIO systems. For example, your purchase order may have been for 1000 TB of basic license and 1000 TB of enterprise. Your LAC will entitle you to activate all, or part of that. You can activate 500 TB for one ScaleIO system, and leave the rest for another activation, for the same, or a different system.

NOTICE

ScaleIO licenses will only work if they have been activated with equal amounts of basic and enterprise capacity. Before you proceed, you should know the capacity and the license level that you want to activate.

To activate the entitlement, perform the following:

1. Identify the installation ID of your ScaleIO system:

- Using the CLI

Run the following command: **scli --query_license**

The installation ID is displayed:

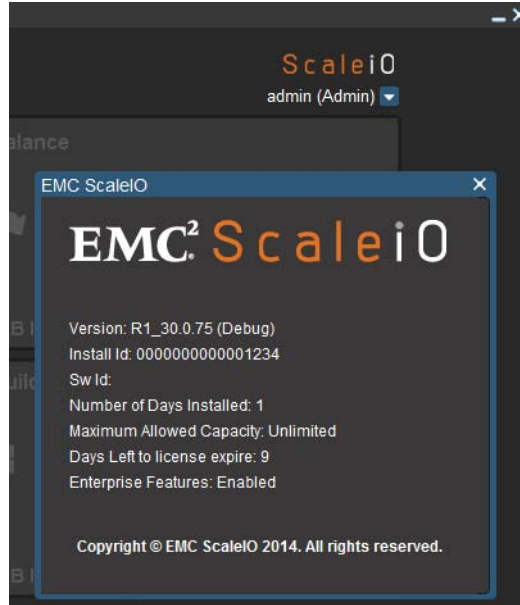
```
Installation ID: 0123456789abcdef
```

Note: To run CLI commands, you first need to log in, as described in [“Logging in” on page 155](#).

- Using the GUI

From the top right of the main window, open the drop-down menu that appears next to the user name, and select **About**.

The installation ID appears in the About window.

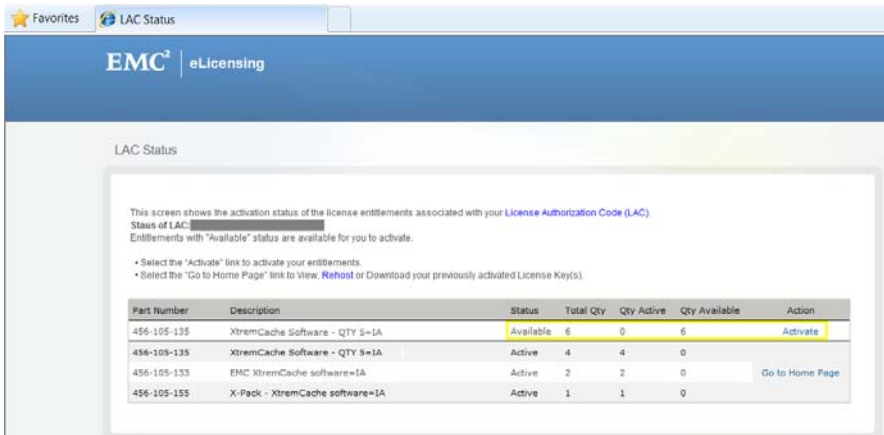


2. If you have the LAC email, skip to [step 4](#) .
3. If you do not have your LAC email, perform the following:
 - a. From the EMC support website, browse to the Powerlink Licensing system:
 - a. Open the EMC support website: <http://support.emc.com>
If you are a new user, create a new user account.
 - b. Click **Service Center**.
 - c. Under **Product Registration and Licenses**, click **Get and Manage Licenses**.
 - d. Select the **ScaleiO** product. The **Powerlink Licensing** website is displayed.
 - e. Click **View Entitlements**. The **Search Entitlements** screen appears.
 - b. Type the **Sales Order#**, then click **Search Entitlements**. A list of entitlements is displayed.
 - c. Locate the entitlement to activate, and choose **Options > Activate**.

The **Powerlink Licensing—Search Entitlements to Activate** screen appears. Skip to [step 6 on page 126](#) .

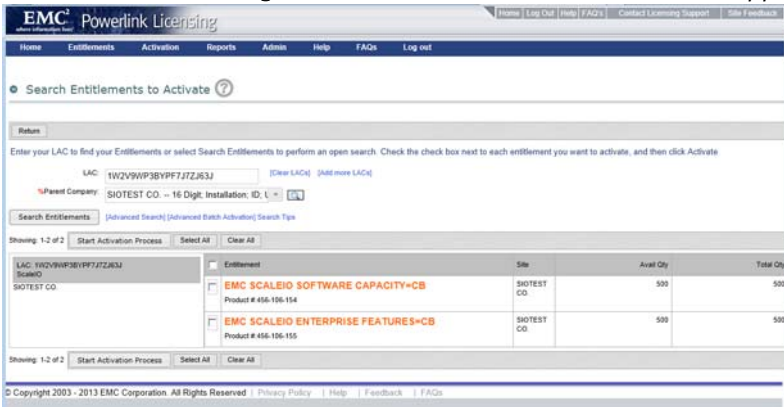
4. If you have your LAC email, perform the following:
 - a. Click the link in the LAC email, and log in.

The **LAC Status** screen appears. Note that some entitlements may already be active.



5. From the **Available** entitlements, find the entitlement that you want to activate, and click **Activate**.

The **Powerlink Licensing—Search Entitlements to Activate** screen appears.



6. Select the items to activate and click **Start Activation Process**.

Note: You do not need to activate both Capacity and Enterprise in any given system, but if you do, you will need to activate equal capacities for both. You can activate Capacity by itself.

A list of *machines* belonging to your organization may appear. If not, you can create machines in the following step.

In the context of the activating process, a *machine* is a ScaleIO system, which could comprise any number of servers.

7. To select an existing machine, click **Select** by the system to activate, and enter the Locking ID.

Note: The Locking ID is the ScaleIO installation ID.

If this is the first time you are activating, add a machine by clicking **Add a machine**. The **Add Machine** screen appears.

8. Enter a name for the new ScaleIO system, and click **Save**.

The **Activate Entitlements—Register** screen appears.

The screenshot shows the 'Activate Entitlements' screen in the 'Register' step. The breadcrumb trail is Search > Register > Activate > Confirm > Complete. A progress bar indicates the current step. Below the breadcrumb, there is a 'Move to site' dropdown menu and buttons for 'Add Site' and 'Full Site'. A message states: 'To register a different site, select from the dropdown list or search for sites. Select the Next button to keep the entitlements assigned to their current site.' Below this, a table displays the registered company and user information. At the bottom, there are 'Cancel Activation' and 'Next >' buttons.

Parent Company	User Name
SIO Test Co	Ebad Horn
16 Digit	16 Digit
Installation ID	Installation ID
United States	United States
[Edit]	ehorn@emc.com
	[Full] [Change]

9. Click **Next**.

To register to a different location, click **Add Site** and add the information for the new location.

The **Activate Entitlements—Activate** screen appears.

The screenshot shows the 'Activate Entitlements' screen in the 'Activate' step. The breadcrumb trail is Search > Register > Activate > Confirm > Complete. A progress bar indicates the current step. Below the breadcrumb, there is a 'Machine Name' field with the value 'SIO_SYSTEM_1' and a 'ScaleIO Installation ID' field with the value '0123456789ABCDEF'. A 'Change Machine' button is next to the machine name. Below this, there is a table with columns for 'Qty', 'Avail', 'Installed', 'Entitlement', and 'Deselect'. The table contains two rows of entitlements. At the bottom, there are 'Activate all', 'Clear all', 'Cancel Activation', '< Back', and 'Next >' buttons.

Qty	Avail	Installed	Entitlement	Deselect
200	500 terabytes	0 terabytes	EMC SCALEIO ENTERPRISE FEATURES=CB Product # 456-106-155	Deselect
200	500 terabytes	0 terabytes	EMC SCALEIO SOFTWARE CAPACITY=CB Product # 456-106-154	Deselect

10. Enter the following information:

- ◆ In the **Machine Information** section, enter the **Installation ID**.
- ◆ In the **ScaleIO** section, enter the amount of capacity to activate.

11. Click **Next**.

The **Activate Entitlements—Confirm** screen appears.

EMC Powerlink Licensing

Home | Log Out | Help | FAQs | Contact Licensing Support | Site Feedback

Home | Entitlements | Activation | Reports | Admin | Help | FAQs | Log out

Activate Entitlements ?

Search | Register | Activate | **Confirm** | Complete

[Cancel Activation](#) | [Back](#) | [Finish](#)

Summary

Here is a summary of this activation transaction:
 2 entitlement(s) will be activated on machine SID_SYSTEM_1 as a result of this transaction.
 SIDTEST Co. - 14 Dgt. Installation, ID: United States

Summary Email Options

To send additional certificates to specified email addresses, enter the addresses in the field below. Use commas to separate multiple addresses.
☐ Do not email certificate to registered user

Result output:

Email to: (Multiple separated by commas)

Language:

Email Comments:

Notes for this transaction

You can add notes concerning this transaction.

Notes | Internal Notes

- When the process is complete, an Activation Certificate will be sent to the purchaser's email address. To add additional recipients, type their email addresses in the **Email** box, using a comma to separate the addresses, then click **Finish**.

The **Activate Entitlements—Complete** screen appears.

EMC Powerlink Licensing

Home | Log Out | Help | FAQs | Contact Licensing Support | Site Feedback

Home | Entitlements | Activation | Reports | Admin | Help | FAQs | Log out

Activate Entitlements ?

Return to search | Entitlement Dashboard | Machine Dashboard

Search | Register | Activate | Confirm | **Complete**

The activation process is completed. From this page, you can view or email the certificate, or select a link from the page toolbar.

[The certificate is being sent automatically to the registered user.](#)

[Email certificate](#) | [Print Certificate](#) | [View certificate](#)

Machine Name | **Activation Information**

SID_SYSTEM_1 | **Activation date:** Apr 10, 2014
 (View summary) | **Certificates sent to:** r.gross@emc.com; Elad.Horn@emc.com

Annotation	Key
ScaleIO	##### EMC License File # Activation Date: Apr 10, 2014 08:49:41 AM # Activated By: r.gross # Type: UNSERVED ##### INCREMENT SID_S (TRUNCATED) View key

[Save to File](#)

© Copyright 2003 - 2013 EMC Corporation. All Rights Reserved | Privacy Policy | Help | Feedback | FAQs

- The license file will be emailed. To download it immediately, click **Save to File**.

Note: You can return to this section at any time to download or email the license file again.

Installing the license

This section describes how to install the license.

To install the license, run the following command:

```
scli --set_license --license_file <license_file>
```

where *<license_file>* is the full path to the license file

Example:

```
scli --set_license --license_file /tmp/0239SH4SS89023T6.lic
```

The ScaleIO license is now installed on the MDM cluster.

You can view license information using the **query_license** command and from the **About** menu in the GUI.

Commands enabled with the enterprise license

When you have installed a license with Enterprise features, the following commands are enabled:

- ◆ Obfuscation
 - **--set_obfuscation_properties**
 - **--add_volume** (if **--use_obfuscation** is used, or if obfuscation is the default as set by **--set_obfuscation_properties**)
- ◆ Snapshot
 - **--snapshot_volume**
- ◆ QoS
 - **--set_sdc_volume_limits**

For more information on these commands, search for the commands in this guide.

Note: If you switch to a basic license (or if you do not install an Enterprise license after the 10-day trial), you can still use **--set_obfuscation_properties** to remove obfuscation and **--set_sdc_volume_limits** to remove volume limits, but you will not be able to use these commands to enable obfuscation or to set volume limits.

License file example

The following figure illustrates a license file with a license for 200TB of both base capacity and enterprise features:

```

#####
# EMC License File
# Activation Date: Apr 10, 2014 08:49:41 AM
# Activated By: robert grosso
# Type:UNSERVED
#####
Header
INCREMENT SIO_BASE EMCLM 1.0 permanent uncouncted \
  VENDOR_STRING=CAPACITY=200;CAPACITY_UNIT=TB;installation_id=;SwID=SL6LC2B6HB4YSK;PLC=SIO; \
  HOSTID=ANY dist_info="ACTIVATED TO SIOTEST CO." ISSUER=EMC \
  ISSUED=10-Apr-2014 NOTICE="ACTIVATED TO License Site Number: \
  PTA10APR20141109559" SN=2169155 SIGN="004A FD6C 87EC 2F63 248F \
  FE9B A852 C700 860B 8332 21F2 9C72 5744 759C D6FE" \
Base
capacity
INCREMENT SIO_SNAPSHOTS EMCLM 1.0 permanent uncouncted \
  VENDOR_STRING=CAPACITY=200;CAPACITY_UNIT=TB;installation_id=;SwID=SL6LC2B6HB4YSK;PLC=SIO; \
  HOSTID=ANY dist_info="ACTIVATED TO SIOTEST CO." ISSUER=EMC \
  ISSUED=10-Apr-2014 NOTICE="ACTIVATED TO License Site Number: \
  PTA10APR20141109559" SN=2169155 SIGN="004C 6427 45B9 3BC4 2656 \
  EC20 3A51 6300 6466 F7A7 566A 59AD 08BD 2BEA DB10" \
Enterprise
features
INCREMENT SIO_QoS EMCLM 1.0 permanent uncouncted \
  VENDOR_STRING=CAPACITY=200;CAPACITY_UNIT=TB;installation_id=;SwID=SL6LC2B6HB4YSK;PLC=SIO; \
  HOSTID=ANY dist_info="ACTIVATED TO SIOTEST CO." ISSUER=EMC \
  ISSUED=10-Apr-2014 NOTICE="ACTIVATED TO License Site Number: \
  PTA10APR20141109559" SN=2169155 SIGN="0069 FC1E 0AF5 FEFF F20C \
  EBB2 146A 7A00 3C7E 42B0 600F 7D78 4560 983C E534" \
INCREMENT SIO_OBFUSCATION EMCLM 1.0 permanent uncouncted \
  VENDOR_STRING=CAPACITY=200;CAPACITY_UNIT=TB;installation_id=;SwID=SL6LC2B6HB4YSK;PLC=SIO; \
  HOSTID=ANY dist_info="ACTIVATED TO SIOTEST CO." ISSUER=EMC \
  ISSUED=10-Apr-2014 NOTICE="ACTIVATED TO License Site Number: \
  PTA10APR20141109559" SN=2169155 SIGN="00D7 202C 9FCA E6F0 F08D \
  26A0 8B01 9700 E6B1 2976 4B92 BFC7 B96A 229B 73C6"

```

Figure 12 License file example

The license file includes the following portions:

- ◆ Header
General information
- ◆ General license
Shows the capacity licensed for the system, in this case 200 (TB)
- ◆ Enterprise features
Shows the enterprise features that are included in your license: Snapshots, QoS, and Obfuscation.

Error messages

Table 6, “Licensing error messages” lists error messages that may be generated by the system, and their troubleshooting solutions.

Table 6 Licensing error messages

Error Message	Description	Solution
The license key is invalid or does not match this version. Contact Support.	The license key is invalid.	Contact support.
The current system configuration exceeds the license entitlements.	More capacity has been installed than the license allows.	Reduce capacity, or extend the license capacity.
Operation could not be completed. The license capacity has been exceeded.	When you try to add an SDS or device, it will cause the licensed capacity to be exceeded.	Do not add the SDS or device, or extend the license capacity.
The license key is too long	The license file is larger than expected.	Check the accuracy of the license key.
The license has expired	The duration of the license has ended.	Extend the duration of the license.
The license installation ID does not match the ID of this system	when they entered the Installation ID in the ELM, it may have been incorrect	Contact support.
Enterprise features are not enabled for this system	The installed license does not include rights to use enterprise features.	Extend the scope of the license.
The license contains a mismatch of the SWID. Contact Support.	The license key is invalid.	Contact support.
The issuer of the license you are attempting to add does not match that of the product	The license key is invalid.	Contact support.
The license contains a mismatch of the capacity values for basic and advanced features. Contact Support.	The capacity licensed for basic features is not equal to the capacity licensed for advanced feature	Contact support.

PART 3

Managing and Monitoring

By the time you have reached this part of the guide, your ScaleIO system should be up and running, all the way through mapping volumes to SDC nodes and installing the license.

The chapters in this part of the guide describe how to use the CLI to manage and monitor ScaleIO activity and components. When applicable, the use of the GUI and the VMware plug-in is also referenced. Chapters include:

[Chapter 6, “Command Quick Reference”](#)

This chapter lists all the CLI commands available to manage and monitor ScaleIO activity.

[Chapter 7, “Security and User Management”](#)

This chapter describes how to create and manage users with different authorization levels.

[Chapter 8, “Setup and Configuration”](#)

This chapter describes how to prepare the MDM and add capacity.

[Chapter 9, “Monitoring System Status”](#)

This chapter describes how to monitor the status of system objects: SDS, MDM, Protection Domains, etc.

[Chapter 10, “Managing System Objects”](#)

This chapter describes how to manage system objects: SDS, MDM, Protection Domains, etc.

[Chapter 11, “iSCSI Configuration”](#)

This chapter describes how to manage and monitor iSCSI initiators.

[Chapter 12, “Using the Graphical User Interface”](#)

This chapter describes how to use the GUI to manage and monitor components.

Chapter 13, “Using the VMware Plug-in”

This chapter describes how to use the VMware plug-in to manage and monitor components.

CHAPTER 6

Command Quick Reference

Use the tables in this chapter as a quick-reference for all ScaleIO commands. Each table shows the activities and monitoring options per ScaleIO component, and which management utilities support various commands.

Tables include:

- ◆ [Device activities and monitoring.....](#) 136
- ◆ [iSCSI activities and monitoring.....](#) 137
- ◆ [MDM activities and monitoring.....](#) 137
- ◆ [Protection Domain activities and monitoring](#) 139
- ◆ [SDC activities and monitoring](#) 141
- ◆ [SDS activities and monitoring](#) 142
- ◆ [Storage Pool activities and monitoring](#) 143
- ◆ [User management activities and monitoring.....](#) 145
- ◆ [Volume activities and monitoring](#) 146
- ◆ [Other activities and monitoring](#) 147

You can see all CLI commands, in alphabetical order at [“Alphabetical command list” on page 149](#).

For information on using the ScaleIO CLI, see [“CLI basics” on page 151](#).

Note: Before running CLI commands, you must be logged-in with a user name that has the right to perform the desired commands.

For more information on the login procedure, default credentials, and user roles, see [“Authenticating with the MDM” on page 155](#).

Device activities and monitoring

To do this	To view this	Use this CLI command	Use the GUI	Use the plug-in
Abort device removal		abort_remove_sds_device	Backend > navigate to, and select the SDS > Abort Removal	
Activate a device		activate_sds_device		
Add a device to an SDS		add_sds_device	Backend > navigate to, and select the SDS > Add device	Deployment Wizard + Advanced configuration
Clear one or more device errors		clear_sds_device_error	Backend > navigate to, and select the device > Clear Device Errors	Basic configuration
Modify device capacity		modify_sds_device_capacity	Backend > navigate to, and select the device > Set Device Capacity Limit	
Remove a device from an SDS		remove_sds_device	Backend > navigate to, and select the device > Remove	Basic configuration
	Retrieve device latency meters	query_all_device_latency_meters	Backend > navigate to, and select the device > Device Latency table view and Property Sheet	
	Retrieve device network statistics	query_network_latency_meters	Backend > navigate to, and select the device > various IO table views and Property Sheet	
	Retrieve device statistics	query_device_latency_meters	Backend > navigate to, and select the device > Property Sheet	
	Retrieve device test results	query_device_test_results	Backend > navigate to, and select the device > Property Sheet	

Table 7 Device activities and monitoring

iSCSI activities and monitoring

To do this	To view this	Use this CLI Command	Use the GUI	Use the plug-in
Add an iSCSI initiator		add_scsi_initiator		Deployment Wizard
Map a volume to an iSCSI initiator		map_volume_to_scsi_initiator		Deployment Wizard
Remove an iSCSI initiator		remove_scsi_initiator		Deployment Wizard
Unmap a volume from an iSCSI initiator		unmap_volume_from_scsi_initiator		Deployment Wizard
	Retrieve info for all iSCSI initiators	query_all_scsi_initiators		

Table 8 iSCSI activities and monitoring

MDM activities and monitoring

To do this	To view this	Use this CLI command	Use the GUI	Use the plug-in
Activate an MDM cluster		switch_to_cluster_mode		Deployment Wizard
Add a primary or single MDM		add_primary_mdm		Deployment Wizard
Add a secondary MDM		add_secondary_mdm		Deployment Wizard
Add an MDM tie-breaker		add_tb		Deployment Wizard
Modify the IP address of an existing MDM		modify_management_ip		
Remove an MDM tie-breaker		remove_tb		
Remove the secondary MDM		remove_secondary_mdm		

Table 9 MDM activities and monitoring (page 1 of 2)

To do this	To view this	Use this CLI command	Use the GUI	Use the plug-in
Set data obfuscation		set_obfuscation_properties¹		
Set the license		set_license		
Switch MDM cluster ownership		switch_mdm_ownership		
Switch MDM cluster to single mode		switch_to_single_mode		
Restrict remote access to MDM to read-only commands		set_remote_read_only_limit_state		
Enable\Disable restricted SDC mode		set_restricted_sdc_mode		
Allow SDC access to the MDM		add_sdc		
Prevent SDC access to the MDM		remove_sdc		
	Retrieve license information	query_license	Preferences menu > About (top right corner)	
	MDM cluster query	query_cluster	Backend > select System> Property Sheet	
	MDM remote access restriction state	query_remote_read_only_limit_state		
	Retrieve restricted SDC mode state	query_restricted_sdc_mode		
	Retrieve approved SDCs in restricted SDC mode	query_all_approved_sdc		

Table 9 MDM activities and monitoring (page 2 of 2)

1. This command is only enabled with an enterprise license.

Protection Domain activities and monitoring

To do this	To view this	Use this CLI command	Use the GUI	Use the plug-in
Activate a protection domain		activate_protection_domain	Backend › navigate to, and select the Protection Domain › Activate Protection Domain	
Add a fault set		add_fault_set	Backend › navigate to, and select the Protection Domain › Add Fault Set (Fault Set will only be visible in the Related Objects section of the Protection Domain's Property Sheet)	Basic configuration
Add a protection domain		add_protection_domain	Backend › select System › Add Protection Domain	Deployment Wizard + Basic configuration
Inactivate a Protection Domain		inactivate_protection_domain	Backend › navigate to, and select the Protection Domain › Inactivate Protection Domain	
Remove a fault set		remove_fault_set		Deployment Wizard + Basic configuration
Remove a protection domain		remove_protection_domain	Backend › navigate to, and select the Protection Domain › Remove	Basic configuration
Remove all SDSs from a Fault Set		clear_fault_set		
Rename a fault set		rename_fault_set		
Rename a protection domain		rename_protection_domain	Backend › navigate to, and select the Protection Domain › Rename	
	Single Fault Set query	query_fault_set		

Table 10 Protection Domain activities and monitoring (page 1 of 2)

To do this	To view this	Use this CLI command	Use the GUI	Use the plug-in
	Fault Sets query	query_all_fault_sets		
	Protection domain query	query_protection_domain	• Dashboard › Cluster › Protection Domains pane • Backend › navigate to, and select the Protection Domain › Property Sheet	Used for viewing

Table 10 Protection Domain activities and monitoring (page 2 of 2)

SDC activities and monitoring

To do this	To view this	Use this CLI command	Use the GUI	Use the plug-in
Remove SDC		remove_sdc		
Rename an SDC		rename_sdc		
Add an MDM definition to an SDC (usually to add the SDC to an additional SIO system)		drv_cfg --add_mdm¹		
Configure the GUID of an MDM on an SDC		drv_cfg --set_guid¹		
Load an MDM configuration file to an SDC		drv_cfg --load_cfg_file¹		
Modify an existing MDM IP's address configured on an SDC		drv_cfg --mod_mdm_ip¹		
Abort SDC removal		abort_remove_sdc		
	SDC query	query_sdc		
	All SDCs query	query_all_sdc	Dashboard > Cluster > Clients pane	Used for viewing
	Query all active tgt objects	drv_cfg --query_tgts¹		
	Query GUIDs	drv_cfg --query_guid¹		
	Query SCSI initiators	drv_cfg --query_scsi_initiators¹		
	Query to determine to which MDM an SDC is connected	drv_cfg --query_mdms¹		

Table 11 SDC activities and monitoring

1. The `drv_cfg` command line is a local CLI utility that affects only the client on which the SDC is running (unlike the ScaleIO CLI which may affect the entire system). Refer to the documentation or the on-line help for the correct usage.

SDS activities and monitoring

To do this	To view this	Use this CLI command	Use the GUI	Use the plug-in
Add an IP address to an SDS		add_sds_ip	Backend > navigate to, and select SDS > Configure IP Addresses	
Add SDS nodes		add_sds	Backend > navigate to, and select a Protection Domain > Add SDS	Deployment Wizard
Change the SDS port used by SIO		modify_sds_port	Backend > navigate to, and select SDS > Configure IP Addresses	
Disable RAM cache of the SDS		disable_sds_rmcache	Backend > navigate to, and select SDS > Configure RAM Cache	
Enable RAM cache of the SDS		enable_sds_rmcache	Backend > navigate to, and select SDS > Configure RAM Cache	
Modify an SDS IP role		modify_sds_ip_role	Backend > navigate to, and select SDS > Configure IP Addresses	
Name\Rename an SDS		rename_sds	Backend > navigate to, and select SDS > Rename	
Remove an IP address from an SDS		remove_sds_ip	Backend > navigate to, and select SDS > Configure IP Addresses	
Set SDS rebalance and rebuilt limits		set_sds_network_limits	Backend > navigate to, and select Protection Domain > Set Network Throttling (configures all SDSs in the specified Protection Domain)	

Table 12 SDS activities and monitoring (page 1 of 2)

To do this	To view this	Use this CLI command	Use the GUI	Use the plug-in
Set the RAM cache size of the SDS		set_sds_rmcache_size	Backend > navigate to, and select SDS > Configure RAM Cache	
Test SDS device		start_device_test		
Test the SDS network		start_sds_network_test		
	All SDSs query	query_all_sds	Dashboard > SDSs tile Backend > Filter by SDSs and toggle between various table views	
	Query volumes	drv_cfg --query_vols¹	Dashboard > Volumes tile Backend > filter by Volumes > toggle between various table views	
	Retrieve network test results	query_sds_network_test_results		
	Single SDS query	query_sds	Backend > Filter for the SDS > select SDS in table and either open its Property Sheet or toggle between various table views	

Table 12 SDS activities and monitoring (page 2 of 2)

Storage Pool activities and monitoring

To do this	To view this	Use this CLI command	Use the GUI	Use the plug-in
Add a storage pool		add_storage_pool	Backend > navigate to, and select a Protection Domain > Add Storage Pool	Deployment Wizard + Basic configuration
Modify spare capacity policy		modify_spare_policy	Backend > navigate to, and select the Storage Pool > Configure Spare Percentage Policy	

Table 13 Storage Pool activities and monitoring (page 1 of 3)

To do this	To view this	Use this CLI command	Use the GUI	Use the plug-in
Modify storage pool's zero padding policy		modify_zero_padding_policy	Backend › navigate to, and select the Storage Pool › Modify Zero Padding	
Remove a storage pool		remove_storage_pool	Backend › navigate to, and select the Storage Pool › Remove	Basic configuration
Rename a storage pool		rename_storage_pool	Backend › navigate to, and select the Storage Pool › Rename	
Set the RAM cache write handling mode of the storage pool		set_rmcache_write_handling_mode	Backend › navigate to, and select the Storage Pool › Configure RAM Cache	
Control the RAM cache usage of a Storage Pool		set_rmcache_usage	Backend › navigate to, and select Storage Pool › Configure RAM Cache	
Set the rebuild policy		set_rebuild_policy	Backend › navigate to, and select the Storage Pool › Set I/O Priority	
Set the rebuild mode		set_rebuild_mode	Backend › navigate to, and select the Storage Pool › Enable/Disable Rebuild/Rebalance	
Set the rebalance policy		set_rebalance_policy	Backend › navigate to, and select the Storage Pool › Set I/O Priority	
Set the rebalance mode		set_rebalance_mode	Backend › navigate to, and select the Storage Pool › Enable/Disable Rebuild/Rebalance	

Table 13 Storage Pool activities and monitoring (page 2 of 3)

To do this	To view this	Use this CLI command	Use the GUI	Use the plug-in
	Storage pool query	query_storage_pool	- Dashboard › navigate to Protection Domain node › Storage Pools tile - Backend › Filter for Storage Pool › select the Storage Pool in table and either open its Property Sheet or toggle various table views	

Table 13 Storage Pool activities and monitoring (page 3 of 3)

User management activities and monitoring

To do this	To view this	Use this CLI command	Use the GUI	Use the plug-in
Add a user		add_user		
Change a user's password		set_password		
Delete a user		delete_user		
Login		login	Start the application; use the Login window	
Logout		logout	Preferences menu › Logout (top right corner)	
Modify user credentials		modify_user		
Reset a user's password		reset_password		

Table 14 User management activities and monitoring (page 1 of 2)

To do this	To view this	Use this CLI command	Use the GUI	Use the plug-in
Reset an admin user (special conditions required)		reset_admin		
	Display information about a user	query_user		
	Display system users and their roles	query_users		

Table 14 User management activities and monitoring (page 2 of 2)

Volume activities and monitoring

To do this	To view this	Use this CLI command	Use the GUI	Use the plug-in
Create a volume		add_volume		Advanced configuration
Detect new volumes		drv_cfg --rescan		
Increase volume capacity		modify_volume_capacity		
Map a volume to an SDC		map_volume_to_sdc		Advanced configuration
Remove a volume		remove_volume		Advanced configuration
Remove consistency group snapshots		remove_consistency_group_snapshots		
Rename a volume		rename_volume		

Table 15 Volume activities and monitoring (page 1 of 2)

1. The `drv_cfg` command line is a local CLI utility that affects only the client on which the SDC is running (unlike the ScaleIO CLI which may affect the entire system). Refer to the documentation or the on-line help for the correct usage.
2. This command is only enabled with an enterprise license.
3. In some circumstances, this command is only enabled with an enterprise license.

To do this	To view this	Use this CLI command	Use the GUI	Use the plug-in
Set volume bandwidth limits		set_sdc_volume_limits²		
Take a snapshot of a volume		snapshot_volume²		
Unmap a volume		unmap_volume_from_sdc		Advanced configuration
	All volumes query	query_all_volumes	Dashboard › System Overview › Volumes tile	
	Retrieve volume bandwidth limits	query_sdc_volume_limits		

Table 15 Volume activities and monitoring (page 2 of 2)

1. The `drv_cfg` command line is a local CLI utility that affects only the client on which the SDC is running (unlike the ScaleIO CLI which may affect the entire system). Refer to the documentation or the on-line help for the correct usage.
2. This command is only enabled with an enterprise license.
3. In some circumstances, this command is only enabled with an enterprise license.

Other activities and monitoring

To do this	To view this	Use this CLI command	Use the GUI	Use the plug-in
Configure the facility field for syslog events		set_syslog_facility		Deployment Wizard
Set capacity threshold alert		set_capacity_alerts_threshold	Backend › select System › Set Capacity Alert Thresholds	
Get help on a CLI command		help		
Rename the system		rename_system	Backend › select System table row › Rename	
Show events		showevents.py		
Start sending events to a remote syslog server		start_remote_syslog		

Table 16 Other activities and monitoring (page 1 of 2)

To do this	To view this	Use this CLI command	Use the GUI	Use the plug-in
Stop sending events to a remote syslog server		stop_remote_syslog		
	General query	query_all	Dashboard Backend › Overview or Configuration table views › Property Sheets for more details	
	General property query	query_properties		
	Remote syslog query	query_remote_syslog		

Table 16 Other activities and monitoring (page 2 of 2)

Alphabetical command list

The following table lists all CLI commands in alphabetical order:

Table 17 CLI commands

Command...Page	Command...Page	Command...Page
abort_remove_sds 230	abort_remove_sds_device 234	activate_protection_domain 272
activate_sds_device 240	add_fault_set 174	add_primary_mdm 166
add_protection_domain 173	add_scsi_initiator 289	add_sdc 285
add_sds 178	add_sds_device 231	add_sds_ip 226
add_secondary_mdm 168	add_storage_pool 175	add_tb 168
add_user 157	add_volume 116	clear_fault_set 275
clear_sds_device_error 236	delete_user 158	disable_sds_rmcache 252
drv_cfg --add_mdm 257	drv_cfg --load_cfg_file 260	drv_cfg --mod_mdm_ip 258
drv_cfg --query_guid 212	drv_cfg --query_mdms 210	drv_cfg --query_scsi_initiators 212
drv_cfg --query_tgts 211	drv_cfg --query_vols 211	drv_cfg --rescan 119
drv_cfg --set_guid 259	enable_sds_rmcache 251	help 153
inactivate_protection_domain 271	login 155	logout 156
map_volume_to_scsi_initiator 291	map_volume_to_sdc 118	modify_management_ip 170
modify_sds_device_capacity 235	modify_sds_ip_role 227	modify_sds_port 228
modify_spare_policy 176	modify_user 159	modify_volume_capacity 222
modify_zero_padding_policy 273	query_all 183	query_all_approved_sdc 204
query_all_device_latency_meters 213	query_all_fault_sets 206	query_all_scsi_initiators 293
query_all_sdc 210	query_all_sds 208	query_all_volumes 213
query_cluster 202	query_device_latency_meters 242	query_device_test_results 239
query_fault_set 205	query_license 214	query_network_latency_meters 243
query_properties 191	query_protection_domain 204	query_remote_read_only_limit_state 203

Table 17 CLI commands (continued)

Command...Page	Command...Page	Command...Page
query_remote_syslog 214	query_restricted_sdc_mode 203	query_sdc 209
query_sdc_volume_limits 256	query_sds 207	query_sds_network_test_results 242
query_storage_pool 206	query_user 160	query_users 160
remove_consistency_group_snaps_hots 220	remove_fault_set 274	remove_protection_domain 264
remove_scsi_initiator 290	remove_sdc 285	remove_sds 229
remove_sds_device 233	remove_sds_ip 228	remove_secondary_mdm 279
remove_storage_pool 264	remove_tb 280	remove_volume 221
rename_fault_set 276	rename_protection_domain 262	rename_sdc 256
rename_sds 225	rename_storage_pool 263	rename_system 286
rename_volume 218	reset_admin 163	reset_password 161
set_capacity_alerts_threshold 177	set_drl_properties 245	set_license 171
set_num_of_io_buffers 246	set_obfuscation_properties 172	set_password 161
set_rebalance_mode 266	set_rebalance_policy 269	set_rebuild_mode 265
set_rebuild_policy 267	set_remote_read_only_limit_state 283	set_restricted_sdc_mode 284
set_rmcache_usage 249	set_rmcache_write_handling_mode 250	set_sdc_volume_limits 255
set_sds_network_limits 244	set_sds_rmcache_size 253	set_syslog_facility 390
set_volume_rmcache_usage 248	showevents.py 388	snapshot_volume 218
start_device_test 237	start_remote_syslog 389	start_sds_network_test 241
stop_remote_syslog 390	switch_mdm_ownership 279	switch_to_cluster_mode 169
switch_to_single_mode 278	unmap_volume_from_scsi_initiator 292	unmap_volume_from_sdc 223

CLI basics

The CLI enables you to perform all provision, maintain, and monitor activities in ScaleIO.

This section describes CLI basics and the commands used to create and map volumes. Other CLI commands are described in Part 3, “Managing and Monitoring.”

The CLI is installed as part of the MDM component and can be found in the following path:

- ◆ **Linux and VMware**—`scli`
- ◆ **Xen**—`siocli`
- ◆ **Windows**—`C:\Program Files\emc\scaleio\MDM\bin`

All CLI commands use the following format:

- ◆ **Linux and VMware**
`scli [--mdm_ip <IP>] <command>`
- ◆ **Xen**
`siocli [--mdm_ip <IP>] <command>`
- ◆ **Windows**
`./cli [--mdm_ip <IP>] <command>`

Description:

Execute a CLI command

Parameter	Description
--mdm_ip <IP>	In a non-clustered environment, use the MDM IP address. In a clustered environment, use the IP addresses of the primary and secondary MDM. If the CLI does not reside on the MDM, the --mdm_ip parameter must be added to every CLI command.
<command>	Command to be executed

```
scli --mdm_ip 10.10.10.3,10.10.10.4 --query_all
```

The `mdm_ip` indicates the MDM that receives and is to execute the command. If the command is run from the Primary MDM, this switch may be omitted.

If you want to avoid using the `--mdm_ip` parameter in every command, or avoid having to install the CLI on servers other than the MDM, log in to the CLI via SSL, using a terminal application.

Note: The order of the parameters and command is insignificant.
CLI commands are lowercase and case-sensitive.
All parameters are preceded with `--`

Before using the CLI, you must first log in, as described in [“Logging in” on page 155](#).

Syntax

All names of objects in the system will be capitalized, for example, Protection Domain. In the case where the name is in fact initials it will be in uppercase, for example, MDM.

The actual CLI command format uses the following format:

- ◆ Message - Required
- ◆ <> - Argument
- ◆ () – Required element
- ◆ [] – Optional element
- ◆ | - Select from options A|B|C

Each command entry uses the above syntax and looks like the following example:

Usage:
`scli --cmd_example --r1 (--r2 | --r3 <V1>) [o1 <V2>|o2]`
[Options]

Description: a description of what `cmd_example` does

Parameter	Description
<code>--r1</code>	r1 description
<code>--r2</code>	r2 description
<code>--r3 <V1></code>	r3 description with possible V1 input values

--o1 <V2>	o1 description with possible V2 input values
--o2	o2 description
Options: CHOOSE SEVERAL	
--so1 <V3>	so1 description with possible V3 input values
--so2	so2 description

The interpretation is as follows:

- ◆ The text `scli --cmd_example r1` is mandatory.
- ◆ The `(--r2 | --r3 <V1>)` indicates that you must choose one of the options separated by “|”. Selecting an option is REQUIRED, indicated by “()”.
- ◆ The `[o1 <V2> | o2]` indicates that you may choose one of the options separated by “|”. Selecting an option is OPTIONAL, indicated by “[]”.
- ◆ The `[Options]` indicates that you may choose one of the options that will be described in the table under Options. It is OPTIONAL, indicated by “[]”.

Getting help with the CLI

The CLI supports auto-completion. To complete a command or parameters, press the TAB key while typing CLI commands.

Note: In Windows, ScaleIO does not support auto-completion.

Alternately, you can run the help command.

Command

`help`

Syntax

`scli --help [Options]`

Description/Notes

Use this command to view CLI help.

Parameters

Parameter	Description
Options: CHOOSE ONE	
mdm	Help on MDM commands
sds	Help on SDS commands
vol	Help on volume-related commands
sdc	Help on SDC commands
SCSI	Help on SCSI related commands
general	Help on general commands
all	Help on all commands
user	Help on commands related to user management
<blank>	List options

Example

```
scli --help --mdm
```

CHAPTER 7

Security and User Management

This chapter describes first steps that are needed to use the CLI and how to create and manage users. Topics include:

- ◆ [Authenticating with the MDM 155](#)
- ◆ [Adding and modifying users 157](#)

Authenticating with the MDM

This section describes how to authenticate with the MDM. Activities include:

- ◆ [“Logging in” on page 155](#)
- ◆ [“Logging out” on page 156](#)

To access the CLI, you must first log in, using a terminal application. If the CLI and the MDM do not reside on the same server, add the `--mdm_ip` parameter to all CLI commands. In a non-clustered environment, use the MDM IP address. In a clustered environment, use the IP addresses of the primary and secondary MDMs, separated by a comma. For example:

```
scli --mdm_ip 10.10.10.3,10.10.10.4 --login --username  
supervisor1
```

You will be prompted to enter the password.

The default MDM user created during setup is an administrator user, with the *admin* user name.

Logging in

Command

```
login
```

Syntax

```
scli --login --username <NAME> [--password <PASSWORD>]
```

Description/Notes

This command logs the specified user into the CLI management system. Every user must log in before performing CLI commands.

When a user is authenticated by the system, all commands performed will be done with their respective role until a logout is performed, or until the session expires, by reaching one of the following timeouts:

- ◆ Maximum session length (default: 8 hours)
- ◆ Session idle time (default: 10 minutes)

During installation with the installation manager or the VMware plug-in, the password for the *admin* user is reset. You should log in with the new password.

If you installed ScaleIO manually, after logging in the first time (with the default password, *admin*), you will need to change the password and log in again. Once that is accomplished, the *admin* user can create additional users.

Parameters

Parameter	Description
--username	User name
--password	User password. If you do not type your password, you will be prompted to do so. Note: Note: In Linux, to prevent the password from being recorded in the history log, leave out the <code>--password</code> flag and enter the password interactively.

Example

```
scli --login siouser1 --password 1!2@3A
```

Logging out

Command

logout

Syntax

```
scli --logout
```

Description/Notes

This command logs the current user out of the system.

Example

```
scli --logout
```

Adding and modifying users

This section describes how to add and modify users. Activities include:

- ◆ [“Adding users” on page 157](#)
- ◆ [“Deleting users” on page 158](#)
- ◆ [“Modifying user credentials” on page 159](#)
- ◆ [“Displaying system users and their roles” on page 160](#)
- ◆ [“Displaying information about a specific user” on page 160](#)
- ◆ [“Resetting user passwords” on page 161](#)
- ◆ [“Changing user passwords” on page 161](#)
- ◆ [“Resetting the admin user password” on page 162](#)

Administrator users can create other users, with the following roles:

User role	Query	Configure parameters	Configure user credentials
Monitor	Yes		
Configure	Yes	Yes	
Administrator	Yes	Yes	Yes

When a new user is created, the administrator that created the user will receive an automatically-generated password that is required for first-time authentication. When the new user logs in the first time, they are required to change this password.

Adding users

Command

```
add_user
```

Syntax

```
scli --add_user --username <NAME> --user_role  
<Monitor|Configure|Administrator>
```

Description/Notes

This command, only available to administrator roles, adds a user to the system. A random generated password for the created user is returned.

Note: When adding users, you may need to use the “ or ‘ characters to enable the use of Bash syntax characters.

Parameters

Parameter	Description
--username	The user name to add to the system
--user_role	The user role: • monitor read only • configure view and configure all parameters except for user credentials • administrator view and configure all parameters (administrator)

Example

```
scli --add_user --username siouser2 --user_role  
configure
```

Deleting users

Command

```
delete_user
```

Syntax

```
scli --delete_user --username <NAME>
```

Description/Notes

This command, only available to administrator roles, deletes the specified user from the system.

Parameters

Parameter	Description
--username	User name to delete

Example

```
scli --delete_user --username siouser2
```

Modifying user credentials

Command

```
modify_user
```

Syntax

```
scli --modify_user (--user_id <ID>|--username <NAME>)  
--user_role <Monitor|Configure|Administrator>
```

Description/Notes

This command, only available to administrator roles, modifies the user role of the specified user in the system.

Parameters

Parameter	Description
--user_id	The ID number of the user to modify. You can obtain the user ID from the query_users command, or when adding the user.
--username	The user name of the user to modify
--user_role	The new user role: • monitor read only • configure view and configure all parameters except for user credentials • administrator view and configure all parameters (administrator)

Example

```
scli --modify_user --username siouser3 --user_role
monitor
```

Displaying system users and their roles

Command

```
query_users
```

Syntax

```
scli --query_users
```

Description/Notes

This command, only available to administrator roles, displays all the users defined in the system, their roles, and user ID.

Example

```
scli --query_users
```

Displaying information about a specific user

Command

```
query_user
```

Syntax

```
scli --query_user (--user_id <ID> | --username <NAME>)
```

Description/Notes

This command, only available to administrator roles, displays information about the specified user.

Parameters

Parameter	Description
--user_id	The user ID of the user. You can obtain the user ID via the query_users command, or when adding the user.
--username	The name of the user

Example

```
scli --query_user --username sio_user
```

Resetting user passwords

Command

```
reset_password
```

Syntax

```
scli --reset_password (--user_id <ID> | --username <NAME>)
```

Description/Notes

This command, only available to administrator roles, generates a new password for the specified user. The user will need to change the password again after logging in with this password.

Parameters

Parameter	Description
--user_id	The user ID of the user whose password will be reset. You can obtain the user ID from the query_users command, or when adding the user.
--username	The user name of the user whose password will be reset

Example

```
scli --reset_password --username siouser3
```

Changing user passwords

Command

```
set_password
```

Syntax

```
scli --set_password [--old_password <OLD_PASSWORD>]
[--new_password <NEW_PASSWORD>]
```

Description/Notes

This command, only available to administrator roles, changes the password of the user that is currently logged in to the system.

Parameters

Parameter	Description
--old_password	User's current password. Note: In Linux, to prevent the password from being recorded in the history log, leave out the --old_password flag and enter the password interactively.
--new_password	User's new password. Note: In Linux, to prevent the password from being recorded in the history log, leave out the --new_password flag and enter the password interactively. Password rules: • Must be between 6 (default, configurable) and 31 characters • Presence of least 3 groups out of [a-z], [A-Z], [0-9], special characters (!@#\$...) • The current password is not allowed

Example

```
scli --set_password --old_password 1!2@3A
--new_password P9*7&6
```

Resetting the admin user password

You can reset the password of the default *admin* user, using a combination of a file written to the MDM, and the **reset_admin** CLI command. You must have write privileges on the MDM to complete this task.

Note: There may be multiple users defined in your system with Administrator roles. This section refers only to the default built-in *admin* user. You can reset the other administrator user passwords like any other user.

Command

`reset_admin`

Syntax

`scli --reset_admin [--i_am_sure]`

where `--i_am_sure` is an optional parameter which makes the operation skip the safety questions (For example: “Are you sure?”).

To reset the *admin* user password, perform the following steps:

1. Create a text file called `MDM_SERVICE_MODE` on the MDM, in the location corresponding to your operating system:
 - **Windows:** `C:\Program Files\emc\scaleio\MDM\logs`
 - **Linux:** `/opt/emc/scaleio/mdm/logs/`
2. In the body of the file, type the text **Reset Admin**, and save the file.
3. In the CLI, type the command `scli --reset_admin`.

The *admin* user password is reset to **admin**.

CHAPTER 8

Setup and Configuration

This chapter describes how to use the CLI to set up and configure ScaleIO. Topics include:

- ◆ [Preparing the MDM 165](#)
- ◆ [Adding capacity 173](#)
- ◆ [Creating and mapping volumes 182](#)

Note: Before running CLI commands, you must be logged-in with a user name that has the right to perform the desired commands.

Preparing the MDM

This section describes CLI commands used in the preparation of the MDM. For the most part, these tasks are performed during installation by the Installation Manager or the VMware deployment wizard.

Topics include:

- ◆ [“Setting up a single or Primary MDM” on page 166](#)
- ◆ [“MDM cluster setup” on page 167](#)
- ◆ [“Setting up the secondary MDM” on page 168](#)
- ◆ [“Adding a Tie-Breaker \(TB\)” on page 168](#)
- ◆ [“Activating the MDM cluster” on page 169](#)
- ◆ [“Setting the license” on page 171](#)
- ◆ [“Setting data obfuscation” on page 172](#)

Setting up a single or Primary MDM

Command

```
add_primary_mdm
```

Syntax

```
scli --add_primary_mdm --primary_mdm_ip <IP>  
[--mdm_management_ip <IP>] [--accept_license]
```

Description/Notes

Add the Primary MDM to the MDM configuration.

This command adds a single MDM, or the initial Primary MDM in cluster configuration. As part of the command process, the license agreement is displayed for acceptance.

NOTICE

It is not recommended to use Single Mode in production systems, except in temporary situations. The MDM contains all the metadata required for system operation. Single Mode has no protection, and exposes the system to a single point of failure.

Parameters

Parameter	Description
<code>--primary_mdm_ip <IP></code>	A comma-separated list (no space after the commas) of up to eight IP addresses associated with the Primary MDM, to be used for MDM cluster internal control communications. Note: You must configure the IP addresses in the MDM nodes.
<code>--mdm_management_ip <IP></code>	A comma-separated list (no space after the commas) of up to eight IP addresses, to be used to manage the MDM. Note: You must configure the IP addresses in the MDM nodes.
<code>--accept_license</code>	Skip the license agreement confirmation

Example

```
scli --mdm_ip 192.168.1.4,192.168.1.5
--add_primary_mdm --mdm_management_ip
192.168.1.10,192.168.1.11
```

MDM cluster setup

It is recommended to activate the MDM on two nodes, primary and secondary.

Because IP communication is needed for ScaleIO to function, the MDM IP address must always be up and running. If the IP address of the primary node is down, the secondary node will take over.

On Windows, there are two IP addresses, one for each MDM known to all SDCs and clients.

An MDM can be installed on any server. For example, one MDM can run on an application server, while the second MDM can run on any other server, for example one of the SDS nodes.

Note: For CLI commands, in cluster mode, use the IP address of the Primary MDM.

Setting up the secondary MDM

Command

`add_secondary_mdm`

Syntax

```
scli --add_secondary_mdm --secondary_mdm_ip <IP>
[--secondary_mdm_port <PORT>]
```

Description/Notes

Add the Secondary MDM to the MDM cluster configuration.

This command adds an MDM in cluster configuration that will serve as the initial Secondary MDM in cluster mode.

Parameters

Parameter	Description
<code>--secondary_mdm_ip <IP></code>	A comma-separated list (no space after the commas) of IP addresses associated with the Secondary MDM
<code>--secondary_mdm_port <PORT></code>	Port of the Secondary MDM (default: 9011)

Example

```
scli --mdm_ip 192.168.1.4 --add_secondary_mdm
--secondary_mdm_ip 192.168.1.6
```

Adding a Tie-Breaker (TB)

Command

`add_tb`

Syntax

```
scli --add_tb --tb_ip <IP> [--tb_port <PORT>]
[--force_clean] [--i_am_sure]
```

Description/Notes

Add the Tie-Breaker to the MDM cluster configuration.

Parameters

Parameter	Description
--tb_ip <IP>	A comma-separated list (no space after the commas) of IP addresses associated with the Tie-Breaker
--tb_port <PORT>	Port of the Tie-Breaker (default: 9011)
--force_clean	Remove the previous Tie-Breaker configuration
--i_am_sure	Skip the safety questions for command execution (For example: "This could damage the stored data. Are you sure?")

Example

```
scli --mdm_ip 192.168.1.200 --add_tb --tb_ip
192.168.1.5
```

Activating the MDM cluster

Command

```
switch_to_cluster_mode
```

Syntax

```
scli --switch_to_cluster_mode
```

Description/Notes

Switch MDM to cluster mode. This command activates the MDM cluster.

After you activate the cluster, you can run the **query_cluster** command to make sure that it is running properly. For more information, see [“MDM cluster query” on page 202](#).

Parameters

Not applicable.

Example

```
scli --mdm_ip 192.168.1.200 --switch_to_cluster_mode
```

Modifying an MDM’s management IP address

Command

`modify_management_ip`

Syntax

```
--modify_management_ip ( --mdm_management_ip <IP> |  
--clear_all )
```

Description/Notes

Modifies the MDM cluster’s management IP addresses. If you are using this command to add additional management IP addresses, you must enter all the existing IP addresses in the command, and add the new ones at the end. Up to 8 IP addresses are supported.

NOTICE

If you modify MDM IP addresses, ensure that you implement this change in all components and interfaces which are mapped to the MDM.

For example:

GUI: In the Login window, login using the new IP address, and clear the old IP address from the history, if it is now obsolete.

REST Gateway and OpenStack: Modify the mapping in the REST Gateway to the new management IP address

SDCs: If for any reason, the management IP address does not get updated in the SDC, use the non-cli command `/opt/emc/scaleio/sdc/bin/drv_cfg`

`--mod_mdm_ip`. If the SDC is mapped to more than one ScaleIO system, use the non-CLI command `/opt/emc/scaleio/sdc/bin/drv_cfg --add_mdm`

vSphere: Using the vSphere web plugin interface, unregister the ScaleIO system, and re-register it with the new IP address.

Parameters

Parameter	Description
<code>--mdm_management_ip <IP></code>	IP address to be used to manage the MDM
<code>--clear_all</code>	Clear all management IP addresses

Example

```
scli --modify_management_ip --mdm_management_ip  
192.168.1.10,192.168.1.11,192.168.1.12
```

Setting the license

Command

```
set_license
```

Syntax

```
scli --set_license --license_file <LICENSE_FILE>]
```

Description/Notes

Setting the license is a precondition for all other configuration commands. The ScaleIO license can be used based on several schemes: capacity, time, or both, depending on your system's needs. To set the system license, you must first obtain a license from EMC. The license is flexible and can be changed on-the-fly.

Parameters

Parameter	Description
--license_file <LICENSE_FILE>	Path to a file containing the license key value supplied by EMC

Example

```
scli --mdm_ip 192.168.1.200 --set_license  
--license_file /tmp/0239SH4SS89023T6.lic
```

Setting data obfuscation

Command

```
set_obfuscation_properties
```

Syntax

```
scli --set_obfuscation_properties  
(--use_obfuscation | --dont_use_obfuscation)
```

Description/Notes

By default, volume data is not obfuscated. You can use this command to change the global default. The default value can be overridden when using the **add_volume** command, on a per volume basis.

Note: The obfuscation feature is enabled for enterprise licenses, as well as during the 10-day trial period. If you use this command to change the default to use obfuscation, and then continue without an enterprise license, you will need to change the default back to not using obfuscation before you can create volumes.

Parameters

Parameter	Description
--use_obfuscation	Obfuscate the data of newly created volumes.
--dont_use_obfuscation	Do not obfuscate the data of newly created volumes.

-Example

```
scli --mdm_ip 192.168.1.200  
--set_obfuscation_properties --use_obfuscation
```

Adding capacity

This section describes CLI commands used to add capacity to the ScaleIO system.

Topics include:

- ◆ [“Adding a Protection Domain” on page 173](#)
- ◆ [“Adding a Fault Set” on page 174](#)
- ◆ [“Adding a Storage Pool” on page 175](#)
- ◆ [“Modifying spare policy” on page 176](#)
- ◆ [“Setting a capacity alert threshold” on page 177](#)
- ◆ [“Adding SDS nodes and devices” on page 178](#)

Adding a Protection Domain

Command

```
add_protection_domain
```

Syntax

```
scli --add_protection_domain [--protection_domain_name  
<NAME>]
```

Description/Notes

Add a Protection Domain, with a name that meets the following requirements:

You can define object names, according to the following rules:

1. Contain less than 32 characters
2. Contain only alphanumeric and punctuation characters
3. Be unique within the object type

When a name has not been defined, the system may display default system-defined names, as follows:

- ◆ SDS—its first IP address
- ◆ Device—the path to the device
- ◆ All other objects—the object’s ID

ScaleIO objects are assigned a unique ID that can be used to identify the object in CLI commands. You can retrieve the ID via a query, or via the object’s property sheet in the GUI.

Parameters

Parameter	Description
<code>--protection_domain_name <NAME></code>	A unique name to be associated with the created Protection Domain

Example

```
scli --mdm_ip 192.168.1.200 --add_protection_domain
--protection_domain_name rack_1.1
```

Adding a Fault Set**Command**

```
add_fault_set
```

Syntax

```
scli --add_fault_set (--protection_domain_id <ID> |
--protection_domain_name <NAME>) [--fault_set_name
<NAME>]
```

Description/Notes

This command adds an empty Fault Set to the specified Protection Domain. The Fault Set is enabled by default. Fault Sets provide additional safeguards for protecting your data against hardware failure. Fault Sets are subsets of a given Protection Domain. When you define SDSs later on, you can add them to the Fault Set.

You can define object names, according to the following rules:

1. Contain less than 32 characters
2. Contain only alphanumeric and punctuation characters
3. Be unique within the object type

When a name has not been defined, the system may display default system-defined names, as follows:

- ◆ SDS—its first IP address
- ◆ Device—the path to the device
- ◆ All other objects—the object's ID

ScaleIO objects are assigned a unique ID that can be used to identify the object in CLI commands. You can retrieve the ID via a query, or via the object's property sheet in the GUI.

Parameters

Parameter	Description
<code>--protection_domain_id <ID></code>	The ID of the Protection Domain to which the Fault Set will be added
<code>--protection_domain_name <NAME></code>	The name of the Protection Domain to which the Fault Set will be added
<code>--fault_set_name</code>	The name of the new Fault Set

Example

```
scli --add_fault_set --protection_domain_name sio-pd1
--fault_set_name sio-fs1
```

Adding a Storage Pool

Command

```
add_storage_pool
```

Syntax

```
scli --add_storage_pool (--protection_domain_id <ID> |
--protection_domain_name <NAME>) [--storage_pool_name
<NAME>]
```

Description/Notes

Add a Storage Pool to a Protection Domain. A Storage Pool is a group of devices within a Protection Domain. When a Protection Domain is created, a default Storage Pool called **default** is automatically added to it. Each time that you add devices to the system, you must map them to Storage Pools. If you intend to use additional Storage Pools (and not just the default ones), you should create them before you start adding SDSs and devices to the system.

Each Protection Domain must contain at least one Storage Pool (either the default one, or a user-defined one). You cannot remove all the Storage Pools from a Protection Domain.

You can define object names, according to the following rules:

1. Contain less than 32 characters
2. Contain only alphanumeric and punctuation characters
3. Be unique within the object type

When a name has not been defined, the system may display default system-defined names, as follows:

- ◆ SDS—its first IP address
- ◆ Device—the path to the device
- ◆ All other objects—the object's ID

ScaleIO objects are assigned a unique ID that can be used to identify the object in CLI commands. You can retrieve the ID via a query, or via the object's property sheet in the GUI.

Parameters

Parameter	Description
--protection_domain_id <ID>	Protection Domain ID
--protection_domain_name <NAME>	Protection Domain name
--storage_pool_name <NAME>	Name to be associated with the created Storage Pool

Example

```
scli --mdm_ip 192.168.1.200 --add_storage_pool
--protection_domain_name rack_1.1
--storage_pool_name sp_1.1_rack_1.1
```

Modifying spare policy

Command

`modify_spare_policy`

Syntax

```
scli --modify_spare_policy (--protection_domain_id
<ID> | --protection_domain_name <NAME>)
[--storage_pool_id <ID> | --storage_pool_name <NAME>]
--spare_percentage <PERCENT> [--i_am_sure]
```


Description/Notes

Modify the current spare capacity reservation policy.

To ensure data protection during server failures, ScaleIO reserves 10% of the capacity by default, not allowing it to be used for volume allocation.

To ensure full system protection during the event of a node failure, you must make sure that the spare capacity is at least equal to the amount of capacity in the node containing the maximum capacity or the maximum Fault Set capacity. If all nodes contain equal capacity, it is recommended to set the capacity value to at least 1/N of the total capacity (where N is the number of SDS nodes).

Parameters

Parameter	Description
--protection_domain_id <ID>	Protection Domain ID
--protection_domain_name <NAME>	Protection Domain name
--storage_pool_id <ID>	Storage Pool ID
--storage_pool_name <NAME>	Storage Pool name
--spare_percentage <PERCENT>	Percentage of the total capacity to be set aside as spare
--i_am_sure	Skip the safety questions for command execution (For example: "This could damage the stored data. Are you sure?")

Example

```
scli --mdm_ip 192.168.1.200 --modify_spare_policy
--protection_domain_name rack_1.1
--storage_pool_name --spare_percentage 10
```

Setting a capacity alert threshold**Command**

```
set_capacity_alerts_threshold
```

Syntax

```
scli --set_capacity_alerts_threshold
--capacity_high_threshold <PERCENT>
--capacity_critical_threshold <PERCENT>
```

Description/Notes

Set the threshold for triggering capacity usage alerts.

The alerts thresholds are calculated from each Storage Pool capacity after deducting the defined amount of spare capacity.

Parameters

Parameter	Description
--capacity_high_threshold <PERCENT>	Threshold of the non-spare capacity of the Storage Pool that will trigger a <i>high-priority</i> alert, in percentage format
--capacity_critical_threshold <PERCENT>	Threshold of the non-spare capacity of the Storage Pool that will trigger a <i>critical-priority</i> alert, in percentage format

Note: All commands and parameters are preceded by --

Example

```
scli --mdm_ip 192.168.1.200
--set_capacity_alerts_threshold
--capacity_high_threshold 80
--capacity_critical_threshold 90
```

Adding SDS nodes and devices

Command

add_sds

Syntax

```
scli --add_sds --sds_ip <IP> [--sds_ip_role <ROLE>]
[--sds_port <PORT>] [--protection_domain_id <ID>|
--protection_domain_name <NAME>]
[(--fault_set_id<ID> | --fault_set_name <NAME>)]
--device_path <PATH> [--device_name <NAMES>]
[--rmcache_size_mb <SIZE>]
[--storage_pool_id <ID> | --storage_pool_name <NAME>]
[--sds_name <NAME>] [--force_clean] [--i_am_sure]
[--test_time <TIME>] [Test_Options]
```

Description/Notes

Add an SDS to the specified Protection Domain.

This command links the SDS components to the MDM. It informs the SDS which devices to use, and learns about each device capacity. It enables you to associate multiple IP addresses to the SDS, by a comma-separated list. By default, the command also performs performance tests to the added devices and saves the results.

You can assign a name to the SDS, as well as to SDS devices. This name can assist in future object identification. This can be particularly helpful for SDS devices, as the name will remain constant, even if the path changes.

You can define object names, according to the following rules:

1. Contain less than 32 characters
2. Contain only alphanumeric and punctuation characters
3. Be unique within the object type

When a name has not been defined, the system may display default system-defined names, as follows:

- ◆ SDS—its first IP address
- ◆ Device—the path to the device
- ◆ All other objects—the object's ID

ScaleIO objects are assigned a unique ID that can be used to identify the object in CLI commands. You can retrieve the ID via a query, or via the object's property sheet in the GUI.

You can configure up to eight IP addresses per SDS, each being defined as one of the following roles:

- ◆ **SDC only**
Communication is enabled only between this SDS and SDCs. NOTE: The MDM will not be aware of this IP, and therefore, internal error-checking will not be performed. If an incorrect IP address is supplied, throughput may be affected.
- ◆ **SDS only**
Communication is enabled only between this SDS and other SDS and MDM components
- ◆ **All (default)**
Communication is enabled with all components

You can define a role for every IP address, or use the default for all. Each SDS must have either of the following:

- ◆ at least one IP address with the role *all*
- ◆ two IP addresses with the roles *sdm_only* and *sds_only*

A situation where all IP addresses are either *sdm_only* or *sds_only* is not valid.

IP roles can be configured when adding an SDS, by adding a new IP address to an SDS, or by editing a current IP role.

NOTICE

This command reformats the devices used by the SDS component and erases all existing data!

By default, the performance of each added device is tested before it can be used. The SDS will perform two performance tests on the given devices: random writes and random reads. When the tests are complete, the device capacity is automatically added to the Protection Domain storage used by the MDM. To modify this behavior, specify one of the Test-Option parameters.

Parameters

Parameter	Description
--sds_ip <IP>	A comma-separated list (no space after the commas) of IP addresses or hostnames associated with the SDS over which the data will be transferred
--sds_ip_role <IP>	A comma separated list of IP roles associated with the SDS IP addresses. Each role is either <i>sdm_only</i> , <i>sds_only</i> , or <i>all</i> .
--sds_port <PORT>	Port associated with the SDS (default: 7072)
--protection_domain_id <ID>	Protection Domain ID
--protection_domain_name <NAME>	Protection Domain name
--fault_set_id <ID>	Fault Set ID
--fault_set_name <NAME>	Fault Set name

<code>--device_path <PATH></code>	The full path to the devices to be added, comma-separated. Up to 64 devices can be specified for each SDS. Each device can be a disk, an unmounted partition, or a file that represents free space on a mounted device.
<code>--device_name <NAME></code>	When using this flag to assign names to the SDS devices, the names will be appropriated to the devices in the <code>device_path</code> list, respectively. The amount of names must equal the amount of devices. Comma-separated, no spaces.
<code>--rmcache_size_mb <SIZE></code>	Size of the SDS RAM cache in MB (default: 128 MB)
<code>--storage_pool_id <ID></code>	A comma-separated list (no space after the commas) of Storage Pool IDs to be associated with the storage devices, respectively. If omitted, all devices are associated with the default pool. If one Storage Pool is specified in the list, all devices are associated with it. Otherwise, each device is associated with the Storage Pool situated in the same position in the list.
<code>--storage_pool_name <NAME></code>	A comma-separated list (no space after the commas) of Storage Pool names to be associated with the storage devices, respectively. If omitted, all devices are associated with the default pool. If one Storage Pool is specified in the list, all devices are associated with it. Otherwise, each device is associated with the Storage Pool situated in the same position in the list.
<code>--sds_name <NAME></code>	Name to be associated with the SDS
<code>--force_clean</code>	Clean a previous SDS configuration
<code>--i_am_sure</code>	Skip the safety questions for command execution (For example: "This could damage the stored data. Are you sure?")
<code>--test_time <TIME></code>	The maximum test run-time in seconds (default: 10). The test will stop when it reaches the first of this limit, or the time it takes for 128 MB of data reads and writes.

Test_Options: CHOOSE ONE	
--test_only	Devices will be tested, but not used. To start using their capacity, run the activate_sds_device command.
--no_test	The device capacity will be used without any device testing
<blank>	Read and write test will be run on devices before their capacity is used

Example

```
scli --mdm_ip 192.168.1.200 --add_sds --sds_ip
192.168.1.9,192.168.1.29 -sds_ip_role
sds_only,sdc_only --protection_domain_name rack_1.1
--device_path /dev/cciss/c0d1p3,/dev/cciss/c0d1p4
--device_name sds01,sds02 --sds_name sds_1
```

Creating and mapping volumes

Creating and mapping volumes is described in full in [Chapter 4, “Creating and Mapping Volumes.”](#)

CHAPTER 9

Monitoring System Status

This chapter describes how to use the CLI to monitor the current ScaleIO system status. Topics include:

- ◆ Overview query 183
- ◆ Properties query..... 191
- ◆ MDM queries 202
- ◆ Protection Domain query..... 204
- ◆ Fault Set queries 205
- ◆ Storage Pool query 206
- ◆ SDS queries 207
- ◆ SDC queries 209
- ◆ All volumes query..... 213
- ◆ All device latency meters query 213
- ◆ License query..... 214

You can monitor the ScaleIO system using the following CLI queries or by using the GUI. For more information on GUI monitoring, see [Chapter 12, “Using the Graphical User Interface.”](#)

Note: Before running CLI commands, you must be logged-in with a user name that has the required permissions to perform the desired commands.

Overview query

Command

`query_all`

Syntax

`scli --query_all`

Description/Notes

This command provides aggregated information about all objects in all Protection Domains.

Parameters

Not applicable.

Example

```
scli --mdm_ip 192.168.1.200 --query_all
```

Example output

System Info:

```
Product:  EMC ScaleIO Version: R1_30.0.30
ID:       51fdfbc22efebfd4
```

License info:

```
Installation ID: 0000000000001234
SWID: PVJ4LNCMFLKQDB
Maximum capacity: Unlimited
Usage time left: Unlimited
Enterprise features: Enabled
The system was activated 0 days ago
```

System settings:

```
Volumes are not obfuscated by default
Capacity alert thresholds: High: 80, Critical: 90
Thick volume reservation percent: 0
MDM restricted SDC mode: disabled
```

Query all returned 1 Protection Domain:

```
Protection Domain defaultFD (Id: 6548864300000000) has 1 storage pools, 3 Fault Sets,
6 SDS nodes, 6 volumes and 8.3 TB (8496 GB) available for volume allocation
Operational state is Active
```

```
Storage Pool default (Id: 9a5887e500000000) has 6 volumes and 8.3 TB (8496 GB)
available for volume allocation
```

```
The number of parallel rebuild/rebalance jobs: 2
Rebuild is Enabled and using Limit-Concurrent-IO policy with the following
parameters:
Number of concurrent IOs per device: 1
```

```
Rebalance is Enabled and using Favor-Application-IO policy with the following
parameters:
```

```
Number of concurrent IOs per device: 1, Bandwidth limit per device:
10240 KB per second
Zero padding is enabled
Spare policy: 10% out of total
RAM cache is used
RAM Read Cache write handling mode is 'passthrough'
```

SDS Summary:

```
Total 6 SDS Nodes
6 SDS nodes have membership state 'Joined'
```



```

6 SDS nodes have connection state 'Connected'
22.0 TB (22516 GB) total capacity
16.6 TB (17017 GB) unused capacity
0 Bytes snapshots capacity
3.2 TB (3248 GB) in-use capacity
0 Bytes thin capacity
3.2 TB (3248 GB) protected capacity
0 Bytes failed capacity
0 Bytes degraded-failed capacity
0 Bytes degraded-healthy capacity
0 Bytes unreachable-unused capacity
0 Bytes active rebalance capacity
0 Bytes pending rebalance capacity
0 Bytes active fwd-rebuild capacity
0 Bytes pending fwd-rebuild capacity
0 Bytes active bck-rebuild capacity
0 Bytes pending bck-rebuild capacity
0 Bytes rebalance capacity
0 Bytes fwd-rebuild capacity
0 Bytes bck-rebuild capacity
0 Bytes active moving capacity
0 Bytes pending moving capacity
0 Bytes total moving capacity
2.2 TB (2251 GB) spare capacity
3.2 TB (3248 GB) at-rest capacity
0 Bytes decreased capacity

```

Primary-reads	0 IOPS	0 Bytes per-second
Primary-writes	0 IOPS	0 Bytes per-second
Secondary-reads	0 IOPS	0 Bytes per-second
Secondary-writes	0 IOPS	0 Bytes per-second
Backward-rebuild-reads	0 IOPS	0 Bytes per-second
Backward-rebuild-writes	0 IOPS	0 Bytes per-second
Forward-rebuild-reads	0 IOPS	0 Bytes per-second
Forward-rebuild-writes	0 IOPS	0 Bytes per-second
Rebalance-reads	0 IOPS	0 Bytes per-second
Rebalance-writes	0 IOPS	0 Bytes per-second

Volumes summary:

```

6 thick-provisioned volumes. Total size: 1.6 TB (1624 GB)
6 volumes mapped to all SDC nodes

```

Table 18 query_all command output (page 1 of 6)

Output	Description
System Info	
Product	The ScaleIO software version of the system
ID	The system ID number
License Info	
Installation ID	The Installation ID number, which is required for licensing purposes
SWID	The SWID number, which is required for licensing purposes
Maximum capacity	The maximum capacity permitted by the system's license
Usage time left	The amount of time left until the license expires
Enterprise features	Indicates whether enterprise features are enabled or not by the system's license
The system was activated <i>n</i> days ago	The number of days since the system was activated
System Settings	
Volumes are\are not obfuscated	The obfuscation setting for all volumes in the system (default = not obfuscated)
Capacity alert thresholds	The alert thresholds currently configured for capacity usage, as percentages
Thick volume reservation	The amount of capacity reserved for thick volumes, as a percentage
MDM restricted SDC mode	Indicates whether users on remote clients are restricted to read-only access (enabled=read-only access; disabled=full read-write access)

Table 18 query_all command output (page 2 of 6)

Output	Description
Protection Domain	The following items are displayed separately for each Protection Domain
Protection Domain summary	Lists the following information for each Protection Domain: • Name • ID • Number of Storage Pools in the Protection Domain • Number of Fault Sets in the Protection Domain • Number of SDS nodes in the Protection Domain • Number of volumes associated with the Protection Domain • Amount of capacity in the Protection Domain that is available for volume allocation
Operational state	Indicates the Protection Domain's current state, such as active, inactive, and so on.
Storage Pool	
Storage Pool summary	Lists the following information for each Storage Pool: • Name • ID • Number of volumes associated with the Storage Pool • Amount of capacity in the Storage Pool that is available for volume allocation
The number of parallel Rebuild/Rebalance jobs	The number of parallel rebuild and rebalance jobs currently existing in the system
Rebuild is Enabled/Disabled...	Indicates whether the Rebuild feature is enabled or disabled (in normal production conditions, Rebuild should be enabled). When enabled, the Rebuild policy configured in the system is displayed, along with relevant parameters.
Rebalance is Enabled/Disabled...	Indicates whether the Rebalance feature is enabled or disabled (in normal production conditions, Rebalance should be enabled). When enabled, the Rebalance policy configured in the system is displayed, along with relevant parameters.
Zero padding is Enabled/Disabled	Indicates whether zero padding is enabled or disabled

Table 18 query_all command output (page 3 of 6)

Output	Description
Spare policy	The percentage of total capacity reserved as Spare
RAM Read Cache is used/not used	Indicates whether or not the RAM Read Cache feature is in use in the Storage Pool
RAM Read Cache write handling mode is...	If RAM Read Cache is used, displays the write handling mode currently in use (passthrough, or cached)
SDS Summary	
Total	The total number of SDS nodes
<i>n</i> SDS nodes have membership state 'Joined'	The number of SDS nodes which are connected to the cluster, can receive I/O and hold primary and secondary copies of data Note: It takes some time from actual disconnection until the SDS is disconnected from the cluster, and vice versa, and there are also up-pending and down-pending states.
<i>n</i> SDS nodes have connection state 'Connected'	The number of SDS nodes which are currently connected to the MDM
<i>n</i> TB (<i>n</i> GB) total capacity	The total amount of available raw storage Note: This does not represent the total amount of capacity available for volume allocation.
<i>n</i> TB (<i>n</i> GB) unused capacity	The quantity of raw capacity in the system that can be earmarked for specific purposes, such as Spare, or used for new volume creation.
<i>n</i> Bytes snapshots capacity	The quantity of capacity used for storing snapshots
<i>n</i> TB (<i>n</i> GB) in-use capacity	The total quantity of healthy, degraded and failed capacity
<i>n</i> Bytes thin capacity	The quantity of capacity currently needed for storage purposes
<i>n</i> TB (<i>n</i> GB) protected capacity	The quantity of capacity which is fully protected (primary and secondary copies of the data exist)

Table 18 query_all command output (page 4 of 6)

Output	Description
<i>n</i> Bytes failed capacity	The quantity of capacity which is not available at all (neither primary, nor secondary copies)
<i>n</i> Bytes degraded-failed capacity	The quantity of degraded-failed capacity. When an SDS fails, all its capacity is defined as degraded-failed, and the secondary copies (which are spread across the Protection Domain) are defined as degraded-healthy.
<i>n</i> Bytes degraded-healthy capacity	The quantity of degraded-healthy capacity. When an SDS fails, all its capacity is defined as degraded-failed, and the secondary copies (which are spread across the Protection Domain) are defined as degraded-healthy.
<i>n</i> Bytes unreachable-unused capacity	The quantity of capacity that is not configured for any use type in the system, that is currently unavailable.
<i>n</i> Bytes active rebalance capacity	The quantity of capacity that is currently being migrated to a different location, for load balancing purposes
<i>n</i> Bytes pending rebalance capacity	The quantity of capacity that is waiting in the job queue for migration to a different location, for load balancing purposes
<i>n</i> Bytes active fwd-rebuild capacity	The quantity of capacity for which one copy of data exists, and a second copy is currently being created
<i>n</i> Bytes pending fwd-rebuild capacity	The quantity of capacity for which one copy of data exists, and a job for the creation of a second copy is waiting in the job queue
<i>n</i> Bytes active bck-rebuild capacity	The quantity of capacity for which one copy of data went offline and came back online, and changes are currently being synchronized in that copy
<i>n</i> Bytes pending bck-rebuild capacity	The quantity of capacity for which one copy of data went offline and came back online, and changes are waiting in the job queue to be synchronized in that copy
<i>n</i> Bytes rebalance capacity	The total quantity of capacity which is either currently rebalancing, or pending rebalancing
<i>n</i> Bytes fwd-rebuild capacity	The total quantity of degraded capacity which is either currently in Forward Rebuild state, or is pending Forward Rebuild.

Table 18 query_all command output (page 5 of 6)

Output	Description
<i>n</i> Bytes bck-rebuild capacity	The total quantity of degraded capacity which is either currently in Backward Rebuild state, or is pending Backward Rebuild
<i>n</i> Bytes active moving capacity	The quantity of capacity that is currently being migrated from one location to another
<i>n</i> Bytes pending moving capacity	The quantity of capacity that is waiting in the job queue for migration from one location to another
<i>n</i> Bytes total moving capacity	The total quantity of active and pending moving (migrating) capacity
<i>n</i> TB (<i>n</i> GB) spare capacity	The quantity of capacity that is reserved for system use, when recovery from failure is required. This capacity cannot be used for storage purposes.
<i>n</i> TB (<i>n</i> GB) at-rest capacity	The quantity of capacity that is fully protected, and not in Rebuild or Rebalance states
<i>n</i> Bytes decreased capacity	The quantity of Decreased capacity that was deducted from devices (using the Set Device Capacity Limit GUIcommand, or <code>modify_sds_device_capacity</code> CLI command), and cannot be used for any purpose.
Primary-reads <i>n</i> IOPS <i>n</i> Bytes per-second	Number of primary data copy read IOPS, and read bandwidth
Primary-writes <i>n</i> IOPS <i>n</i> Bytes per-second	Number of primary data copy write IOPS, and write bandwidth
Secondary-reads <i>n</i> IOPS <i>n</i> Bytes per-second	Number of secondary data copy (protection) read IOPS, and read bandwidth
Secondary-writes <i>n</i> IOPS <i>n</i> Bytes per-second	Number of secondary copy (protection) write IOPS, and write bandwidth
Backward-rebuild-reads <i>n</i> IOPS <i>n</i> Bytes per-second	Number of Backward Rebuild read IOPS, and read bandwidth
Backward-rebuild-writes <i>n</i> IOPS <i>n</i> Bytes per-second	Number of Backward Rebuild write IOPS, and write bandwidth
Forward-rebuild-reads <i>n</i> IOPS <i>n</i> Bytes per-second	Number of Forward Rebuild read IOPS, and read bandwidth
Forward-rebuild-writes <i>n</i> IOPS <i>n</i> Bytes per-second	Number of Forward Rebuild write IOPS, and write bandwidth

Table 18 query_all command output (page 6 of 6)

Output	Description
Rebalance-reads <i>n</i> IOPS <i>n</i> Bytes per-second	Number of Rebalance read IOPS, and read bandwidth
Rebalance-writes <i>n</i> IOPS <i>n</i> Bytes per-second	Number of Rebalance write IOPS, and write bandwidth
Volumes Summary	
<i>n</i> thick-provisioned volumes	The number of thick-provisioned volumes, and the total size in TB and GB
<i>n</i> volumes mapped to all SDC nodes	The number of volumes mapped to SDC nodes

Properties query

Command

query_properties

Syntax

```
scli --query_properties --object_type <TYPE>
(--object_id <ID> | --all_objects) (--properties
<PROPS> | --preset <PRESET>) [--group_by_property]
```

Description/Notes

This command queries any set of properties, on any set of objects of the specified type. The properties that can be queried depend on the type of the object that is queried. For example, SDS has different attributes to Volume.

A number of preset combinations are available for use with this command. A preset is a predefined set of properties, usually with some logical relationship, which specifies a group of commonly queried properties. The available presets are also dependent on the object type. All object types have at least one preset called `all`, which queries all the properties for that type.

Parameters

Parameter	Description
--object_type <TYPE>	The object type to query. Object types include: SYSTEM PROTECTION_DOMAIN STORAGE_POOL FAULT_SET SDS SDC VOLUME DEVICE VTREE SCSI_INITIATOR
--object_id <ID>	A comma-separated list of object IDs; use this option for querying one or more specific objects.
--all_objects	Queries all objects of the specified type
--preset <PRESET>	Queries a predefined set of properties. For the presets that can be used per object type, see Table 19 on page 193 .
--properties <PROPERTIES>	Queries a comma-separated list of properties. For a list of properties that can be queried per object type, see Table 19 on page 193 .
--group_by_property	Group results by property type, rather than by object (default)

Note: Use `scli --query_properties --object_type <TYPE>` with one of the valid types above, to get detailed presets and properties options.

Example

```
scli --query_properties --object_type SDS --all_objects --properties IPS,PORT,PROTECTION_DOMAIN_ID,RMCACHE_ENABLED
SDS 46fec7eb00000000:
    IPS                127.0.0.9
    PORT               7072
    PROTECTION_DOMAIN_ID 543664ed00000000
    RMCACHE_ENABLED    No

SDS 46fec7ec000000001:
    IPS                127.0.0.9,127.0.0.101
    PORT               7073
    PROTECTION_DOMAIN_ID 543664ed00000000
    RMCACHE_ENABLED    Yes

SDS 46fec7ed000000002:
    IPS                127.0.0.9,127.0.0.101,127.0.0.102
    PORT               7074
    PROTECTION_DOMAIN_ID 543664ed00000000
    RMCACHE_ENABLED    Yes
```

Table 19 Object properties and presets

Property/Preset	Sys ¹	PD	SP	FS	SDS	SDC	Vol	Dev	VTree	SCSI
Presets										
All	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Capacity	✓	✓	✓	✓	✓			✓		
IO	✓	✓	✓	✓	✓	✓	✓	✓		
RAM_Cache	✓	✓	✓	✓	✓		✓			
Properties										
CAPACITY_LIMIT_IN_KB	✓	✓	✓	✓	✓			✓		
MAX_CAPACITY_IN_KB	✓	✓	✓	✓	✓			✓		
CAPACITY_IN_USE_IN_KB	✓	✓	✓	✓	✓			✓		
THICK_CAPACITY_IN_USE_IN_KB	✓	✓	✓	✓	✓			✓		
THIN_CAPACITY_IN_USE_IN_KB	✓	✓	✓	✓	✓			✓		
SNAP_CAPACITY_IN_USE_IN_KB	✓	✓	✓	✓	✓			✓		
UNREACHABLE_UNUSED_CAPACITY_IN_KB	✓	✓	✓	✓	✓			✓		
UNUSED_CAPACITY_IN_KB	✓	✓	✓	✓	✓			✓		
SNAP_CAPACITY_IN_USE_OCCUPIED_IN_KB	✓	✓	✓	✓	✓			✓		
THIN_CAPACITY_ALLOCATED_IN_KB	✓	✓	✓	✓	✓			✓		

Table 19 Object properties and presets

Property/Preset	Sys ¹	PD	SP	FS	SDS	SDC	Vol	Dev	VTree	SCSI
SPARE_CAPACITY_IN_KB	✓	✓	✓							
AVAILABLE_FOR_THICK_ALLOCATION_IN_KB	✓	✓	✓							
PROTECTED_CAPACITY_IN_KB	✓	✓	✓							
DEGRADED_HEALTHY_CAPACITY_IN_KB	✓	✓	✓							
DEGRADED_FAILED_CAPACITY_IN_KB	✓	✓	✓							
FAILED_CAPACITY_IN_KB	✓	✓	✓							
PROTECTED_VAC_IN_KB	✓	✓	✓	✓	✓			✓		
DEGRADED_HEALTHY_VAC_IN_KB	✓	✓	✓	✓	✓			✓		
DEGRADED_FAILED_VAC_IN_KB	✓	✓	✓	✓	✓			✓		
FAILED_VAC_IN_KB	✓	✓	✓	✓	✓			✓		
MOVING_CAPACITY_IN_KB	✓	✓	✓							
ACTIVE_MOVING_CAPACITY_IN_KB	✓	✓	✓							
PENDING_MOVING_CAPACITY_IN_KB	✓	✓	✓							
FWD_REBUILD_CAPACITY_IN_KB	✓	✓	✓							
ACTIVE_FWD_REBUILD_CAPACITY_IN_KB	✓	✓	✓							
PENDING_FWD_REBUILD_CAPACITY_IN_KB	✓	✓	✓							
BCK_REBUILD_CAPACITY_IN_KB	✓	✓	✓							
ACTIVE_BCK_REBUILD_CAPACITY_IN_KB	✓	✓	✓							
PENDING_BCK_REBUILD_CAPACITY_IN_KB	✓	✓	✓							
REBALANCE_CAPACITY_IN_KB	✓	✓	✓							
ACTIVE_REBALANCE_CAPACITY_IN_KB	✓	✓	✓							
PENDING_REBALANCE_CAPACITY_IN_KB	✓	✓	✓							
AT_REST_CAPACITY_IN_KB	✓	✓	✓							
ACTIVE_MOVING_IN_FWD_REBUILD_JOBS	✓	✓	✓	✓	✓			✓		
ACTIVE_MOVING_IN_BCK_REBUILD_JOBS	✓	✓	✓	✓	✓			✓		

Table 19 Object properties and presets

Property/Preset	Sys ¹	PD	SP	FS	SDS	SDC	Vol	Dev	VTree	SCSI
ACTIVE_MOVING_IN_REBALANCE_JOBS	✓	✓	✓	✓	✓			✓		
ACTIVE_MOVING_OUT_FWD_REBUILD_JOBS	✓	✓	✓	✓	✓			✓		
ACTIVE_MOVING_OUT_BCK_REBUILD_JOBS	✓	✓	✓	✓	✓			✓		
ACTIVE_MOVING_OUT_REBALANCE_JOBS	✓	✓	✓	✓	✓			✓		
PENDING_MOVING_IN_FWD_REBUILD_JOBS	✓	✓	✓	✓	✓			✓		
PENDING_MOVING_IN_BCK_REBUILD_JOBS	✓	✓	✓	✓	✓			✓		
PENDING_MOVING_IN_REBALANCE_JOBS	✓	✓	✓	✓	✓			✓		
PENDING_MOVING_OUT_FWD_REBUILD_JOBS	✓	✓	✓	✓	✓			✓		
PENDING_MOVING_OUT_BCK_REBUILD_JOBS	✓	✓	✓	✓	✓			✓		
PENDING_MOVING_OUT_REBALANCE_JOBS	✓	✓	✓	✓	✓			✓		
IN_USE_VAC_IN_KB	✓	✓	✓	✓	✓			✓		
PRIMARY_VAC_IN_KB	✓	✓	✓	✓	✓			✓		
SECONDARY_VAC_IN_KB	✓	✓	✓	✓	✓			✓		
REBUILD_WAIT_SEND_Q_LENGTH	✓	✓		✓	✓					
REBALANCE_WAIT_SEND_Q_LENGTH	✓	✓		✓	✓					
REBUILD_PER_RECEIVE_JOB_NET_THROTTLING_IN_KBPS	✓	✓		✓	✓					
REBALANCE_PER_RECEIVE_JOB_NET_THROTTLING_IN_KBPS	✓	✓		✓	✓					
FIXED_READ_ERROR_COUNT	✓	✓	✓	✓	✓			✓		
PRIMARY_READ_BWC	✓	✓	✓	✓	✓			✓		
PRIMARY_READ_FROM_DEV_BWC	✓	✓	✓	✓	✓			✓		
PRIMARY_WRITE_BWC	✓	✓	✓	✓	✓			✓		
SECONDARY_READ_BWC	✓	✓	✓	✓	✓			✓		
SECONDARY_READ_FROM_DEV_BWC	✓	✓	✓	✓	✓			✓		
SECONDARY_WRITE_BWC	✓	✓	✓	✓	✓			✓		

Table 19 Object properties and presets

Property/Preset	Sys ¹	PD	SP	FS	SDS	SDC	Vol	Dev	VTree	SCSI
FWD_REBUILD_READ_BWC	✓	✓	✓	✓	✓			✓		
FWD_REBUILD_WRITE_BWC	✓	✓	✓	✓	✓			✓		
BCK_REBUILD_READ_BWC	✓	✓	✓	✓	✓			✓		
BCK_REBUILD_WRITE_BWC	✓	✓	✓	✓	✓			✓		
REBALANCE_READ_BWC	✓	✓	✓	✓	✓			✓		
REBALANCE_WRITE_BWC	✓	✓	✓	✓	✓			✓		
TOTAL_READ_BWC	✓	✓	✓	✓	✓			✓		
TOTAL_WRITE_BWC	✓	✓	✓	✓	✓			✓		
USER_DATA_READ_BWC	✓	✓	✓			✓	✓			
USER_DATA_WRITE_BWC	✓	✓	✓			✓	✓			
RMCACHE_SIZE_IN_KB	✓	✓		✓	✓					
RMCACHE_SIZE_IN_USE_IN_KB	✓	✓		✓	✓					
RMCACHE_ENTRY_EVICTION_SIZE_COUNT_IN_KB	✓	✓		✓	✓					
RMCACHE_BIG_BLOCK_EVICTION_SIZE_COUNT_IN_KB	✓	✓		✓	✓					
RMCACHE_NUM_OF_4KB_ENTRIES RMCACHE_NUM_OF_8KB_ENTRIES RMCACHE_NUM_OF_16KB_ENTRIES RMCACHE_NUM_OF_32KB_ENTRIES RMCACHE_NUM_OF_64KB_ENTRIES RMCACHE_NUM_OF_128KB_ENTRIES	✓	✓		✓	✓					
RMCACHE_4KB_ENTRY_COUNT RMCACHE_8KB_ENTRY_COUNT RMCACHE_16KB_ENTRY_COUNT RMCACHE_32KB_ENTRY_COUNT RMCACHE_64KB_ENTRY_COUNT RMCACHE_128KB_ENTRY_COUNT	✓	✓		✓	✓					
RMCACHE_ENTRY_EVICTION_COUNT	✓	✓		✓	✓					
RMCACHE_BIG_BLOCK_EVICTION_COUNT	✓	✓		✓	✓					

Table 19 Object properties and presets

Property/Preset	Sys ¹	PD	SP	FS	SDS	SDC	Vol	Dev	VTree	SCSI
RMCACHE_NO_EVICTION_COUNT	✓	✓		✓	✓					
RMCACHE_SKIP_COUNT_LARGE_IO	✓	✓		✓	✓					
RMCACHE_SKIP_COUNT_UNALIGNED_4KB_IO	✓	✓		✓	✓					
RMCACHE_SKIP_COUNT_CACHE_ALL_BUSY	✓	✓		✓	✓					
NUM_OF_UNMAPPED_VOLUMES	✓	✓	✓							
NUM_OF_MAPPED_TO_ALL_VOLUMES	✓	✓	✓							
NUM_OF_THICK_BASE_VOLUMES	✓	✓	✓							
NUM_OF_THIN_BASE_VOLUMES	✓	✓	✓							
NUM_OF_SNAPSHOTS	✓	✓	✓							
NUM_OF_VOLUMES_IN_DELETION	✓	✓	✓							
NUM_OF_DEVICES	✓		✓		✓					
NUM_OF_SDS	✓	✓		✓						
NUM_OF_STORAGE_POOLS	✓	✓								
NUM_OF_VOLUMES	✓		✓						✓	
NUM_OF_VTREES	✓		✓							
SCSI_INITIATOR_ID_LIST	✓									
NUM_OF_SCSI_INITIATORS	✓									
PROTECTION_DOMAIN_ID_LIST	✓									
NUM_OF_PROTECTION_DOMAINS	✓									
SDC_ID_LIST	✓									
NUM_OF_SDC	✓									
NUM_OF_FAULT_SETS	✓	✓								
ID	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
NAME	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
VERSION_NAME	✓									

Table 19 Object properties and presets

Property/Preset	Sys ¹	PD	SP	FS	SDS	SDC	Vol	Dev	VTree	SCSI
DEFAULT_VOL_OBFUSCATION	✓									
CAPACITY_ALERT_HIGH_THRESHOLD	✓									
CAPACITY_ALERT_CRITICAL_THRESHOLD	✓									
INSTALL_ID	✓									
SW_ID	✓									
DAYS_INSTALLED	✓									
MAX_LICENSED_CAPACITY	✓									
CAPACITY_DAYS_LEFT	✓									
OBFUSCATION_DAYS_LEFT	✓									
SNAPSHOTS_DAYS_LEFT	✓									
QOS_DAYS_LEFT	✓									
REPLICATION_DAYS_LEFT	✓									
INITIAL_LICENSE	✓									
THICK_VOLUME_PERCENT	✓									
MDM_MODE	✓									
MDM_CLUSTER_STATE	✓									
PRIMARY_MDM_ACTOR_IPS	✓									
PRIMARY_MDM_ACTOR_PORT	✓									
SECONDARY_MDM_ACTOR_IPS	✓									
SECONDARY_MDM_ACTOR_PORT	✓									
TIEBREAKER_MDM_ACTOR_IPS	✓									
TIEBREAKER_MDM_ACTOR_PORT	✓									
MDM_MGMT_IPS	✓									
MDM_MGMT_PORT	✓									
RESTRICTED_SDC_MODE_ENABLED	✓									

Table 19 Object properties and presets

Property/Preset	Sys ¹	PD	SP	FS	SDS	SDC	Vol	Dev	VTree	SCSI
SDS_ID_LIST		✓		✓						
STORAGE_POOL_ID_LIST		✓								
FAULT_SET_ID_LIST		✓								
STATE		✓		✓	✓			✓		
REBUILD_NETWORK_THROTTLING_ENABLED		✓								
REBALANCE_NETWORK_THROTTLING_ENABLED		✓								
OVERALL_IO_NETWORK_THROTTLING_ENABLED		✓								
REBUILD_NETWORK_THROTTLING		✓								
REBALANCE_NETWORK_THROTTLING		✓								
OVERALL_IO_NETWORK_THROTTLING		✓								
DEVICE_ID_LIST			✓		✓					
VOLUME_ID_LIST			✓			✓			✓	✓
VTREE_ID_LIST			✓							
SPARE_PERCENT			✓							
PROTECTION_DOMAIN_ID			✓	✓	✓					
ZERO_PAD_ENABLED			✓							
USE_RMCACHE			✓				✓			
RMCACHE_WRITE_HANDLING_MODE			✓							
REBUILD_ENABLED			✓							
REBUILD_IO_PRIORITY_POLICY			✓							
NUM_REBUILD_IOPS_PER_DEVICE			✓							
REBUILD_BW_LIMIT_PER_DEVICE			✓							
REBUILD_APP_IOPS_PER_DEVICE_THRESHOLD			✓							
REBUILD_APP_BW_PER_DEVICE_THRESHOLD			✓							
REBUILD_QUIET_PERIOD			✓							

Table 19 Object properties and presets

Property/Preset	Sys ¹	PD	SP	FS	SDS	SDC	Vol	Dev	VTree	SCSI
REBALANCE_ENABLED			✓							
REBALANCE_IO_PRIORITY_POLICY			✓							
NUM_REBALANCE_IOPS_PER_DEVICE			✓							
REBALANCE_BW_LIMIT_PER_DEVICE			✓							
REBALANCE_APP_IOPS_PER_DEVICE_THRESHOLD			✓							
REBALANCE_APP_BW_PER_DEVICE_THRESHOLD			✓							
REBALANCE_QUIET_PERIOD			✓							
NUM_PARALLEL_JOBS_PER_DEVICE			✓							
IPS					✓					
PORT					✓					
ON_VMWARE					✓					
PROTECTION_DOMAIN_ID					✓					
FAULT_SET_ID					✓					
MEMBERSHIP_STATE					✓					
MDM_CONNECTION_STATE					✓	✓				
DRL_MODE					✓					
RMCACHE_ENABLED					✓					
RMCACHE_SIZE					✓					
RMCACHE_FROZEN					✓					
RMCACHE_MEMORY_ALLOCATION_STATE					✓					
NUMBER_OF_IO_BUFFERS					✓					
NUM_OF_MAPPED_VOLUMES						✓				✓
GUID						✓				
IP						✓				
APPROVED						✓				

Table 19 Object properties and presets

Property/Preset	Sys ¹	PD	SP	FS	SDS	SDC	Vol	Dev	VTree	SCSI
CHILD_VOLUME_ID_LIST							✓			
NUM_OF_CHILD_VOLUMES							✓			
DESCENDANT_VOLUME_ID_LIST							✓			
NUM_OF_DESCENDANT_VOLUMES							✓			
NUM_OF_MAPPED_SDCS							✓			
NUM_OF_MAPPED_SCSI_INITIATORS							✓			
SIZE							✓			
OBFUSCATED							✓			
CREATION_TIME							✓			
TYPE							✓			
CONSISTENCY_GROUP_ID							✓			
STORAGE_POOL_ID							✓	✓	✓	
VTREE_ID							✓			
ANCESTOR_ID							✓			
SOURCE_DELETED							✓			
MAPPING_TO_ALL_SDCS_ENABLED							✓			
AVG_READ_SIZE_IN_BYTES								✓		
AVG_WRITE_SIZE_IN_BYTES								✓		
AVG_READ_LATENCY_IN_MICROSEC								✓		
AVG_WRITE_LATENCY_IN_MICROSEC								✓		
CURRENT_PATH								✓		
ORIGINAL_PATH								✓		
ERR_STATE								✓		
CAPACITY_LIMIT								✓		
MAX_CAPACITY								✓		

Table 19 Object properties and presets

Property/Preset	Sys ¹	PD	SP	FS	SDS	SDC	Vol	Dev	VTree	SCSI
SDS_ID								✓		
NET_CAPACITY_IN_USE_IN_KB									✓	
BASE_NET_CAPACITY_IN_USE_IN_KB									✓	
SNAP_NET_CAPACITY_IN_USE_IN_KB									✓	
TRIMMED_CAPACITY_IN_KB									✓	
BASE_VOLUME_ID									✓	
IQN										✓

1. Sys=System, PD=Protection Domain, SP=Storage Pool, FS=Fault Set, Vol=Volume, Dev=Device, SCSI=SCSI Initiator

MDM queries

MDM cluster query

Command

`query_cluster`

Syntax

`scli --query_cluster`

Description/Notes

This command provides the MDM cluster state. It returns the identity of the primary, secondary, and tie-breaker servers.

Parameters

Not applicable.

Example

`scli --mdm_ip 192.168.1.200 --query_cluster`

Remote read-only limit state

Command

```
query_remote_read_only_limit_state
```

Syntax

```
scli --query_remote_read_only_limit_state
```

Description/Notes

This command queries the MDM's remote access restriction state. If the state is enabled, remote users may only issue read-only commands to the MDM. If the state is disabled, all command types may be issued to the MDM by remote clients.

Parameters

Not applicable.

Example

```
scli --query_remote_read_only_limit_state
```

Restricted SDC mode query

Command

```
query_restricted_sdc_mode
```

Syntax

```
scli --query_restricted_sdc_mode
```

Description/Notes

This command queries whether restricted SDC mode is enabled or disabled in the ScaleIO system. If the mode is enabled, each SDC to which you want to map volumes must be registered in the system using the `--add_sdc` command.

Parameters

Not applicable

Example

```
scli --query_restricted_sdc_mode
```

All approved SDC query

Command

```
query_all_approved_sdc
```

Syntax

```
scli --query_all_approved_sdc
```

Description/Notes

This command queries the system for all the SDCs that have been approved by the system, when it is operating in restricted SDC mode. This query can be useful if restricted SDC mode is enabled, and you want to determine which SDCs can be used for volume mapping.

Parameters

Not applicable

Example

```
scli --query_all_approved_sdc
```

Protection Domain query

Command

```
query_protection_domain
```

Syntax

```
scli --query_protection_domain (--protection_domain_id  
<ID> | --protection_domain_name <NAME>)
```

Description/Notes

This command provides aggregated information about all objects in a single Protection Domain.

Parameters

Parameter	Description
--protection_domain_id <ID>	Protection Domain ID
--protection_domain_name <NAME>	Protection Domain name

Example

```
scli --mdm_ip 192.168.1.200 --query_protection_domain
--protection_domain_name rack_1.1
```

Fault Set queries

Query a specific Fault Set

Command

```
query_fault_set
```

Syntax

```
scli --query_fault_set (--fault_set_id <ID> |
((--protection_domain_id <ID> |
--protection_domain_name <NAME>)
--fault_set_name <NAME>))
```

Description/Notes

This command provides information about the specified Fault Set.

Parameters

Parameter	Description
--protection_domain_id <ID>	Protection Domain ID
--protection_domain_name <NAME>	Protection Domain name
--fault_set_id <ID>	Fault Set ID
--fault_set_name <NAME>	Fault Set name

Example

```
scli --query_fault_set --fault_set_name fs-rack25
```

Query all Fault Sets in a Protection Domain

Command

`query_all_fault_sets`

Syntax

`scli --query_all_fault_sets (--protection_domain_id <ID> | --protection_domain_name <NAME>)`

Description/Notes

This command provides information for all the Fault Sets in the specified Protection Domain.

Parameters

Parameter	Description
<code>--protection_domain_id <ID></code>	Protection Domain ID
<code>--protection_domain_name <NAME></code>	Protection Domain name

Example

```
scli --query_all_fault_sets
--protection_domain_name sio-pd25
```

Storage Pool query

Command

`query_storage_pool`

Syntax

`scli --query_storage_pool (--protection_domain_id <ID> | --protection_domain_name <NAME>) (--storage_pool_id <ID> | --storage_pool_name <NAME>)`

Description/Notes

This command provides aggregated information about all objects in a single Storage Pool.

Parameters

Parameter	Description
--protection_domain_id <ID>	Protection Domain ID
--protection_domain_name <NAME>	Protection Domain name
--storage_pool_id <ID>	Storage Pool ID
--storage_pool_name <NAME>	Storage Pool name

Example

```
scli --mdm_ip 192.168.1.200 --query_storage_pool
--protection_domain_name rack_1.1
--storage_pool_name sp_1.1_rack_1.1
```

SDS queries

Query a specific SDS node

Command

```
query_sds
```

Syntax

```
scli --query_sds (--sds_id <ID> | --sds_name <NAME> |
--sds_ip <IP>)
```

Description/Notes

This command provides detailed information about a single SDS.

Parameters

Parameter	Description
--sds_id <ID>	SDS ID
--sds_name <NAME>	SDS name
--sds_ip <IP>	SDS IP address

Example

```
scli --mdm_ip 192.168.1.200 --query_sds --sds_ip  
192.168.1.6
```

Query all SDS nodes

Command

```
query_all_sds
```

Syntax

```
scli --query_all_sds
```

Description/Notes

This command provides information about all SDSs in the system.

Parameters

Not applicable.

Example

```
scli --mdm_ip 192.168.1.200 --query_all_sds
```


SDC queries

Query a specific SDC node

Command

`query_sdc`

Syntax

`scli --query_sdc (--sdc_id <ID> | --SDC_name <NAME> |
--sdc_guid <GUID> | --sds_ip <IP>)`

Description/Notes

This command provides information about the specified SDC.

Parameters

Parameter	Description
<code>--sdc_id <ID></code>	SDC ID
<code>--sdc_name <NAME></code>	SDC name
<code>--sdc_guid <GUID></code>	SDC GUID
<code>--sds_ip <IP></code>	SDC IP address

Example

`scli --mdm_ip 192.168.1.200 --query_sdc --sdc_ip
192.168.2.25`

Query all SDC nodes

Command

```
query_all_sdc
```

Syntax

```
scli --query_all_sdc
```

Description/Notes

This command provides information about all SDCs in the system.

Parameters

Not applicable.

Example

```
scli --mdm_ip 192.168.1.200 --query_all_sdc
```

Query MDMs using drv_cfg

Command

```
drv_cfg --query_mdms
```

Note: This is not a CLI command, but rather an executable that is run on the SDC server.

Syntax

```
/opt/emc/scaleio/sdc/bin/drv_cfg --query_mdms
```

Description/Notes

This utility retrieves information about all known MDM objects in kernel mode. This utility is typically used to determine to which MDM an SDC is connected.

Example

```
/opt/emc/scaleio/sdc/bin/drv_cfg --query_mdms
```

Query tgt objects using drv_cfg

Command

```
drv_cfg --query_tgts
```

Note: This is not a CLI command, but rather an executable that is run on the SDC server.

Syntax

```
/opt/emc/scaleio/sdc/bin/drv_cfg --query_tgts
```

Description/Notes

This utility retrieves information about all known active tgt objects in kernel mode.

Example

```
/opt/emc/scaleio/sdc/bin/drv_cfg --query_tgts
```

Query Volumes using drv_cfg

Command

```
drv_cfg --query_vols
```

Note: This is not a CLI command, but rather an executable that is run on the SDC server.

Syntax

```
/opt/emc/scaleio/sdc/bin/drv_cfg --query_vols
```

Description/Notes

This utility retrieves information about all known active volume objects in kernel mode. You can use this utility to determine which volumes are mapped, and the ID of each volume in the ScaleIO system.

Example

```
/opt/emc/scaleio/sdc/bin/drv_cfg --query_vols
```

Query GUID using drv_cfg

Command

```
drv_cfg --query_guid
```

Note: This is not a CLI command, but rather an executable that is run on the SDC server.

Syntax

```
/opt/emc/scaleio/sdc/bin/drv_cfg --query_guid
```

Description/Notes

This utility retrieves the unique ID of the kernel module. The utility can be used to verify that all SDC GUIDs in the system are unique.

Note: If the SDC was removed and reinstalled, the GUID of the SDC will be different to its original GUID. In such a case, you may need to remove the SDC, if two SDCs now have the same GUID.

Example

```
/opt/emc/scaleio/sdc/bin/drv_cfg --query_guid
```

Query SCSI initiators using drv_cfg

Command

```
drv_cfg --query_scsi_initiators
```

Note: This is not a CLI command, but rather an executable that is run on the SDC server.

Syntax

```
/opt/emc/scaleio/sdc/bin/drv_cfg  
--query_scsi_initiators --mdm_id <MDM_ID>
```

Description/Notes

This utility retrieves all known SCSI initiators from a specific MDM.

Parameters

Parameter	Description
--mdm_id <MDM_ID>	The ID of the MDM to query

Example

```
/opt/emc/scaleio/sdc/bin/drv_cfg
--query_scsi_initiators --mdm_id 041f3f180729988b
```

All volumes query

Command

```
query_all_volumes
```

Syntax

```
scli --query_all_volumes
```

Description/Notes

This command provides information about all volumes in the system.

Parameters

None

Example

```
scli --mdm_ip 192.168.1.200 --query_all_volumes
```

All device latency meters query

Command

```
query_all_device_latency_meters
```

Syntax

```
scli --query_all_device_latency_meters
[--protection_domain_id <ID> |
--protection_domain_name <NAME>]
```

Description/Notes

This command retrieves device latency meters for all the devices in the specified Protection Domain.

Parameters

Parameter	Description
--protection_domain_id <ID>	Protection Domain ID
--protection_domain_name <NAME>	Protection Domain name

Example

```
scli --query_all_device_latency_meters
--protection_domain_name pd10
```

License query

Command

```
query_license
```

Syntax

```
scli --query_license
```

Description/Notes

Queries information about the current license restrictions.

Parameters

Not applicable.

Example

```
scli --mdm_ip 192.168.1.200 --query_license
```

Remote syslog query

Command

```
query_remote_syslog
```

Syntax

```
scli --query_remote_syslog
```

Description/Notes

Queries the remote syslog module state and configuration.

Parameters

Not applicable.

Example

```
scli --query_remote_syslog
```


CHAPTER 10

Managing System Objects

This chapter describes how to use the CLI to manage ScaleIO system objects. Topics include:

- ◆ [Managing volumes.....](#) 217
- ◆ [Managing the SDS.....](#) 224
- ◆ [Managing RAM read cache](#) 247
- ◆ [Managing the SDC.....](#) 254
- ◆ [Managing Protection Domains.....](#) 261
- ◆ [Managing Fault Sets.....](#) 274
- ◆ [Managing the MDM cluster.....](#) 277
- ◆ [Naming or renaming the system](#) 286

Note: Before running CLI commands, you must be logged-in with a user name that has the right to perform the desired commands.

Managing volumes

This section describes how to use the CLI to manage volumes. Topics include:

- ◆ [“Renaming a volume” on page 218](#)
- ◆ [“Taking a snapshot of a volume \(Enterprise license\)” on page 218](#)
- ◆ [“Removing consistency group snapshots \(Enterprise license\)” on page 220](#)
- ◆ [“Removing a volume” on page 221](#)
- ◆ [“Increasing a volume size” on page 222](#)
- ◆ [“Unmapping a volume” on page 223](#)

Renaming a volume

Command

rename_volume

Syntax

```
scli --rename_volume (--volume_id <ID> | --volume_name <NAME>) --new_name <NAME>
```

Description/Notes

This command changes the name of a volume, and can be used at any time.

Parameters

Parameter	Description
--volume_id <ID>	Volume ID
--volume_name <NAME>	Volume name
--new_name <NAME>	New Name to be associated with the volume

Example

```
scli --mdm_ip 192.168.1.200 --rename_volume  
--volume_name vol1 --new_name vol_new_1
```

Taking a snapshot of a volume (Enterprise license)

Command

snapshot_volume

Syntax

```
scli --snapshot_volume (--volume_id <ID> |  
--volume_name <NAME> | --volume_id_from_file <FILE> |  
--volume_name_from_file <FILE>) [--snapshot_name  
<NAME> | --snapshot_name_from_file <FILE>]
```

Description/Notes

This command creates a snapshot of one or more volumes. When specifying more than one volume (a list), a **consistency group** is generated, and the ID associated with it is displayed. The snapshots under the consistency group are taken simultaneously for all listed volumes, thus ensuring their consistency.

You can define object names, according to the following rules:

- 1. Contain less than 32 characters
- 2. Contain only alphanumeric and punctuation characters
- 3. Be unique within the object type

When a name has not been defined, the system may display default system-defined names, as follows:

- ◆ SDS—its first IP address
- ◆ Device—the path to the device
- ◆ All other objects—the object’s ID

ScaleIO objects are assigned a unique ID that can be used to identify the object in CLI commands. You can retrieve the ID via a query, or via the object’s property sheet in the GUI.

This command is enabled during the 10-day trial, and for permanent enterprise licenses only.

Note: The consistency group is for convenience purposes ONLY. There are no protection measures to conserve the consistency group. You can delete members from it.

Parameters

Parameter	Description
--volume_id <ID>	A comma-separated list of volume IDs
--volume_name <NAME>	A comma-separated list of volume names

<code>--volume_name_from_file <FILE></code>	A file containing a new-line-separated list of volume names
<code>--snapshot_name <NAME></code>	A comma-separated list of names to be associated with the created snapshots. The names in this list correspond to the names in the volume name or volume ID list.
<code>--snapshot_name_from_file <FILE></code>	A file containing a new-line-separated list of names to be associated with the created snapshots

Example

```
scli --mdm_ip 192.168.1.200 --snapshot_volume
--volume_name vol_1 --snapshot_name snap_1
```

Removing consistency group snapshots (Enterprise license)

Command

```
remove_consistency_group_snapshots
```

Syntax

```
scli --remove_consistency_group_snapshots
--consistency_group_id <ID> [--i_am_sure]
```

Description/Notes

This command removes all snapshots that belong to a specific consistency group.

The consistency group ID is displayed when it is created, and you can display it by using the **query_all_volumes** command.

This command is enabled during the 10-day trial, and for permanent enterprise licenses only.

Note: This command can take a long time, depending on the size of the consistency group.

Parameters

Parameter	Description
--consistency_group_id <ID>	Consistency group ID
--i_am_sure	Skip the safety questions for command execution (For example: “This could damage the stored data. Are you sure?”)

Example

```
scli --mdm_ip 192.168.1.200
--remove_consistency_group_snapshots
--consistency_group_id 783c7f00000000
```

Removing a volume

Command

```
remove_volume
```

Syntax

```
scli --remove_volume (--volume_id <ID> | --volume_name
<NAME>) [Options] [--i_am_sure]
```

Description/Notes

This command removes a ScaleIO volume. Before removing a volume, you must ensure that it is not mapped to any SDCs. If it is, use the **unmap_volume_from_sdc** command or the VMware plug-in to unmap it before removing it.

When removing a volume, you can remove the VTree as well (all related snapshots), the volume and its snapshots, or just the snapshots. Before removing a VTree, you must unmap all volumes in the VTree before removing them.

For more information about snapshots, refer to [“Snapshots” on page 41](#).

Note: Removal of a volume erases all the data on the corresponding volume.

Parameters

Parameter	Description
--volume_id <ID>	Volume ID
--volume_name <NAME>-	Volume Name
--i_am_sure	Skip the safety questions for command execution (For example: “This could damage the stored data. Are you sure?”)
Options	
--remove_entire_snapshot_tree	Removes an entire snapshot tree assigned to the specified volume, including parents and siblings
-remove_with_descendant_snapshots	Removes the specified volume, and all volumes that were created as snapshots of the specified volume or one of its descendants
--remove_descendant_snapshots_only	Removes snapshots created from the specified volume, but does not remove the specified volume

Example

```
scli --mdm_ip 192.168.1.200 --remove_volume
--volume_name vol_1
```

Increasing a volume size**Command**

```
modify_volume_capacity
```

Syntax

```
scli --modify_volume_capacity (--volume_id <ID> |
--volume_name <NAME>) --size_gb <SIZE>
```

Description/Notes

This command increases the capacity of a volume. You can increase (but not decrease) a volume capacity at any time, as long as there is enough capacity for the volume size to grow.

Parameters

Parameter	Description
--volume_id <ID>	Volume ID
--volume_name <NAME>	Volume name
--size_gb <SIZE>	New volume size in GB. Basic allocation granularity is 8 GB.

Example

```
scli --mdm_ip 192.168.1.200 --modify_volume_capacity
--volume_name vol_1 --size_gb 150000
```

Unmapping a volume**Command**

```
unmap_volume_from_sdc
```

Syntax

```
scli --unmap_volume_from_sdc (--volume_id <ID> |
--volume_name <NAME>) (--sdc_ip <IP> | --sdc_id <ID>
|--sdc_name <NAME>|--all_sdc) [--i_am_sure]
```

Description/Notes

This command unmaps a volume from one or all SDCs.

Parameters

Parameter	Description
--volume_id <ID>	Volume ID
--volume_name <NAME>	Volume name
--sdc_id <ID>	SDC ID
--sdc_name <NAME>	SDC name

<code>--sdc_ip <IP></code>	SDC IP Address
<code>--all_sdc</code>	Unmap the volume from all SDCs
<code>--i_am_sure</code>	Skip the safety questions for command execution (For example: "This could damage the stored data. Are you sure?")

Example (Unmap Volume from a Single SDC)

```
scli --mdm_ip 192.168.1.200 --unmap_volume_from_sdc
--volume_name vol_1 --sdc_ip 192.168.1.3
```

Example (Unmap Volume from all SDCs)

```
scli --mdm_ip 192.168.1.200 --unmap_volume_from_sdc
--volume_name vol_1 --all_sdc
```

Managing the SDS

This section describes how to use the CLI to manage ScaleIO data server nodes (SDS). Topics include:

- ◆ [“Naming or renaming an SDS” on page 225](#)
- ◆ [“Adding an IP address to an SDS” on page 226](#)
- ◆ [“Modifying the role of an IP on an SDS” on page 227](#)
- ◆ [“Removing an IP address from an SDS” on page 228](#)
- ◆ [“Modifying an SDS port” on page 228](#)
- ◆ [“Removing an SDS ” on page 229](#)
- ◆ [“Aborting the removal of an SDS” on page 230](#)
- ◆ [“Managing SDS devices” on page 231](#)
 - [“Adding a device to an SDS” on page 231](#)
 - [“Removing a device from an SDS” on page 233](#)
 - [“Aborting removal of a device from an SDS” on page 234](#)
 - [“Modifying the capacity of an SDS device ” on page 235](#)
 - [“Clearing an SDS device error” on page 236](#)

- ◆ “Testing an SDS device” on page 237
 - “Starting a device test” on page 237
 - “Retrieving SDS device test results” on page 239
 - “Activating an SDS device ” on page 240
- ◆ “Testing the network” on page 241
 - “Starting an SDS network test” on page 241
 - “Retrieving SDS network test results” on page 242
 - “Retrieving SDS device statistics” on page 242
 - “Retrieving SDS device network statistics” on page 243
- ◆ “SDS network limits” on page 244
- ◆ “Setting DRL properties” on page 245
- ◆ “Configuring I/O memory buffers” on page 246

Naming or renaming an SDS

Command

```
rename_sds
```

Syntax

```
scli --rename_sds (--sds_id <ID> | --sds_name <NAME> |  
--sds_ip <IP>) --new_name <NAME>
```

Description/Notes

This command renames or names an SDS. Names can be a useful means of identifying an SDS using either the CLI or the GUI. For information about naming rules, see [“Adding SDS nodes and devices” on page 178](#).

Parameters

Parameter	Description
--sds_id <ID>	SDS ID
--sds_name <NAME>	SDS name
--sds_ip <IP>	SDS IP address
--new_name <NAME>	New, unique name to be associated with the SDS

Example

```
scli --mdm_ip 192.168.1.200 --rename_sds
--sds_ip 192.168.1.4 --new_name sds_new_name
```

Adding an IP address to an SDS**Command**

```
add_sds_ip
```

Syntax

```
scli --add_sds_ip (--sds_id <ID> | --sds_name <NAME> |
--sds_ip <IP>) --new_sds_ip <IP> [--sds_ip_role <ROLE>]
```

Description/Notes

This command adds an IP address to an SDS.

Parameters

Parameter	Description
--sds_id <ID>	SDS ID
--sds_name <NAME>	SDS name
--sds_ip <IP>	SDS IP address
--new_sds_ip <IP>	New IP address to be associated with the SDS
--sds_ip_role <ROLE>	An IP role, either SDC only, SDS only, or all (default)

Example

```
scli --mdm_ip 192.168.1.200 --add_sds_ip
--sds_ip 192.168.1.4 --new_sds_ip 192.168.1.24
```

Modifying the role of an IP on an SDS

Command

```
modify_sds_ip_role
```

Syntax

```
scli --modify_sds_ip_role (--sds_id <ID> | --sds_name
<NAME> | --sds_ip <IP>) [--sds_ip_to_modify <IP>]
--new_sds_ip_role <ROLE>
```

Description/Notes

This command modifies the role of an SDS’s IP address. The IP address can be used for SDC only, SDS only, or for both.

Parameters

Parameter	Description
--sds_id <ID>	SDS ID
--sds_name <NAME>	SDS name
--sds_ip <IP>	SDS IP address
--sds_ip_to_modify <IP>	The IP address of the SDS being modified
--new_sds_ip_role <ROLE>	An IP role: SDC only, SDS only, or all

Example

```
scli --modify_sds_ip_role --sds_name sds01
--sds_ip_to_modify 192.168.1.4 --new_sds_ip_role all
```

Removing an IP address from an SDS

Command

`remove_sds_ip`

Syntax

```
scli --remove_sds_ip (--sds_id <ID> | --sds_name <NAME>
| --sds_ip <IP>) --sds_ip_to_remove <IP>
```

Description/Notes

This command removes an IP address from an SDS.

Parameters

Parameter	Description
<code>--sds_id <ID></code>	SDS ID
<code>--sds_name <NAME></code>	SDS name
<code>--sds_ip <IP></code>	SDS IP address
<code>--sds_ip_to_remove <IP></code>	IP address to remove from the SDS

Example

```
scli --mdm_ip 192.168.1.200 --remove_sds_ip
--sds_ip 192.168.1.4 --sds_ip_to_remove 192.168.1.24
```

Modifying an SDS port

Command

`modify_sds_port`

Syntax

```
scli --modify_sds_port (--sds_id <ID> | --sds_name
<NAME> | --sds_ip <IP>) --new_sds_port <PORT>
```

Description/Notes

This command modifies the port used by the SDS for communication purposes.

Parameters

Parameter	Description
--sds_id <ID>	SDS ID
--sds_name <NAME>	SDS name
--sds_ip <IP>	SDS IP address
--new_sds_port <PORT>	New port to be associated with the SDS

Example

```
scli --mdm_ip 192.168.1.200 --modify_sds_port
--sds_ip 192.168.1.4 --new_sds_port 6801
```

Removing an SDS

Command

```
remove_sds
```

Syntax

```
scli --remove_sds (--sds_id <ID> | --sds_name <NAME> |
--sds_ip <IP>)
```

Description/Notes

This command initiates the removal of an SDS. The command removes an SDS object and disconnects the SDS from the MDM. This is an asynchronous operation and will run in the background. You can run **query_all_sds** periodically to track progress.

You can remove an SDS at any time, and no downtime is required. During execution of this command, the associated data is replicated to different nodes. Therefore, the removal process is asynchronous and might take a long time. You can abort the removal using the **abort_remove_sds** command.

Note: If the capacity of this SDS is still used by volumes, and it cannot be replaced due to lack of available free space, the command will fail.

Parameters

Parameter	Description
--sds_id <ID>	ID of the SDS to remove
--sds_name <NAME>	Name of the SDS to remove
--sds_ip <IP>	IP address of the SDS to remove

Example

```
scli --mdm_ip 192.168.1.200 --remove_sds --sds_ip
192.168.1.4
```

Aborting the removal of an SDS**Command**

```
abort_remove_sds
```

Syntax

```
scli --abort_remove_sds (--sds_id <ID> | --sds_name
<NAME> | --sds_ip <IP>)
```

Description/Notes

This command attempts to abort the removal of an SDS. If done at too late a stage in the removal process, this command might fail, and the SDS will be removed.

Parameters

Parameter	Description
--sds_id <ID>	ID of the SDS whose removal you want to stop
--sds_name <NAME>	Name of the SDS whose removal you want to stop
--sds_ip <IP>	IP address of the SDS whose removal you want to stop

Example

```
scli --mdm_ip 192.168.1.200 --abort_remove_sds
--sds_ip 192.168.1.4
```

Managing SDS devices

This section describes how to use the CLI to manage SDS devices.

Adding a device to an SDS

Command

```
add_sds_device
```

Syntax

```
scli --add_sds_device (sds_id <ID>| --sds_name <NAME> |
--sds_ip <IP>) --device_path <PATH>
[--device_name <NAME>] [--storage_pool_id <ID>
|--storage_pool_name <NAME>] [--test_time]
[Test_Options]
```

Description/Notes

This command adds a device to the devices managed by the given SDS.

Note: This command destroys all existing data on the device.

You can assign a name to SDS devices. This name can assist in future object identification. This can be particularly helpful for SDS devices, as the name will remain constant, even if the path changes.

You can define object names, according to the following rules:

1. Contain less than 32 characters
2. Contain only alphanumeric and punctuation characters
3. Be unique within the object type

When a name has not been defined, the system may display default system-defined names, as follows:

- ◆ SDS—its first IP address
- ◆ Device—the path to the device
- ◆ All other objects—the object's ID

ScaleIO objects are assigned a unique ID that can be used to identify the object in CLI commands. You can retrieve the ID via a query, or via the object's property sheet in the GUI.

By default, the command also performs performance tests on the added device, and saves the results.

Until the test is complete, the device capacity cannot be used. The SDS will perform two performance tests on the given devices: random writes and random reads. When the tests are complete, the device capacity is automatically added to the Storage Pool storage used by the MDM. To modify this behavior, specify one of the option parameters.

Parameters

Parameter	Description
--sds_id <ID>	SDS ID
--sds_name <NAME>	SDS name
--sds_ip <IP>	SDS IP address
--device_path <PATH>	The full path to the devices to be added, comma-separated. Up to 64 devices can be specified for each SDS.
--device_name <NAME>	When using this flag to assign names to the SDS devices, the names will be appropriated to the devices in the device_path list, respectively. The amount of names must equal the amount of devices. Comma-separated, no spaces.
--storage_pool_id <ID>	Storage Pool ID. if not specified, will use the default Storage Pool.
--storage_pool_name <NAME>	Storage Pool name. if not specified, will use the default Storage Pool.
--test_time <TIME>	The maximum test run-time in seconds (default: 10). The test will stop when it reaches the first of this limit, or the time it takes for 128 MB of data reads and writes. When <code>no_test</code> is selected, this switch is ignored.

Test_Options: CHOOSE ONE	
--test_only	Devices will be tested, but not used. To start using their capacity, run the activate_sds_device command.
--no_test	Device capacity will be used without any device testing
<blank>	Read and write test will be run on devices before their capacity will be used

Example

```
scli --mdm_ip 192.168.1.200 --add_sds_device
--sds_ip 192.168.1.6 --device_path /dev/sdb
--device_name sd02
```

Removing a device from an SDS

Command

```
remove_sds_device
```

Syntax

```
scli --remove_sds_device (--device_id <ID> | ((--sds_id
<ID> | --sds_name <NAME> | --sds_ip <IP>)
(--device_name <NAME> | --device_path <PATH>)))
```

Description/Notes

Initiates removal of a storage device from an SDS. Note that this process is asynchronous, and will run in the background.

An SDS device can be removed at any time, and no downtime is required. During execution of this command, the associated data is replicated to different nodes. Therefore, the removal process is asynchronous, and it might take a long time. You can abort the removal with the **abort_remove_sds_device** command.

Note: If the capacity of this SDS is still used by volumes, and cannot be replaced, the command will fail.

Parameters

Parameter	Description
--device_id <ID>	The ID of the device to be removed
--sds_id <ID>	ID of the SDS from which the device should be removed
--sds_name <NAME>	Name of the SDS from which the device should be removed
--sds_ip <IP>	IP address of the SDS from which the device should be removed
--device_name <NAME>	The name of the storage device or file to be removed from the SDS
--device_path <PATH>	The path of the storage device to be removed from the SDS

Example

```
scli --mdm_ip 192.168.1.200 --remove_sds_device
--sds_ip 192.168.1.6 --device_name /dev/sdb
```

Aborting removal of a device from an SDS**Command**

```
abort_remove_sds_device
```

Syntax

```
scli --abort_remove_sds_device (--device_id <ID> |
((--sds_id <ID> | --sds_name <NAME> | --sds_ip <IP>)
(--device_name <NAME> | --device_path <PATH>)))
```

Description/Notes

This command attempts to stop the removal of an SDS device. If performed at too late a stage, this command might fail, and the SDS device will be removed.

Parameters

Parameter	Description
--device_ID <ID>	The ID of the storage device that was requested to be removed from the SDS
--sds_id <ID>	ID of the SDS from which the device was to be removed
--sds_name <NAME>	Name of the SDS from which the device was to be removed
--sds_ip <IP>	IP address of the SDS from which the device was to be removed
--device_name <NAME>	The name of the storage device or file that was requested to be removed from the SDS
--device_path <PATH>	The path of the device that was requested to be removed

Example

```
scli --mdm_ip 192.168.1.200 --abort_remove_sds_device
--sds_ip 192.168.1.6 --device_name /dev/sdb
```

Modifying the capacity of an SDS device

Command

```
modify_sds_device_capacity
```

Syntax

```
scli --modify_sds_device_capacity (--device_id <ID> |
((--sds_id <ID> | --sds_name <NAME> | --sds_ip <IP>)
(--device_name <NAME> | --device_path <PATH>)))
--size_gb <SIZE>
```

Description/Notes

This command modifies the used capacity of an SDS device. The capacity assigned to the SDS device must be smaller than its actual physical size.

Parameters

Parameter	Description
--device_ID <ID>	The ID of the SDS device
--sds_id <ID>	SDS ID
--sds_name <NAME>	SDS name
--sds_ip <IP>	SDS IP address
--device_name <NAME>	SDS storage device name or file
--device_path <PATH>	The path of the device whose capacity is to be modified
--size_gb <SIZE>	Size of device to use in GB, between 30GB and the physical device size

Example

```
scli --mdm_ip 192.168.1.200
--modify_sds_device_capacity
--sds_ip 192.168.1.6 --device_name /dev/sdb --size_gb
150
```

Clearing an SDS device error**Command**

```
clear_sds_device_error
```

Syntax

```
scli --clear_sds_device_error (--sds_id <ID> |
--sds_name <NAME> | --sds_ip <IP>) (--device_id <ID> |
--device_name <NAME> | --device_path <PATH> |
--clear_all)
```

Description/Notes

This command clears an SDS device error.

Note: The command does not check if the device error was fixed. If the error persists, the device will return to an error state as soon as it is accessed. You can verify that the device error has been fixed by running an SDS query.

Parameters

Parameter	Description
--sds_id <ID>	SDS ID
--sds_name <NAME>	SDS name
--sds_ip <IP>	SDS IP address
--device_id <ID>	The ID of the device
--device_name <NAME>	SDS storage device name or file
--device_path <PATH>	The path of the device
--clear_all	Clears errors on all the SDS devices

Example (Single Device)

```
scli --mdm_ip 192.168.1.200 --clear_sds_device_error
--device_name /dev/sdb --sds_ip 192.168.1.7
```

Example (All Devices)

```
scli --mdm_ip 192.168.1.200 --clear_sds_device_error
--clear_all --sds_ip 192.168.1.7
```

Testing an SDS device

This section describes how to use the CLI to test SDS devices.

Starting a device test

Command

```
start_device_test
```

Syntax

```
scli --start_device_test ((--device_id <ID> |
((--sds_id <ID> | --sds_name <NAME> | --sds_ip <IP>)
(--device_name <NAME> | --device_path <PATH>))) |
(--sds_id <ID> | --sds_name <NAME> | --sds_ip <IP>) |
(((--protection_domain_id <ID> |
--protection_domain_name <NAME>) [--storage_pool_name
<NAME>]) | --storage_pool_id <ID>)) [--i_am_sure]
[Options] [Control]
```

Description/Notes

This command initiates a device test for one or all SDS devices.

By default, every added SDS device is tested for performance. You can choose to perform another test at any given time. Unlike the default tests, with this command, you can choose the test parameters.

Parameters

Parameter	Description
--sds_id <ID>	SDS ID
--sds_name <NAME>	SDS name
--sds_ip <IP>	IP address associated with the SDS
--device_id <ID>	Device ID
--device_path <PATH>	The path of the SDS device
--device_name <NAME>	SDS storage device name or file
--protection_domain_id <ID>	Protection Domain ID
--protection_domain_id <NAME>	Protection Domain name
--storage_pool_id <ID>	Storage Pool ID
--storage_pool_name <NAME>	Storage Pool name
--i_am_sure	Skip the safety questions for command execution (For example: "This could damage the stored data. Are you sure?")
Options: CHOOSE SEVERAL	
--io_type <read/write>	The I/O type, either read (default) or write. If the storage device is in use, only read testing can be performed.
--io_pattern <random/sequential>	The I/O pattern, either random (default) or sequential
--io_size_kb <SIZE>	The read or write I/O size in KB, from 4KB to 512 KB (default: 8)
Control: CHOOSE SEVERAL	

<code>--test_time <TIME></code>	Maximum test run time in seconds (default: 10 seconds)
<code>--io_total_size_mb <SIZE></code>	The total size of the test reads or writes in MB, between 1 and 32768 (default 128 MB), specifying the total I/O size in MB.
<code><blank></code>	Use defaults

Example

```
scli --mdm_ip 192.168.1.200 --start_device_test
--sds_ip 192.168.1.6 --device_path /dev/sdb --io_type
write --io_size 8
```

Retrieving SDS device test results

Command

```
query_device_test_results
```

Syntax

```
scli --query_device_test_results (--sds_id <ID> |
--sds_name <NAME> | --sds_ip <IP>) (--device_name
<NAME> | --show_all_devices)
```

Description/Notes

This command returns the SDS device test results. Every SDS saves results for the last two tests per device.

Parameters

Parameter	Description
<code>--sds_id <ID></code>	SDS ID
<code>--sds_name <NAME></code>	SDS name
<code>--sds_ip <IP></code>	SDS IP address
<code>--device_name <NAME></code>	SDS storage device name or file
<code>--show_all_devices</code>	Show results for all devices

Example

```
scli --mdm_ip 192.168.1.200
--query_device_test_results
--sds_ip 192.168.1.6 --device_name /dev/sdb
```

Activating an SDS device

Command

```
activate_sds_device
```

Syntax

```
scli --activate_sds_device (--sds_id <ID> | --sds_name
<NAME> | --sds_ip <IP>) (--device_id <ID> |
--device_name <NAME> | --device_path <PATH> |
--activate_all_devices)
```

Description/Notes

This command activates one or several SDS devices that have completed their tests.

Devices added using the commands **add_sds** or **add_sds_device** with the **test_only** parameter will not be used by the system until activated by this command.

Parameters

Parameter	Description
--sds_id <ID>	SDS ID
--sds_name <NAME>	SDS name
--sds_ip <IP>	SDS IP address
--device_id <ID>	The ID of the SDS device to activate
--device_name <NAME>	SDS storage device name or file
--device_path <PATH>	The path of the SDS device to activate
--activate_all_devices	Activate all devices of the specified SDS. If all the devices cannot be activated, this command will fail.

Example

```
scli --mdm_ip 192.168.1.200 --activate_sds_device
--sds_ip 192.168.1.5 --activate_all_devices
```


Testing the network

This section describes how to use the CLI to test the network.

Starting an SDS network test

Command

```
start_sds_network_test
```

Syntax

```
scli --start_sds_network_test (--sds_id <ID> |  
--sds_name <NAME> | --sds_ip <IP>) [--parallel_messages  
<NUMBER>] [--network_test_size_gb  
<SIZE>] [--network_test_length_secs <SECONDS>]
```

Description/Notes

This command initiates a network test between an SDS and all of its peers.

Parameters

Parameter	Description
--sds_id <ID>	SDS ID
--sds_name <NAME>	SDS name
--sds_ip <IP>	SDS IP address
--parallel_messages <NUMBER>	The number of parallel messages sent during the test, between 1 and 16 (default: 4)
--network_test_size_gb <SIZE>	The amount of data sent between the tested SDS and every other SDS (default size: 1GB).
--network_test_length_secs <SECONDS>	The maximum amount of time spent testing the SDS, regardless of the number of SDSs in the system. The default value is 0 (unlimited).

Example

```
scli --mdm_ip 192.168.1.200 --start_sds_network_test  
--sds_ip 192.168.1.4 --parallel_messages 8  
--network_test_size_gb 2 --network_test_length_secs  
120
```

Retrieving SDS network test results

Command

```
query_sds_network_test_results
```

Syntax

```
scli --query_sds_network_test_results (--sds_id <ID> |  
--sds_name <NAME> | --sds_ip <IP>)
```

Description/Notes

This command returns the results of the last network test performed between an SDS and its peers.

Parameters

Parameter	Description
--sds_id <ID>	SDS ID
--sds_name <NAME>	SDS name
--sds_ip <IP>	SDS IP address

Example

```
scli --mdm_ip 192.168.1.200  
--query_sds_network_test_results  
--sds_ip 192.168.1.4
```

Retrieving SDS device statistics

Command

```
query_device_latency_meters
```

Syntax

```
scli --query_device_latency_meters (--sds_id <ID> |  
--sds_name <NAME> | --sds_ip <IP>)
```

Description/Notes

This command queries SDS devices latency meters.

The SDS maintains statistics about reads and writes to its devices. This command returns the average I/O size and latency for both reads and writes.

Parameters

Parameter	Description
--sds_id <ID>	SDS ID
--sds_name <NAME>	SDS name
--sds_ip <IP>	SDS IP address

Example

```
scli --mdm_ip 192.168.1.200
--query_device_latency_meters
--sds_ip 192.168.1.5
```

Retrieving SDS device network statistics

Command

```
query_network_latency_meters
```

Syntax

```
scli --query_network_latency_meters (s--ds_id <ID> |
--sds_name <NAME> | --sds_ip <IP>)
```

Description/Notes

The SDS maintains statistics about network messages. This command retrieves the network average I/O size and average latency.

Parameters

Parameter	Description
--sds_id <ID>	SDS ID
--sds_name <NAME>	SDS name
--sds_ip <IP>	SDS IP address

Example

```
scli --mdm_ip 192.168.1.200
--query_network_latency_meters
--sds_ip 192.168.1.5
```

SDS network limits

Command

set_sds_network_limits

Syntax

```
scli --set_sds_network_limits (--protection_domain_id
<ID> | --protection_domain_name <NAME>)
[--rebuild_limit <LIMIT>] [--rebalance_limit <LIMIT>]
[--overall_limit <LIMIT>] [--i_am_sure]
```

Description/Notes

This command limits the network bandwidth used by all the SDSs in the specified Protection Domain, for various traffic types, including IO.

The SDS nodes transfer data between themselves. This data consists of user-data being replicated as part of the RAID protection, and data copied for internal rebalancing and recovery from failures. You can modify the balance between these types of data loads by limiting the data copy bandwidth. This change affects all SDSs in the specified Protection Domain.

Note: Contact EMC Support before you modify this configuration.

Parameters

Parameter	Description
--protection_domain_id <ID>	Protection Domain ID
--protection_domain_name <NAME>	Protection Domain name
--rebuild_limit <LIMIT>	Limits the network bandwidth for rebuild in MB/Sec. 0 is unlimited

<code>--rebalance_limit <LIMIT></code>	Limits the network bandwidth for rebalance in MB/Sec. 0 is unlimited
<code>--overall_limit <LIMIT></code>	Limit the overall network bandwidth in MB per second. This includes the rebuild, rebalance and application IO bandwidth. 0 is unlimited
<code>--i_am_sure</code>	Skip the safety questions for command execution (For example: "This could damage the stored data. Are you sure?")

Example

```
scli --mdm_ip 192.68.1.200 --set_sds_network_limits
--protection_domain_name pd1 --rebuild_limit 100
```

Setting DRL properties

Command

```
set_drl_properties
```

Syntax

```
scli --set_drl_properties (--sds_id <ID> | --sds_name
<NAME> | --sds_ip <IP> | --set_all) (--memory_only |
--hardened)
```

Description/Notes

This command sets the properties of the dirty-region-logging (DRL) used by a specific SDS. DRL bits indicate if data is in-writing to a certain location. Once the data is written in both primary and secondary locations, the DRL bit associated with the written location is cleared. These bits can be either stored in DRAM only (memory_only) or also backed up in non-volatile memory (hardened). The former delivers better I/O performance; the latter reduces data movement following a power-cycle giving rise to a faster rebuild.

NOTICE

This command may have performance implications. Contact EMC Support before you apply it.

Parameters

Parameter	Description
--sds_id <ID>	SDS ID
--sds_name <NAME>	SDS name
--sds_ip <IP>	SDS IP address
--set_all	Apply the properties to all SDSs. Overrides previous settings.
--memory_only	Dirty-region-logging information will be stored in memory only (default)
--hardened	Dirty-region-logging information will be stored both in memory and on disk

Example

```
scli --mdm_ip 192.68.1.200 --set_drl_properties
--hardened
```

Configuring I/O memory buffers

Command

```
set_num_of_io_buffers
```

Syntax

```
scli --set_num_of_io_buffers (--sds_id <ID> |
--sds_name <NAME> | --sds_ip <IP>) --num_of_io_buffers
<VALUE>
```

Description/Notes

This command sets the number of memory buffers that the SDS uses for I/O. The number of buffers acts as a multiplier, that controls the total buffer size that can be used for I/O.

Note: This setting controls the balance between memory usage and better performance. Consult with EMC Technical Support before using this command.

Parameters

Parameter	Description
<code>--sds_id <ID></code>	SDS ID
<code>--sds_name <NAME></code>	SDS name
<code>--sds_ip <IP></code>	The IP address of the SDS
<code>--num_of_io_buffers <VALUE></code>	The new number of I/O buffers to use (range: 1–10)

Example

```
scli --set_num_of_io_buffers --sds_ip 10.25.137.41
--num_of_io_buffers 5
```

Managing RAM read cache

This section describes how to manage the RAM read cache feature, which is designed to allocate RAM on nodes for caching of reads or writes. The feature is configured at the following levels:

- ◆ For a volume (optional)—specific volume to use or not use caching. If you want all I/Os for a specific volume to use caching, make sure that the volume, the corresponding Storage Pool, and its SDSs are all configured for using caching.
- ◆ For one or more Storage Pools—caching must be configured at this level for caching to work in the corresponding SDSs.
- ◆ For individual SDSs—caching may be disabled at this level, even if caching in the corresponding Storage Pool is enabled. Cache size can be configured at the SDS level.

By default, all volumes and Storage Pools are configured to use caching, and all SDSs have caching enabled, using a cache size of 128 MB. You can configure individual SDSs in the Storage Pool with different RAM values, or disable caching completely.

For a read to be stored in a specific SDS cache, you have to make sure that the cache on that SDS is enabled, and the relevant Storage Pool and the relevant volume are both configured to use cache.

Topics include:

- ◆ [“Configuring RAM read cache usage of a volume” on page 248](#)
- ◆ [“Using the RAM read cache of a Storage Pool” on page 249](#)
- ◆ [“Setting the RAM read cache write handling mode” on page 250](#)
- ◆ [“Enabling the RAM read cache of an SDS” on page 251](#)
- ◆ [“Disabling the RAM read cache of an SDS” on page 252](#)
- ◆ [“Setting RAM read cache size of an SDS” on page 253](#)

Configuring RAM read cache usage of a volume

Command

```
set_volume_rmcache_usage
```

Syntax

```
scli --set_volume_rmcache_usage (--volume_id |  
--volume_name) (--use_cache | --dont_use_cache)  
[--i_am_sure]
```

Description/Notes

This command controls the use of RAM read cache in the specified volume. Only one volume can be configured at a time. If you want to ensure that all I/Os for this volume are cached, the relevant Storage Pool should be configured to use cache, and the relevant SDSs should all have caching enabled.

Note: There are two ways of enabling cache at the volume level: during initial creation of the volume, using the `--add_volume` command (for more information, see [“Creating volumes” on page 116](#)), or later, using the `--set_volume_rmcache_usage` command described in this topic.

Parameters

Parameter	Description
--volume_id <ID>	Volume ID
--volume_name <NAME>	Volume name
--use_cache	Use RAM read cache on the Volume
--dont_use_cache	Do not use RAM read cache on the Volume
--i_am_sure	Skip the safety questions for command execution (For example: “This could damage the stored data. Are you sure?”)

Example

```
scli --set_volume_rmcache_usage --volume_name vol_10
--use_cache
```

Using the RAM read cache of a Storage Pool

Command

```
set_rmcache_usage
```

Syntax

```
scli --set_rmcache_usage (((--protection_domain_id
<ID> | --protection_domain_name <NAME>)
[--storage_pool_name <NAME>]) | --storage_pool_id <ID>)
(--use_rmcache | --dont_use_rmcache) [--i_am_sure]
```

Description/Notes

This command controls the use of RAM read cache in the specified Storage Pool. Caching must also be enabled in each SDS in the Storage Pool, as well, using the command `enable_sds_rmcache`. Caching will only begin once devices have been added to the SDSs. It is possible to configure use of RAM caching for a Storage Pool and then disable caching on one or more SDSs individually. For more information, see [“Enabling the RAM read cache of an SDS” on page 251](#).

Parameters

Parameter	Description
--protection_domain_id <ID>	Protection Domain ID
--protection_domain_name <NAME>	Protection Domain name
--storage_pool_id <ID>	Storage Pool ID
--storage_pool_name <NAME>	Storage Pool name
--use_rmcache	Use RAM read cache in the Storage Pool (default)
--dont_use_rmcache	Do not use RAM read cache in the Storage Pool
--i_am_sure	Skip the safety questions for command execution (For example: "This could damage the stored data. Are you sure?")

Example

```
scli --set_rmcache_usage --protection_domain_name pd10
--storage_pool_name spflash --use_rmcache
```

Setting the RAM read cache write handling mode**Command**

```
set_rmcache_write_handling_mode
```

Syntax

```
scli --set_rmcache_write_handling_mode
(--storage_pool_id <ID> | --storage_pool_name <NAME>)
--rmcache_write_handling_mode <passthrough/cached>
[--i_am_sure]
```

Description/Notes

This command sets the RAM read cache write handling mode of the specified Storage Pool. Writes typically skip the cache, but in certain circumstances, you may want to cache writes as well as reads.

Parameters

Parameter	Description
--storage_pool_id <ID>	Storage Pool ID
--storage_pool_name <NAME>	Storage Pool name
--rmcache_write_handling_mode <PASSTHROUGH / CACHED>	The write-handling mode used by the RAM read cache: passthrough —writes skip the cache and are stored in storage only cached —writes are stored in both cache and storage
--i_am_sure	Skip the safety questions for command execution (For example: “This could damage the stored data. Are you sure?”)

Example

```
scli --set_rmcache_write_handling_mode
--storage_pool_name spflash
--rmcache_write_handling_mode cached
```

Enabling the RAM read cache of an SDS

Command

```
enable_sds_rmcache
```

Syntax

```
scli --enable_sds_rmcache (--sds_id <ID> | --sds_name
<NAME> | --sds_ip <IP>) [--i_am_sure]
```

Description/Notes

This command enables the RAM read cache of the devices in the specified SDS. For a read to be stored in a specific SDS cache, you have to make sure that the cache on this SDS is enabled, and the relevant Storage Pool and the relevant volume are both configured to use cache. Caching will only begin after one or more devices are added to the SDS.

Note: You can also enable/disable the RAM read cache for all SDSs in a Protection Domain using one command. To do this, add the relevant Protection Domain name or ID to the `enable_sds_rmcache` or `disable_sds_rmcache` command. For example, `scli --enable_sds_rmcache --sds_ip 10.100.5.25 --protection_domain pd25`

Parameters

Parameter	Description
<code>--sds_id <ID></code>	SDS ID
<code>--sds_name <NAME></code>	SDS name
<code>--sds_ip <IP></code>	SDS IP address
<code>--i_am_sure</code>	Skip the safety questions for command execution (For example: "This could damage the stored data. Are you sure?")

Example

```
scli --enable_sds_rmcache --sds_ip 10.100.5.25
```

Disabling the RAM read cache of an SDS

Command

```
disable_sds_rmcache
```

Syntax

```
scli --disable_sds_rmcache (--sds_id <ID> | --sds_name <NAME> | --sds_ip <IP>) [--i_am_sure]
```

Description/Notes

This command disables the RAM read cache of the specified SDS.

Parameters

Parameter	Description
--sds_id <ID>	SDS ID
--sds_name <NAME>	SDS name
--sds_ip <IP>	SDS IP address
--i_am_sure	Skip the safety questions for command execution (For example: “This could damage the stored data. Are you sure?”)

Example

```
scli --disable_sds_rmcache --sds_name sds23
```

Setting RAM read cache size of an SDS

Command

```
set_sds_rmcache_size
```

Syntax

```
scli --set_sds_rmcache_size (--sds_id <ID> | --sds_name <NAME> | --sds_ip <IP>) --rmcache_size_mb <SIZE> [--i_am_sure]
```

Description/Note

This command sets the RAM read cache size of the specified SDS. By default, RAM read cache size is set to 128 MB in all SDSs.

Parameters

Parameter	Description
--sds_id <ID>	SDS ID
--sds_name <NAME>	SDS name

<code>--sds_ip <IP></code>	SDS IP address
<code>--rmcache_size_mb <SIZE></code>	New size of RAM read cache in MB (default: 128 MB).
<code>--i_am_sure</code>	Skip the safety questions for command execution (For example: “This could damage the stored data. Are you sure?”)

Example

```
scli --set_sds_rmcache_size --sds_name sds10
--rmcache_size_mb 256
```

Managing the SDC

This section describes how to use the CLI to manage ScaleIO data clients (SDC).

Note: For information about restricting SDC access to the MDM, and removing SDCs from the system, see [“Managing SDC access to the MDM” on page 283](#).

Topics include:

- ◆ [“Setting volume bandwidth limits \(Enterprise license\)” on page 255](#)
- ◆ [“Retrieving volume bandwidth limits” on page 256](#)
- ◆ [“Naming or renaming an SDC” on page 256](#)
- ◆ [“Adding an MDM using drv_cfg” on page 257](#)
- ◆ [“Modifying an MDM IP address using drv_cfg” on page 258](#)
- ◆ [“Setting the SDC’s GUID using drv_cfg” on page 259](#)
- ◆ [“Loading a configuration file using drv_cfg” on page 260](#)

Setting volume bandwidth limits (Enterprise license)

Command

```
set_sdc_volume_limits
```

Syntax

```
scli --set_sdc_volume_limits (--volume_id <ID> |  
--volume_name <NAME>) (--sdc_ip <IP>| --sdc_name <NAME>  
| --sdc_id <ID>) [--i_am_sure] (Options)
```

Description/Notes

This command sets limits to the IOPs and bandwidth that one SDC generates for the specified volume. This enables you to control the quality of service (QoS).

This command can only be used to enable QoS during the 10-day trial, or if your permanent license enables enterprise features. If these conditions are not met, you can use the command only to stop QoS activities.

Parameters

Parameter	Description
--volume_id <ID>	Volume ID
--volume_name <NAME>	Volume name
--sdc_id <ID>	SDC ID
--sdc_name <NAME>	SDC name
--sdc_ip <IP>	SDC IP address
--i_am_sure	Skip the safety questions for command execution (For example: “This could damage the stored data. Are you sure?”)
Options: CHOOSE AT LEAST ONE	
--limit_iops <NUMBER>	Limits the volume IOPS. The number of IOPS must be larger than 10. 0 is unlimited.
--limit_bandwidth <NUMBER>	Limits the volume network bandwidth. The bandwidth is in MB/sec. 0 is unlimited

Example

```
scli --mdm_ip 192.168.1.200 --set_sdc_volume_limit
--volume_name vol1 --sdc_ip 192.168.1.3 --limit_iops
100
```

Retrieving volume bandwidth limits

Command

query_sdc_volume_limits

Syntax

```
scli --query_sdc_volume_limits (--volume_id <ID> |
--volume_name <NAME>) (--sdc_ip <IP>| --sdc_id <ID>)
```

Description/Notes

This command queries the IOPS and bandwidth limits that one SDC generates for the specified volume.

Parameters

Parameter	Description
--volume_id <ID>	Volume ID
--volume_name <NAME>	Volume name
--sdc_id <ID>	SDC ID
--sdc_ip <IP>	SDC IP address

Example

```
scli --mdm_ip 192.168.1.200 --query_sdc_volume_limits
--volume_name vol1 --sdc_ip 192.168.1.3
```

Naming or renaming an SDC

Command

rename_sdc

Syntax

```
scli --rename_sdc (--sdc_id <ID> | --sdc_name <NAME> |
--sdc_ip <IP>) --new_name <NAME>
```


Description/Notes

This command assigns a new name to the specified SDC.

Parameters

Parameter	Description
--sdc_id <ID>	SDC ID
--sdc_name <NAME>	The current name of the SDC
--sdc_ip <IP>	The IP address of the SDC
--new_name <NAME>	The new name that you want to assign to the specified SDC

Example

```
scli --rename_sdc --sdc_id c8a300bd00000000 --new_name
sdc-flash-21
```

Adding an MDM using drv_cfg

Command

```
drv_cfg --add_mdm
```

Note: This is not a CLI command, but rather an executable that is run on the SDC server.

Syntax

```
/opt/emc/scaleio/sdc/bin/drv_cfg --add_mdm
--ip <MDM_IP_ADDRESS_LIST>
```

Description/Notes

This utility calls the kernel module to connect to an MDM. This command is typically used in cases where an SDC is connected to more than one ScaleIO system.

Note: Extending your ScaleIO system with another MDM requires that you update all SDCs in your system with the new MDM IP address. Run the `drv_cfg` utility with the `--mod_mdm_ip` option (see [“Modifying an MDM IP address using drv_cfg” on page 258](#)), and to make the change persistent, use the `--file` parameter. In

addition, any additional objects or systems which interface with the MDM must also be updated. For more information, see the notice in [“Modifying an MDM’s management IP address” on page 170.](#)

Parameters

Parameter	Description
--ip <MDM_IP_ADDRESS_LIST>	List of IP addresses for this MDM (comma delimited)
Optional Parameter	
--file <CONFIG_FILE_NAME>	Name of the configuration file to which the MDM information should be written
--only_cfg	Do not call the kernel to actually connect

Example

```
/opt/emc/scaleio/sdc/bin/drv_cfg --add_mdm
--ip 10.100.22.20,10.100.22.30
--file /bin/emc/scaleio/drv_cfg.txt
```

Modifying an MDM IP address using drv_cfg

Command

```
drv_cfg --mod_mdm_ip
```

Note: This is not a CLI command, but rather an executable that is run on the SDC server.

Syntax

```
/opt/emc/scaleio/sdc/bin/drv_cfg --mod_mdm_ip
--ip <EXISTING_MDM_IP_ADDRESS>
--new_mdm_ip <NEW_MDM_IP_ADDRESSES>
```

Description/Notes

This utility calls the kernel to modify an MDM’s IP address list. It is typically used in cases when MDM IP address has changed or MDMs are added/remove from/to the system.

Note: Extending your ScaleIO system with another MDM requires that you update all SDCs in your system with the new MDM IP address. Ensure that you run this command on all SDCs. For more information, see the notice in [“Modifying an MDM’s management IP address” on page 170.](#)

Parameters

Parameter	Description
--ip <EXISTING_MDM_IP_ADDRESS>	One of the existing MDM IP addresses
--new_mdm_ip <NEW_MDM_IP_ADDRESSES>	The new IP address list (comma delimited) for this MDM. If you want to retain the existing address(es), include them in this list.
Optional Parameter	
--file <CONFIG_FILE_NAME>	The name of the configuration file to which the MDM information should be written
--only_cfg	Do not call the kernel to actually connect

Example

```
/opt/emc/scaleio/sdc/bin/drv_cfg --mod_mdm_ip
--ip 10.100.20.20
--new_mdm_ip 10.100.20.20,10.100.20.30,10.100.20.40
```

Setting the SDC’s GUID using drv_cfg

Command

```
drv_cfg --set_guid
```

Note: This is not a CLI command, but rather an executable that is run on the SDC server.

Syntax

```
/opt/emc/scaleio/sdc/bin/drv_cfg --set_guid
```

Description/Notes

This utility generates a new GUID for the SDC. It is used automatically during installation. Please contact EMC Technical Support before using this command. If the `--file` parameter is used, the command will update the configuration file.

Note: If the service is locked, a restart is required for the new GUID to take effect or free the ScaleIO devices used by the application.

Parameters

Parameter	Description
<code>--guid <GUID></code>	The GUID by which this SDC will be identified in the MDM. If you do not provide one, the system will automatically create it.
<code>--file <CONFIG_FILE_NAME></code>	The name of the configuration file to which the MDM information should be written
<code>--only_cfg</code>	Do not call the kernel module to actually set the GUID

Example

```
/opt/emc/scaleio/sdc/bin/drv_cfg --set_guid
--guid d9b8a46d-4abd-4ec9-abb2-7bd74f6b0ebe
--file /bin/emc/scaleio/drv_cfg.txt
```

Loading a configuration file using `drv_cfg`

Command

```
drv_cfg --load_cfg_file
```

Note: This is not a CLI command, but rather an executable that is run on the SDC server.

Syntax

```
/opt/emc/scaleio/sdc/bin/drv_cfg
--load_cfg_file <FILE_NAME>
```

Description/Notes

This utility reads a configuration file containing MDM IP addresses, and calls the kernel to connect to them.

Example

```
/opt/emc/scaleio/sdc/bin/drv_cfg  
--load_cfg_file /bin/emc/scaleio/drv_cfg.txt
```

Managing Protection Domains

This section describes how to use the CLI to manage Protection Domains. Topics include:

- ◆ [“Renaming a Protection Domain” on page 262](#)
- ◆ [“Renaming a Storage Pool” on page 263](#)
- ◆ [“Removing a Protection Domain” on page 264](#)
- ◆ [“Removing a Storage Pool” on page 264](#)
- ◆ [“Setting the rebuild mode” on page 265](#)
- ◆ [“Setting the rebalance mode” on page 266](#)
- ◆ [“Setting the rebuild policy” on page 267](#)
- ◆ [“Setting the rebalance policy” on page 269](#)
- ◆ [“Inactivating a Protection Domain” on page 271](#)
- ◆ [“Activating a Protection Domain” on page 272](#)
- ◆ [“Modifying Storage Pool zero padding policy” on page 273](#)

Renaming a Protection Domain

Command

rename_protection_domain

Syntax

```
scli --rename_protection_domain
(--protection_domain_id <ID> |
--protection_domain_name <NAME>) --new_name <NAME>
```

Description/Notes

This command names (or renames) a Protection Domain. For information about naming rules, see [“Adding a Protection Domain” on page 173](#).

Parameters

Parameter	Description
--protection_domain_id <ID>	Protection Domain ID
--protection_domain_name <NAME>	Protection Domain name
--new_name <NAME>	A new, unique name to be associated with the Protection Domain

Example

```
scli --mdm_ip 192.168.1.200 --rename_protection_domain
--protection_domain_name pd1 --new_name
protection_domain_1.
```

Renaming a Storage Pool

Command

```
rename_storage_pool
```

Syntax

```
scli --rename_storage_pool (--protection_domain_id <ID> | --protection_domain_name <NAME>)
(--storage_pool_id <ID> | --storage_pool_name <NAME>)
--new_name <NAME>
```

Description/Notes

This command names (or renames) a Storage Pool. For information about naming rules, see [“Adding a Protection Domain” on page 173](#).

Parameters

Parameter	Description
--protection_domain_id <ID>	Protection Domain ID
--protection_domain_name <NAME>	Protection Domain name
--storage_pool_id <ID>	Storage Pool ID
--storage_pool_name <NAME>	Storage Pool name
--new_name <NAME>	A new, unique name to be associated with the Storage Pool

Example

```
scli --mdm_ip 192.168.1.200 --rename_storage_pool
--protection_domain_name rack_1.1
--storage_pool_name sp_1.1_rack_1.1
--new_name sp_2.2_rack_1.1
```

Removing a Protection Domain

Command

`remove_protection_domain`

Syntax

```
scli --remove_protection_domain
(--protection_domain_id <ID> |
--protection_domain_name <NAME>)
```

Description/Notes

This command removes a Protection Domain.

Note: A Protection Domain can only be removed if there is no SDS associated with it.

Parameters

Parameter	Description
<code>--protection_domain_id <ID></code>	Protection Domain ID
<code>--protection_domain_name <NAME></code>	Protection Domain name

-Example

```
scli --mdm_ip 192.168.1.200 --remove_protection_domain
--protection_domain_name my_protection_domain
```

Removing a Storage Pool

Command

`remove_storage_pool`

Syntax

```
scli --remove_storage_pool (--protection_domain_id
<ID> | --protection_domain_name <NAME>)
(--storage_pool_id <ID> | --storage_pool_name <NAME>)
[--i_am_sure]
```


Description/Notes

This command removes a Storage Pool from a Protection Domain. Each Protection Domain must contain at least one Storage Pool (either the default one, or a user-defined one). You cannot remove all the Storage Pools from a Protection Domain.

Parameters

Parameter	Description
--protection_domain_id <ID>	Protection Domain ID
--protection_domain_name <NAME>	Protection Domain name
--storage_pool_id <ID>	Storage Pool ID
--storage_pool_name <NAME>	Storage Pool name
--i_am_sure	Skip the safety questions for command execution (For example: "This could damage the stored data. Are you sure?")

Example

```
scli --mdm_ip 192.168.1.200 --remove_storage_pool
--protection_domain_name rack_1.1
--storage_pool_name sp_1.1_rack_1.1
```

Setting the rebuild mode

Command

```
set_rebuild_mode
```

Syntax

```
scli --set_rebuild_mode (--protection_domain_id <ID> |
--protection_domain_name <NAME>) (--storage_pool_id
<ID> | --storage_pool_name <NAME>) (--enable_rebuild |
--disable_rebuild) [--i_am_sure]
```

Description/Notes

This command enables or disables rebuilds in the specified Storage Pool. Rebuilds are an essential part of the ScaleIO system, without which redundancy will not be restored after failures, and should only be disabled temporarily, in special circumstances.

Parameters

Parameter	Description
--protection_domain_id <ID>	Protection Domain ID
--protection_domain_name <NAME>	Protection Domain name
--storage_pool_id <ID>	Storage Pool ID
--storage_pool_name <NAME>	Storage Pool name
--enable_rebuild	Enable rebuilds in the specified Storage Pool
--disable_rebuild	Disable rebuilds in the specified Storage Pool
--i_am_sure	Skip the safety questions for command execution (For example: "This could damage the stored data. Are you sure?")

Example

```
scli --set_rebuild_mode --protection_domain_name pd10
--storage_pool_name sp20 --enable_rebuild
```

Setting the rebalance mode

Command

```
set_rebalance_mode
```

Syntax

```
scli --set_rebalance_mode (--protection_domain_id <ID>
| --protection_domain_name <NAME>) (--storage_pool_id
<ID> | --storage_pool_name <NAME>) (--enable_rebalance
| --disable_rebalance) [--i_am_sure]
```

Description/Notes

This command enables or disables rebalancing of the specified Storage Pool.

Note: Rebalancing is an essential part of the ScaleIO system, and should only be disabled, temporarily, in special circumstances.

Disabling rebalance may cause the system to become unbalanced even if no capacity is added or removed. For example, during a recovery from an SDS or device failure, some rebalance activity may be needed to ensure optimal balancing.

Parameters

Parameter	Description
--protection_domain_id <ID>	Protection Domain ID
--protection_domain_name <NAME>	Protection Domain name
--storage_pool_id <ID>	Storage Pool ID
--storage_pool_name <NAME>	Storage Pool name
--enable_rebuild	Enable rebalancing of the specified Storage Pool
--disable_rebuild	Disable rebalancing of the specified Storage Pool
--i_am_sure	Skip the safety questions for command execution (For example: "This could damage the stored data. Are you sure?")

Example

```
scli --set_rebalance_mode --protection_domain_name
pd10 --storage_pool_name sp20 --enable_rebalance
```

Setting the rebuild policy

Command

```
set_rebuild_policy
```

Syntax

```
scli --set_rebuild_policy (--protection_domain_id <ID>
| --protection_domain_name <NAME>) (--storage_pool_id
<ID> | --storage_pool_name <NAME>) --policy <POLICY>
[--i_am_sure] [Options]
```

Description

This command sets the rebuild IO priority policy for a Storage Pool. This feature affects system performance, and should only be modified by advanced users.

Parameters

Parameter	Description
--protection_domain_id <ID>	Protection Domain ID
--protection_domain_name <NAME>	Protection Domain name
--storage_pool_id <ID>	Storage Pool ID
--storage_pool_name <NAME>	Storage Pool name
--policy <POLICY>	Policy to use for rebuild IO priority. Can be one of the following options: no_limit—Rebuild IOs are not limited limit_concurrent_io—Limit the number of allowed concurrent rebuild IOs (default) favor_application_io—Limit the number and bandwidth of rebuild IOs when application IOs are in-progress dynamic_bandwidth_throttling—Limit the number and bandwidth of rebuild IOs when application IOs are in-progress or have been in a defined quiet period
--i_am_sure	Skip the safety questions for command execution (For example: "This could damage the stored data. Are you sure?")
Options: CHOOSE ONE OR SEVERAL	
--concurrent_io_limit <LIMIT>	The maximum number of concurrent rebuild IOs per device (default: 1)
--bandwidth_limit <BANDWIDTH>	The maximum bandwidth of rebuild IOs, in KB per second, per device (default: 10,240). This property will take effect only if the policy is set to <code>favor_application_io</code> or <code>dynamic_bandwidth_throttling</code> .

<code>--quiet_period <PERIOD></code>	If the application IOs are below the IOPS and bandwidth threshold in this period, given in milliseconds, no throttling will be applied to the rebuild IOs (default: 2000). This property will take effect only if policy is set to <code>dynamic_bandwidth_throttling</code> .
<code>--application_iops_threshold <THRESHOLD></code>	The application IOPS threshold above which rebuild IO throttling will be applied (default: 10). This property will take effect only if policy is set to <code>dynamic_bandwidth_throttling</code> .
<code>--application_bandwidth_threshold <THRESHOLD></code>	The application IO bandwidth threshold, in KB per second, above which rebuild IO throttling will be applied (default:10,240). This property will take effect only if policy is set to <code>dynamic_bandwidth_throttling</code> .

Example

```
scli --set_rebuild_policy --protection_domain_name pd1
--storage_pool_name sp1 --policy no_limit
--bandwidth_limit 512
```

Setting the rebalance policy

Command

```
set_rebalance_policy
```

Syntax

```
scli --set_rebalance_policy (--protection_domain_id
<ID> | --protection_domain_name <NAME>)
(--storage_pool_id <ID> | --storage_pool_name <NAME>)
--policy <POLICY> [--i_am_sure] [Options]
```

Description

This command sets the rebalance IO priority policy for a Storage Pool. This feature affects system performance, and should only be modified by advanced users.

Parameters

Parameter	Description
--protection_domain_id <ID>	Protection Domain ID
--protection_domain_name <NAME>	Protection Domain name
--storage_pool_id <ID>	Storage Pool ID
--storage_pool_name <NAME>	Storage Pool name
--policy <POLICY>	Policy to use for rebalance IO priority. Can be one of the following options. no_limit—Rebalance IOs are not limited limit_concurrent_io—Limit the number of allowed concurrent rebalance IOs favor_application_io—Limit the number and bandwidth of rebalance IOs when application IOs are in-progress (default) dynamic_bandwidth_throttling—Limit the number and bandwidth of rebalance IOs when application IOs are in-progress or have been in a defined quiet period
--i_am_sure	Skip the safety questions for command execution (For example: "This could damage the stored data. Are you sure?")
Options: CHOOSE ONE OR SEVERAL	
--concurrent_io_limit <LIMIT>	The maximum number of concurrent rebuild IOs per device (default: 1)
--bandwidth_limit <BANDWIDTH>	The maximum bandwidth of rebuild IOs, in KB per second, per device (default: 10,240). This property will take effect only if policy is set to favor_application_io or dynamic_bandwidth_throttling.

<code>--quiet_period <PERIOD></code>	If the application IOs are below the IOPS and bandwidth threshold in this period, given in milliseconds, no throttling will be applied to the rebuild IOs (default: 2000). This property will take effect only if policy is set to <code>dynamic_bandwidth_throttling</code> .
<code>--application_iops_threshold <THRESHOLD></code>	The application IOPS threshold above which rebuild IO throttling will be applied (default: 10).This property will take effect only if policy is set to <code>dynamic_bandwidth_throttling</code> .
<code>--application_bandwidth_threshold <THRESHOLD></code>	The application IO bandwidth threshold, in KB per second, above which rebuild IO throttling will be applied (default:10,240).This property will take effect only if policy is set to <code>dynamic_bandwidth_throttling</code> .

Example

```
scli --set_rebalance_policy --protection_domain_name
pd1 --storage_pool_name sp1 --policy no_limit
--bandwidth_limit 512
```

Inactivating a Protection Domain

Command

```
inactivate_protection_domain
```

Syntax

```
scli --inactivate_protection_domain
(--protection_domain_id <ID> |
--protection_domain_name <NAME>)
[--force_inactivate] [--i_am_sure]
```

Description

This command inactivates the specified Protection Domain. Using this feature is a much more effective way to shut down nodes, and is preferable to shutting them down manually.

When this feature is in effect, the following activities can take place, behind the scenes:

- Determine if there are any current rebuild/rebalance activities taking place. If so, the shutdown will be delayed (unless it is forced) until they are finished.
- Block future rebuild/rebalance activities.
- Quiesce application I/O and disable access to volumes.
- Move the DRL mode of all SDSs to harden, in preparation of rebooting the server.
- Reload of all SDSs before re-enabling data access.

Note: If you inactivate a Protection Domain, the data remains on the SDSs, and therefore, it is preferable to remove a Protection Domain if you no longer need it.

Parameters

Parameter	Description
--protection_domain_id <ID>	Protection Domain ID
--protection_domain_name <NAME>	Protection Domain name
--force_shutdown	Inactivate the Protection Domain, ignoring current system errors
--i_am_sure	Skip the safety questions for command execution (For example: "This could damage the stored data. Are you sure?")

Example

```
scli --inactivate_protection_domain
--protection_domain_name pd1
```

Activating a Protection Domain

Command

```
activate_protection_domain
```

Syntax

```
scli --activate_protection_domain
(--protection_domain_id <ID> |
--protection_domain_name <NAME>) [--force_activate]
[--i_am_sure]
```


Description

This command activates the specified Protection Domain.

Parameters

Parameter	Description
--protection_domain_id <ID>	Protection Domain ID
--protection_domain_name <NAME>	Protection Domain name
--force_activate	Activate the Protection Domain, ignoring current system errors
--i_am_sure	Skip the safety questions for command execution (For example: “This could damage the stored data. Are you sure?”)

Example

```
scli --activate_protection_domain
--protection_domain_name pd1
```

Modifying Storage Pool zero padding policy

Command

```
modify_zero_padding_policy
```

Syntax

```
scli --modify_zero_padding_policy
(--protection_domain_id <ID> |
--protection_domain_name <NAME>) (--storage_pool_id
<ID> | --storage_pool_name <NAME>)
(--zero_padding_enabled | --zero_padding_disabled)
```

Description

This command modifies the zero padding policy of the Storage Pool.

Parameters

Parameter	Description
--protection_domain_id <ID>	Protection Domain ID
--protection_domain_name <NAME>	Protection Domain name
--storage_pool_id <ID>	Storage Pool ID
--storage_pool_name <NAME>	Storage Pool name

Example

```
scli --modify_zero_padding_policy --
protection_domain_name pd10 --storage_pool_name sp1
--zero_padding_disabled
```

Managing Fault Sets

This section describes how to use the CLI to manage Fault Sets. Topics include:

- ◆ [“Removing a Fault Set” on page 274](#)
- ◆ [“Removing SDSs from a Fault Set” on page 275](#)
- ◆ [“Renaming an existing Fault Set” on page 276](#)

Removing a Fault Set

Command

```
remove_fault_set
```

Syntax

```
scli --remove_fault_set (--fault_set_id <ID> |
((--protection_domain_id <ID> |
--protection_domain_name <NAME>)) --fault_set_name
<NAME>))
```

Description

This command removes the specified Fault Set. The Fault Set must be empty. You can remove SDSs from the Fault Set using the `clear_fault_set` command. For more information, see [“Removing SDSs from a Fault Set” on page 275](#).

Parameters

Parameter	Description
--protection_domain_id <ID>	Protection Domain ID
--protection_domain_name <NAME>	Protection Domain name
--fault_set_id <ID>	Fault Set ID
--fault_set_name <NAME>	Fault Set name

Example

```
scli --remove_fault_set --fault_set_name sio-fs1
```

Removing SDSs from a Fault Set

Command

```
clear_fault_set
```

Syntax

```
scli --clear_fault_set (--fault_set_id <ID> |  
  ((--protection_domain_id <ID> |  
    --protection_domain_name <NAME>)) --fault_set_name  
  <NAME>)) [--i_am_sure]
```

Description

This command removes all SDSs from the specified Fault Set.

Parameters

Parameter	Description
--protection_domain_id <ID>	Protection Domain ID
--protection_domain_name <NAME>	Protection Domain name
--fault_set_id <ID>	Fault Set ID
--fault_set_name <NAME>	Fault Set name
--i_am_sure	Skip the safety questions for command execution (For example: "This could damage the stored data. Are you sure?")

Example

```
scli --clear_fault_set --fault_set_name sio-fs1
```

Renaming an existing Fault Set

Command

```
rename_fault_set
```

Syntax

```
scli --rename_fault_set (--fault_set_id <ID> |  
((--protection_domain_id <ID> |  
--protection_domain_name <NAME>) --fault_set_name  
<NAME>)) --new_name <NAME>
```

Description

This command renames the specified Fault Set.

Parameters

Parameter	Description
--protection_domain_id <ID>	Protection Domain ID
--protection_domain_name <NAME>	Protection Domain name
--fault_set_id <ID>	Fault Set ID
--fault_set_name <NAME>	Fault Set name
--new_name <NAME>	The new name that will be assigned to the Fault Set

Example

```
scli --rename_fault_set --fault_set_name sio-fs-test
--new_name sio-fs1
```

Managing the MDM cluster

This section describes how to use the CLI to manage the MDM cluster. Topics include:

- [“Switching to single mode” on page 277](#)
- [“Switching MDM ownership” on page 278](#)
- [“Removing the secondary MDM” on page 279](#)
- [“Removing a tie-breaker” on page 279](#)
- [“Updating the SDC driver with IP changes” on page 280](#)
- [“Changing an MDM server or changing an MDM IP address” on page 280](#)
- [“Limiting remote clients to read-only access” on page 282](#)
- [“Managing SDC access to the MDM” on page 283](#)

Switching to single mode

Command

```
switch_to_single_mode
```

Syntax

```
scli --switch_to_single_mode [--i_am_sure]
```

Description/Notes

This command switches the MDM cluster to single mode, where only one MDM will manage the system.

NOTICE

While the MDM ownership is being switched, the cluster will be temporarily degraded.

Most cluster maintenance commands can only be run when the cluster is in *single*, as opposed to *cluster* mode.

NOTICE

It is not recommended to use Single Mode in production systems, except in temporary situations. The MDM contains all the metadata required for system operation. Single Mode has no protection, and exposes the system to a single point of failure.

Parameters

Parameter	Description
--i_am_sure	Skip the safety questions for command execution (For example: "This could damage the stored data. Are you sure?")

Example

```
scli --mdm_ip 192.168.1.200 --switch_to_single_mode
```

Switching MDM ownership

Command

```
switch_mdm_ownership
```

Syntax

```
scli --switch_mdm_ownership
```

Description/Notes

This command switches MDM cluster ownership from the current Primary MDM to the Secondary MDM.

NOTICE

While the MDM ownership is being switched, the cluster will be temporarily degraded.

Parameters

Not applicable.

Example

```
scli --mdm_ip 192.168.1.200 --switch_mdm_ownership
```

Removing the secondary MDM

Command

```
remove_secondary_mdm
```

Syntax

```
scli --remove_secondary_mdm
```

Description/Notes

This command removes the Secondary MDM from the MDM cluster configuration.

Note: This command can only be used while the MDM cluster is in single mode.

Parameters

Not applicable.

Example

```
scli --mdm_ip 192.168.1.200 --remove_secondary_mdm
```

Removing a tie-breaker

Command

```
remove_tb
```

Syntax

```
scli --remove_tb
```

Description/Notes

This command removes the Tie-Breaker from the MDM cluster configuration.

Note: This command can be used only while the MDM cluster is in single mode.

Parameters

Not applicable.

Example

```
scli --mdm_ip 192.168.1.200 --remove_tb
```

Updating the SDC driver with IP changes

1. Edit `/bin/emc/scaleio/drv_cfg.txt` and change the IP address in the last line to the new IP.
2. Save and close the file.
3. Type the following command:

```
/etc/init.d/scini restart
```

Changing an MDM server or changing an MDM IP address

You can move an MDM from the current to a new server in either of the following ways:

- ◆ Create a new IP address for the new MDM server
- ◆ Move the current IP address to the new MDM server

This procedure describes both options.

To move an MDM between servers, perform the following:

1. Prepare the new MDM node with the necessary IP addresses.
2. Query the MDM cluster by typing the following command:

```
scli --query_cluster --mdm_ip <MDM_IP>
```

Ensure that the Primary MDM is not running on the server that is about to be replaced. If it is, first use the **switch_mdm_ownership** command.

3. Install the MDM on a new server. Ensure that the server is connected to the network that is used by ScaleIO components.
4. Switch the cluster to single mode by typing the following command:

```
scli --switch_to_single_mode
```


5. Remove the secondary MDM node by typing the following command:

```
scli --remove_secondary
```

6. Add the new MDM node by typing the following command:

```
scli --add_secondary_mdm --secondary_mdm_ip <IP>  
[--secondary_mdm_port <PORT>]
```

Example

```
scli --add_secondary_mdm --mdm_ip 9.4.4.111  
--secondary_mdm_ip 9.4.4.112
```

Example output

```
Successfully added a Secondary MDM. Object ID  
2eab49560bb0b8b4
```

7. Switch to cluster mode by typing the following command:

```
scli --switch_to_cluster_mode
```

8. Query the MDM cluster to see that its state is back to normal by typing the following command:

```
scli --query_cluster
```

Example output

```
Mode: Cluster, Cluster State: Normal, Tie-Breaker State:  
Connected  
Primary IP: 9.4.4.111  
Secondary IP: 9.4.4.112  
Tie-Breaker IP: 9.4.4.113  
Management IP: 9.4.4.222, 9.4.4.221
```

When changing an MDM IP, you must update the SDC as well.

To update the SDC on a Windows server, perform the following:

1. Update the IP addresses, by running the following command:

```
C:\Program Files\emc\scaleio\sdsc\bin\drv_cfg --mod_mdm_ip  
--ip <EXISTING_MDM_IP_ADDRESS>  
--new_mdm_ip <NEW_MDM_IP_ADDRESSES>
```

2. Verify the changes, by running the following command:

```
C:\Program Files\emc\scaleio\sdsc\bin\drv_cfg --query_mdms
```

Output similar to the following should appear:

```
Retrieved 1 mdm(s)
MDM-ID 043925027bbed30e SDC ID 28c5479b00000000 INSTALLATION ID
7214f7ca647c185b IPs [0]-9.4.4.12 [1]-9.4.4.11
```

To update the SDC on a Linux server, perform the following:

1. Update the IP addresses, by running the following command:

```
/opt/emc/scaleio/sdc/bin/drv_cfg --mod_mdm_ip
--ip <EXISTING_MDM_IP_ADDRESS>
--new_mdm_ip <NEW_MDM_IP_ADDRESSES>
```

2. Verify the changes, by running the following command:

```
/opt/emc/scaleio/sdc/bin/drv_cfg --query_mdms
```

Output similar to the following should appear:

```
Retrieved 1 mdm(s)
MDM-ID 043925027bbed30e SDC ID 28c5479b00000000 INSTALLATION ID
7214f7ca647c185b IPs [0]-9.4.4.12 [1]-9.4.4.11
```

Limiting remote clients to read-only access

Command

```
set_remote_read_only_limit_state
```

Syntax

```
scli --set_remote_read_only_limit_state
--remote_read_only_limit_state (enabled | disabled)
```

Description/Notes

This command configures your ScaleIO system to restrict access from remote clients to read-only operations on the MDM. When this restriction is enabled, remote client users cannot change any configurations on the MDM. However, users on a local host may still make configuration changes while the restriction is enforced.

NOTICE

A “local user” is one that successfully communicates with the MDM using the IP address 127.0.0.1 (which is the default IP address used by SCLI). If you try to issue commands from the local machine using other local IP addresses, you will not be able to configure the system.

Parameters

Parameter	Description
<code>--remote_read_only_limit_state</code> (enabled disabled)	Enables or disables restricted state (default = disabled)

Example

```
scli --set_remote_read_only_limit_state
--remote_read_only_limit_state enabled
```

Managing SDC access to the MDM

To harden SDC access to the MDM, it is possible to restrict access, pending approval of the SDC by the system. The default system setting is full access (restricted mode is disabled). When the restricted access mode is enabled, volumes can only be mapped to “approved” SDCs. Approval is obtained by issuing the `--add_sdc` command for each SDC. You can set restricted mode for an SDC either before or after it has been added to your network.

To restrict SDC access to the MDM, two steps are required:

- 1. Enable restricted SDC mode in the system.
- 2. Issue the `--add_sdc` command for each SDC.

Topics in this section include:

- ◆ [“Enabling/Disabling restricted SDC mode” on page 284](#)
- ◆ [“Restricting an SDC’s access to the MDM” on page 284](#)
- ◆ [“Canceling an SDC’s restricted access and removing an SDC” on page 285](#)

Enabling/Disabling restricted SDC mode

Command

```
set_restricted_sdc_mode
```

Syntax

```
scli --set_restricted_sdc_mode --restricted_sdc_mode  
(enabled | disabled)
```

Description/Notes

This command enables or disables restricted SDC mode. For more information, see [“Managing SDC access to the MDM” on page 283](#).

Parameters

Parameter	Description
--restricted_sdc_mode (enabled disabled)	Enables or disables restricted SDC mode (default=disabled)

Example

```
scli --set_restricted_sdc_mode --restricted_sdc_mode  
enabled
```

Restricting an SDC’s access to the MDM

Command

```
add_sdc
```

Syntax

```
scli --add_sdc --sdc_ip <ip> | --sdc_guid <guid>  
[--sdc_name <name>]
```

Description/Notes

This command configures your system allow an SDC access to the MDM, while restricted SDC mode is enabled.

Parameters

Parameter	Description
--sdc_ip <IP>	The IP address of the SDC
--sdc_guid <GUID>	The GUID of the SDC. You can obtain the GUID by querying the SDC using <code>--query_all_sdc</code> , by viewing the SDC's properties in the GUI, or using the command <code>drv_cfg --query_guid</code> locally.
--sdc_name <NAME>	Assigns a name to the SDC

Example

```
scli --add_sdc --sdc_ip 10.125.120.53 --sdc_name sdc53
```

Canceling an SDC’s restricted access and removing an SDC

Command

```
remove_sdc
```

Syntax

```
scli --remove_sdc (--sdc_id <ID> | --sdc_name <NAME> |  
--sdc_guid <GUID> | --sdc_ip <IP>)
```

Description/Notes

This command removes an SDC from the system. If your system is using Restricted SDC Mode, this command also prevents an SDC’s access to the MDM (its “approved” status is removed). As a result, volumes cannot be mapped to the SDC. If the SDC is currently connected to the MDM, the command will not be successful, and the connection will be maintained. The command will also fail if the SDC has volume mapping.

Parameters

Parameter	Description
--sdc_id <ID>	The ID of the SDC—you can obtain the ID by querying the SDC using <code>--query_all_sdc</code> , or by viewing the SDC's properties in the GUI.
--sdc_name <NAME>	The name assigned to the SDC, if one was assigned to it
--sdc_guid <GUID>	The GUID of the SDC—you can obtain the GUID by querying the SDC using <code>--query_all_sdc</code> , by viewing the SDC's properties in the GUI, or using the command <code>drv_cfg --query_guid</code> locally.
--sdc_ip <IP>	The IP address of the SDC

Example

```
scli --remove_sdc --sdc_ip 10.125.120.53
```

Naming or renaming the system

Command

```
rename_system
```

Syntax

```
scli --rename_system --new_name <NAME>
```

Description/Notes

This command names or renames the system. You can determine the current system name using the `query_cluster` and `query_all` commands.

Parameters

Parameter	Description
--new_name <NAME>	New Name to be associated with the system

Example

```
scli --rename_system --new_name sio-prod-sys2
```


CHAPTER 11

ISCSI Configuration

This chapter describes how to use the CLI to configure ESXi iSCSI initiators. Topics include:

- ◆ Adding an iSCSI initiator 289
- ◆ Removing the iSCSI initiator 290
- ◆ Mapping a volume to an iSCSI initiator 291
- ◆ Unmapping a volume from an iSCSI initiator..... 292
- ◆ Querying iSCSI initiators..... 293

Note: Before running CLI commands, you must be logged-in with a user name that has the right to perform the desired commands.

Adding an iSCSI initiator

Command

`add_scsi_initiator`

Syntax

`scli --add_scsi_initiator --iqn <IQN> [--initiator_name <NAME>]`

Description/Notes

This command adds an iSCSI initiator that connects to a ScaleIO iSCSI target.

You can define object names, according to the following rules:

- 1. Contain less than 32 characters
- 2. Contain only alphanumeric and punctuation characters
- 3. Be unique within the object type

When a name has not been defined, the system may display default system-defined names, as follows:

- ◆ SDS—its first IP address
- ◆ Device—the path to the device
- ◆ All other objects—the object’s ID

ScaleIO objects are assigned a unique ID that can be used to identify the object in CLI commands. You can retrieve the ID via a query, or via the object’s property sheet in the GUI.

Parameters

Parameter	Description
--iqn <IQN>	The iSCSI qualified name (IQN) to be used
--initiator_name <NAME>	Name to be associated with the iSCSI initiator object

Example

```
scli --mdm_ip 192.168.1.200 --add_scsi_initiator
--iqn iqn.2001-04.com.example:diskarrays-sn-a8675309
--initiator_name ESX1_1
```

Removing the iSCSI initiator

Command

```
remove_scsi_initiator
```

Syntax

```
scli --remove_scsi_initiator (--initiator_id <ID> |
--initiator_name <NAME> | --iqn <IQN>) [--i_am_sure]
```

Description/Notes

This command removes an iSCSI initiator. Before running this command, ensure that there are no volumes mapped to the initiator.

Parameters

Parameter	Description
--initiator_id <ID>	iSCSI initiator ID
--initiator_name <NAME>	iSCSI initiator name
--iqn <IQN>	The iSCSI qualified name (IQN)
--remove_mapping	Unmap all volume from this SCSI initiator
--i_am_sure	Skip the safety questions for command execution (For example: "This could damage the stored data. Are you sure?")

Example

```
scli --mdm_ip 192.168.1.200
--remove_scsi_initiator --initiator_name ESX1_1
```

Mapping a volume to an iSCSI initiator

Command

```
map_volume_to_scsi_initiator
```

Syntax

```
scli --map_volume_to_scsi_initiator (--volume_id <ID> |
--volume_name <NAME>) (--initiator_id <ID> |
--initiator_name <NAME> | --iqn <IQN>) [--lun <NUMBER>]
```

Description/Notes

This command maps a volume to an iSCSI initiator. Mapping a ScaleIO volume to an iSCSI initiator exposes the volume to the corresponding iSCSI initiator as an iSCSI device.

Before an iSCSI initiator can see ScaleIO devices, the devices must be mapped to at least one SDC through which the SCSI initiator is connected.

Parameters

Parameter	Description
--volume_id <ID>	Volume ID
--volume_name <NAME>	Volume name
--initiator_id <ID>	iSCSI initiator ID
--initiator_name <NAME>	iSCSI initiator name
--iqn <IQN>	The iSCSI qualified name (IQN)
--lun <NUMBER>	LUN number to assign to the mapping, between 0 and 255 (default: next available)

Example

```
scli --mdm_ip 192.168.1.200
--map_volume_to_scsi_initiator
--volume_name voll --initiator_name ESX1_1
--lun_number 5
```

Unmapping a volume from an iSCSI initiator

Command

```
unmap_volume_from_scsi_initiator
```

Syntax

```
scli --unmap_volume_from_scsi_initiator (--volume_id
<ID> | --volume_name <NAME>) (--initiator_id <ID> |
--initiator_name <NAME> | --iqn <IQN> |
--all_initiators) [--i_am_sure]
```

Description/Notes

This command unmaps a volume from an iSCSI initiator.

Parameters

Parameter	Description
--volume_id <ID>	Volume ID
--volume_name <NAME>	Volume name
--initiator_id <ID>	iSCSI initiator
--initiator_name <NAME>	iSCSI initiator name
--iqn <IQN>	The iSCSI qualified name (IQN)
--all_initiators	Unmap from all iSCSI initiators
--i_am_sure	Skip the safety questions for command execution (For example: "This could damage the stored data. Are you sure?")

Example (Unmap Volume from a single iSCSI initiator)

```
scli --mdm_ip 192.168.1.200
--unmap_volume_from_scsi_initiator
--volume_name vol1 --initiator_name ESX1_1
```

Example (Unmap Volume from all iSCSI initiators)

```
scli --mdm_ip 192.168.1.200
--unmap_volume_from_scsi_initiator
--volume_name vol1 --all_initiators
```

Querying iSCSI initiators

Command

```
query_all_scsi_initiators
```

Syntax

```
scli --query_all_scsi_initiators
```

Description/Notes

This command returns all the defined iSCSI initiators, their names, IQN and ID.

Parameters

Not applicable.

Example

```
scli --mdm_ip 192.168.1.200  
--query_all_scsi_initiators
```

CHAPTER 12

Using the Graphical User Interface

This chapter describes how to use the Graphical User Interface (GUI) to monitor and configure ScaleIO. The various windows display different views and data that are beneficial to the storage administrator. You can review the overall status of the system, drill down to the object level, and monitor these objects. You can use the GUI to provision and modify some of the objects.

The following sections in this chapter describe the available windows, and how to use them. The [“Glossary” on page 611](#) provides more detailed information about the objects and properties displayed in the GUI. The appendix [“Command Matrix Quick Reference” on page 105](#) provides information about the GUI commands that can also be performed using the CLI. The following table provides a general overview of the tasks that you can perform with the GUI.

To do this...	Use...
See a general overview of the entire system	Dashboard view—see “Dashboard view” on page 300
See detailed information about one or more system objects, in table format (filtering available)	Backend view—see “Backend view” on page 307
See very detailed information about a specific system object	Property Sheets—see “Property Sheets” on page 317
Minimize the main window to a floating widget	Widget— “Widget (10)” on page 301
See a list of errors and alerts currently active in the system	Alerts view—see “Alerts view” on page 315
Add, remove, or configure a system object	Backend view—see “Configuring system properties” on page 321
Monitor various aspects of your system	Backend view—see “Monitoring and viewing system information” on page 319
Find information about your system’s license	Preferences menu—see “Viewing licensing information” on page 320

Topics in this chapter include:

- ◆ Opening the GUI and logging in 296
- ◆ General GUI overview 297
- ◆ Monitoring and viewing system information 319
- ◆ Configuring system properties 321

Opening the GUI and logging in

Open the GUI using the option for your operating system:

- In Windows, select **Windows Start button > All Programs > ScaleIO > EMC ScaleIO GUI**
- In Linux, run the script: `/opt/emc/scaleio/gui/run.sh`

Login to the GUI by typing the following information in the required fields, and then click **Connect**:

- Management IP address or host name of the MDM
- Your user name
- Your password

Note: Obtain the above information from your system administrator. Users and passwords are configured via the ScaleIO CLI. For more information, see [Chapter 7, “Security and User Management.”](#)



Figure 13 Login dialog box

Connection and disconnection information

You can check at any time to which IP address your GUI is connected using the following methods:

- ◆ View the IP address displayed on the top left side of the GUI **Dashboard** (for more information about the Dashboard, see [“Dashboard view” on page 300](#)).
- ◆ Hover your mouse pointer over the **Management** tile on the Dashboard. A tooltip displays connection information for the nodes in the MDM cluster, and the management IP address

If your GUI loses its connection with the MDM, the window display is dimmed, and a notification dialog box is displayed.

General GUI overview

The GUI displays the same or similar data in the same location for different objects in the system, depending on the way that you choose to filter the data. Topics in this section include:

- ◆ [“GUI conventions” on page 297](#)
- ◆ [“Dashboard view” on page 300](#)
- ◆ [“Backend view” on page 307](#)
- ◆ [“Alerts view” on page 315](#)
- ◆ [“Property Sheets” on page 317](#)

GUI conventions

This section describes conventions used in the ScaleIO GUI. Topics include:

- ◆ [“Alerts indicators” on page 297](#)
- ◆ [“Color codes” on page 298](#)

Alerts indicators

The **Alerts** indicators show the overall error state of the system. When lit, indicators show the number of active alerts of each severity. Similar indicators are displayed in some views of the Backend table, and also on Property Sheets (in some cases, an

additional blue indicator for information only is included). You can view details about the alerts active in the system in the Alerts view. For more information about Alerts, see [“Alerts view” on page 315](#).



Figure 14 Alerts indicators

Color codes

Color codes provide quick visual feedback on the status of various objects in the system. The following tables summarize the colors used in the system, and their meaning.

Table 20 GUI color codes

Color	Meaning	Dashboard View	Backend View
GREEN (protected)	Available protected, healthy storage	✓	✓
YELLOW	Volume capacity, snapshot capacity (yellow outline) Capacity-related statuses	✓	✓
ORANGE (degraded)	Data is not protected Rebuild or Rebalance in progress	✓ ✓	✓
RED (failed)	Data is unavailable	✓	✓
DARK GRAY	Unused capacity No activity or zero values	✓	✓
DARK GRAY striped with RED	System is unable to determine if capacity is Unavailable or Unused	✓	✓
PALE GRAY	Decreased	✓	
BLUE (spare)	Capacity reserved for recovery purposes	✓	
BRONZE	Snapshot capacity	✓	
DARK BLUE	Indicates selected items in the filter		✓

Table 21 Alert symbols and color codes

Color	Meaning	Dashboard View	Backend View	Alert View
YELLOW 	Low alert status	✓	✓	✓
ORANGE 	Medium alert status	✓	✓	✓
RED 	High alert status	✓	✓	✓
LIGHT BLUE	Information message (no faults)		✓	✓

Dashboard view

The **Dashboard** displays the overall system status. Each tile displays a certain aspect of the storage system. Various controls let you customize the information displayed on the Dashboard. The following figure shows the Dashboard controls.



Figure 15 Dashboard controls

- | | |
|---|---|
| <p>1 Navigation toggle—Displays navigation tree</p> <p>2 Current view—Displays object currently being applied to the dashboard</p> <p>3 Dashboard—Displays the Dashboard view</p> <p>4 Backend—Displays the Backend view</p> <p>5 Alerts—Displays the Alert view</p> | <p>6 Preferences—User name, Preferences, Logout, About</p> <p>7 Color code legend—Displays the legend</p> <p>8 I/O Workload toggles—control the information displayed in this tile. For more information, see Table 25 on page 336.</p> <p>9 Dimmer toggle—Enables\disables the dimmer</p> <p>10 Widget toggle—Minimizes the display to a widget</p> |
|---|---|

Navigation tree (1)

The Dashboard's navigation button toggles the display of the navigation tree. The navigation tree is hierarchical, and controls the Dashboard display. You can display information on the Dashboard according to:

- Entire system (default)
- Protection Domain
- Storage Pool

You can change the dashboard display by double-clicking the desired navigation tree node. Some tiles on the Dashboard may be dimmed if they are not relevant for the node that you have selected.

Preferences menu (6)

The **Preferences** menu lets you do the following:

- View the user name of the user currently logged in to the system (default)
- Open the **Preferences** window, where system preferences can be set. For more information, see [“Customizing system preferences” on page 335](#).
- Logout of the system
- Display information about your system, including information required for licensing (**About** option). For more information, see [“Viewing licensing information” on page 320](#).

Dimmer (9)

The **Dimmer** button  toggles the dimmer feature on and off. When you use the dimmer, only tiles that are essential for real-time monitoring are lit. You can temporarily light up the dimmed tiles by hovering the mouse pointer over them.

Widget (10)

The **Widget** button  reduces the dashboard size to a widget containing a condensed display of the storage system. The widget floats on your desktop, allowing you to visually monitor your system, while using other applications. The widget displays the Capacity tile, Workload activity, Rebuild/Rebalance activity, and Alerts indicators.

When the dashboard is minimized to a widget, the **Full-Screen** button is displayed in the top-right-corner, as shown in the following figure. This button toggles the display back to full dashboard mode.

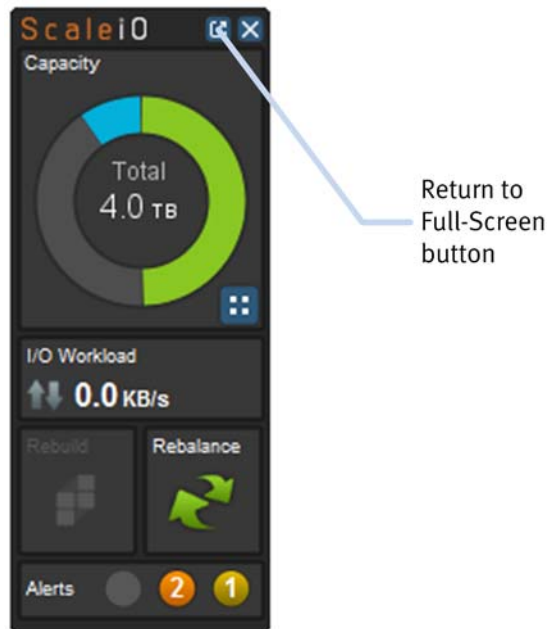


Figure 16 Widget

Dashboard tiles

The Dashboard tiles provide a visual overview of storage system status. The tiles are dynamic, and contents are refreshed at the interval set in the system preferences (default: 10 second intervals). System preferences can also be used to set the display to basic or advanced reporting. For more information, see [“Customizing system preferences” on page 335](#).

Some of the tiles’ contents differ, depending on the navigation filter in use. When the dimmer feature is enabled, the display of non-essential tiles is dimmed, unless the mouse pointer is positioned over them.

Active alert statuses relevant for specific tiles are indicated by red, orange or yellow symbols on those tiles. These indicators show that one or more alerts are active, but not the number of alerts.

Note: The filter used in the Backend view does not influence the Dashboard display.

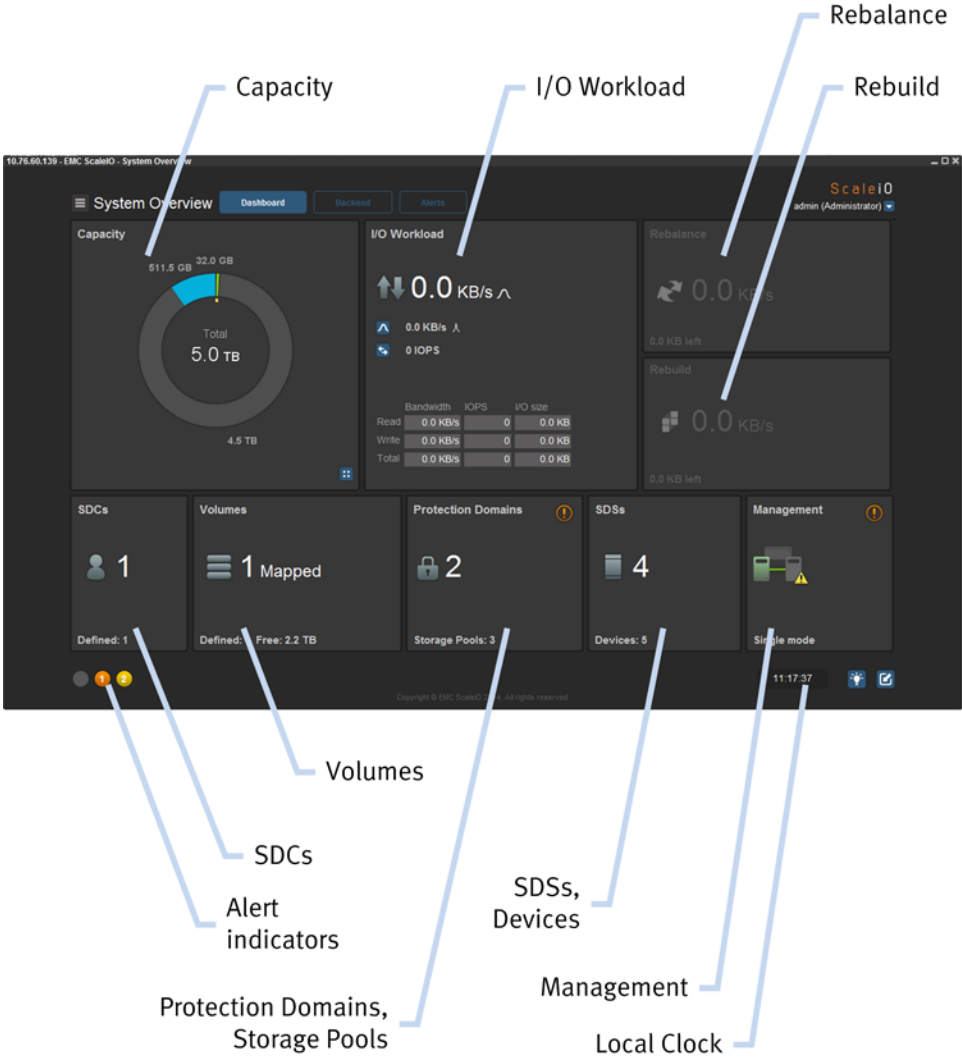


Figure 17 Dashboard tiles

The following table describes the tiles displayed on the **Dashboard**.

Table 22 Dashboard tiles

Tile	Description
Capacity	Displays the raw capacity of the system, rounded off to multiples of 8 GB. The available raw capacity is represented by concentric rings outwards from the center: Outer Ring Displays the storage usage using the color codes described in the legend. The actual values are written next to the colored segments. The icon in the bottom right corner of the tile displays the color code legend. The outer ring is divided into colors as follows: • In use—From the total, in clockwise direction: shows healthy, degraded and failed capacity. The total of these three items is equal to the sum of capacity in use. • Unused—Shows how much further the raw capacity can be expanded; if this capacity is not accessible, it will be marked as Unavailable Unused. • Special purpose—Shows spare capacity reserved for system operation; Decreased capacity that was deducted from devices (using the Set Device Capacity Limit command), and cannot be used. Note: A miniature version of the outer Capacity ring is shown in some Backend table views and Property Sheets. Center circle Displays the total amount of available raw storage. Note: This does not represent the total amount of capacity available for volume allocation. Inner Ring Displays the snapshot usage. The arc displays the total amount of available data. The filled (bronze) part represents the capacity used by original data volumes, and the hollow (outlined) part represents the capacity used for snapshot volumes. This displays the ratio of snapshot usage. To get a more accurate idea of snapshot usage, see the Backend Capacity Usage view.
I/O Workload	Displays the performance statistics of the system (IOPS, bandwidth and I/O size). More details about I/O can be viewed in the Backend table views: Application I/O, Overall I/O, and I/O Bandwidth. In Advanced Dashboard view (controlled by system Preferences—see “Customizing system preferences” on page 335) aggregated values of bandwidth and IOPS are displayed. The table in this tile summarizes the Reads, Writes and Totals of IOPS, and throughput and the average size of an I/O.

Table 22 Dashboard tiles (continued)

Tile	Description
Rebalance	Indicates if ScaleIO is currently redistributing data over the storage capacity. Rebalancing is usually a result of adding new storage capacity, or safely removing storage capacity, and triggers redistribution to utilize the additional compute power, and to improve performance. Rebalancing may also happen after recovery from server or storage device failure. The tile displays the rate in which the data is rebalanced, using a large green font and icon. Capacity that is pending redistribution is displayed in small white fonts.
Rebuild	Indicates if ScaleIO is currently rebuilding RAID 1 data. A rebuild is usually a result of a recovery due to failure of a server or a storage device. The tile displays the rate in which the data is rebuilt, using a large orange font and icon. Capacity that is still pending rebuild is displayed in small white fonts. In Advanced Dashboard view (controlled by system Preferences—see “Customizing system preferences” on page 335) more details are displayed on this tile.
SDCs	Displays the number of SDCs (clients) in the system. The large number in the center is the number of SDCs connected to the MDM. The defined number includes all SDCs defined in the system (some of which may be disconnected from the MDM).
Volumes	Displays the number of volumes defined across the system, the free available capacity, and the used capacity. The amount of Free capacity shown on this tile is the maximum amount that can be used for creating a new volume. This amount takes into account how much raw data is needed for maintaining RAID 1 and system spares. Note that the number of volumes and the total capacity include snapshots.
Protection Domains	Displays the number and status of all Protection Domains defined in the system. The large number in the center is the number of Protection Domains. This tile is displayed when the dashboard is filtering information according to Cluster.
Storage Pools	Displays the number and status of all Storage Pools defined in the Protection Domain. The large number in the center is the number of Storage Pools. This tile is displayed when the dashboard is filtering information according to Protection Domain.
SDSs	Displays the number and status of all SDSs (servers) in the system. The large number in the center is the number of SDSs defined in the MDM. This tile is displayed when the dashboard is filtering according to Cluster or Protection Domain.

Table 22 Dashboard tiles (continued)

Tile	Description
Devices	Displays the number and status of all storage devices defined in the Storage Pool. The large number in the center is the number of devices defined in the MDM. This tile is displayed when the dashboard is filtering according to Storage Pool.
Management	Displays the status of the MDM cluster (three nodes), or of an MDM operating in Single Mode (one node). The status is displayed graphically as a combination of the three MDM cluster elements (Primary\Secondary\Tie-Breaker, or Single only) and an alert icon if active alerts exist. For more information, see “Management (MDM) cluster status” on page 306 . When you hover your mouse pointer over this tile, a tooltip displays the IP addresses used by the MDM cluster or node.
Clock	Displays the time on your local GUI client machine (not the MDM time)

Management (MDM) cluster status

The graphics shown in the following tables represent various MDM states. A tooltip displays the IP addresses used by the MDM cluster or node.

- ◆ In cluster mode, a Primary MDM, a Secondary MDM, and a Tie-Breaker are configured in the system, and statuses are displayed on the **Management** tile of the dashboard.
- ◆ In single mode, only one MDM is configured in the system, and the status of that MDM is displayed on the **Management** tile of the dashboard.

Note:

It is not recommended to use Single Mode in production systems, except in temporary situations. The MDM contains all the metadata required for system operation. Single Mode has no protection, and exposes the system to a single point of failure.

If the connection to the MDM is lost, the Dashboard is dimmed, and a dialog box is displayed.

Table 23 MDM cluster statuses

Symbol	Description
	Cluster Up: The MDM cluster is up
	Cluster Degraded: The Secondary MDM is either down, or is synchronizing with the Primary MDM
	Cluster Degraded – Tie-Breaker Down: Tie-Breaker is reported as down
	Cluster Disconnected: No communications with Primary MDM
	Single Mode operation: Only one MDM exists. This mode should not be used in Production environments.

Backend view

The **Backend** view provides detailed information about objects in the system, and lets you perform various configuration operations. The main areas of the Backend view are:

- ◆ **Filter**—lets you filter the information displayed in the table and Property Sheets. For more information, see [“Filter \(1\)” on page 310](#).
- ◆ **Toolbar buttons**—let you display various sets of information, perform commands on the selected row in the table (add, remove, configuration), or toggle the display of Property Sheets, by clicking the appropriate button
- ◆ **Table**—displays detailed information about system objects. The table displays a wide range of information, which can be filtered. Certain commands can be performed on objects, using the context-sensitive menu for the desired row in the table, or the **Command menu** on the toolbar.
- ◆ **Property Sheets**—display very detailed read-only information about the object selected in the table. For more information, see [“Property Sheets” on page 317](#). For more information about the terminology used in the Property Sheets, see the [“Glossary” on page 611](#).

Note: Irrelevant, mostly zero values, are “dimmed” in the Backend view. The only exception (where a value could be greater than zero but is dimmed) is when the Max Capacity is the same as the Total Capacity. In this case, Max Capacity would be dimmed (if decreased capacity exists, $\text{Max} = [\text{Total} + \text{decreased}]$ in the Backend table). Similarly, arrows and icons are unavailable in the same circumstances.

Note: Some objects in the system can be identified by ID numbers. The ID numbers displayed in the GUI can be used in CLI commands to specify these objects.

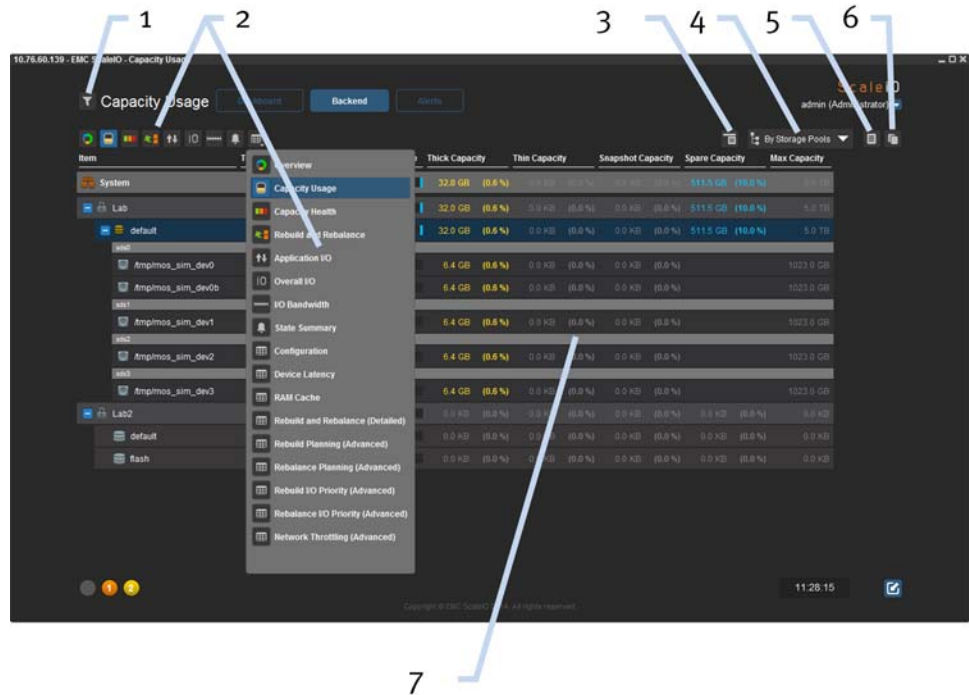


Figure 18 Backend view

- 1 **Filter toggle**—controls display of the filter
- 2 **Table view options**—each button provides a different combination of properties which can be displayed together in the table. Additional views are available from the **More Table Views** button. For more information, see [“Table” on page 310](#).
- 3 **Command menu**—contains a list of commands which you can perform on the row selected in the table. For more information, see [“Command menu \(3\)” on page 310](#).
- 4 **Storage Pools\SDS toggle**—toggles display of the table rows grouped according to either Storage Pools, or SDSs. Some table views are only available when sorted by either SDSs or Storage Pools. For example, Fault Sets are only displayed when sorting by SDSs, and Rebuild I/O Priority is only displayed when sorting by Storage Pools.
- 5 **Show Property Sheet**—controls display of the Property Sheet. The Property Sheet displays information about the object selected in the table.
- 6 **Duplicate Property Sheet**—Opens and floats the Property Sheet in a new window, which can be kept open while you display the properties of a different object, for comparison or other purposes
- 7 **Table**—displays a summary of properties for the objects selected in the filter, according to the selected table view option

Command menu (3)

The **Command menu** button displays a list of commands which you can perform on rows selected in the table. The contents of the **Command menu** differ, depending on the object selected in the table. Many of the commands can also be accessed from the context-sensitive menu when table rows are right-clicked.

Filter (1)

The filter lets you filter out the information shown in the table, so that only the objects related to the items selected in the filter are visible. Items colored dark blue in the filter are displayed. The buttons at the top of the filter panel control the items hidden, displayed, selected or cleared in the filter. Below these buttons, a search field lets you type free text to search for a object by name. [Figure 19 on page 310](#) shows a filter being used to show specific devices in the Backend table.

You can filter information according to Storage Pools, SDSs, Volumes, Protection Domains and Devices. Your filtering choice would depend on your current problem or management needs. You can also add a specific object to the filter, using the **Add to Filter** command from the **Command menu**.

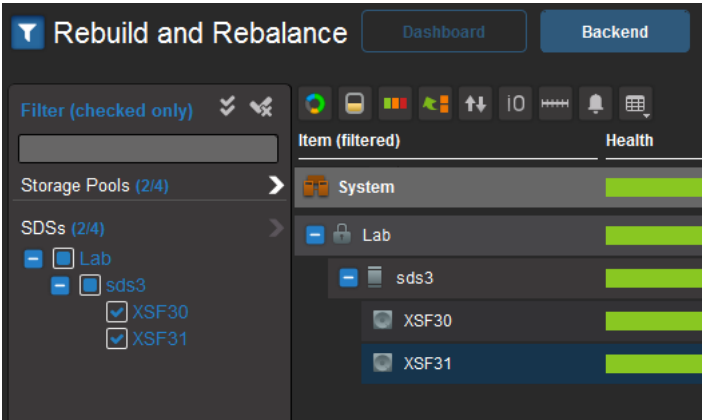


Figure 19 Backend filter

Table

The table displays object statuses, and allows configuration of some objects. The contents of a Property Sheet for a specific object are determined by the row selected in the table. The color codes described in [“Color codes” on page 298](#) also apply to the items displayed in the table.

The information displayed in the table is controlled by the filter and the table view options. Selected objects (rows in the table) can be created, configured and removed using context-sensitive menu options, or commands from the **Command menu**. The columns in the table can be resized, by dragging the borders in the heading row of the table. The scrollbar at the bottom of the table lets you scroll through the columns in the table. The following table describes the available table views:

Note: Clock icons  in the cells indicate stale\aging data.

Table 24 Table view options

Name of view	Contents of view	Suggested use, comments
Overview 	Total Capacity, Capacity In-Use, I/O Bandwidth, IOPS, Rebuild, Rebalance, Alerts	Provides a general overview the capacity and health of system objects. If you find that there are active alerts, you can switch to State Summary table view, or the Alerts view to see more details about the alerts. While this view is similar to the Dashboard, the main difference is that here, you can simultaneously monitor many objects within their hierarchy. You can then filter the table for specific objects or sets of objects, in contrast to the Dashboard, where you can only drill-down to objects. In addition, commands and Property Sheets are available to you from this view. Note: The miniature Capacity ring shown here represents the outer Capacity ring on the Dashboard. For more information, see Table 22 on page 304.
Capacity Usage 	Total, In-Use, Usage, Thick Thin, Snapshot, Spare, Max Related Property Sheet section: Capacity	Provides a breakdown of capacity usage per use type. You can use this to check whether more capacity needs to be added to your system, and where.

Table 24 Table view options (continued)

Name of view	Contents of view	Suggested use, comments
Capacity Health 	Capacity In-Use, Protected, Degraded, Failed, Health, Rebuild, Rebalance Related Property Sheet sections: Capacity, Alerts, Rebuild/Rebalance	Provides information about the health of the objects in the system, per object
Rebuild and Rebalance 	Health, Backward Rebuild, Forward Rebuild, Rebalance Related Property Sheet sections: Alerts, Rebuild/Rebalance	Provides a summary of Rebuild and Rebalance health, status, and workload per object
Application I/O 	Bandwidth, IOPS and I/O Size for: Total, Read, Write, 2nd Write Related Property Sheet section: Workload	Provides workload information for applications reading/writing to storage in the system. 2nd Writes refer to the protection copy of data being written to storage.
Overall I/O 	Bandwidth, IOPS and I/O Size for: Total, Total Read, Total Write Related Property Sheet section: Workload	Provides workload information for all I/Os in the system, including both application I/Os, and I/Os for internal processes
I/O Bandwidth 	Read, Write, Backward Rebuild, Forward Rebuild, Rebalance, Total, Total Read, Total Write Related Property Sheet section: Network Throttling	Shows the bandwidth being used for various jobs in the system
State Summary 	Summary Related Property Sheet section: Alerts	Can be used to identify items in the system which have open alert states, and to view the alert messages, including information statuses of various objects. Alerts marked blue are for information purposes only, and do not require that any action be taken.

Table 24 Table view options (continued)

Name of view	Contents of view	Suggested use, comments
Configuration 	Total Capacity, SDSs, Devices, Storage Pools, Volumes, Free Capacity for Volume Allocation, Alerts Related Property Sheet sections: Identity, Related Objects	Provides an overview of the number of objects per type in your system, their capacity, and lets you determine the amount of free capacity available for creating an additional volume. The Free Capacity for Volume Allocation column is the only one that is not stated in Raw Capacity values. This table view is a convenient location from which to perform Add, Remove, Activate and Inactivate commands. For more information, see “Configuring system properties” on page 321 . The Related Objects section of the Property Sheet helps you to identify related objects to the one selected in the table.
Device Latency 	Average Read Latency, Average Write latency, Average Read Size, Average Write Size Related Property Sheet sections: Device Latency, Device Test Results	Provides an overview of performance information, per device. When the table is sorted by SDSs, the Down arrow in each SDS row reveals all the devices in the SDS. Note: Information is shown only at Device level, and there is no aggregation of information at higher levels.
RAM Read Cache 	State, Size, Used, Hit Rate, Write Mode Related Property Sheet section: RAM Read Cache	Lets you check which SDSs have RAM Read Cache enabled, view associated counters, and check which Storage Pool is set to use the cache for its devices. Advanced feature; modify with caution.
Rebuild and Rebalance (Detailed) 	Health, Backward Rebuild, Forward Rebuild, Rebalance Related Property Sheet section: Rebuild/Rebalance	Shows workload and active rebuild and rebalance jobs, as well as pending jobs to be processed. Credited incoming and outgoing information is displayed for each process (Backward Rebuild, Forward Rebuild and Rebalance).

Table 24 Table view options (continued)

Name of view	Contents of view	Suggested use, comments
Planned Rebuilds (Advanced) 	Degraded, Distribution, Backward and Forward Rebuilds Related Property Sheet section: Rebuild/Rebalance	Shows amount of unprotected data, a visual breakdown of rebuild progress (Distribution), bandwidth, direction and status (Active/Pending) of jobs. You can monitor how the degraded capacity is planned to be rebuilt: How failed degraded capacity is expected to be rebuilt, then how the system will pool it for the rebuild processes (backward and forward,) and which of it is actively being rebuilt. Note: overall Degraded capacity includes both healthy and failed copies of the data, while the processed capacity includes only the failed copies. Advanced feature; modify with caution.
Planned Rebalancing (Advanced) 	Protected, Distribution, Rebalance Related Property Sheet section: Rebuild/Rebalance	Shows amount of protected data, a visual breakdown of rebalance progress (Distribution), bandwidth, direction and status (Active/Pending) of jobs. Advanced feature; modify with caution.
Rebuild I/O Priority (Advanced) 	Policy, Concurrent I/O limit, Bandwidth Limit, Application Threshold, Quiet Period Related Property Sheet section: Network Throttling	Displays bandwidth settings currently configured for Rebuild jobs. These I/O Priority settings apply only to Storage Pools. These settings control system performance. Advanced feature; modify with caution.
Rebalance I/O Priority (Advanced) 	Policy, Concurrent I/O limit, Bandwidth Limit, Application Threshold, Quiet Period Related Property Sheet section: Network Throttling	Displays I/O priority settings currently configured for Rebalance jobs. These I/O Priority settings apply only to Storage Pools. These settings control system performance. Advanced feature; modify with caution.

Table 24 Table view options (continued)

Name of view	Contents of view	Suggested use, comments
Network Throttling (Advanced) 	Overall I/O Limit, Rebuild I/O Limit, Rebalance I/O Limit, Rebuild Incoming Limit, Rebalance Incoming Limit, Rebuild Queue Length, Rebalance Queue Length, Rebuild Outgoing Jobs, Rebalance Outgoing Jobs Related Property Sheet section: Network Throttling	Displays Network Throttling settings currently configured in the system. These settings control system performance. Advanced feature; modify with caution.
RAM Read Cache (Internal) 		For Support purposes only. Visible only if Backend Internals are enabled in the Preferences window.

Alerts view

The **Alerts** view provides a list of the alert messages currently active in the system, in table format. You can filter the table rows according to alert severity, and according to object types in the system. For a list of alerts generated by the system, see [“Alert List” on page 408](#).

To view a Property Sheet for a specific alert, select the corresponding row in the table, and click the **Show Property Sheet** button. For more information about Property Sheets, see [“Alerts view” on page 315](#).

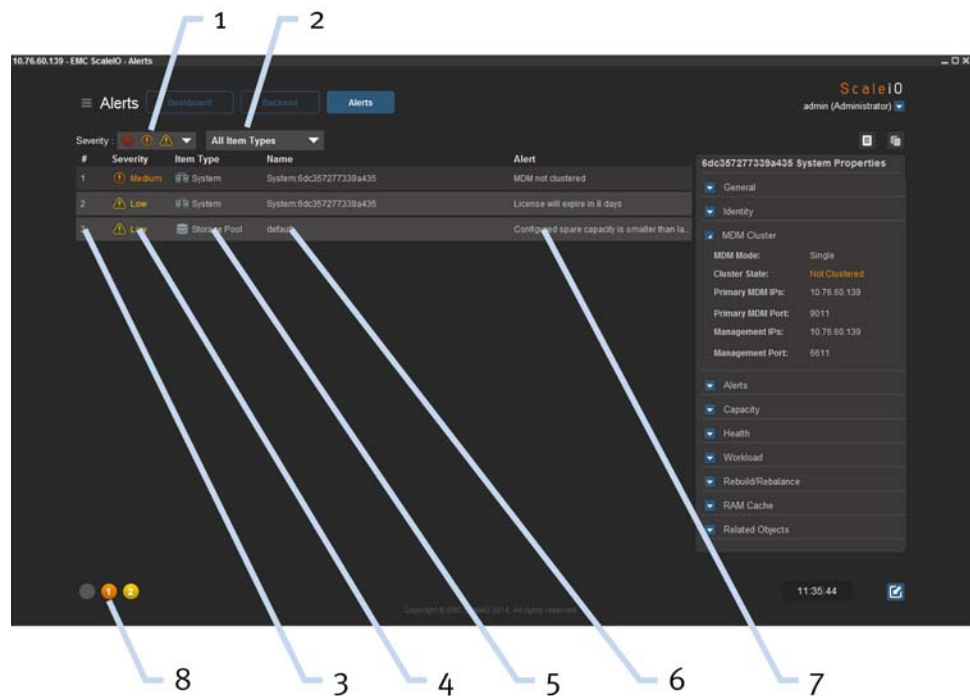


Figure 20 Alerts view

- 1 **Severity filter**—filters the table contents according to alert severity:
All alerts
Medium—alerts which are Medium or High severity
High—only alerts which are High severity
- 2 **Item Types filter**—filters the table contents according to:
All Item Types, MDM, Protection Domain, Storage Pool, SDS, Device, SDC
- 3 **#**—the line number in the Alerts table
- 4 **Severity**—the alert severity: High, Medium or Low
- 5 **Item Type**—MDM, Protection Domain, Storage Pool, SDS, Device, SDC
- 6 **Name**—the user-defined name of the item, if one has been defined
- 7 **Alert**—the alert message generated by the system
- 8 **Alert indicators**—summarize the total amount of each alert type (from left to right: High, Medium, Low)

Property Sheets

The Property Sheets provide detailed read-only information about the object selected in the Backend table, or in the Alerts table. The contents of the Property Sheets differ, depending on the object selected in the Backend or Alerts table. Property sheets help you to monitor specific objects in the system by displaying the following, using the blue collapse and expand arrows next to each section of the Property Sheet:

- **General**, and **Health** information about the object
- **Identifying** information, such as an object's ID number, name, IP addresses, port usage, VM usage
- **Alert** status per selected object
- **Capacity** usage per selected object
- **Workload** information (bandwidth usage and IOPS) per selected object
- **Rebuild\Rebalance** information about the selected object(s), for forward and backward rebuilds, rebalancing, data at rest, and job status (active\pending). The type of information displayed depends on the type of object selected in the table.
- **RAM Read Cache** configuration, state, and statistics for the selected object. The type of information displayed depends on the type of object selected in the table.
- **Device latency** averages for Read and Write, and average I/O size, for the device selected in the table
- **Device test** results for the device selected in the table, if any tests have been performed
- **MDM cluster** details, such as cluster mode and state, IP addresses and ports used for management and MDM functions
- **Network throttling** configuration for the selected SDS, including bandwidth limit per job, and queue length, for both Rebuilding and Rebalancing.
- **I/O Prioritization** configured for the selected Storage Pool, including Rebuild and Rebalance states, number of parallel jobs, I/O prioritization policy, concurrent I/Os and bandwidth limit
- **Miscellaneous** items, such as DRL mode, Zero Padding

- **Related objects**, which can be very useful for troubleshooting problems, or for planning purposes, when you need to make changes to your system.

You can view properties for multiple objects by using the **Duplicate Property Sheet** button, and then navigating to a different object's row in the table. When more than one Property Sheet is open, a floating widget that controls them is displayed in the bottom part of the main window, as shown in the following figure.

Note: You can open Property Sheets, duplicate them, and then simultaneously work on other unrelated objects in the system.



Figure 21 Multiple floating Property Sheets

The following figure shows a typical Property Sheet for an SDS, with the **Identity** section of the Property Sheet expanded.

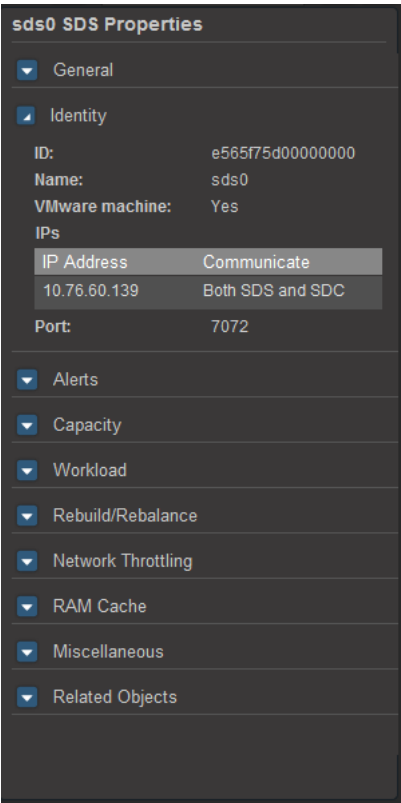


Figure 22 Example of a Property Sheet for an SDS, displaying identifying details

Monitoring and viewing system information

This section describes instructions for monitoring various aspects of the system. Topics include:

- ◆ [Viewing object properties, and drilling-down to details.....](#) 320
- ◆ [Viewing licensing information](#) 320
- ◆ [Verifying your connection to the Management cluster](#) 320

Viewing object properties, and drilling-down to details

1. In the **Backend** view, use the filter to display one or more objects, and select the corresponding check boxes of the desired objects (optional).
2. Navigate to the desired object in the table.
3. Display the required information, using the table view options.
4. Select the required object's row in the table, and then, on the expandable Property Sheet on the right side of the window, click the blue arrow buttons beside the headings to expand them and view specific status information.

Note: Contents of the Property Sheet are dynamic, and differ, depending on the row selected in the table.

Viewing licensing information

Information required for licensing purposes is located in the **About** window, as described in the following steps:

1. From the **Preferences** menu at the top right side of the window, in any view, select the **About** option. The **About** window is displayed.
2. Make a note of the information displayed for **Installation ID**, which is required for electronic licensing purposes. Additional information pertaining to your license is also displayed in this window.

Verifying your connection to the Management cluster

If your GUI connection to the system is operating normally, regular access to all the GUI views is possible. You can check which MDM you are connected to, by hovering your mouse over the Management tile on the Dashboard. The Management IP address to which you are connected is also displayed in the top left corner of the GUI. For more information about MDM statuses, see [“Management \(MDM\) cluster status” on page 306](#).

If the connection is lost, the GUI is dimmed, and a dialog box is displayed.

Configuring system properties

This section describes generic instructions for adding, removing and configuring system objects and properties. All commands for these operations are accessed from the Backend view. Topics include:

- ◆ [Configuring capacity.....](#) 321
- ◆ [Configuring Workload settings \(advanced\).....](#) 329
- ◆ [Enabling and disabling Rebuild\Rebalance \(advanced\)](#) 331
- ◆ [Configuring RAM Read Cache \(advanced\).....](#) 332
- ◆ [Renaming objects](#) 334
- ◆ [Customizing system preferences](#) 335

Configuring capacity

This section contains procedures for adding, removing, and managing SDSs and devices. Topics include:

- [“Adding SDSs and devices” on page 321](#)
- [“Removing SDSs and devices” on page 324](#)
- [“Adding, removing, and activating and inactivating capacity” on page 325](#)
- [“Activating devices” on page 328](#)
- [“Clearing device errors” on page 329](#)
- [“Setting device capacity limits” on page 329](#)

Adding SDSs and devices

SDSs and devices can be added to a system one by one, or in bulk operations, using the **Add SDS** and **Add Device** commands. In addition, the **Add SDS to Protection Domain** window lets you add both SDSs, and corresponding devices, all from the same window. You can associate up to eight IP addresses to the SDS. By default, performance tests are performed on the added devices, and the results are saved in the system.

You can assign a name to the SDS, as well as to the devices. This name can assist in future object identification. This can be particularly helpful for SDS devices, as the name will remain constant, even if the path changes. For more information about parameters and options, see [“Adding SDS nodes and devices” on page 178](#).

Note: Devices can be tested before going online. Various testing options are available the **Advanced** part of the window (default: **Test and Activate**).

1. In the **Backend** view:

- To add one or more SDSs, navigate to the required Protection Domain, and select its row in the table
- To add one or more storage devices to an existing SDS, navigate to the required SDS, and select its row in the table

2. From the **Command menu** or context-sensitive menu, select the desired **Add** option. An **Add...** window is displayed.

3. Enter information in the fields.

Note: Object names must meet the following requirements:

Less than 32 characters

Contain only alphanumeric and punctuation characters

Be unique within the object type

- Fields marked with orange explanation marks are mandatory.
- You must add at least one device to a new SDS at this stage. Additional devices may be added either now, or later, if required.
- The **Advanced** option provides additional items, such as device testing and RAM Read Cache configuration. Click its **Expand** button to display additional fields, and configure them (recommended for advanced users only).
- For some object types, a  button is displayed. Click it to add more objects or rows of the same type.

4. Click **OK**.

The progress of the operation is displayed at the bottom of the window. It is recommended to keep the window open until the operation is completed, and until you can see the result of the operation (see [Figure 24 on page 324](#)).

5. Click **Close**. If you chose the **Test only** option in step 3, activate the devices as described in [“Activating devices” on page 328](#).

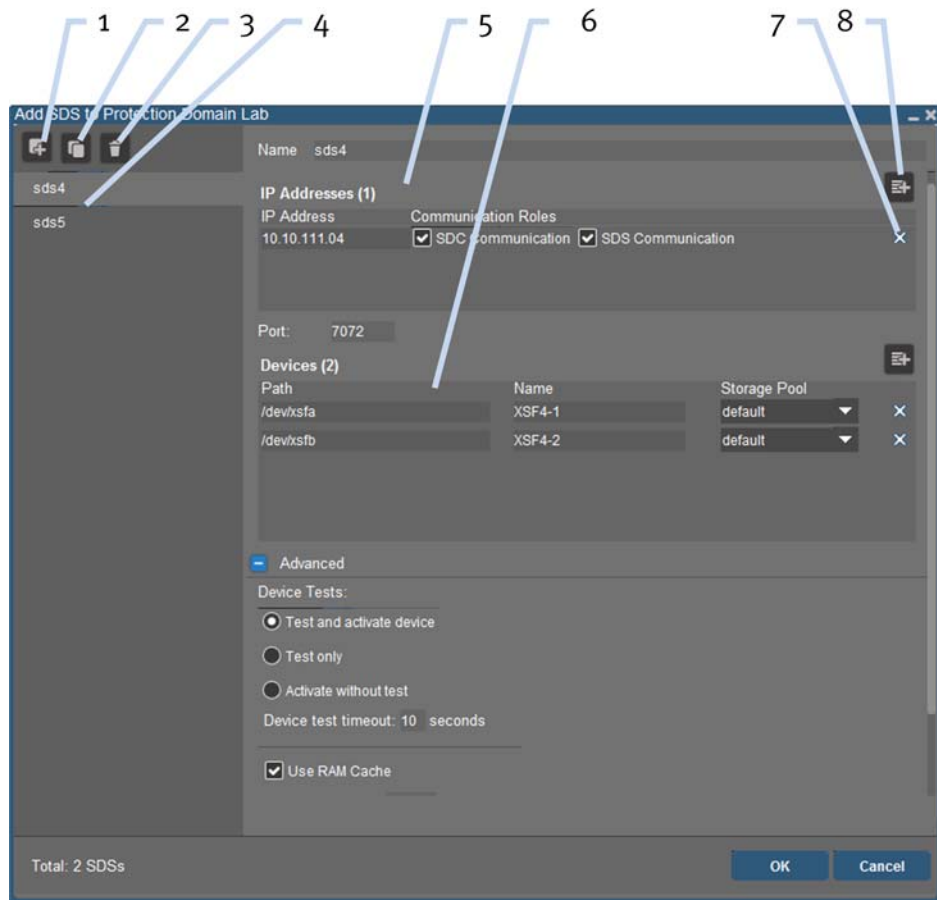


Figure 23 Add SDS window

- | | |
|--|--------------------------------|
| 1 Add another SDS | 5 SDS properties |
| 2 Add another SDS by duplicating the values in the right panel of the window | 6 Devices and their properties |
| 3 Remove the selected SDS from the window | 7 Add object/row |
| 4 List of SDSs that will be added to the Protection Domain | 8 Remove object/row |

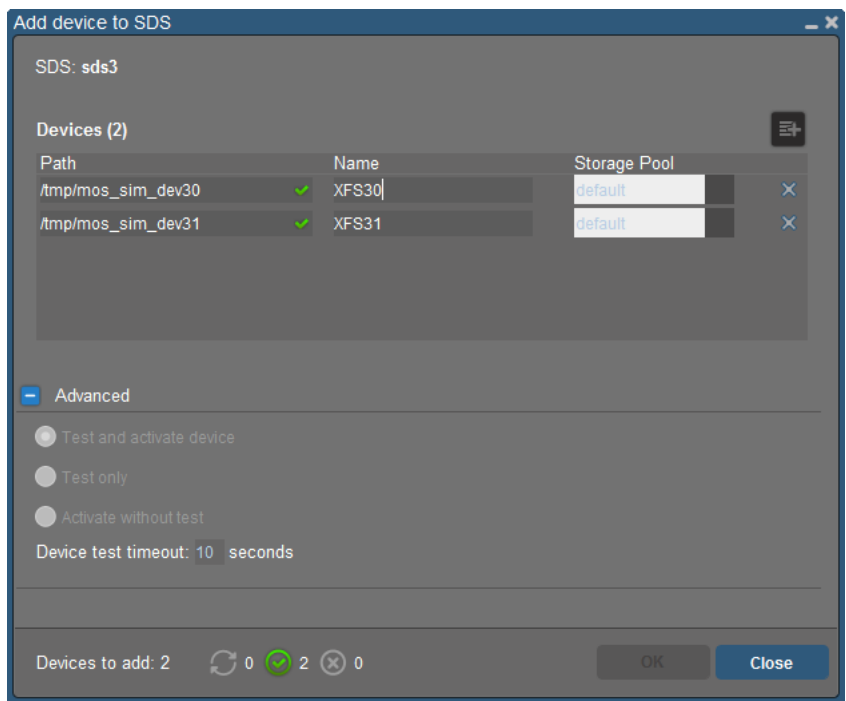


Figure 24 Add Device window showing command validation

Removing SDSs and devices

The removal of some objects in the system can take a long time, because removal may require data to be moved to other storage devices in the system. If you plan to replace a device with a device containing less storage capacity, you can configure the device to a smaller capacity than its actual capacity, in preparation for replacement. This will reduce rebuilding and rebalancing operations in the system later on. For more information, see [“Setting device capacity limits” on page 329](#).

The system has job queues for operations that take a long time to execute. You can view the jobs in the **Planned Rebuilds** and **Planned Rebalancing** table views. Operations that are waiting in the job queue are shown as **Pending**. If a job in the queue is going to take a long time, and you do not want to wait, you can cancel the operation using the **Abort** button in the **Remove** command window (if you left it open), or using the **Abort** command from the **Command menu**.



The Remove command deletes the specified objects from the system. Use the Remove command with caution.

1. In the **Backend** view, navigate to the desired object in the table, and select its row.
2. From the **Command menu** or context-sensitive menu, select the desired **Remove** command. In the confirmation window, click **OK**.

The progress of the operation is displayed at the bottom of the window. It is recommended to keep the window open until the operation is completed, and until you can see the result of the operation (for example, see the validation status at the bottom of the window in [Figure 24 on page 324](#)). For some objects, an **Abort** button is available in the window, which can be used if you decide to abort the operation. There is also an **Abort** command accessible from the **Command menu**.

3. Click **Close**.

Adding, removing, and activating and inactivating capacity

Extra storage capacity can be added to your ScaleIO system by adding SDSs and/or their storage devices. You can either add them to existing Protection Domains and Storage Pools, or create new ones.

The Dashboard **Capacity** tile, some Backend table views (such as **Capacity Usage, Configuration**), and Property Sheets help you to better understand the amount of raw capacity and net free capacity currently available in the system.

Note: Volumes are created and mapped using the CLI. For more information, see [“Creating and Mapping Volumes” on page 115](#).

Topics in this section include:

- ◆ [“Adding, removing, activating and inactivating Protection Domains” on page 326](#)
- ◆ [“Adding Fault Sets” on page 327](#)
- ◆ [“Adding and removing Storage Pools” on page 328](#)

Adding, removing, activating and inactivating Protection Domains

This section describes how to add, remove, activate and inactivate Protection Domains. Inactivation of a Protection Domain does not remove it from the system, but it makes all data stored in that Protection Domain inaccessible to the system.

The inactivation feature is a much more effective way to shut down nodes, and is preferable to shutting them down manually.

When this feature is in effect, the following activities can take place, behind the scenes:

- Determine if there are any current rebuild/rebalance activities taking place. If so, the shutdown will be delayed (unless it is forced) until they are finished.
- Block future rebuild/rebalance activities.
- Quiesce application I/O and disable access to volumes.
- Move the DRL mode of all SDSs to harden, in preparation of rebooting the server.
- Reload of all SDSs before re-enabling data access.

For each of the following procedures, after you click **OK**, the progress and result of the operation is displayed at the bottom of the window (for example, see the bottom of the screen capture in [Figure 24 on page 324](#)).

Note: Protection Domain removal is only possible if the Protection Domain is empty. If you inactivate a Protection Domain, the data remains on the SDSs, and therefore, it is preferable to remove a Protection Domain if you no longer need it.

To add a Protection Domain, perform these steps:

1. In the **Backend** view, select the **System** row.
2. From the **Command menu** or context-sensitive menu, select **Add Protection Domain**. The **Add Protection Domain** window is displayed.
3. Type a name in the **Name** box, and click **OK**.

When the operation is complete, the Protection Domain is active, and by default it contains a Storage Pool, called **default**. You can now add SDSs, Storage Pools and Fault Sets to the Protection Domain.

To remove a Protection Domain, perform these steps:

1. In the **Backend** view, navigate to, and select the Protection Domain.
2. Verify that you have removed all child nodes from the Protection Domain.
3. From the **Command menu** or context-sensitive menu, select **Remove**.
4. Click **OK**.
5. If a confirmation window appears, confirm the operation, and type your password if requested to do so.

To inactivate Protection Domains, perform these steps:

1. In the **Backend** view, navigate to, and select one or more Protection Domains.
2. From the **Command menu** or context-sensitive menu, select **Inactivate Protection Domain**. The **Inactivate Protection Domain** window is displayed.
3. Click **OK**. If a confirmation window appears, confirm the operation, and type your password if requested to do so.

To activate Protection Domains, perform these steps:

1. In the **Backend** view, navigate to, and select one or more Protection Domains.
2. From the **Command menu** or context-sensitive menu, select **Activate Protection Domain**. The **Activate Protection Domain** window is displayed.
3. Click **OK**.

Adding Fault Sets

Fault Sets provide additional safeguards for protecting your data against hardware failure. Fault Sets are subsets of a given Protection Domain.

1. In the **Backend** view, navigate to, and select the Protection Domain.
2. From the **Command menu** or context-sensitive menu, select **Add Fault Set**.
3. Type a name in the **Fault Set Name** box, and click **OK**. The Fault Set will now be visible in the **Related Objects** section of the Protection Domain's Property Sheet.

Note: Use the CLI to remove Fault Sets. For more information, see the command matrix in [“Command Quick Reference” on page 135](#).

Adding and removing Storage Pools

A Storage Pool is a group of devices within a Protection Domain. When a Protection Domain is created, a default Storage Pool called **default** is automatically added to it. Each time that you add devices to the system, you must map them to Storage Pools. If you intend to use additional Storage Pools (and not just the default ones), you should create them before you start adding SDSs and devices to the system.

Each Protection Domain must contain at least one Storage Pool (either the default one, or a user-defined one). You cannot remove all the Storage Pools from a Protection Domain.

To add a Storage Pool, perform these steps:

1. In the **Backend** view, select the desired Protection Domain.
2. From the **Command menu** or context-sensitive menu, select **Add Storage Pool**. The **Add Storage Pool** window is displayed.
3. Type a name in the **Name** box.

Note: The RAM Read Cache features are advanced features, and it is usually recommended to accept the default values. You can configure these features later, if necessary, using the **Configure RAM Read Cache** command. For more information about RAM Read Cache features, see [“Managing RAM read cache” on page 247](#)

4. Click **OK**.

To remove a Storage Pool, perform these steps:

1. In the **Backend** view, select the Storage Pool.
2. From the **Command menu** or context-sensitive menu, select **Remove**. The **Remove Storage Pool** window is displayed.
3. Click **OK**.

Activating devices

Use the **Activate Device** command in the following situations:

- Devices were added to the system using the **Test only** option for Device Tests, and successfully passed the tests.
- Devices were inactivated, and you want to bring them back online.

1. In the **Backend** view, navigate to the device or devices in the table, and select the corresponding rows.
2. From the **Command menu** or context-sensitive menu, select **Activate Device**.

Clearing device errors

1. In the **Backend** view, navigate to the device in the table, and select its row.
2. From the **Command menu** or context-sensitive menu, select **Clear Device Errors**.

Setting device capacity limits

In circumstances when you need to replace a device in your system with a device of a smaller capacity, you can set the capacity limit of the device to be removed to less than its full capacity. In such a case, capacity will be decreased, but the size of the disk remains the unchanged.

1. In the **Backend** view, navigate to the device in the table, and select its row.
2. From the **Command menu** or context-sensitive menu, select **Set Device Capacity Limit**.
3. Type the desired value and click **OK**.

Configuring Workload settings (advanced)

The ScaleIO system includes advanced settings which control I/O priorities and bandwidth use, which can be used to fine-tune system performance. It is recommended to retain default settings, unless you are an advanced user.

Topics include:

- ◆ [Application IOPS and bandwidth \(advanced\)](#) 329
- ◆ [System IOPS and bandwidth \(advanced\)](#) 330

Application IOPS and bandwidth (advanced)

Priority can be given to different types of I/Os in the system, including application I/Os. The number of concurrent Rebuild and Rebalance jobs can be configured, along with bandwidth used for these jobs. I/O prioritization is configured per Storage Pool.



These features affect system performance, and should only be configured by an advanced user.

Give priority to Application I/Os during Rebuild and Rebalance jobs, by performing these steps:

1. In the **Backend** view, navigate to, and select the desired Storage Pool.
2. From the **Command menu** or context-sensitive menu, select **Set I/O Priority**.
3. Select Favor Application I/O for Rebalance and Rebuild, and click **OK**.

System IOPS and bandwidth (advanced)

Topics include:

- ◆ [“I/O prioritization” on page 330](#)
- ◆ [“Configuring Network Throttling” on page 330](#)

I/O prioritization

Priority can be given to different types of I/Os in the system. The number of concurrent Rebuild and Rebalance jobs can be configured, and bandwidth for Rebalance jobs can be configured. If the **Dynamic Bandwidth Throttling** option is selected, additional items can be configured, such as **Application IOPS threshold**, **Application bandwidth threshold**, and **Application threshold quiet period**. I/O prioritization is configured per Storage Pool. Default values for these features are provided in [“Setting the rebuild policy” on page 267](#) and in [“Setting the rebalance policy” on page 269](#).

CAUTION

These features affect system performance, and should only be configured by an advanced user.

Configure I/O prioritization for Rebuild and Rebalance by performing these steps:

1. In the **Backend** view, navigate to, and select the desired Storage Pool.
2. From the **Command menu** or context-sensitive menu, select **Set I/O Priority**.
3. Select the desired options and edit values, and click **OK**.

Configuring Network Throttling

Network throttling affects network limits, and is used to control the flow of traffic over the network. It is configured per Protection Domain. The SDS nodes transfer data between themselves. This data consists of user-data being replicated as part of the

RAID protection, and data copied for internal rebalancing and recovery from failures. You can modify the balance between these types of data loads by limiting the data copy bandwidth. This change affects all SDSs in the specified Protection Domain.

⚠ CAUTION

These features affect system performance, and should only be configured by an advanced user. Contact EMC support before you change this configuration.

1. In the **Backend** view, navigate to the desired Protection Domain, and select its row in the table.
2. From the **Command menu** or context-sensitive menu, select **Set Network Throttling**. The **Set Network Throttling** window is displayed.
3. Configure the settings, and click **OK**.

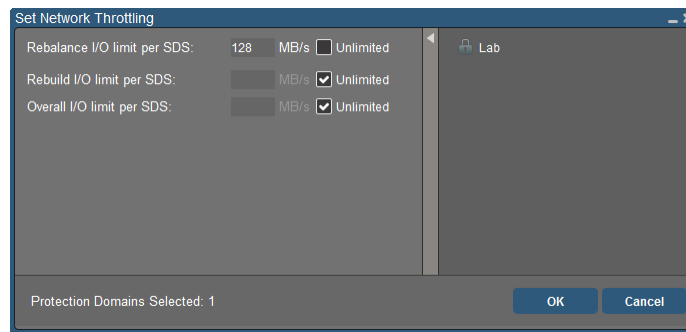


Figure 25 Set Network Throttling window

Enabling and disabling Rebuild\Rebalance (advanced)

By default, Rebuild and Rebalance features are enabled in the system, because they are essential for system health, optimal performance, and data protection. These features should only be disabled temporarily in very specific circumstances, and should not be left disabled for long periods of time. Rebuild and Rebalance features are enabled and disabled per Storage Pool.

CAUTION

Rebuilding is an essential part of the ScaleIO system, which provides protection for your data. It is not recommended to disable the Rebuild feature, except in very special circumstances.

Rebalancing is an essential part of the ScaleIO system, and should only be disabled, temporarily, in special circumstances. Disabling rebalance may cause the system to become unbalanced even if no capacity is added or removed. For example, during a recovery from an SDS or device failure, some rebalance activity may be needed to ensure optimal balancing.

To enable or disable Rebuild and Rebalance features, perform these steps:

1. In the **Backend** view, navigate to, and select the desired Storage Pools.
2. From the **Command menu** or context-sensitive menu, select **Enable/Disable Rebuild/Rebalance**. The **Enable or Disable Rebuild and Rebalance** window is displayed.
3. Select or clear the options that you require (selected=enable; clear=disable), and click **OK**.

Configuring RAM Read Cache (advanced)

The RAM Read Cache feature improves your system's application performance for storage-related activities. By default, all volumes and Storage Pools are configured to use caching, and all SDSs have caching enabled for their devices, using a cache size of 128 MB. You can configure individual SDSs in the Storage Pool with different RAM values, or disable caching completely.

To use RAM Read Cache, you need to configure RAM Read Cache settings at two levels:

- ◆ **Storage Pool**—controls RAM Read Cache for all the SDSs in the selected Storage Pool. Caching can be enabled or disabled, and either **Cached** or **Passthrough** Write Handling modes can be selected. When RAM Read Cache is enabled in a Storage Pool, the feature is enabled at Storage Pool level. However, caching must also be set to Enabled in each SDS in the Storage Pool, as well. Caching will only begin once devices have been added to the SDSs. It is possible to enable RAM caching for a Storage Pool and then disable caching on one or more SDSs individually.

- ◆ **per SDS**—controls RAM Read Cache for one or more SDSs. Caching can be enabled or disabled for the specified SDS, and the capacity allocated for caching on an SDS can be specified. Caching will only begin after one or more devices are added to the SDSs. Ensure that the feature is also enabled at Storage Pool level.

Note: By default, RAM read cache is configured for use in all volumes. You can change this setting using the CLI. For more information, see [“Configuring RAM read cache usage of a volume” on page 248](#).

To configure caching, perform these steps:

1. In the **Backend** view, navigate to, and select the desired Storage Pools.
2. From the **Command menu** or context-sensitive menu, select **Configure RAM Read Cache**. The **Configure RAM Read Cache** window is displayed. The right pane of the window lists the Storage Pools that you are configuring.
3. Select or clear the options that you require (selected=used; clear=not used), and click **OK**.

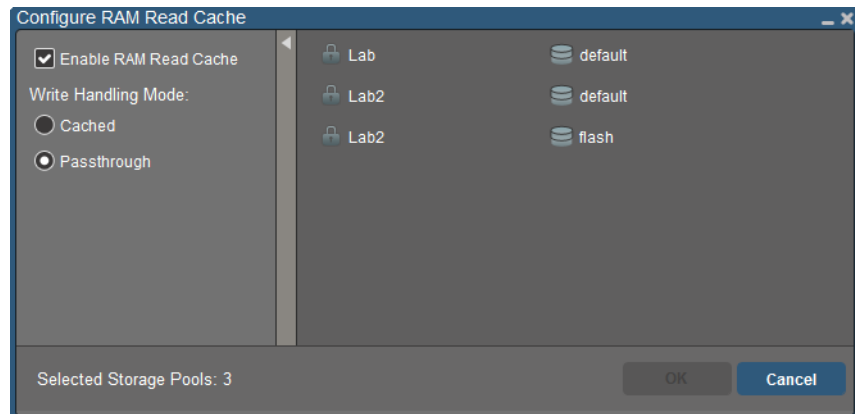


Figure 26 RAM Read Cache configuration at Storage Pool level

4. To enable\disable\configure cache size for SDSs, in the **Backend** view, navigate to, and select the desired SDS(s).
5. From the **Command menu** or context-sensitive menu, select **Configure RAM Read Cache**. The **Configure RAM Read Cache** window is displayed. The right pane of the window lists the SDSs that you are configuring.

6. Select or clear the option that you require (selected=enable; clear=disable).
7. If necessary, edit the value in the **RAM Read Cache Size** box (default=128 MB).
8. Click **OK**.

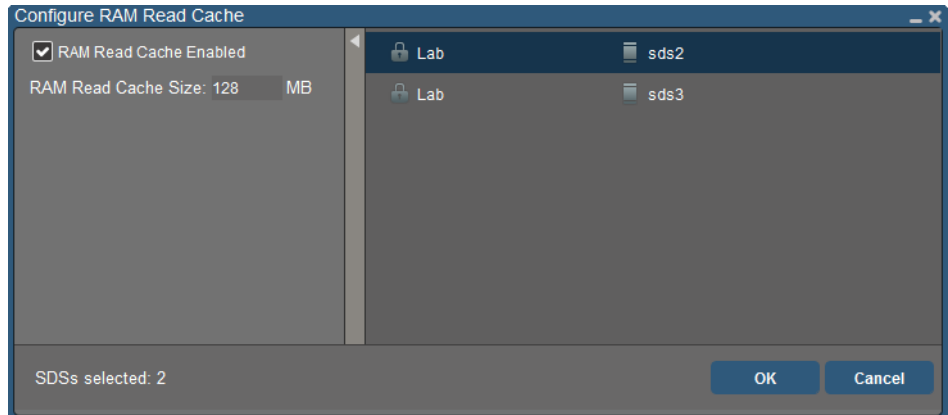


Figure 27 RAM Read Cache configuration at SDS level

Renaming objects

Object names are used to identify the objects in the GUI, and can also be used to specify objects in CLI commands. You can view an object's name in its Property Sheet, in the **Identify** section.

You can define object names, according to the following rules:

1. Contain less than 32 characters
2. Contain only alphanumeric and punctuation characters
3. Be unique within the object type

When a name has not been defined, the system may display default system-defined names, as follows:

- ◆ SDS—its first IP address
- ◆ Device—the path to the device
- ◆ All other objects—the object's ID

1. In the **Backend** view, navigate to the object in the table, and select its row.

2. From the **Command menu** or context-sensitive menu, select the **Rename** command. An editing window is displayed, showing the current name, and an editable field for the new name.
3. Type the new name in the field, and click **OK**.

Customizing system preferences

You can customize various features in the GUI using the **Preferences** window. The following features can be customized:

- Refresh data rate
 - Calculation of averages rate shown on the Dashboard
 - Host history from previous sessions
 - Advanced display mode for Dashboard, Backend and Property Sheet
 - Log level
1. From any location in the GUI, open the **Preferences** menu in the top right corner, and select **Preferences**. The **Preferences** window is displayed.
 2. Edit the options according to your needs, and click **Apply**.

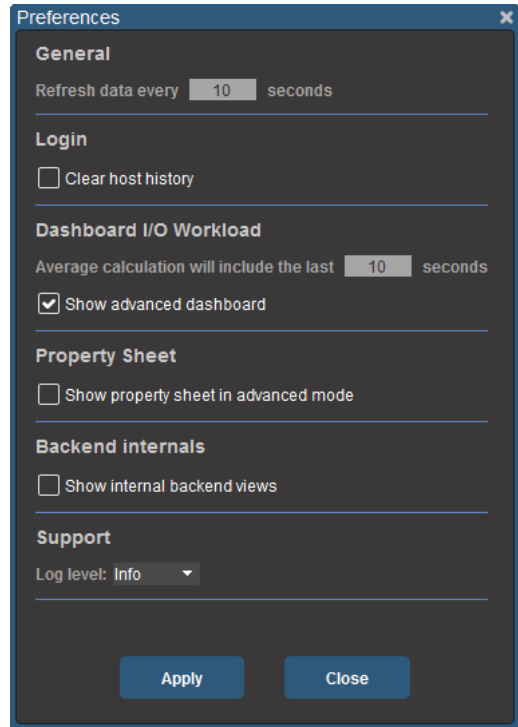


Figure 28 Preferences window

Table 25 Preferences

Item	Description
Refresh data every <i>n</i> seconds	Controls the rate at which data displayed in the GUI is refreshed, in seconds (Default: 10 seconds) The refresh occurs at least at the specified rate. It is not intended to be used as a means of limiting client traffic, although it would actually do so.
Clear host history	When selected, the GUI does not save and present host connection details from previous sessions
Dashboard I/O workload: average calculation will include the last <i>n</i> seconds	Controls the time period used when averages are computed and displayed by the GUI (default: 10 seconds)

Table 25 Preferences (continued)

Item	Description
Show advanced dashboard	When selected, (default), includes more details on some tiles in the Dashboard view. The toggle buttons switch between the statistics displayed in large fonts and small fonts. The upper button toggles between average values and sample values. The lower button toggles between display of bandwidth or IOPs in large fonts on this tile. The  symbol means that the number displayed is the average taken during the last <i>n</i> seconds. <i>n</i> can be configured in system Preferences. The  symbol means that the number displayed is from the last data sample that was taken. The period between automatic refreshes can be configured in system Preferences.
Show Property Sheet in advanced mode	Displays additional details in Property Sheets: • Capacity section—Snapshot Capacity Reserved • Rebuild/Rebalance—Data Movement Jobs • RAM Read Cache—Cache Evictions, Cache Entry, and Cache Skip tables These details are usually only relevant for advanced users and technical support purposes.
Show Backend internal views	Displays additional options for Backend table views. These options are recommended only for advanced users and technical support purposes.
Log level	Controls the type of data saved in system logs, which may be required by Customer Support for troubleshooting purposes. The default setting recommended for regular operation is Info. Other options include: Trace, Debug, Warn, and Error. Note: Trace and Debug options may affect system performance, and are usually only recommended for technical support purposes. GUI logs are saved in the locations: Windows: %AppData%\EMC\ScaleIO\logs Linux: %AppData%\EMC\ScaleIO\logs

CHAPTER 13

Using the VMware Plug-in

This chapter describes how to use the VMware plug-in (the “plug-in”) to view and provision ScaleIO components. Topics include:

- ◆ [Configuring components](#) 341
- ◆ [Viewing components](#) 351

The plug-in communicates with the MDM and the vSphere server enabling you to view components as well as to perform many configuration/provisioning tasks right from within the VMware environment.

Before benefiting from ScaleIO, you must create volumes and map them to SDCs installed on the ESX hosts. This requires the following steps:

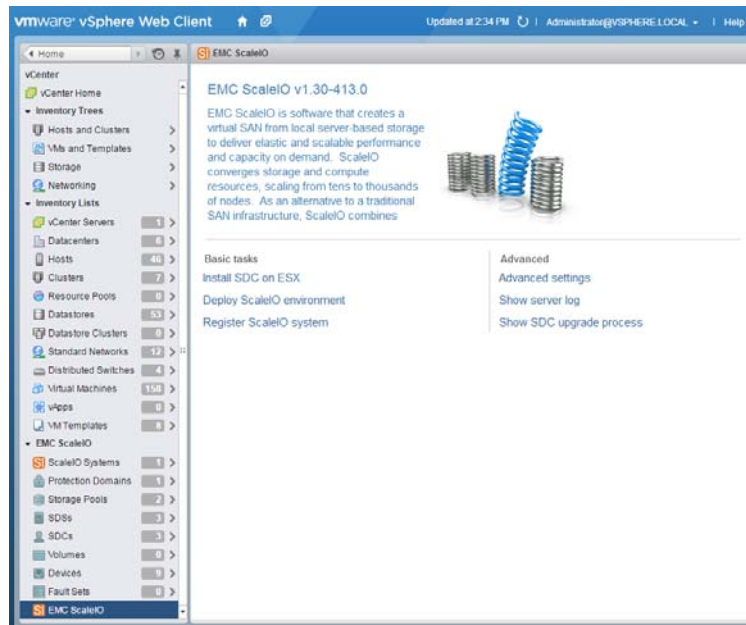
- Creating a volume
- Mapping the volume to all SDCs
- Mapping the volume to the initiator (only required if the SDC is installed on an SVM)

This set of manual tasks is automated in the plug-in, as described in [“Creating and mapping volumes” on page 344](#).

To use the plug-in, it must be registered in your vCenter. For more information, see [“Registering the ScaleIO plug-in and uploading the OVA template” on page 74](#).

To open the plug-in, click  from the vSphere Web Client.

The EMC ScaleIO screen appears.



The ScaleIO screen displays an overview of the configured components. In this example, one system has been configured, with the following components:

- ◆ Protection Domain—1
- ◆ Storage Pool—2
- ◆ SDS—3
- ◆ SDC—3
- ◆ Volumes—0
- ◆ Devices—9
- ◆ Fault Set—0

You can use the plug-in to configure and view ScaleIO components.

Configuring components

There are two levels of component configurations:

- ◆ **Basic**

The basic configurations are all performed the same way; the process is described just once.

- ◆ **Advanced**

The advanced configuration setting each have a unique dialog box, each of which is described on its own in [“Configuring components—advanced” on page 344](#).

The following table lists the activities you can perform, and categorizes each as basic or advanced:

Table 26 Plug-in activity matrix (page 1 of 2)

Component	Activity	Basic or advanced	Access from this screen
System	Register an existing system	Basic—Enter the system Primary MDM IP address, user name, and password.	Main screen
	Unregister a system	Basic	ScaleIO Systems
	Update system credentials	Basic—Enter new user name and password	ScaleIO Systems
ScaleIO Gateway	Register/Update Gateway	Basic—Enter IP address, OS user name, and OS password.	ScaleIO Systems
	Open Gateway	Basic—Navigates to the Gateway Installation Manager	ScaleIO Systems
Protection Domain	Create a Protection Domain	Basic	ScaleIO Systems
	Remove a Protection Domain	Basic	Protection Domains

Table 26 Plug-in activity matrix (page 2 of 2)

Component	Activity	Basic or advanced	Access from this screen
Storage Pool	Create a Storage Pool	Basic	Protection Domains
	Remove a Storage Pool	Basic	Storage Pools
	Configure RAM Read Cache	Basic ¹	Storage Pools
SDS	Add a device to an SDS	Advanced	SDSs
	Remove a device from an SDS	Basic	Devices
SDC	Switch SDC mode	Advanced ³	SDCs
	Upgrade SDC	Advanced	SDCs
Volume	Create and map volumes	Advanced	Storage Pools
	Map volumes	Advanced	Volumes
	Remove a volume (must be unmapped first)	Basic	Volumes
	Unmap a volume	Advanced	Volumes
	Configure RAM Read Cache	Basic ¹	Volumes
Fault set	Create a Fault Set	Basic	Protection Domains
Device	Clear a device error	Basic	Devices
	Note: Removes the error message. Can be performed only after clearing the error.		

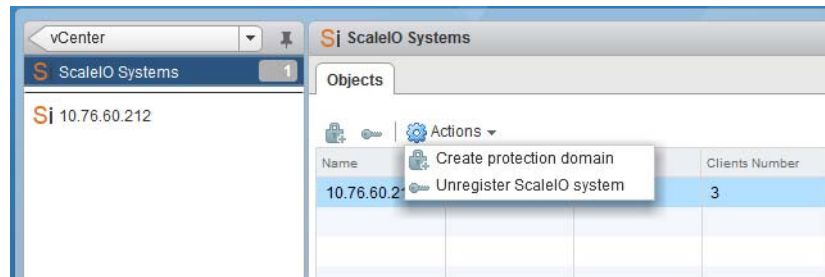
1. For RAM Read Cache to work on a volume, both the volume and its Storage Pool must have the feature enabled.
2. This task can be performed only with the assistance of EMC Support.

Configuring components—basic

This section shows how to perform the basic configuration activities. All activities are performed by opening the **Actions** menu in each screen and entering simple information.

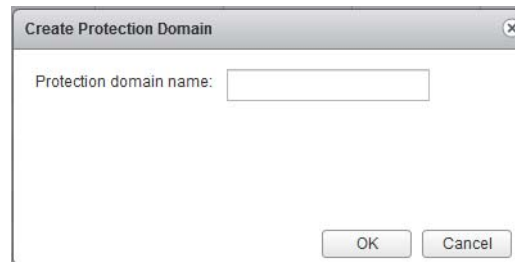
For example, to create a Protection Domain from the **ScaleIO Systems** screen, perform the following:

1. From the **ScaleIO Systems** screen, click **Actions** and choose **Create Protection Domain**:



Note: You can also click the action icons   in the menu or right-click the item to choose options from a drop-down menu.

The **Create Protection Domain** dialog appears:



2. Enter a name for the Protection Domain, then click **OK**.

The process is similar for the rest of the basic activities.

Configuring components—advanced

This section describes how to perform the following activities:

- ◆ “Creating and mapping volumes”
- ◆ “Unmapping a volume”
- ◆ “Adding devices to an SDS”
- ◆ “Switching SDC mode”
- ◆ “Upgrading an SDC”

Registering an existing system

This section describes how to register an existing system.

1. From the main plug-in window, click **Register ScaleIO system**.
2. Enter the following information, then click **OK**:
 - **Primary MDM IP**
The IP address of the existing system Primary MDM
 - **User name**
The user name of the existing system
 - **Password**
The password of the existing system

Creating and mapping volumes

This section describes how to use the plug-in to create volumes in the VMware environment. You can map volumes to SDCs in the same step, or you can map the volume after it has been created.

Creating and mapping volumes

Volumes are created from devices in a Storage Pool.

1. From the **Storage Pools** screen, click **Actions › Create volume**.

The **Create Volume** dialog appears:

Create Volume

Volume name:

Number of Volumes to Create:

Volume size (GB): * Must be a multiple of 8

Volume provisioning:

Use RAM Read Cache: ☒

Obfuscation:

☒ Map volume to ESXs

Select ESXs:

- SIO-VC
 - VALERIA-DC
 - ☐ 10.103.110.214
 - Plugin-Cluster
 - ☐ 10.103.110.212
 - ☐ 10.103.110.213

☐ Manually configure LUN identifier to

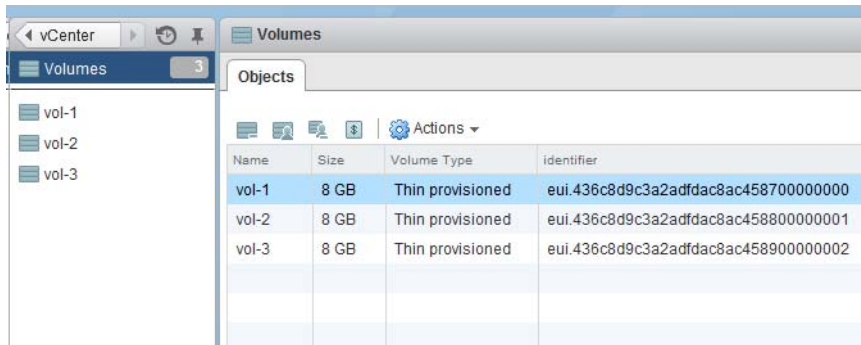
OK Cancel

2. Enter the following information:

- **Volume name**
Enter a name for the new volume.
- **Number of volumes to create**
Enter the number of volumes to create. Multiple volumes appear as *volume_name-X*.
- **Volume size**
Enter the size of the volume. This must be in multiples of 8 GB.
- **Volume provisioning**
Select thick or thin provisioning.
- **Use RAM Read Cache**
Select to enable RAM Read Cache for the created volumes. Use of RAM Read Cache is determined by the policy for the Storage Pool and the volume.

- **Obfuscation**
Select whether the volume should be obfuscated.
3. To map the volume to ESXs, perform the following:
 - a. Select **Map volume to ESXs**.
 - b. In the **Select ESXs** area, select the clusters or ESXs to which this volume should be mapped.
 4. To configure the LUN identifier manually, select **Manually configure LUN identifier to** and enter the identifier ID.
 5. Click **OK**.
 6. Enter the password for the ScaleIO *admin* user.

The following figure illustrates multiple volumes created:



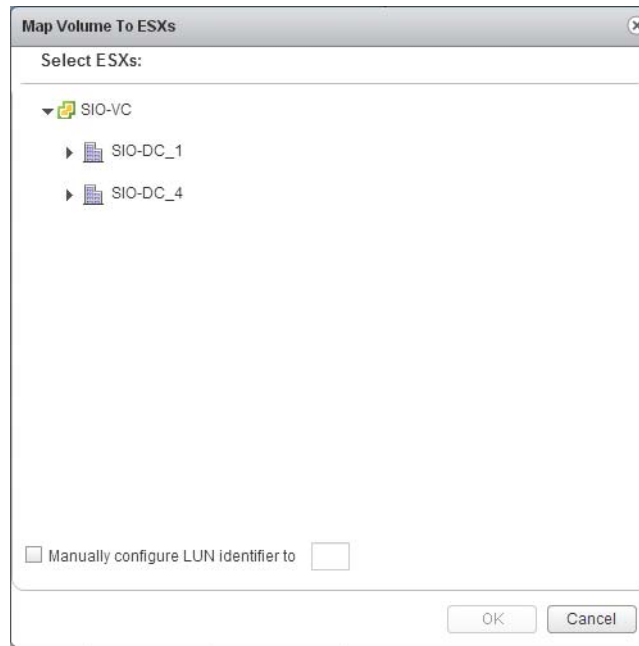
Name	Size	Volume Type	identifier
vol-1	8 GB	Thin provisioned	eui.436c8d9c3a2adfdac8ac458700000000
vol-2	8 GB	Thin provisioned	eui.436c8d9c3a2adfdac8ac458800000001
vol-3	8 GB	Thin provisioned	eui.436c8d9c3a2adfdac8ac4589000000002

Mapping volumes

You can manually map volumes after they have been created, from the **Volumes** screen.

1. From the **Volumes** screen, select a volume to map, then choose **Actions > Map a volume**.

The **Map Volume to ESXs** dialog appears.



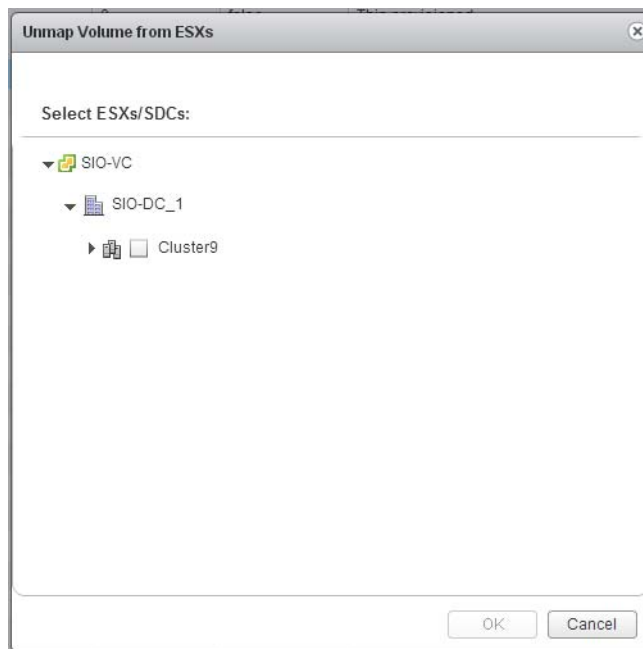
2. Select the clusters or ESXs to which this volume should be mapped.
3. To configure the LUN identifier manually, select **Manually configure LUN identifier to** and enter the identifier ID.
4. Click **OK**.

Unmapping a volume

This section describes how to use the plug-in to unmap a volume from an ESX.

1. From the Volumes screen, select the volume to unmap, and choose **Actions > Unmap volume**.

The **Unmap volume from ESXs** dialog appears.



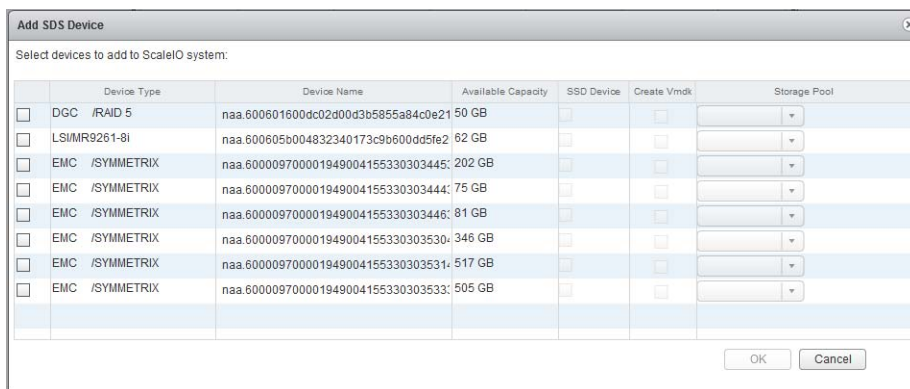
2. Select the ESXs or clusters from which to unmap the volume, then click **OK**.

Adding devices to an SDS

This section describes how to use the plug-in to add storage devices to an SDS in the VMware environment.

1. From the **SDSs** screen, click **Actions** > **Add SDS device**. It may take a moment to load the device list from the vCenter.

The **Add SDS Device** dialog appears:



2. Add devices to an SDS:
 - a. Select the device to add.
 - b. If you need to create a VMDK disk, select **Create VMDK**.

Note: This option is only enabled if you first enable VMDK creation from the **Advanced Settings** on the plug-in main screen.

- c. Select a Storage Pool for the device.
3. Click **OK**.

Switching SDC mode

You can use the plug-in to switch the SDC from being installed on an SVM to being installed directly on an ESX. Installing the SDC directly on the ESX is only an option for ESXi 5.5.

Switching SDC mode requires that the SDC be installed on every ESX host in the system. You can do this, as described in [“Task 3: Installing the SDC on ESX hosts” on page 77](#).

Note: This task can only be performed together with EMC Support.

Upgrading an SDC

You can use the plug-in to upgrade the version of an SDC installed directly on an ESX. This is relevant only for ESXi 5.5.

To upgrade the SDC version, perform the following:

1. From the SDCs screen, select **Upgrade SDC**. The Upgrade SDC dialog appears.

ESX	ESX Password	Current Task	Status
10.103.110.100			

☐ Skip fixing iSCSI targets after SDC installation

☐ Show passwords

Process log:

2. Enter the ESX root password, then click **Start**.
3. If prompted, select the new SDC driver, then click **OK**.

Upgrade progress is shown in the **Upgrade SDC** screen.

You can allow this process to run in the background. To check on progress, click **Show SDC upgrade process** from the main ScaleIO screen.

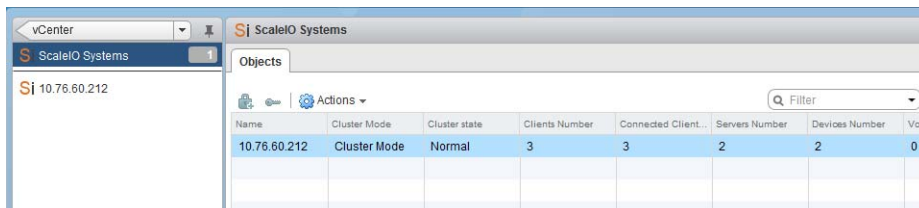
Viewing components

This section describes how to use the plug-in to view installed components.

To view an installed component, click it from the **EMC ScaleIO** list.

Every component shows details that are relevant to the selected component.

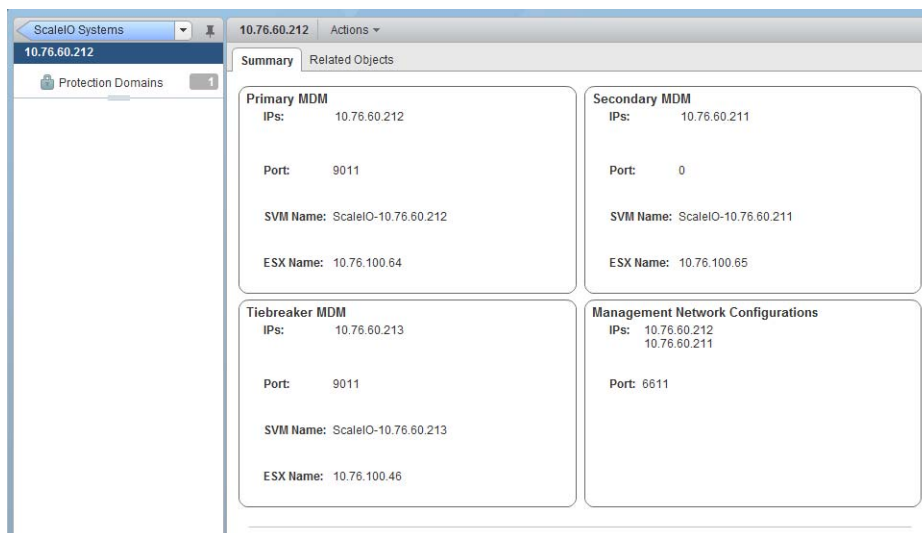
For example, when you select **ScaleIO system**, the following system details appear:



The screenshot shows the vCenter interface with the ScaleIO Systems view. A table lists the installed systems. The first row is highlighted in blue.

Name	Cluster Mode	Cluster state	Clients Number	Connected Client...	Servers Number	Devices Number	Vol...
10.76.60.212	Cluster Mode	Normal	3	3	2	2	0

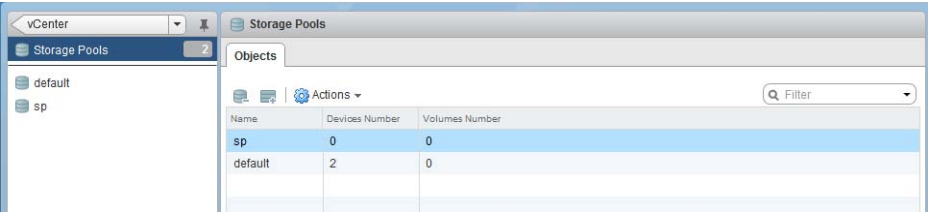
You can drill-down for more details by double-clicking the displayed details.



The screenshot shows the detailed view of the ScaleIO system 10.76.60.212. The view is divided into two tabs: Summary and Related Objects. The Summary tab is active, showing details for the Primary MDM, Secondary MDM, Tiebreaker MDM, and Management Network Configurations.

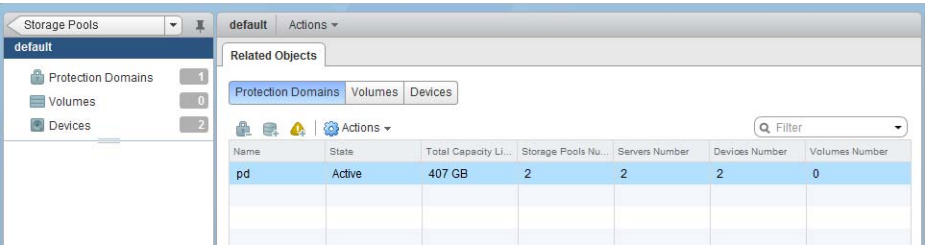
Summary	Related Objects
Primary MDM IPs: 10.76.60.212 Port: 9011 SVM Name: ScaleIO-10.76.60.212 ESX Name: 10.76.100.64	Secondary MDM IPs: 10.76.60.211 Port: 0 SVM Name: ScaleIO-10.76.60.211 ESX Name: 10.76.100.65
Tiebreaker MDM IPs: 10.76.60.213 Port: 9011 SVM Name: ScaleIO-10.76.60.213 ESX Name: 10.76.100.46	Management Network Configurations IPs: 10.76.60.212 10.76.60.211 Port: 6611

When you select **Storage Pools**, the following details appear:



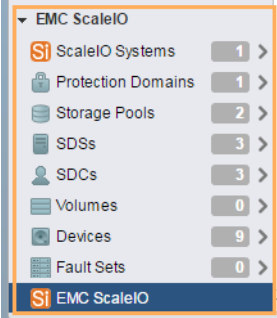
Name	Devices Number	Volumes Number
sp	0	0
default	2	0

When you drill-down on this screen, the following details appear:



Name	State	Total Capacity Li...	Storage Pools Nu...	Servers Number	Devices Number	Volumes Number
pd	Active	407 GB	2	2	2	0

You can view the properties of all the ScaleIO components in the menu:



Component	Count	Action
ScaleIO Systems	1	>
Protection Domains	1	>
Storage Pools	2	>
SDSs	3	>
SDCs	3	>
Volumes	0	>
Devices	9	>
Fault Sets	0	>

PART 4

Reference

The appendices in this part of the guide describe various topics related to advanced management. Chapters include:

[Appendix A, “Manual Installation”](#)

This appendix describes how to manually install and upgrade ScaleIO components on Linux, Windows, and ESX platforms.

[Appendix B, “System Events and Alerts”](#)

This appendix describes events and alerts generated by the ScaleIO system.

[Appendix C, “Return Messages”](#)

This appendix describes error messages generated by the ScaleIO system, and as well as how to fix the problems.

[Appendix D, “Troubleshooting, FAQ, and Other Tasks”](#)

This appendix describes troubleshooting steps, frequently asked questions, and provides further information on automating installation.

[Appendix E, “ScaleIO on Xen”](#)

This appendix describes steps to take when deploying ScaleIO in the Xen environment.

[Appendix F, “Deployment in OpenStack Environments”](#)

This appendix describes ScaleIO deployment in an OpenStack cloud operating system environment.

[Appendix G, “REST API Reference”](#)

This appendix describes the REST API exposed by ScaleIO.

[Appendix H, “SNMP Trap Support”](#)

This appendix describes the SNMP alert functionality.

[“Glossary”](#)

The glossary defines many important concepts used in ScaleIO.

APPENDIX A

Manual Installation

This appendix describes how to install ScaleIO components in situations when the installation manager and VMware deployment wizard are not suitable. Topics include:

- ◆ [Manual installation on Linux and Windows servers.....](#) 355
- ◆ [Quick installation and provisioning example](#) 362
- ◆ [Deploying ScaleIO on ESX](#) 365
- ◆ [Manually upgrading ScaleIO components.....](#) 373

NOTICE

This appendix is for reference purposes only. It is highly recommended to use the automated installation manager or the VMware deployment wizard to install ScaleIO, as described in [Chapter 3, “Installation.”](#) If that is not possible, contact EMC Support.

Manual installation on Linux and Windows servers

This section describes how to install ScaleIO manually on Linux and Windows servers.

To install ScaleIO manually, you must install the following components:

- ◆ **MDM**

You can install MDM in Cluster mode (using a primary, secondary, and tie-breaker MDM on three separate servers) or in Single mode (a single MDM on one server).

NOTICE

It is not recommended to use Single Mode in production systems, except in temporary situations. The MDM contains all the metadata required for system operation. Single Mode has no protection, and exposes the system to a single point of failure.

- ◆ **Tie-Breaker**

The Tie-Breaker is installed on a third server, and is required when using MDM cluster mode.

- ◆ **Call-Home (optional)**

The Call-Home function emails status information to the ScaleIO support center and the local ScaleIO administrator. Call-Home is installed on the same server where MDM is installed, and only after the MDM was installed.

For the Call-Home feature to function, you must configure the SMTP system on the MDM servers to enable ScaleIO to send outgoing emails.

- ◆ **SDS**

The SDS is installed on all servers that will contribute storage devices to the ScaleIO system.

- ◆ **SDC**

The SDC is installed on *every* server that will expose ScaleIO volumes to the application running on it.

- ◆ **LIA (optional)**

It is highly recommended to install the Lightweight Installation Agent (LIA) on every node in the ScaleIO system. This will enable upgrade, uninstall, and Get Info operations to be performed automatically using the Installation Manager.

You can install ScaleIO components on Linux and Windows machines. Proceed to the section that matches your environment:

- ◆ [“Installing on Linux servers” on page 356](#)
- ◆ [“Installing on Windows servers” on page 360](#)

Installing on Linux servers

This section describes how to perform a manual installation of the ScaleIO components on Linux servers.

Note: Prior to installing MDM components on Linux CentOS 6 or RHEL 6, set the shared memory parameter in the `/etc/sysctl.conf` file to at least the following value: **`kernel.shmmax=209715200`**.

To use this value, type the **`sysctl -p`** command.

To install ScaleIO components, perform the following:

1. Install the MDM components:
 - a. For both cluster and single mode, run the following command, from the node which is to act as MDM:

```
rpm -i <full rpm file path>
```

For example:

```
rpm -i EMC-ScaleIO-mdm-1.31-XXX.X.el6.x86_64.rpm
```

For single mode installation, the MDM installation is complete. Proceed with the Call-Home component.

- b. For cluster mode, continue here:
 1. Install the second MDM by repeating the previous step on a different server.
 2. On a third server, install the Tie-Breaker, by running the following command

```
rpm -i <full rpm file path>
```

For example:

```
rpm -i EMC-ScaleIO-tb-1.31-XXX.X.el6.x86_64.rpm
```

Note: The default MDM credentials are:

user name: **admin**

password: **admin**

2. Install the Call-Home component (optional), by running the following command, on each MDM node:

```
rpm -i <full rpm file path>
```

For example:

```
rpm -i EMC-ScaleIO-callhome-1.31-XXX.X.el6.x86_64.rpm
```

The Call-Home component requires further configuration, as described in [“Configuring the Call-Home feature” on page 359](#).

3. Install the SDS component on *every* server that will contribute storage drives to the ScaleIO system, by running the following command:

```
rpm -i <full rpm file path>
```

For example:

```
rpm -i EMC-ScaleIO-sds-1.31-XXX.X.el6.x86_64.rpm
```

Note: When using fast devices (SSD), you can optimize SDS parameters by replacing the previous command with the following:

```
CONF=IOPS rpm -i  
EMC-ScaleIO-sds-1.31-XXX.X.el6.x86_64.rpm
```

4. Install the SDC component on *every* server that will expose ScaleIO volumes to the application running on it, by running the following command:

```
MDM_IP=<IP of the MDM>  
rpm -i <full rpm file path>
```

For example:

```
MDM_IP=192.168.1.4,192.168.1.5 rpm -i  
EMC-ScaleIO-sdc-1.31-XXX.X.el6.x86_64.rpm
```

Note: Add all the MDM IP addresses (minimally, one primary and one secondary address).

5. Install the LIA component on *every* node (optional), by running the following command:

```
rpm -i <full rpm file path>
```

For example:

```
rpm -i EMC-ScaleIO-lia-1.31-XXX.X.el6.x86_64.rpm
```

The LIA component requires security configuration, as described in the *EMC ScaleIO Security Configuration Guide*.

Post-installation considerations

Each installed component creates subdirectories for its use in the following directory:

```
/opt/emc/scaleio/<component>/
```

For example: `/opt/emc/scaleio/mdm/`

1. Install the GUI, where needed, by running the following command:

- **Linux**

```
rpm -i <RPM_GUI_package_name>
```

- **Ubuntu (run the command with administrator privileges)**

```
dpkg -i <DEB_GUI_package_name>
```

2. To install the ScaleIO Gateway, follow the instructions described in [“Installing the ScaleIO Gateway” on page 57](#).

The ScaleIO Gateway includes the Installation Manager (IM) and the NSNMP alerts functionality.

Configuring the Call-Home feature

This section describes the additional configuration required to enable the Call-Home feature.

To configure, perform the following:

1. Edit the `conf.txt` file for your operating system, according to the parameters in the following table:

- **Windows**

```
C:\Program Files\EMC\ScaleIO\callhome\cfg
```

- **Linux**

```
/opt/emc/scaleio/callhome/cfg
```

Table 27 Call-Home configuration parameters

Section	Parameter	Description
[general]	email_from	User's source email address to be listed in all outgoing mails
	username	MDM user that Call-Home home uses to connect to the MDM and perform the queries. Recommended to be a user with <i>monitor</i> role.
	password	Password for the user name specified in previous section
	customer_name	The customer name. This will enable support to assist more rapidly.

Table 27 Call-Home configuration parameters

Section	Parameter	Description
[smtp]	host	SMTP server host name or IP
	username	SMTP server credentials
	password	SMTP server credentials
[email_alert]	email_to	Customer destination email address that should receive alert mails regarding ScaleIO events
	severity	Event severity threshold at which Call-Home will start sending alert mails, either Warning, Error (default), or Critical.

2. Restart the CallHome service.

Installing on Windows servers

This section describes how to perform a manual installation of the ScaleIO components on Windows servers. It is highly recommended to use the automated installation manager as described in [Chapter 3, “Installation.”](#)

To install ScaleIO components, perform the following:

1. Install the MDM components:
 - a. Install **PythonModulesInstall.exe** on all nodes that will run the MDM. You can download the file from EMC Online Support (<https://support.emc.com>).
 - b. For both cluster and single mode, run the following file:

EMC-ScaleIO-mdm-1.31.XXX.X.msi

For single mode installation, the MDM installation is complete. Proceed with the Call-Home component.
 - c. For cluster mode, continue here:
 1. Install the second MDM by repeating the previous steps on a different server.
 2. On a third server, install the Tie-Breaker, by running the following file:

EMC-ScaleIO-tb-1.31.XXX.X.msi

Note: The default MDM credentials are:

user name: **admin**
password: **admin**

2. Install the Call-Home component (optional), by running the following file on the MDM nodes:

EMC-ScaleIO-callhome-1.31.XXX.X.msi

Note: Call-Home must be installed after the MDM is installed.

The Call-Home component requires further configuration, as described in [“Configuring the Call-Home feature” on page 359](#).

3. Install the SDS component on *every* server that will contribute storage drives to the ScaleIO system, by running the following file:

EMC-ScaleIO-sds-1.31.XXX.X.msi

Note: When using fast devices (SSD), you can optimize SDS parameters by replacing the previous command with the following:

msiexec /i EMC-ScaleIO-sds-1.31-XXX.X.msi CONF=IOPS

4. Install the SDC component on *every* server that will expose ScaleIO volumes to the application running on it, by running the following file:

msiexec /i EMC-ScaleIO-sdc-1.31.XXX.X.msi MDM_IP=<MDM_IP>

Use the IP address of the MDM.

5. Install the LIA component on *every* node (optional), by running the following command:

EMC-ScaleIO-lia-1.31.XXX.X.msi

The LIA component requires security configuration, as described in the *EMC ScaleIO Security Configuration Guide*.

Post-installation considerations

Each installed component creates subdirectories for its use in the following directory:

`c:\Program files\emc\scaleio\<component>\`

For example: `c:\Program files\emc\scaleio\mdm\`

1. Install the GUI, where needed, by running the following command:

EMC-ScaleIO-gui-1.31-XXX.X.msi

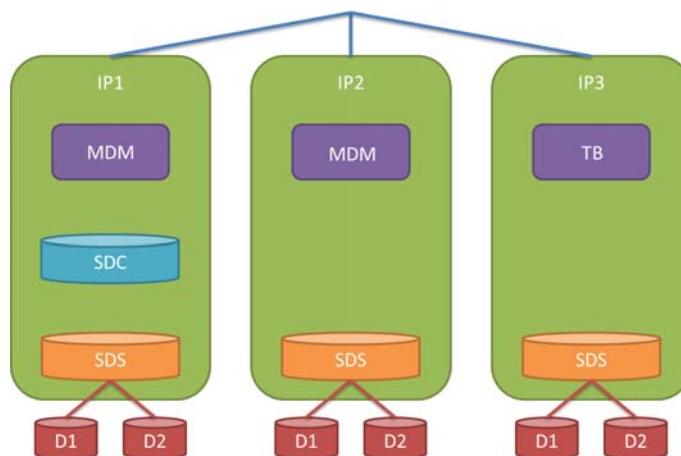
2. To install the ScaleIO Gateway, follow the instructions described in [“Installing the ScaleIO Gateway” on page 57](#).

The ScaleIO Gateway include the Installation Manager (IM) and the SNMP alerts functionality.

Quick installation and provisioning example

This section illustrates a quick and simple manual installation.

The flow in the example below shows how to install and configure ScaleIO in the following configuration:



- ◆ MDM resides on nodes IP1 and IP2.
- ◆ The Tie-Breaker is installed on node IP3.
- ◆ SDSs are installed on all nodes. Each has two physical devices dedicated for ScaleIO: `/dev/d1`, `/dev/d2`.

- ◆ SDC is installed on node IP1.
- ◆ Call-home and LIA are not being installed in this example.

Installing ScaleIO components

This section describes how to install the required components on a Linux server.

1. Install the MDMs on nodes IP1 and IP2, by running the following command on those nodes:

```
rpm -i EMC-ScaleIO-mdm-1.31-XXX.X.el6.x86_64.rpm
```

2. Install the Tie-Breaker on node IP3, by running the following command on that node:

```
rpm -i EMC-ScaleIO-tb-1.31-XXX.X.el6.x86_64.rpm
```

3. Install the SDS on all nodes (IP1, IP2, and IP3), by running the following command on all nodes:

```
rpm -i EMC-ScaleIO-sds-1.31-XXX.X.el6.x86_64.rpm
```

4. Install the SDC on node IP1, by running the following command on that node:

```
MDM_IP=IP1
```

```
rpm -i EMC-ScaleIO-sdc-1.31-XXX.X.el6.x86_64.rpm
```

Preparing the MDM

This section describes how to prepare the MDM.

1. Define the Primary MDM on node IP1, by running the following command, from a node on which the MDM is installed:

```
scli --add_primary_mdm --primary_mdm_ip IP1
```

2. Log in with default administrator credentials (*admin admin*), change password, and log in with new password, by running the following commands:

```
scli --login --username admin --password admin
```

```
scli --set_password --old_password admin --new_password  
<password>
```

```
scli --login --username admin --password <password>
```

3. Install the ScaleIO license, by running the following command:

```
scli --set_license --license_file  
<full_path_to_license_file>
```

4. Define the Secondary MDM on node IP2, by running the following command:

```
scli --add_secondary_mdm --mdm_ip IP1  
--secondary_mdm_ip IP2
```

5. Define the Tie-Breaker on node IP3, by running the following command:

```
scli --add_tb --tb_ip IP3 --mdm_ip IP1
```

6. Switch to cluster mode, by running the following command:

```
scli --switch_to_cluster_mode  
--mdm_ip IP1
```

Adding capacity

This section describes how to add capacity.

1. Define a Protection Domain, `ScaleIO-1`, by running the following command:

```
scli --add_protection_domain  
--mdm_ip IP1 --protection_domain_name ScaleIO-1
```

2. Add an SDS on IP1, and its devices to `ScaleIO-1`, and name it `sds1`, by running the following command:

```
scli --add_sds --mdm_ip IP1 --sds_ip IP1  
--device_path /dev/d1,/dev/d2  
--sds_name sds1 --protection_domain_name ScaleIO-1
```

3. Add an SDS on IP2, and its devices to `ScaleIO-1`, add meaningful names to the devices (optional), and name the SDS `sds2`, by running the following command:

```
scli --add_sds --mdm_ip IP1 --sds_ip IP2  
--device_path /dev/d1,/dev/d2  
--device_name node_12_dev1,node_12_dev5 --sds_name sds2  
--protection_domain_name ScaleIO-1
```

4. Add an SDS on IP3, and its devices to ScaleIO-1, and name it **sds3**, by running the following command:

```
scli --add_sds --mdm_ip IP1 --sds_ip IP3
--device_path /dev/d1,/dev/d2
--sds_name sds3 --protection_domain_name ScaleIO-1
```

Creating and mapping volumes

This section describes how to create and map volumes.

1. Define a 2500 GB volume, and name it **Vol1**, by running the following command:

```
scli --add_volume --mdm_ip IP1 --size_gb 2500
--volume_name vol1 --protection_domain_name ScaleIO-1
```

2. Map Vol1 to the SDC on IP1, by running the following command:

```
scli --map_volume_to_sdc --mdm_ip IP1 --volume_name vol1
--sdc_ip IP1
```

Deploying ScaleIO on ESX

This section describes topics related to installing ScaleIO in VMware environments.

It is highly recommended to deploy using the VMware plug-in deployment wizard. This appendix describes tasks that are necessary in cases where this is not possible or desirable, such as for scripting. Topics include:

- ◆ [Deploying the ScaleIO virtual machine](#) 366
- ◆ [Configuring the UUID on virtual machines.....](#) 368
- ◆ [Configuring iSCSI devices on an ESX host](#) 369
- ◆ [Installing the SDC directly on an ESX host.....](#) 371
- ◆ [Optimizing the guest operating system performance](#) 372

Before starting, obtain the IP addresses for all of the nodes to be installed, and an additional IP address for the MDM cluster, as described in the following table:

Number of networks	IP addresses required
1 network (management network)	• 1 for vmnic • 1 for SVM
2 networks	• 2 for vmnic (1 for mgmt, 1 for data) • 2 for SVM (1 for mgmt, 1 for data)
3 networks	• 3 for vmnic (1 for mgmt, 2 for data) • 3 for SVM (1 for mgmt, 2 for data)

Deploying the ScaleIO virtual machine

To run ScaleIO components on an ESX host, you need to deploy the ScaleIO virtual machine (SVM) on the ESX. That said, there is an option to run the SDC directly on an ESX 5.5 host. If all you want to run on the ESX is the SDC, there is no need to create an SVM on that host.

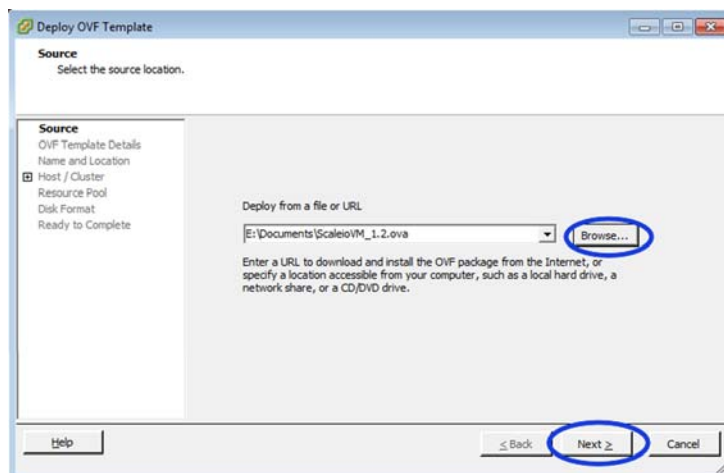
This section describes how to deploy the SVM and prepare it for installation of ScaleIO.

Note: Before deploying, ensure that networks for each ESX to be part of the system have a properly defined Port Group and VMkernel.

To deploy the SVM on the ESX, perform the following:

1. Download the installation software from the EMC Support site (<https://support.emc.com>). If necessary, extract the files to an installation folder.
2. Download the following document:
<http://www.vmware.com/files/pdf/techpaper/vmware-multipathing-configuration-software-iSCSI-port-binding.pdf>.
3. Use the vSphere client to connect to a vCenter.
4. Select **File > Deploy OVF Template**.

The Deploy OVF Template wizard appears.



5. Enter the full path to the OVA, and click **Next**.
6. Accept all default values, and click **Finish**.
7. Clone the SVM to each ESX host.
8. On each ESX physical host, configure the network and NTP (and DNS, if necessary).
 - a. Using the console, start the SVM, and login. The default user name is **root**, and the default password is **admin**.
 - b. Configure the network:
 - IP address
 - Gateway address
 - DNS
 - NTP server
9. On each SVM in the system, install the relevant ScaleIO components, as described in [“Installing on Linux servers” on page 356](#). The packages are located under `/root/install`

Hint: When using the OVA, the installation packages can be found in `/root/install/`.

Note: If you are installing the SDC directly on the ESX, skip the next steps, and go to [“Installing the SDC directly on an ESX host” on page 371](#).

10. If you are installing the SDC on the SVM, perform the following:

Note: If you are not installing the SDC at all, there is no need to perform these steps.

- a. On each ESX host, log in and configure the iSCSI devices.
For more information, see [“Configuring iSCSI devices on an ESX host” on page 369](#).
- b. To discover all the ScaleIO LUNs, after adding the volumes, perform a rescan on the iSCSI initiator of all ESX hosts.

Configuring the UUID on virtual machines

To configure the virtual machine, you must enable the UUID attribute on *every* virtual machine, by performing the following:

1. Start the vSphere Client, and log in to a vCenter Server.
2. Select **Virtual Machines and Templates**.
3. From the **Virtual Machines** tab, right-click the virtual machine, and choose **Power > Power Off**.

The virtual machine powers off.

4. Right-click the virtual machine, and click **Edit Settings**.
5. From the **Options** tab, select **Advanced > General** in the settings column.
6. Click **Configuration Parameters**.

The Configuration Parameters window appears.

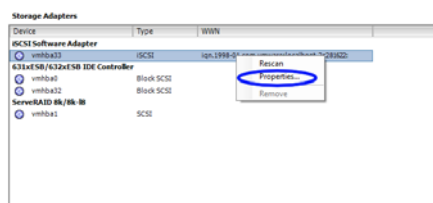
7. Click **Add Row**, and enter the following:
 - In the **Name** column, enter **disk.EnableUUID**.
 - In the **Value** column, enter **TRUE**.
8. Click **OK**.
9. Power on the virtual machine.
10. Repeat this procedure for every virtual machine in the ScaleIO system.

Configuring iSCSI devices on an ESX host

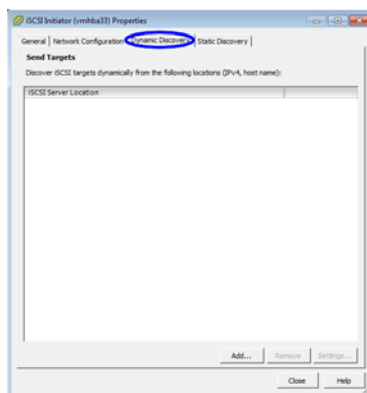
In a VMware environment, ScaleIO exposes its volumes as iSCSI LUNs. Therefore, one must configure an iSCSI device on each and every ESX host, and discover the ScaleIO volumes.

Hint: For assistance, refer to this document: <http://www.vmware.com/files/pdf/techpaper/vmware-multipathing-configuration-software-iSCSI-port-binding.pdf>

1. If the iSCSI software adapter isn't present, install it now.
2. Right-click the iSCSI device and select **Properties**.



3. In **Network configuration**, add the **VMkernel Port Bindings** with the corresponding vmnic used for the ScaleIO network on the SVM.
4. Select the **Dynamic Discovery** tab.



5. On SDC nodes, add the IP address of the SVMs as follows:
 - a. Click **Add**.
 - b. Enter the IP address of the current SVM and of the next SVM.

Note: Rotate the IP addresses, so the last ESX will have the IP of the SVM that is running on it and the IP of the SVM running on the first ESX.

For example:

SVM1 is on ESX1, SVM2 is on ESX2, etc.

On ESX1, include the IP addresses of SVM1 and 2.

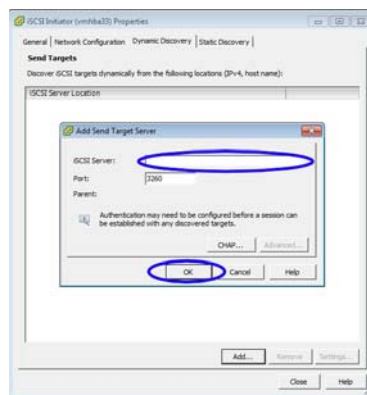
On ESX2, include the IP addresses of SVM2 and 3.

...

On the last ESX, include the IP addresses of the last SVM and the first one.

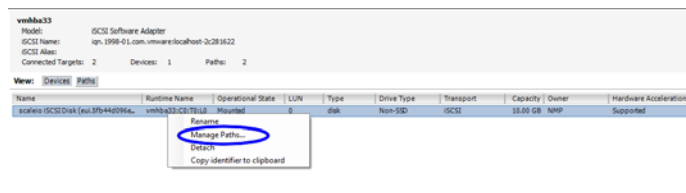
For a complete description of how to do this, see “How do I assign IP addresses to SVMs to enable multi-pathing?” on page 483.

c. Click **OK**.

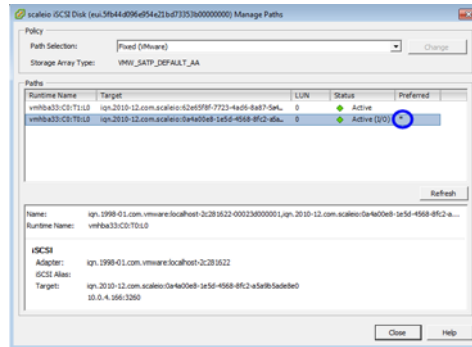


6. Click **OK** and rescan the iSCSI HBA.

- Right-click the newly discovered LUN, and select **Manage Paths...**



8. Select the path to the local SVM, and set it as **Fixed**. This sets the local SVM as the preferred iSCSI path.



9. Exit the path management window.

Installing the SDC directly on an ESX host

This section describes how to install the SDC directly on an ESXi 5.5 host, not on an SVM.

To install the SDC component on an ESX host, perform the following:

1. Set the acceptance level of your host to *PartnerSupported*, by typing:

```
esxcli software acceptance set --level=PartnerSupported
```

2. Install the SDC VIB, by typing:

```
esxcli software vib install -d <full_path_to_VIB>
```

where *full_path_to_VIB* is the full path to the `sdv-1.31.XXX.X-esx5.5.zip` file

3. Reboot the ESX host. The SDC *will not* automatically boot up at this point.

You need to update the SDM GUID and MDM IP address parameters:

- GUID, for example: 12345678-90AB-CDEF-1234-567890ABCDEF
- MDM IP addresses. You can define multiple MDM clusters, each with multiple IP addresses.
 - Separate the IP addresses of the same MDM cluster with a “,” symbol.
 - Separate multiple MDM clusters with the “+” symbol.

Hint: To install without changing the acceptance level, type this command:
`esxcli software vib install -F -d <VIB location>`

In the following example, there are two MDM clusters, the first has two IP addresses and the second has only one:

10.20.30.40,50.60.70.80+11.22.33.44

4. To update the SDC parameters, type the following command:

```
esxcli system module parameters set -m scini -p  
"IoctlIniGuidStr=<GUID> IoctlMdmIPStr=<MDM_IPs>"
```

where:

- *GUID* is the GUID (maximum of 1024 digits)
- *MDM_IPs* is the IP addresses, as described earlier

5. Back up the parameters, by typing the following:

```
/bin/auto-backup.sh
```

6. Load the SDC module, by typing the following:

```
esxcli system module load -m scini
```

Optimizing the guest operating system performance

The configuration of the guest operating system affects the performance of the system. To modify the guests' configuration for optimal ScaleIO usage, perform the following procedures.

Modify the device scheduler (Linux guests only)

The following command modifies the I/O scheduler of the devices. Perform the following command for each device which exposes a ScaleIO volume inside the guest virtual machine.

Command

```
echo noop > /sys/block/<device_name>/queue/scheduler
```

Example

```
echo noop > /sys/block/sds/queue/scheduler
```

Modify the SCSI controller type of the guest virtual machine

To configure the SCSI controller type to use a Paravirtual SCSI (PVSCSI) adapter, perform the following steps for each guest using ScaleIO storage.

Note: Before performing the following steps, consult VMware documentation to verify that your guest operating system supports Paravirtual SCSI adapters.

1. Power off the guest virtual machine.
2. Open the vSphere client, and right click on the guest.
3. Select **Edit Settings**.
4. Select **SCSI Controller 0**.
5. Click **Change Type**.
6. Select VMware **Paravirtual**.
7. Click **OK**.

Manually upgrading ScaleIO components

This section describes how to manually upgrade ScaleIO components from v1.30 to v1.31 (or to a newer release of v1.30).

To manually upgrade components from previous versions, contact EMC Support.

Note: It is highly recommended to use the Installation Manager to upgrade ScaleIO components, as described in [“Upgrading from a previous version” on page 97](#).

Before you begin

Before you begin, use the GUI to verify that the system is error-free and is not currently in rebuild or rebalance states. Do not attempt to upgrade the system if there are errors or a rebuild\rebalance in progress. Rectify all issues and wait until the rebuild\rebalance is complete before you begin the upgrade procedure. Ensure that you know the IP addresses of the Primary and Secondary MDMs in your system. They are required for the purposes of switching system control during the upgrade procedure.

1. Start the ScaleIO GUI and verify that:
 - No rebuild or rebalance is running in the background
 - No degraded capacity exists

- No SDS or SDC is disconnected
- No SDS device is in error state
- The MDM cluster is not in degraded mode, including the Tie-Breaker

Upgrading Windows systems

This section describes how to manually upgrade ScaleIO components on Microsoft Windows™ 2012 R2 systems. In general, the upgrade procedure includes the following activities, in chronological order:

1. Verify that system status is error-free, and that no rebuilding or rebalancing is in progress, as described in [“Before you begin” on page 373](#).
2. Identify MDM node addresses, and unpack the installation package, as described in [“Identifying MDM cluster nodes and unpacking the packages” on page 375](#).
3. Upgrade the Secondary MDM, and switch system control to the upgraded MDM, as described in [“Upgrading the Secondary MDM” on page 375](#).
4. Upgrade the former Primary MDM (now acting as secondary), and then switch system control back to this MDM, as described in [“Upgrading the Primary MDM \(now operating as secondary\):” on page 376](#).
5. Upgrade the Tie-Breaker MDM, as described in [“Upgrading the Tie-Breaker” on page 377](#).
6. Upgrade SDSs one at a time; wait for each one to rebuild and rebalance before proceeding to upgrade the next one, as described in [“Upgrading the SDSs” on page 377](#).
7. Upgrade SDCs, and restart each one, as described in [“Upgrading the SDCs” on page 377](#).
8. Upgrade the GUI, as described in [“Upgrading the GUI” on page 377](#).

Note: Restart of the SDC host machines is required to complete the upgrade procedure. Therefore, perform the upgrade at an appropriate time for your network.

Identifying MDM cluster nodes and unpacking the packages

1. Using the CLI, identify the Primary MDM, Secondary MDM, and Tie-Breaker nodes, by typing the command:

```
cli.exe --query_cluster
```

Make a note of the MDM nodes' details, because they will be required in the following procedures.

2. Copy the packages `EMC-ScaleIO-callhome-<VERSION>.msi` and `EMC-ScaleIO-mdm-{version}.msi` to the two MDM nodes.
3. Copy the `EMC-ScaleIO-tb-<VERSION>.msi` package to the Tie-Breaker node.
4. Copy the `EMC-ScaleIO-sds-<VERSION>.msi` package to each node that has an SDS installed on it.
5. Copy the `EMC-ScaleIO-sdc-<VERSION>.msi` package to each node that has an SDC installed on it.
6. Copy the `EMC-ScaleIO-gui-<VERSION>.msi` to the nodes that run the management software.

Upgrading the MDM cluster

Upgrade the MDMs in the following order, as described below. This order ensures normal system operation while the upgrade is being performed.

1. Secondary MDM (when finished, switch system control to this MDM)
2. Primary MDM (when finished, switch system control back to this MDM)
3. Tie-Breaker

Upgrading the Secondary MDM

This section describes how to upgrade the Secondary MDM. All the procedures in this section are performed on the Secondary MDM node.

1. Double-click the `EMC-ScaleIO-callhome-<VERSION>.msi` package and follow the on-screen instructions to perform an upgrade of the Call Home feature.
2. Double-click the `EMC-ScaleIO-mdm-<VERSION>.msi` package and follow the on-screen instructions to perform an upgrade of the MDM.

3. Start the ScaleIO GUI, and verify that:
 - No rebuild or rebalance is running in the background
 - No degraded capacity exists
 - No SDS or SDC is disconnected
 - No SDS device is in error state
 - The MDM cluster is not in degraded mode, including the Tie-Breaker
4. Switch system control to this MDM, by typing the command:


```
./cli --mdm_ip <MDM_IP_ADDRESS> --switch_mdm_ownership
```

A message similar to the following is displayed:

```
Cluster ownership is being switched asynchronously.
```

Upgrading the Primary MDM (now operating as secondary):

This section describes how to upgrade the Primary MDM, which is now operating as the secondary one. All the procedures in this section are performed on this MDM node.

1. Double-click the EMC-ScaleIO-callhome-<VERSION>.msi package and follow the on-screen instructions to perform an upgrade of the Call Home feature.
2. Double-click the EMC-ScaleIO-mdm-<VERSION>.msi package and follow the on-screen instructions to perform an upgrade of the MDM.
3. Start the ScaleIO GUI, and verify that:
 - No rebuild or rebalance is running in the background
 - No degraded capacity exists
 - No SDS or SDC is disconnected
 - No SDS device is in error state
 - The MDM cluster is not in degraded mode, including the Tie-Breaker
4. Switch system control back to this MDM, by typing the command:


```
./cli --mdm_ip <MDM_IP_ADDRESS> --switch_mdm_ownership
```

A message similar to the following is displayed:

```
Cluster ownership is being switched asynchronously.
```
5. Verify that the system is running correctly, by typing the command:


```
./cli --query_cluster
```


Verify rebalance\rebuild status, and ensure that no degraded capacity is detected.

Upgrading the Tie-Breaker

This section describes how to upgrade the Tie-Breaker node. All the procedures in this section are performed on the Tie-Breaker node.

1. Double-click the `EMC-ScaleIO-tb-<VERSION>.msi` package and follow the on-screen instructions to perform an upgrade of the Call Home feature.

Upgrading the GUI

This section describes how to upgrade the management GUI.

1. Double-click the `EMC-ScaleIO-gui-<VERSION>.msi` package and follow the on-screen instructions.

Upgrading the SDSs

Upgrade each SDS in the system, one at a time, to ensure normal system operation while the upgrade is being performed.

1. On an SDS host, double-click the `EMC-ScaleIO-sds-<VERSION>.msi` package and follow the on-screen instructions to perform the SDS upgrade.

After approximately 60–120 seconds, the system will enter rebuild\rebalance state. Wait until the rebuild\rebalance is complete before continuing to the next step. You can verify that rebuild\rebalance is finished, using the GUI or CLI.

2. Upgrade all remaining SDSs, one at a time, using the procedures in Step 1.

Upgrading the SDCs

Upgrade each SDC in the system, one at a time, to ensure normal system operation while the upgrade is being performed.

1. On an SDS host, double-click the `EMC-ScaleIO-sdc-<VERSION>.msi` package and follow the on-screen instructions to perform the SDS upgrade.

Note: The on-screen instructions will prompt you to perform a restart. Restart the Window server on which the SDC is installed.

2. Upgrade all remaining SDCs, one at a time, using the procedures above.

When all the SDCs have been upgraded, the upgrade of your ScaleIO system is complete.

Upgrading VMware systems

This section explains how to manually upgrade ScaleIO on ESX 5.1 systems.

In general, the upgrade procedure includes the following activities, in chronological order:

1. Verify that system status is error free, and that no rebuilding or rebalancing is in progress, as described in [“Before you begin” on page 373](#).
2. Upgrade the Secondary MDM; switch system control to the upgraded MDM, as described in [“Upgrading the Secondary MDM” on page 379](#).
3. Upgrade the former Primary MDM (now acting as secondary); switch system control back to this MDM, as described in [“Upgrading the Primary MDM \(now operating as secondary\)” on page 379](#).
4. Upgrade the Tie-Breaker, as described in [“Upgrading the Tie-Breaker” on page 380](#).
5. Upgrade SDSs; wait for each one to rebuild and rebalance, as described in [“Upgrading the SDSs” on page 381](#).
6. Upgrade SDCs, and restart each one, as described in [“Upgrading the SDCs” on page 381](#).

NOTICE

Before starting the upgrade, ensure that all ESX hosts have two paths to ScaleIO: One path to the local SVM, and the second path to one of the remote SVMs.

Upgrading the MDM cluster

Upgrade the MDMs in the following order. This order ensures normal system operation while the upgrade is being performed.

1. Secondary MDM (when finished, switch system control to this MDM)
2. Primary MDM (when finished, switch system control back to this MDM)
3. Tie-Breaker

Upgrading the Secondary MDM

This section describes how to upgrade the Secondary MDM. All the procedures in this section are performed on the Secondary MDM node.

1. Copy the upgrade package to the Secondary MDM node.
2. Copy the `mdm` and `callhome` packages to the `/tmp` directory on the Secondary MDM node.
3. Upgrade the Secondary MDM by typing the command:

```
rpm -U <PATH_TO_MDM_PACKAGE>
```

4. Update the `callhome` package by typing the command:

```
rpm -U <PATH_TO_CALLHOME_PACKAGE>
```

5. Start the ScaleIO GUI, and verify that:
 - No rebuild or rebalance is running in the background
 - No degraded capacity exists
 - No SDS or SDC is disconnected
 - No SDS device is in error state
 - The MDM cluster is not in degraded mode, including the Tie-Breaker
6. Switch MDM system control to this node by typing the command:

```
scli --mdm_ip <MDM_IP_ADDRESS> --switch_mdm_ownership
```

A message similar to the following is displayed:

```
Cluster ownership is being switched asynchronously.
```

7. Copy the new GUI from
`/opt/scaleio/ecs/mdm/bin/dashboard.jar`
 to your desktop, and start the GUI.

Upgrading the Primary MDM (now operating as secondary)

This section describes how to upgrade the Primary MDM, which is now operating as the secondary one. All the procedures in this section are performed on this MDM node.

1. Upgrade the original Primary MDM (now operating as secondary) by typing the command:

```
rpm -U <PATH_TO_MDM_PACKAGE>
```

2. Verify successful execution of the command by typing:
`rpm -qa | grep -i mdm`
3. Upgrade the `callhome` package by typing the command:
`rpm -U <PATH_TO_CALLHOME_PACKAGE>`
4. Start the ScaleIO GUI, and verify that:
 - No rebuild or rebalance is running in the background
 - No degraded capacity exists
 - No SDS or SDC is disconnected
 - No SDS device is in error state
 - The MDM cluster is not in degraded mode, including the Tie-Breaker
5. Switch MDM system control back to this MDM by typing the command:
`scli --mdm_ip <MDM_IP_ADDRESS> --switch_mdm_ownership`
6. Start the ScaleIO GUI, and verify that:
 - No rebuild or rebalance is running in the background
 - No degraded capacity exists
 - No SDS or SDC is disconnected
 - No SDS device is in error state
 - The MDM cluster is not in degraded mode, including the Tie-Breaker

Upgrading the Tie-Breaker

This section describes how to upgrade the Tie-Breaker node. All the procedures in this section are performed on the Tie-Breaker node.

1. Copy the Tie-Breaker package to the `/tmp/` directory on the Tie-Breaker.
2. On the Tie-Breaker, type the command:
`rpm -U /tmp/<PATH_TO_TIE-BREAKER_PACKAGE>`
3. Start the ScaleIO GUI, and verify that:
 - No rebuild or rebalance is running in the background
 - No degraded capacity exists
 - No SDS or SDC is disconnected
 - No SDS device is in error state
 - The MDM cluster is not in degraded mode, including the Tie-Breaker

Upgrading the SDSs

Upgrade each SDS in the system, one at a time, to ensure normal system operation while the upgrade is being performed.

1. On an SDS, type the command:

```
rpm -U <PATH_TO_SDS_PACKAGE>
```

After approximately 60–120 seconds, the system will enter rebuild\rebalance state. Wait until the rebuild\rebalance is complete before continuing to the next step. You can verify that rebuild\rebalance is finished, using the GUI or CLI.

2. Start the ScaleIO GUI, and verify that:
 - No rebuild or rebalance is running in the background
 - No degraded capacity exists
 - No SDS or SDC is disconnected
 - No SDS device is in error state
 - The MDM cluster is not in degraded mode, including the Tie-Breaker
3. Upgrade the remaining SDSs, one at a time, using the procedures above.

Upgrading the SDCs

Upgrade each SDC in the system, one at a time, to ensure normal system operation while the upgrade is being performed.

1. Uninstall the iSCSI_TARGET by typing the command:

```
rpm -e <PATH_TO_SCSI_TARGET_PACKAGE>
```

2. Upgrade the SDC by typing the command:

```
rpm -U <PATH_TO_NEW_VERSION_PACKAGE>
```

A message similar to the following is displayed:

```
Warning: Unit file of created job changed on disk, 'systemctl
--system daemon-reload' recommended.
```

3. Type the command:

```
'systemctl --system daemon-reload
```

4. Install the new iSCSI_TARGET by typing the command:

```
rpm -i <PATH_TO_NEW_TARGET_PACKAGE>
```

5. Rescan the iSCSI initiator on ESX host.

6. Upgrade the remaining SDCs, one at a time, using the procedures above.

When all the SDCs have been upgraded, the upgrade of your ScaleIO system is complete.

Upgrading Linux systems

This section explains how to manually upgrade ScaleIO on Linux systems.

In general, the upgrade procedure includes the following activities, in chronological order:

1. Verify that system status is error free, and that no rebuilding or rebalancing is in progress, as described in [“Before you begin” on page 373](#).
2. Upgrade the Secondary MDM; switch system control to the upgraded MDM, as described in [“Upgrading the Secondary MDM” on page 383](#).
3. Upgrade the former Primary MDM (now acting as secondary); switch system control back to this MDM, as described in [“Upgrading the Primary MDM \(now operating as secondary\)” on page 383](#).
4. Upgrade the Tie-Breaker, as described in [“Upgrading the Tie-Breaker” on page 384](#).
5. Upgrade SDSs; wait for each one to rebuild and rebalance, as described in [“Upgrading the SDSs” on page 385](#).
6. Upgrade SDCs, and restart each one, as described in [“Upgrading the SDCs” on page 385](#).
7. Update the GUI, as described in [“Upgrading the GUI” on page 385](#).

Upgrading the MDM cluster

Upgrade the MDMs in the following order. This order ensures normal system operation while the upgrade is being performed.

1. Secondary MDM (when finished, switch system control to this MDM)
2. Primary MDM (when finished, switch system control back to this MDM)
3. Tie-Breaker

Upgrading the Secondary MDM

This section describes how to upgrade the Secondary MDM. All the procedures in this section are performed on the Secondary MDM node.

1. Copy `mdm` and `callhome` packages to the `/tmp/` directory on the Secondary MDM node.
2. Upgrade the secondary MDM by typing the command:

```
rpm -U <PATH_TO_MDM_PACKAGE>
```

3. Upgrade the `callhome` package on the same host by typing the command:

```
rpm -U /tmp/<PATH_TO_CALLHOME_PACKAGE>
```

4. Start the ScaleIO GUI, and verify that:

- No rebuild or rebalance is running in the background
- No degraded capacity exists
- No SDS or SDC is disconnected
- No SDS device is in error state
- The MDM cluster is not in degraded mode, including the Tie-Breaker

5. Switch MDM system control to this node by typing the command:

```
scli --mdm_ip <MDM_IP_ADDRESS> --switch_mdm_ownership
```

A message similar to the following is displayed:

```
Cluster ownership is being switched asynchronously.
```

6. Copy the new GUI from
`/opt/scaleio/ecs/mdm/bin/dashboard.jar`
 to your desktop, and start the GUI.

Upgrading the Primary MDM (now operating as secondary)

This section describes how to upgrade the Primary MDM, which is now operating as the secondary one. All the procedures in this section are performed on this MDM node.

1. Upgrade the original Primary MDM (now operating as secondary) by typing:

```
rpm -U <PATH_TO_MDM_PACKAGE>
```

2. Verify successful execution of the command by typing:

```
rpm -qa|grep -i mdm
```

3. Upgrade the `callhome` package on the same host by typing the command:

```
rpm -U /tmp/<PATH_TO_CALLHOME_PACKAGE>
```

4. Start the ScaleIO GUI, and verify that:

- No rebuild or rebalance is running in the background
- No degraded capacity exists
- No SDS or SDC is disconnected
- No SDS device is in error state
- The MDM cluster is not in degraded mode, including the Tie-Breaker

5. Switch system control back to this MDM by typing the command:

```
scli --mdm_ip <MDM_IP_ADDRESS> --switch_mdm_ownership
```

6. Start the ScaleIO GUI, and verify that:

- No rebuild or rebalance is running in the background
- No degraded capacity exists
- No SDS or SDC is disconnected
- No SDS device is in error state
- The MDM cluster is not in degraded mode, including the Tie-Breaker MDM

Upgrading the Tie-Breaker

This section describes how to upgrade the Tie-Breaker node. All the procedures in this section are performed on the Tie-Breaker node.

1. Copy the Tie-Breaker package to the `/tmp/` directory on the Tie-Breaker.
2. Type the command:

```
rpm -U /tmp/<ECS-TB_PACKAGE>
```

3. Start the ScaleIO GUI, and verify that:

- No rebuild or rebalance is running in the background
- No degraded capacity exists
- No SDS or SDC is disconnected
- No SDS device is in error state
- The MDM cluster is not in degraded mode, including the Tie-Breaker

Upgrading the SDSs

Upgrade each SDS in the system, one at a time, to ensure normal system operation while the upgrade is being performed.

1. Upgrade an SDS by typing the command:

```
rpm -U <PATH_TO_SDS_PACKAGE>
```

After approximately 60–120 seconds, the system will enter rebuild\rebalance state. Wait until the rebuild\rebalance is complete before continuing to the next step. You can verify that rebuild\rebalance is finished, using the GUI or CLI.

2. Upgrade the remaining SDSs, one at a time, using the procedures above.

Upgrading the SDCs

Upgrade each SDC in the system, one at a time, to ensure normal system operation while the upgrade is being performed.

1. Stop I/O activity on the SDC.
2. Unmount all file systems from ScaleIO volumes.
3. Upgrade SDC by typing the command:

```
rpm -U <PATH_TO_SDC_PACKAGE>
```

4. Upgrade the remaining SDCs, one at a time, using the procedures above.

When all the SDCs have been upgraded, the upgrade of your ScaleIO system is complete.

Upgrading the GUI

1. Type command for your operating system:

- **Linux**

```
rpm -Uvh <PATH_TO_RPM_GUI_PACKAGE>
```

- **Ubuntu** (run with administrator privileges):

```
dpkg -i <PATH_TO_DEB_PACKAGE>
```


APPENDIX B

System Events and Alerts

This appendix describes ScaleIO system events and alerts. Topics include:

- ◆ [Event format.....](#) 388
- ◆ [Viewing events.....](#) 389
- ◆ [Authentication](#) 394
- ◆ [CLI commands](#) 394
- ◆ [License and installation](#) 397
- ◆ [MDM.....](#) 399
- ◆ [SDC.....](#) 402
- ◆ [SDS.....](#) 403
- ◆ [Rebuild](#) 407
- ◆ [Alert List.....](#) 408

This appendix describes event messages and alerts that can be generated by the ScaleIO system. An event message is generated as a response to changes that have occurred while the system is running. Event messages to notify you of the changes in case your intervention is needed. Similarly, alerts are generated by the ScaleIO system, and are displayed in the **Alerts** view of the GUI. Some alerts are also converted to SNMP traps.

Each event message is associated with a severity level. The severity indicates the risk (if any) to the system, in relation to the changes that generated the event message. The severity levels are as follows:

- ◆ **Info**
Informs you of events that one should be aware of, but that do not put the system at risk (No Urgency)
Example: CLI_COMMAND_RECEIVED
- ◆ **Warning**
Indicates a failure that may result from an acceptable condition (e.g. user error), but can also indicate a possible failure.
Example: SDC_DISCONNECTED.
If the disconnection is planned, or self-recovered, then all is OK. Otherwise, this might require user intervention.

- ◆ **Error**

An error alarm was raised by the system. This error requires your attention. The system is stable, but could be degraded.

Example: MDM_DATA_DEGRADED

The system is operational but some data is not protected. The system is recovering, but hardware replacement might be required.

- ◆ **Critical**

A major error alarm was raised by system. The system requires immediate attention.

Example: MDM_DATA_FAILED

Some data is unavailable.

Event entries are documented as follows:

- ◆ **Name**

The name associated with the event

- ◆ **Message**

The message that will appear

- ◆ **Severity**

The severity level

- ◆ **Description**

A description of the reasons that triggered the event notification

- ◆ **Action**

Possible actions that can resolve the reported event (if relevant)

Event format

All event messages received are in a parsable structured format, containing the following fields:

ID: a sequential number attached to all events

Date: the local time set in the server

Format: YYYY-MM-DD hh:mm:ss.ssssss

Name: the unique name of the event

Severity: one of the predefined severity levels

Message: message describing the event

Some event notification message verbosity may be expanded by using the full switch (see [“Viewing events locally” on page 390](#)).

The following is an example of a possible event notification:

```
139  2013-07-22 17:21:11.694571 CLI_COMMAND_RECEIVED
INFO      Command MAP_VOL_TO_SCSI_INITIATOR Received
```

This event has the option of extended verbosity. When requested, the event notification will be displayed as follows:

```
139  2013-07-22 17:21:11.694571 CLI_COMMAND_RECEIVED
INFO      Command MAP_VOL_TO_SCSI_INITIATOR Received Vol
Name: snap_raw; SCSI Initiator Name: ini-21
bAllocateLunNum: 1 lunNum: 0
```

The following is a breakdown of the event according to the fields in the event record (as described above):

Parameter	Description
ID	139
Date	2013-07-22 17:21:11.694571
Name	CLI_COMMAND_RECEIVED
Severity	INFO
Message	Command MAP_VOL_TO_SCSI_INITIATOR Received
Extended	Command MAP_VOL_TO_SCSI_INITIATOR Received Vol Name: snap_raw; iSCSI Initiator Name: ini-21 bAllocateLunNum: 1 lunNum: 0

Viewing events

You can view events in the following ways:

- ◆ view on a local server
- ◆ via Syslog
- ◆ via email

Viewing events locally

Events can be viewed by running the following command, and by using switches to filter the data.

Command

`showevents.py`

Syntax

`/opt/emc/scaleio/mdm/bin/showevents.py [Options]`

Description/Notes

Displays events, which can be filtered by optional switches

Parameters

Parameter	Description
Options:	
<code>--min_severity <SEVERITY></code>	Displays events with at least the specified minimum severity
<code>--severity <SEVERITY></code>	Displays events with the specified severity
<code>--from_id <ID></code>	Displays all events starting from the given ID
<code>--to_id <ID></code>	Displays all events ending at the given ID
<code>--from_date <ID></code>	Displays all events starting from the given date
<code>--to_date <ID></code>	Displays all events ending at the given date
<code>--grep <TEXT></code>	Displays events containing the specified text
<code>--full</code>	Extends message verbosity

Example

```
/opt/emc/scaleio/mdm/bin/showevents.py --severity  
ERROR
```

Viewing events in Syslog

The MDM syslog service can send ScaleIO events, via TCP/IP, to RFC 6587-compliant remote (or local) Syslog servers. Messages are sent with facility `local0`, by default.

Once the syslog service is started, all events will be sent until the service is stopped.

This section describes how to use the CLI to start, stop, and configure the facility field of the syslog events.

Start posting events to remote syslog servers

Command

```
start_remote_syslog
```

Syntax

```
scli --start_remote_syslog --remote_syslog_server_ip
<IP_ADDRESSES> [--remote_syslog_server_port <PORT>]
[--syslog_facility <FACILITY>]
```

Description/Notes

Starts posting events to one or more remote syslog servers.

Parameters

Parameter	Description
--remote_syslog_server_ip <IP ADDRESSES>	A comma-separated list of IP addresses of syslog servers
--remote_syslog_server_port <PORT>	The syslog server port (default 1468)
--syslog_facility <FACILITY>	Controls the facility field of the event (legal values 0–23; default 16)

Example

```
scli --start_remote_syslog --remote_syslog_server_ip
192.168.1.10 --remote_syslog_server_port 1500
```

Stop posting events to remote syslog servers

Command

```
stop_remote_syslog
```

Syntax

```
scli --stop_remote_syslog --remote_syslog_server_ip  
<IP_ADDRESSES>
```

Description/Notes

Stops posting events to remote syslog servers.

Parameters

Parameter	Description
--remote_syslog_server_ip <IP ADDRESSES>	A comma-separated list of IP addresses of syslog servers

Example

```
scli --stop_remote_syslog --remote_syslog_server_ip  
192.168.1.10,192.168.1.20
```

Configure the syslog events facility field

Command

```
set_syslog_facility
```

Syntax

```
scli --set_syslog_facility --remote_syslog_server_ip  
<IP_ADDRESSES> --syslog_facility <FACILITY>
```

Description/Notes

Configures the facility field of the syslog events.

Parameters

Parameter	Description
--remote_syslog_server_ip <IP ADDRESSES>	A comma-separated list of IP addresses of syslog servers
--syslog_facility <FACILITY>	Controls the facility field of the event (legal values 0–23; default 16)

Example

```
scli --set_syslog_facility --remote_syslog_server_ip
192.168.1.10,192.168.1.20 --syslog_facility 20
```

Receiving events by email

When installing the system, an email account is defined, which will receive event notifications from the system. When configuring the email account, one should specify the minimum severity (starting from Warning) for filtering the events. By default, all events appear in the highest verbosity (as if full is selected).

Call Home configuration is done during the installation process by the installation manager and the VMware plug-in.

Note: To enable Call Home, you must first use the **set_license** command to enter a valid license.

Authentication

Authentication Failed

Parameter	Description
Name	AUTHENTICATION_FAILED
Message	Authentication failed for user U
Severity	Warning
Description	User entered the wrong password
Action	If you see this event multiple times, someone may be trying to gain unauthorized access to the system.

CLI commands

CLI Command Received

Parameter	Description
Name	CLI_COMMAND_RECEIVED
Message	Command X Received
Severity	Info
Description	CLI command X was entered by a user
Action	None

CLI Command Succeeded

Parameter	Description
Name	CLI_COMMAND_SUCCEEDED
Message	Command X ended successfully
Severity	Info
Description	CLI command X was executed successfully
Action	None

CLI Command Failed

Parameter	Description
Name	CLI_COMMAND_FAILED
Message	Command X failed with error E
Severity	Warning
Description	The CLI command X entered by user failed with error E
Action	Look up error E and address the issue accordingly

Snapshot volumes could not be found, by ID

Parameter	Description
Name	SNAPSHOT_VOLUMES_FAILED_BY_ID
Message	Could not snapshot volumes, because a volume ID was not found. ID: "MOS_OBJID__FORMAT".

Severity	Error
Description	This message is posted if a snapshot_volume command contains an invalid volume ID (out of many). The CLI will only get an error code, but in the event, you can see which volume ID is invalid.
Action	Verify the parameters entered for the snapshot_volume command

Snapshot volumes could not be found, by name

Parameter	Description
Name	SNAPSHOT_VOLUMES_FAILED_BY_NAME
Message	Could not snapshot volumes, because a volume was not found: Name: %s.
Severity	Error
Description	This message is posted if a snapshot_volume command contains an invalid volume name (out of many). The CLI will only get an error code, but in the event, you can see which volume name is invalid.
Action	Verify the parameters entered for the snapshot_volume command

License and installation

License Expiration Warning

Parameter	Description
Name	LICENSE_EXPIRATION_WARNING
Message	License will expire in X days
Severity	Warning
Description	System license will expire in 30 days or less
Action	Contact EMC Support for license renewal, and then reinstall.

License Expiration Error

Parameter	Description
Name	LICENSE_EXPIRATION_ERROR
Message	License will expire in X days
Severity	Error
Description	System license will expire in 7 days or less
Action	Contact EMC Support for license renewal. If you have already renewed your license, install it.

License Expiration Critical

Parameter	Description
Name	LICENSE_EXPIRATION_CRITICAL
Message	License will expire in X days
Severity	Critical
Description	System license will expire in 2 days or less
Action	Contact EMC Support for license renewal. If you have already renewed your license, install it.

License Expired

Parameter	Description
Name	LICENSE_EXPIRED
Message	License has expired
Severity	Critical
Description	The system's license has expired
Action	To resume operational mode, contact EMC Support for license renewal. If you have already renewed your license, install it.

Upgrade has started

Parameter	Description
Name	UPGRADE_STARTED
Message	Upgrade to version %s has started.
Severity	Info
Description	An upgrade procedure has been initiated
Action	Not needed

Upgrade has failed

Parameter	Description
Name	UPGRADE_FINISHED
Message	Upgrade completed successfully.
Severity	Info
Description	An upgrade procedure completed successfully
Action	Not needed

Upgrade has failed

Parameter	Description
Name	UPGRADE_FAILED
Message	Upgrade was not successful. Reason: %s
Severity	Error
Description	An upgrade procedure was not able to complete
Action	Fix the error and retry the upgrade

MDM

MDM Started

Parameter	Description
Name	MDM_STARTED
Message	MDM Process started
Severity	Info
Description	MDM process has started running
Action	None

MDM Becoming Primary

Parameter	Description
Name	MDM_BECOMING_PRIMARY
Message	MDM has become the Primary MDM of the cluster
Severity	Warning
Description	The Primary MDM has failed and the Secondary MDM has taken ownership, and has become the Primary MDM.
Action	If this event followed a system start or execution of the switch_mdm_ownership command, disregard this notification. In other cases, check if any hardware is malfunctioning and requires replacement.

MDM Data Degraded

Parameter	Description
Name	MDM_DATA_DEGRADED
Message	Some of the Storage Pool data is now in Degraded state
Severity	Error
Description	Some of the Storage Pool data is in Degraded state. This data is not protected against another failure.
Action	The system is rebuilding the Degraded data to return to Normal (protected) state. Check if any hardware is malfunctioning and requires replacement.

MDM Data Failed

Parameter	Description
Name	MDM_DATA_FAILED
Message	Some Storage Pool data is now unavailable
Severity	Critical
Description	Multiple failures have occurred. Some Storage Pool data is now unavailable. This data cannot be accessed.
Action	Locate and fix the failed hardware. If the problem is not resolved, contact EMC Support.

MDM Data Normal

Parameter	Description
Name	MDM_DATA_NORMAL
Message	All of the Storage Pool data has returned to Normal state
Severity	Info
Description	All Storage Pool data previously in Degraded or Failed state has returned back to Normal state. User data is fully accessible and protected.
Action	None

SDC

New SDC Connected

Parameter	Description
Name	NEW_SDC_CONNECTED
Message	New SDC (IP: X; ID: Y; GUID: Z) connected
Severity	Warning
Description	A new SDC (IP: X; ID: Y; GUID: Z) has connected to the MDM
Action	A new SDC has just connected to the MDM. Validate that this is a valid SDC.

SDC Connected

Parameter	Description
Name	SDC_CONNECTED
Message	SDC (IP: X; ID: Y; GUID: Z) reconnected
Severity	Info
Description	An existing SDC (IP: X; ID: Y; GUID: Z) has reconnected to the MDM
Action	None

SDC Disconnected

Parameter	Description
Name	SDC_DISCONNECTED
Message	SDC (IP: X; ID: Y; GUID: Z) disconnected
Severity	Warning
Description	SDC (IP: X; ID: Y; GUID: Z) has disconnected from the MDM.
Action	Make sure it is expected otherwise this might be a hardware malfunction

SDS

SDS Disconnected

Parameter	Description
Name	SDS_DISCONNECTED
Message	SDS X (IP:Y; ID: Z) disconnected
Severity	Error
Description	SDS X (IP: Y; ID Z) has disconnected from the MDM
Action	Make sure that this is an expected event, because otherwise this might be caused by a hardware malfunction.

SDS Reconnected

Parameter	Description
Name	SDS_RECONNECTED
Message	SDS X (IP:Y; ID: Z) reconnected

Severity	Info
Description	SDS X (IP: Y; ID Z) has reconnected to the MDM. If this event appears multiple times subsequently for the same SDS (and not directly after SDS_DISCONNECTED), it can indicate a bad network connection.
Action:	Check network connections.

SDS Remove Done

Parameter	Description
Name	SDS_REMOVE_DONE
Message	SDS X (IP:Y; ID: Z) was removed successfully
Severity	Info
Description	The asynchronous process of removing an SDS has completed.
Action	None

Open SDS Device Failed

Parameter	Description
Name	OPEN_SDS_DEVICE_FAILED
Message	Failed to open a device D on SDS X (IP:Y; ID: Z) with error message E
Severity	Error
Description	Failed to open storage device D on SDS X (IP:Y; ID: Z) with error message E
Action	Check the cause of the error, and identify if it's a human error or a system malfunction. Check hardware if needed.

SDS Device Error Report

Parameter	Description
Name	SDS_DEV_ERROR_REPORT
Message	Device error reported device D on SDS X (IP:Y; ID: Z)
Severity	Error
Description	Error reported on storage device D on SDS X (IP:Y; ID: Z)
Action	Check the storage device on the server

Device capacity is high

Parameter	Description
Name	DEV_CAPACITY_USAGE_HIGH
Message	Capacity usage on %s is HIGH.")
Severity	Warning
Description	Capacity is high, due to capacity used by snapshots/thin volumes
Action	Remove unnecessary snapshots or add more storage

Device capacity is critical

Parameter	Description
Name	DEV_CAPACITY_USAGE_CRITICAL
Message	Capacity usage on %s is CRITICAL.")
Severity	Error
Description	Capacity is critical, due to capacity used by snapshots/thin volumes
Action	Remove unnecessary snapshots or add more storage

Device capacity has returned to normal

Parameter	Description
Name	DEV_CAPACITY_USAGE_NORMAL
Message	Capacity usage on %s is normal.")
Severity	Info
Description	Capacity usage is back to normal
Action	Not needed

SDS configuration has become invalid

Parameter	Description
Name	SDS_CONFIG_INVALID
Message	CLI_TARGET_NAME_CAP" %s (ID "MOS_OBJID__FORMAT ") configuration is invalid.
Severity	Critical
Description	The SDS cannot access its configuration files.
Action	Contact EMC Support

SDS disk errors were fixed

Parameter	Description
Name	SDS_FIX_DISK_ERROR
Message	CLI_TARGET_NAME_CAP" %s (ID "MOS_OBJID__FORMAT ") device %s fixed %d disk errors via reads.
Severity	Warning
Description	There were read errors on this device that were fixed by reading the data from secondary and re-writing it. This may be a sign of impending device hardware malfunction.
Action	Check for hardware malfunction

Rebuild

No Rebuild Progress Warning

Parameter	Description
Name	NO_REBUILD_PROGRESS_WARNING
Message	No rebuild progress for 30 minutes
Severity	Warning
Description	Rebuild did not progress for 30 minutes during the current recovery
Action	Contact EMC Support

No Rebuild Progress Error

Parameter	Description
Name	NO_REBUILD_PROGRESS_ERROR
Message	No rebuild progress for 60 minutes
Severity	Error
Description	Rebuild did not progress for 60 minutes during the current recovery
Action	Contact EMC Support

No Rebuild Progress Critical

Parameter	Description
Name	NO_REBUILD_PROGRESS_CRITICAL
Message	No rebuild progress for 180 minutes
Severity	Critical
Description	Rebuild did not progress for 180 minutes during the current recovery
Action	Contact EMC Support

Rebuild Progress Resumed

Parameter	Description
Name	REBUILD_PROGRESS_RESUMED
Message	Rebuild progress resumed
Severity	Info
Description	Following a detection of a rebuild not progressing, the system has now detected that the rebuild progress has resumed. The system is currently recovering.
Action	None

Alert List

Alert messages are generated by the system for some error conditions, and are displayed in the Alerts view of the GUI. For more information, see [“Alerts view” on page 315](#). Some alerts are also converted into SNMP traps. For more information, see [“Supported Alerts” on page 604](#).

Table 28 Alert list

Alert Code	Description	SNMP Trap
DEVICE_FAILED	Device failed	Yes
SDC_DISCONNECTED	SDC disconnected	Yes
MDM_NOT_CLUSTERED	MDM isn't clustered	Yes
SDS_DISCONNECTED	SDS is disconnected	Yes
SDS_DISCONNECTS_FREQUENTLY	SDS disconnects frequently	No
SDS_RMCACHE_MEMORY_ALLOCATION_FAILED	Memory allocation for RAM Read Cache failed on SDS	No
STORAGE_POOL_HAS_CAPACITY_ERRORS	Storage Pool has capacity errors	No
STORAGE_POOL_HAS_FAILED_CAPACITY	Storage Pool has failed capacity	Yes

Table 28 Alert list

Alert Code	Description	SNMP Trap
STORAGE_POOL_HAS_DEGRADED_CAPACITY	Storage pool has degraded capacity	Yes
STORAGE_POOL_HAS_UNREACHABLE_CAPACITY	Storage Pool has decreased capacity	No
STORAGE_POOL_HAS_UNAVAILABLE_UNUSED_CAPACITY	Storage Pool has unavailable-unused capacity	No
STORAGE_POOL_EXTREMELY_UNBALANCED	The Storage Pool relies too heavily (over 50%) on capacity from a single SDS or Fault Set. Balance capacity over other SDSs or Fault Sets.	No
STORAGE_POOL_UNBALANCED	Storage Pool is unbalanced	No
CAPACITY_UTILIZATION_ABOVE_CRITICAL_THRESHOLD	Capacity utilization above critical threshold	Yes
CAPACITY_UTILIZATION_ABOVE_HIGH_THRESHOLD	Capacity utilization above high threshold	Yes
CONFIGURED_SPARE_CAPACITY_SMALLER_THAN_LARGEST_FAULT_UNIT	Configured spare capacity is smaller than largest fault unit	No
SPARE_CAPACITY_AND_FREE_CAPACITY_SMALLER_THAN_LARGEST_FAULT_UNIT	Spare capacity and free capacity are smaller than the largest fault unit	No
SPARE_CAPACITY_BELOW_THRESHOLD	Spare capacity is below threshold	No
LICENSE_EXPIRED	License expired	Yes
LICENSE_ABOUT_TO_EXPIRE	License will expire in %d days	Yes
FWD_REBUILD_STUCK	Forward rebuild cannot proceed	No
BKWD_REBUILD_STUCK	Backward rebuild cannot proceed	No
REBALANCE_STUCK	Rebalance cannot proceed	No
MDM_FAILS_OVER_FREQUENTLY	MDM fails over frequently	No
FAILURE_RECOVERY_CAPACITY_BELOW_THRESHOLD	Failure recovery capacity is below the threshold	Yes
DEVICE_PENDING_ACTIVATION	Device test is done and device is pending activation	No

Table 28 Alert list

Alert Code	Description	SNMP Trap
PD_INACTIVE	Inactive Protection Domain	Yes
DRL_MODE_NON_VOLATILE	DRL mode: Hardened	No
NOT_ENOUGH_FAULT_UNITS_IN_SP	Storage Pool does not meet the minimum requirement of 3 fault units	No
SDC_MAX_COUNT	No more SDCs can be defined on this system; the maximum has been reached	No

APPENDIX C

Return Messages

This appendix describes messages that can be returned by the ScaleIO CLI. Each return message contains the following:

- ◆ **Name** of the return message (return code)
- ◆ **Message** presented with the return code
- ◆ **Commands** that may return the relevant code
- ◆ **Description** of the reasons that caused the system to generate the return code
- ◆ **Action** or actions that may resolve the issue (if relevant)

SDS Device Name Changed

Parameter	Description
Name	SDS_DEVICE_NAME_CHANGED
Message	The SDS detected that the device name has changed. Re-run the command using the device ID.
Commands	<code>remove_sds_device</code> and <code>abort_remove_sds_device</code>
Description	In some situations (usually following a reboot), the operating system changes the device name. The SDS detects this change. <code>Remove_sds</code> is a time consuming operation. To ensure that you have chosen the correct device, ScaleIO alerts you to the name change.
Action	Identify the device in the output of <code>query_sds</code> and use the device ID to run the command again. You can also resynchronize the device name.

Success

Parameter	Description
Name	SUCCESS
Message	Success
Commands	All
Description	Command was executed successfully
Action	None

No Resources

Parameter	Description
Name	NO_RESOURCES
Message	Insufficient space
Commands	<code>add_volume</code>
Description	There is insufficient space to create a volume of the requested size
Action	Add capacity to the system by adding another SDS/device, or create a smaller volume

Timeout

Parameter	Description
Name	TIMEOUT
Message	Timeout
Commands	All
Description	No reply received from the MDM within the specified timeout period
Action	Validate the requested operational state using queries

Already Exists

Parameter	Description
Name	ALREADY_EXISTS
Message	Already Exists
Commands	All object addition commands
Description	The added object already exists
Action	Check command parameters, and use queries to view existing objects' properties

Communication Error

Parameter	Description
Name	COMMUNICATION_ERROR
Message	Communication error
Commands	SDS related commands
Description	SDS has communication errors
Action	Use <code>query_all</code> to determine which SDS is disconnected

Wrong Reconfiguration Mode

Parameter	Description
Name	WRONG_RECONFIGURATION_MODE
Message	SDS being configured, retry command
Commands	All SDS related commands
Description	SDS is being configured by the MDM
Action	Retry the command

SDS Add Device Open Error

Parameter	Description
Name	SDS_ADD_DEV_OPEN_ERROR
Message	Error opening SDS device
Commands	add_sds, add_sds_device
Description	SDS cannot open one of the specified devices
Action	Validate the command parameters. If correct, validate that the device can be accessed on the SDS.

SDS Add Device Size Problem

Parameter	Description
Name	SDS_ADD_DEV_SIZE_PROBLEM
Message	SDS device size error
Commands	add_sds, add_sds_device
Description	The device size is smaller or larger than the allowed size. For a full description of product limits, see “Product limits” on page 26 .
Action	Validate the command parameters, and set the device size appropriately

SDS Add Device IO Error

Parameter	Description
Name	SDS_ADD_DEV_IO_ERROR
Message	Add SDS device I/O error
Commands	add_sds, add_sds_device
Description	The SDS was unable to write to one of the specified devices
Action	Validate the command parameters, and check the specified devices

SDS Actively Attach to this MDM

Parameter	Description
Name	SDS_ACTIVE_ATTACH_TO_THIS_MDM
Message	SDS actively attached to this MDM
Commands	add_sds
Description	SDS was already configured by this MDM. This usually implies that that the provided IP address or hostname resolves to an already configured SDS CURRENTLY CONNECTED “Actively” implies that the SDS is configured and communicating with the MDM.
Action	Check the provided IP address or hostname. Contact EMC Support.

SDS Already Attached to this MDM

Parameter	Description
Name	SDS_ALREADY_ATTACHED_TO_THIS_MDM
Message	SDS already attached to this MDM

Commands	add_sds
Description	SDS was previously configured by this MDM. This usually indicates that the SDS was previously removed using remove_sds, but was not cleaned up properly.
Action	Validate the SDS IP address and port, and check the MDM configuration to validate that the SDS is not already configured under a different IP address. If the SDS is not found in the MDM configuration, this might indicate that it was not cleaned up properly when it was removed. To add the SDS forcefully, thus overriding its configuration and data, use the --force_clean flag.

SDS Active Attach to Other MDM

Parameter	Description
Name	SDS_ACTIVE_ATTACH_TO_OTHER_MDM
Message	SDS actively attached to another MDM
Commands	add_sds
Description	SDS is already managed by another MDM. <i>Active</i> implies that the SDS is configured and communicating with the MDM.
Action	Check the command parameters to validate the SDS IP address and port. Check the configuration of any other MDMs installed that might be connected to this SDS. Contact EMC Support.

SDS Already Attached to Other MDM

Parameter	Description
Name	SDS_ALREADY_ATTACHED_TO_OTHER_MDM
Message	SDS already attached to another MDM

Commands	add_sds
Description	SDS was previously configured by another MDM
Action	Check your command parameters to validate the SDS IP address and port. Check for other ScaleIO installations of MDMs. If the SDS is not found in any MDM configuration, this might indicate that it was not cleaned up properly when it was removed. To add the SDS, use the <code>-force_clean</code> flag. Note: This command erases the existing SDS configuration and data.

SDS Not Found

Parameter	Description
Name	SDS_NOT_FOUND
Message	SDS not found
Commands	All SDS related commands
Description	The SDS was not found
Action	Check the provided parameters. Use <code>query_all_sds</code> to view the configured SDSs.

Volume Not Found

Parameter	Description
Name	VOL_NOT_FOUND
Message	Volume not found
Commands	All volume related commands
Description	The volume was not found
Action	Check the provided parameters. Use <code>query_all_volumes</code> to view the configured volumes.

SDC Not Found

Parameter	Description
Name	SDC_NOT_FOUND
Message	SDC not found
Commands	All SDC related commands
Description	SDC was not found
Action	Use <code>query_all_sdc</code> to view the configured SDCs

Volume Already Mapped to SDC

Parameter	Description
Name	VOLUME_ALREADY_MAPPED_TO_SDC
Message	Volume already mapped to SDC
Commands	map_volume_to_sdc (when mapping to a single SDC)
Description	The specified volume is already mapped to the specified SDC
Action	Check the command parameters, and use query_all_volumes to validate the current mapping

Volume Already Mapped to All SDCs

Parameter	Description
Name	VOLUME_ALREADY_MAPPED_TO_ALL_SDCS
Message	Volume already mapped to all SDCs
Commands	map_volume_to_sdc (when mapping to all SDCs)
Description	The specified volume is already mapped to all SDCs
Action	Check the command parameters, and use query_all_volumes to validate the current mapping

Volume Already Mapped to SCSI

Parameter	Description
Name	VOLUME_ALREADY_MAPPED_TO_SCSI
Message	Volume already mapped to iSCSI initiator
Commands	map_volume_to_scsi_initiator
Description	The specified volume is already mapped to the specified iSCSI initiator
Action	Check the command parameters, and use query_all_scsi_initiators to validate the current mapping

Volume Not Mapped to SDC

Parameter	Description
Name	VOLUME_NOT_MAPPED_TO_SDC
Message	Volume not mapped to SDC
Commands	unmap_volume_from_sdc, query_sdc_volume_limits, set_sdc_volume_limits
Description	The specified volume is not mapped to the specified SDC
Action	Check the command parameters, and use query_all_sdc to validate the current mapping

Volume Not Mapped to SCSI

Parameter	Description
Name	VOLUME_NOT_MAPPED_TO SCSI
Message	Volume not mapped to iSCSI initiator
Commands	unmap_volume_from_scsi_initiator
Description	The specified volume is not mapped to the specified iSCSI initiator
Action	Check the command parameters, and use query_all_scsi_initiators to validate the current mapping

Volume Mapped to All SDCs

Parameter	Description
Name	VOLUME_MAPPED_TO_ALL_SDCS
Message	Volume mapped to all SDCs
Commands	map_volume_to_sdc, unmap_volume_from_sdc, set_sdc_volume_limits
Description	The volume is mapped to all SDCs
Action	Check the command parameters, and use query_all_volumes to validate the current mapping

Too Many Mappings

Parameter	Description
Name	TOO_MANY_MAPPINGS
Message	Too many mappings
Commands	map_volume_to_sdc, map_volume_to_scsi_initiator
Description	Mapping of an additional volume will exceed the system limit
Action	Validate if all existing volumes that are mapped are relevant. Contact EMC Support.

Invalid Volume ID

Parameter	Description
Name	INVALID_VOLUME_ID
Message	Invalid volume ID
Commands	All volume related commands
Description	The specified volume ID is invalid
Action	Check the specified volume ID. Use <code>query_all_volumes</code> to find the correct ID, or use the volume name.

Invalid SDS ID

Parameter	Description
Name	INVALID_SDS_ID
Message	Invalid SDS ID
Commands	All SDS commands
Description	The specified SDS ID is invalid
Action	Check the specified SDS ID. Use <code>query_all_sds</code> to find the correct ID, or use the SDS name or IP address.

Invalid SDC ID

Parameter	Description
Name	INVALID_SDC_ID
Message	Invalid SDC ID
Commands	All SDC commands
Description	The specified SDC ID is invalid
Action	Check the specified SDC ID. Use <code>query_all_sdc</code> to find the correct ID, or use the SDC IP address.

Host Not Found

Parameter	Description
Name	HOST_NOT_FOUND
Message	Host not found
Commands	All SDS commands
Description	The specified host name was not found
Action	Check the specified host name

Duplicate Host Name

Parameter	Description
Name	DUPLICATE_HOST_NAME
Message	Duplicate host name
Commands	<code>add_sds</code>
Description	The list of host names includes two identical host names or IP addresses, or two host names are resolved to the same IP address
Action	Check the specified host name list

Address and Port in Use

Parameter	Description
Name	ADDRESS_AND_PORT_IN_USE
Message	SDS IP address and port are already in use
Commands	add_sds
Description	The specified IP address and port are already in use by another defined SDS
Action	Check the specified IP address and port

Too Many SDSs in Protection Domain

Parameter	Description
Name	TOO_MANY_SDSS_IN_PROTECTION_DOMAIN
Message	Too many SDSs in Protection Domain
Commands	add_sds
Description	Adding the SDS will exceed the system limit of allowed SDSs in a Protection Domain
Action	Check configuration

Too Many SDSs

Parameter	Description
Name	TOO_MANY_SDSS
Message	Too many SDSs
Commands	add_sds
Description	Adding the SDS will exceed the system limit of allowed SDSs in the system
Action	Check configuration

Too Many Volumes in Protection Domain

Parameter	Description
Name	TOO_MANY_VOLUMES_IN_PROTECTION_DOMAIN
Message	Too many volumes in Protection Domain
Commands	add_volume
Description	Adding a volume will exceed the limit for the number of volumes allowed in a Protection Domain
Action	Check configuration

Too Many Volumes

Parameter	Description
Name	TOO_MANY_VOLUMES
Message	Too many volumes
Commands	add_volume
Description	Adding a volume will exceed the limit for the number of volumes allowed in a system
Action	Check configuration

SDS Name in Use

Parameter	Description
Name	SDS_NAME_IN_USE
Message	SDS Name in use
Commands	add_sds, rename_sds
Description	The specified SDS name is already in use by another SDS
Action	Use query_all_sds to validate existing names, and issue the command with another name

Volume Name in Use

Parameter	Description
Name	VOLUME_NAME_IN_USE
Message	Volume name in use
Commands	<code>add_volume</code> , <code>rename_volume</code>
Description	The specified volume name is already in use by another volume
Action	Use <code>query_all_volumes</code> to validate existing names, and issue the command with another name

Duplicate SDS Device Name

Parameter	Description
Name	DUPLICATE_SDS_DEVICE_NAME
Message	Duplicate SDS device name
Commands	<code>add_sds</code>
Description	A device appears more than once in the <code>add_sds</code> command
Action	Validate command parameters

Duplicate SDC IP

Parameter	Description
Name	DUPLICATE_SDC_IP
Message	More than one SDC exists for the same IP
Commands	<code>map_volume_to_sdc</code> , <code>unmap_volume_from_sdc</code> , <code>set_sdc_volume_limits</code> , <code>query_sdc_volume_limits</code>
Description	The specified SDC IP address is not unique. It is associated with more than one SDC.
Action	Use <code>query_all_sdc</code> to find the relevant ID. Use the SDC ID in the command instead of the SDC IP address.

SDS not Under Removal

Parameter	Description
Name	SDS_NOT_UNDER_REMOVAL
Message	SDS not being removed
Commands	abort_remove_sds
Description	The SDS is not being removed
Action	Check command parameters. If the parameters are correct, it is still possible that the SDS has already been removed.

SDS Being Removed

Parameter	Description
Name	SDS_BEING_REMOVED
Message	SDS is being removed
Commands	SDS related commands
Description	The SDS is currently being removed
Action	None

Volume Mapped

Parameter	Description
Name	VOLUME_MAPPED
Message	Volume is mapped
Commands	remove_volume, remove_consistency_group
Description	The volume (for remove_volume) or any volume in the group (remove_consistency_group) is mapped to an SDC
Action	Unmap before removing the volume or consistency group. Use query_all_volumes to check current mapping.

Wrong Cluster State

Parameter	Description
Name	WRONG_CLUSTER_STATE
Message	Wrong MDM cluster state
Commands	Cluster commands
Description	The command is not relevant to the current MDM cluster state. Most MDM cluster commands are relevant only while in <i>single</i> MDM mode.
Action	Use <code>switch_to_single_mode</code> before performing MDM cluster maintenance. Note that the MDM cluster is not protected while in this mode.

Tie-Breaker Already Configured

Parameter	Description
Name	TIE_BREAKER_ALREADY_CONFIGURED
Message	Tie-Breaker already configured
Commands	<code>add_tb</code>
Description	A Tie-Breaker is already configured in the system
Action	Only one Tie-Breaker can be configured. Use <code>query_cluster</code> to check the current configuration.

Tie-Breaker not Configured

Parameter	Description
Name	TIE_BREAKER_NOT_CONFIGURED
Message	A Tie-Breaker not configured
Commands	<code>remove_tb</code> , <code>switch_to_cluster_mode</code>
Description	A Tie-Breaker is not configured. Cannot remove it, and cannot switch to cluster mode.
Action	Use <code>add_tb</code> to configure a Tie-Breaker

Primary MDM Already Configured

Parameter	Description
Name	PRIMARY_MDM_ALREADY_CONFIGURED
Message	Primary MDM already configured
Commands	add_primary_mdm
Description	Primary MDM has already been configured
Action	None

Already in Single Mode

Parameter	Description
Name	ALREADY_IN_SINGLE_MODE
Message	Already in single mode
Commands	switch_to_single_mode
Description	Cluster is already in Single mode
Action	None

MDM_Already in Cluster Mode

Parameter	Description
Name	MDM_ALREADY_IN_CLUSTER_MODE
Message	MDM already in cluster mode
Commands	switch_to_cluster_mode
Description	MDM Cluster is already in Cluster mode
Action	None

Secondary MDM not Configured

Parameter	Description
Name	SECONDARY_MDM_NOT_CONFIGURED
Message	Secondary MDM not configured

Commands	<code>remove_secondary_mdm</code> , <code>switch_to_cluster_mode</code>
Description	Secondary MDM is not configured. Cannot remove it, and cannot switch to cluster mode.
Action	Use <code>query_cluster</code> to check the current configuration. If switching to cluster mode, use <code>add_secondary_mdm</code> to configure a Secondary MDM.

Secondary MDM not Connected

Parameter	Description
Name	SECONDARY_MDM_NOT_CONNECTED
Message	Secondary MDM not connected
Commands	<code>switch_mdm_ownership</code>
Description	Cluster ownership cannot be switched, because the Secondary MDM is not connected to the Primary MDM
Action	Check for hardware issues. Contact EMC Support.

Error Configuring Secondary MDM

Parameter	Description
Name	ERROR_CONFIG_SEC_MDM
Message	Error configuring secondary MDM
Commands	<code>add_tb</code>
Description	The Secondary MDM could not be configured to work with this Tie-Breaker
Action	Use <code>query_cluster</code> to view the cluster state, and check the Secondary MDM configuration

Bad Hostname

Parameter	Description
Name	BAD_HOSTNAME
Message	Invalid IP or host-name specified

Commands	<code>add_primary_mdm</code> , <code>add_secondary_mdm</code> , <code>add_tb</code>
Description	The specified host name or IP address is invalid
Action	Check the specified host name or IP address. Validate the network configuration.

Use MDM IP

Parameter	Description
Name	<code>USE_MDM_IP</code>
Message	Use cluster MDM physical IP to access the MDM
Commands	All cluster commands
Description	The command reached the Secondary MDM. Use the physical IP address to access the MDM.
Action	Add <code>--mdm_ip</code> to the commands

Command Only in Cluster

Parameter	Description
Name	<code>CMD_ONLY_IN_CLUSTER</code>
Message	Command can run only in Cluster mode
Commands	<code>switch_mdm_ownership</code> , <code>switch_to_single_mode</code>
Description	This command can be issued only when in cluster mode
Action	Use <code>query_cluster</code> to check the current configuration

Command Only in Single

Parameter	Description
Name	CMD_ONLY_IN_SINGLE
Message	Command can run only in Single mode
Commands	MDM cluster commands
Description	This command can be issued in Single mode only
Action	Use <code>switch_mdm_ownership</code> to switch to single mode before issuing this command

Command Error Cluster Degraded

Parameter	Description
Name	COMMAND_ERROR_CLUSTER_DEGRADED
Message	Command cannot run when cluster is degraded
Commands	<code>switch_mdm_ownership</code>
Description	This command cannot be issued when the cluster is degraded
Action	Check the cluster state and hardware configuration to determine the reason for cluster degradation

Too Many Devices

Parameter	Description
Name	TOO_MANY_DEVICES
Message	Too many devices for SDS
Commands	<code>add_sds</code> , <code>add_sds_device</code>
Description	Too many devices specified (<code>add_sds</code>), or the SDS already has the maximum number of allowed devices
Action	None

SDS Device not Found

Parameter	Description
Name	SDS_DEVICE_NOT_FOUND
Message	SDS device not found
Commands	SDS device related commands
Description	SDS device was not found
Action	Check the command parameters. Use <code>query_sds</code> to view the device details.

License too Long

Parameter	Description
Name	LICENSE_TOO_LONG
Message	License key is too long
Commands	<code>set_license</code>
Description	The specified license key is too long
Action	Validate the specified license key with the one received from EMC

License Error

Parameter	Description
Name	LICENSE_ERROR
Message	License key is corrupted
Commands	<code>set_license</code>
Description	The specified license key is corrupted
Action	Validate the specified license key with the one received from EMC

Unknown License Version

Parameter	Description
Name	UNKNOWN_LICENSE_VERSION
Message	Unknown license version
Commands	set_license
Description	The specified license key is corrupted
Action	Validate the specified license key with the one received from EMC

License not Set

Parameter	Description
Name	LICENSE_NOT_SET
Message	License not set
Commands	query_license, add_sds, add_sds_device, set_obfuscation_properties, set_data_copy_limit
Description	License was not set. Product cannot be used.
Action	Set the license before continuing to work

Configuration Exceeds New License

Parameter	Description
Name	CONFIG_EXCEEDS_NEW_LICENSE
Message	System Configuration Exceeds New License
Commands	set_license
Description	The specified license decreases the amount of licensed capacity. The current system capacity already exceeds the specified license.
Action	Contact EMC Support to receive a license for a larger amount of capacity

License Capacity Exceeded

Parameter	Description
Name	LICENSE_CAPACITY_EXCEEDED
Message	License capacity exceeded
Commands	add_sds, add_sds_device
Description	Adding the SDS or device exceeds the current licensed capacity
Action	Contact EMC Support to receive a license for a larger amount of capacity

License Expired

Parameter	Description
Name	LICENSE_EXPIRED
Message	License expired
Commands	Most commands
Description	The system time-based license has expired
Action	Contact EMC Support to receive a new license

Installation ID Mismatch

Parameter	Description
Name	INSTALLATION_ID_MISMATCH
Message	License installation ID does not match this system
Commands	set_license
Description	The provided license key does not match the current installation
Action	Contact EMC Support

Customer ID Mismatch

Parameter	Description
Name	CUSTOMER_ID_MISMATCH
Message	License customer ID does not match this system
Commands	set_license
Description	The provided license key does not match the current installation
Action	Contact EMC Support

Unsupported License Version

Parameter	Description
Name	UNSUPPORTED_LICENSE_VERSION
Message	Unsupported license version
Commands	set_license
Description	The provided license key does not match the current installation
Action	Contact EMC Support

Volume Decrease not Supported

Parameter	Description
Name	VOL_DECREASE_NOT_SUPPORTED
Message	Volume capacity can only be increased
Commands	modify_volume_capacity
Description	The specified volume capacity is smaller than the existing volume capacity. Decreasing volume capacity is not supported.
Action	Use <code>query_all_volumes</code> to validate your current configuration

Secondary IP Equals Primary IP

Parameter	Description
Name	SEC_IP_EQUALS_PRI_IP
Message	Secondary IP is the same as the primary IP
Commands	add_secondary_mdm
Description	The specified Secondary MDM IP address is the same as the Primary MDM IP address
Action	Check the command parameters

SDS Device Being Removed

Parameter	Description
Name	SDS_DEV_BEING_REMOVED
Message	SDS device is being removed
Commands	remove_sds, remove_sds_device, activate_sds_device, start_sds_device_test
Description	The specified SDS device is currently being removed. The command cannot be executed.
Action	Wait for the device to be removed

Cannot Remove Last SDS Device

Parameter	Description
Name	CANNOT_REMOVE_LAST_SDS_DEVICE
Message	Last remaining SDS device cannot be removed
Commands	remove_sds_device
Description	The command attempts to remove the last remaining SDS device. This is an illegal operation.
Action	To remove the last remaining device, remove the SDS

Device not Under Removal

Parameter	Description
Name	DEV_NOT_UNDER_REMOVAL
Message	SDS device is not being removed
Commands	abort_remove_sds
Description	The specified device is not in the process of being removed
Action	Check the command parameters

SDS Already Adding Device

Parameter	Description
Name	SDS_ALREADY_ADDING_DEV
Message	A device is being added to this SDS
Commands	add_sds_device, remove_sds
Description	This operation cannot be performed while a device is being added to the SDS
Action	Wait for the device to be added

Invalid Device ID

Parameter	Description
Name	INVALID_DEV_ID
Message	Invalid device ID
Commands	SDS device related commands
Description	The specified SDS device ID is invalid
Action	Use query_sds to determine the correct ID

Too Many Protection Domains

Parameter	Description
Name	TOO_MANY_PROTECTION_DOMAINS
Message	Too many Protection Domains

Commands	add_protection_domain
Description	Adding a Protection Domain will exceed the system limit of the allowed Protection Domains
Action	None

Protection Domain Name in Use

Parameter	Description
Name	PROTECTION_DOMAIN_NAME_IN_USE
Message	Protection Domain name already in use
Commands	add_protection_domain, rename_protection_domain
Description	The specified Protection Domain name is already in use by another Protection Domain
Action	Use <code>query_all</code> to validate the existing names, and issue the command with another name

Protection Domain Not Found

Parameter	Description
Name	PROTECTION_DOMAIN_NOT_FOUND
Message	Protection Domain not found
Commands	All Protection Domain related commands
Description	The specified Protection Domain name or ID do not match any existing Protection Domains
Action	Check the command parameters. Use <code>query_all</code> to validate the existing Protection Domain names.

Protection Domain has SDSs

Parameter	Description
Name	PROTECTION_DOMAIN_HAS_SDSS
Message	Protection Domain has SDSs
Commands	remove_protection_domain
Description	The Protection Domain contains SDSs and cannot be removed
Action	Remove the SDSs before attempting to remove the Protection Domain

Not Enough SDSs in Storage Pool

Parameter	Description
Name	NOT_ENOUGH_SDSS_IN_STORAGE_POOL
Message	Less than three SDSs in Storage Pool
Commands	add_volume
Description	The Storage Pool must contain devices from at least three different SDSs in order to create a volume
Action	Add more devices to the Storage Pool before creating a volume

Remove in Progress

Parameter	Description
Name	REMOVE_IN_PROGRESS
Message	Volume remove in progress
Commands	Multiple commands
Description	The operation cannot be performed, because the volume is being removed
Action	Wait for the volume to be removed

Obfuscation Already Enabled

Parameter	Description
Name	OBFUSCATION_ALREADY_ENABLED
Message	Obfuscation already enabled
Commands	set_obfuscation_properties
Description	Obfuscation state already enabled
Action	Use query_all to validate the current state

Obfuscation Already Disabled

Parameter	Description
Name	OBFUSCATION_ALREADY_DISABLED
Message	Obfuscation already disabled
Commands	set_obfuscation_properties
Description	Obfuscation state already disabled
Action	Use query_all to validate the current state

No Test

Parameter	Description
Name	NO_TEST
Message	Network test results not found
Commands	query_sds_network_test_results
Description	The specified SDS has no network test results
Action	Check the command parameters to make sure that a start_sds_network_test was sent to the specified SDS. If this is the correct SDS, resend the start_sds_network_test command.

Network Test in Progress

Parameter	Description
Name	NETWORK_TEST_IN_PROGRESS
Message	Network test in progress
Commands	query_sds_network_test_results
Description	The SDS network test has not been completed
Action	Wait for the test to be completed. Use the same query periodically until results are displayed.

Too Many SCSI Initiators

Parameter	Description
Name	TOO_MANY SCSI_INITIATORS
Message	Too many iSCSI initiators
Commands	add_scsi_initiator
Description	Addition of the iSCSI initiator will exceed the system limit for allowed iSCSI initiators
Action	Check the configuration, and contact EMC Support

SCSI with Name Already Exists

Parameter	Description
Name	SCSI_WITH_NAME_ALREADY_EXISTS
Message	A iSCSI initiator with the same name already exists
Commands	add_scsi_initiator
Description	Another iSCSI initiator with the same name already exists
Action	Use query_all_scsi_initiators to view the existing names, and use a different name

iSCSI with IQN Already Exists

Parameter	Description
Name	ISCSI_WITH_IQN_ALREADY_EXISTS
Message	A iSCSI initiator with the same IQN already exists
Commands	add_scsi_initiator
Description	Another iSCSI initiator with the same IQN already exists
Action	Use <code>query_all_scsi_initiators</code> to view the existing IQNs, and use a different IQN

LUN Number Busy

Parameter	Description
Name	LUN_NUM_BUSY
Message	The LUN number is already in use
Commands	map_volume_to_scsi_initiator
Description	The specified LUN number is already in use by another mapping
Action	Use <code>query_all_scsi_initiators</code> to view the existing mapping and LUN numbers. Re-run the command using a different LUN number, or let the system choose one for you.

No More LUN Numbers Available

Parameter	Description
Name	NO_MORE_LUN_NUMS_AVAILABLE
Message	No more LUN numbers available
Commands	map_volume_to_scsi_initiator
Description	The system has reached the limit of volume to iSCSI initiator mappings
Action	Use <code>query_all_scsi_initiators</code> to view the existing mapping and LUN numbers

SCSI Initiator not Found

Parameter	Description
Name	SCSI_INITIATOR_NOT_FOUND
Message	iSCSI initiator not found
Commands	iSCSI initiator related commands
Description	The specified iSCSI initiator was not found
Action	Use <code>query_all_scsi_initiators</code> to view the existing iSCSI initiators

SCSI Initiator is Mapped

Parameter	Description
Name	SCSI_INITIATOR_IS_MAPPED
Message	iSCSI initiator is mapped
Commands	<code>remove_scsi_initiator</code>
Description	The iSCSI initiator is mapped to a volume, and cannot be removed
Action	Use <code>query_all_scsi_initiators</code> to view the existing mapping. Use <code>unmap_volume_from_scsi_initiator</code> to remove the mapping before removing the iSCSI initiator.

SDS Device Already Active

Parameter	Description
Name	SDS_DEV_ALREADY_ACTIVE
Message	SDS device already active
Commands	<code>activate_sds_device</code>
Description	At least one specified device is already active
Action	Use <code>query_sds</code> to view the device status

SDS Device Wrong Test Mode

Parameter	Description
Name	SDS_DEV_WRONG_TEST_MODE
Message	SDS device in wrong test mode
Commands	activate_sds_device
Description	At least one specified device will automatically be activated when its test is completed
Action	Use query_sds to view the device status

SDS Device Wrong Test State

Parameter	Description
Name	SDS_DEV_WRONG_TEST_STATE
Message	SDS device test not complete
Commands	activate_sds_device
Description	At least one specified device test is not yet complete. This device cannot be activated.
Action	Use query_sds to view the devices' status

SDS Device Test in Progress

Parameter	Description
Name	SDS_DEV_TEST_IN_PROGRESS
Message	SDS device test in progress
Commands	start_sds_device_test
Description	At least one specified device test is in-progress. A new test for this device cannot be started now.
Action	Use query_sds to view the devices' test status

Volume Allocation Busy Error

Parameter	Description
Name	VOL_ALLOC_BUSY_ERROR
Message	System is busy. Retry later
Commands	add_volume
Description	The MDM is attempting to recover a connection with an SDS. You cannot create a volume now.
Action	Use <code>query_all</code> to view the system status. Retry the command when the situation has returned to normal.

Capacity Highly Unbalanced

Parameter	Description
Name	CAPACITY_HIGHLY_UNBALANCED
Message	System capacity is unbalanced
Commands	add_volume
Description	System capacity is unbalanced. This can be a temporary or permanent state. • Temporary Due to adding or removing capacity, or due to disconnections. In this case, the system will automatically work in the background to correct the situation. • Permanent The capacity of the devices added to ScaleIO is highly unbalanced. This requires user intervention to correct the situation.
Action	If a rebalance is in progress, wait for it to finish and resubmit the command. If the situation persists, contact EMC support.

Volume Create Failed

Parameter	Description
Name	VOL_CREATE_FAILED
Message	Volume creation failed

Commands	add_volume
Description	The volume creation failed
Action	Use <code>query_all</code> to validate the system state, and retry the command

Invalid Password

Parameter	Description
Name	INVALID_PASSWORD
Message	Invalid password
Commands	Most commands
Description	The specified password is incorrect
Action	Check that you are using the correct password in the command

No Permissions

Parameter	Description
Name	NO_PERMISSIONS
Message	No permission to perform this operation
Commands	Most commands
Description	The specified user does not have permissions to issue this command
Action	Contact the system administrator

Too Many Storage Pools

Parameter	Description
Name	TOO_MANY_STORAGE_POOLS
Message	Too many Storage Pools in Protection Domain
Commands	<code>add_storage_pool</code>
Description	Addition of another Storage Pool will exceed the system limit of allowed Storage Pools in a Protection Domain
Action	Use <code>query_protection_domain</code> to view the Storage Pools in the Protection Domain

Storage Pool Already Exists

Parameter	Description
Name	STORAGE_POOL_ALREADY_EXISTS
Message	Storage Pool already exists
Commands	<code>add_storage_pool</code>
Description	A Storage Pool with the specified name already exists in the specified Protection Domain
Action	Use <code>query_protection_domain</code> to view the Storage Pools in the Protection Domain, and choose a different name

Storage Pool not Found

Parameter	Description
Name	STORAGE_POOL_NOT_FOUND
Message	Storage Pool not found
Commands	All Storage Pool related commands
Description	The specified Storage Pool was not found
Action	Use <code>query_protection_domain</code> to view the Storage Pools in the Protection Domain, and check the issued parameters

Storage Pool has Devices

Parameter	Description
Name	STORAGE_POOL_HAS_DEVS
Message	Storage Pool Has SDS devices
Commands	remove_storage_pool
Description	The specified Storage Pool has SDS devices associated with it
Action	Remove the SDS devices before removing the Storage Pool

Storage Pool Name Already Exists

Parameter	Description
Name	STORAGE_POOL_NAME_ALREADY_EXISTS
Message	Storage Pool name already exists
Commands	rename_storage_pool
Description	A Storage Pool with the specified new name already exists in the Protection Domain
Action	Use <code>query_protection_domain</code> to view the Storage Pools in the Protection Domain. Choose another name for the Storage Pool.

Invalid Storage Pool ID

Parameter	Description
Name	INVALID_STORAGE_POOL_ID
Message	Invalid Storage Pool ID
Commands	All Storage Pool related commands
Description	The specified Storage Pool ID is invalid
Action	Check the specified Storage Pool ID. Use <code>query_protection_domain</code> to find the correct ID, or use the Storage Pool name.

Default Storage Pool Cannot be Removed

Parameter	Description
Name	DEFAULT_STORAGE_POOL_CANNOT_BE_REMOVED
Message	The last remaining Storage Pool in a Protection Domain cannot be removed
Commands	remove_storage_pool
Description	The last remaining Storage Pool in the Protection Domain cannot be removed
Action	None

Protection Domain has Storage Pools

Parameter	Description
Name	PROTECTION_DOMAIN_HAS_STORAGE_POOLS
Message	Protection Domain has Storage Pools
Commands	remove_protection_domain
Description	The Protection Domain has more than one Storage Pool associated with it
Action	Remove the Storage Pools before removing the Protection Domain

SDC has Mappings

Parameter	Description
Name	SDC_HAS_MAPPINGS
Message	SDC has mapped volume(s)
Commands	remove_sdc
Description	At least one volume is mapped to the specified SDC
Action	Remove the mapping before removing the SDC

Too Many Volumes in Vtree

Parameter	Description
Name	TOO_MANY_VOLS_IN_VTREE
Message	Too many volumes in VTree
Commands	<code>snapshot_volume</code>
Description	Taking a snapshot of the specified volume will exceed the allowed system limit of snapshots per volume
Action	Use <code>query_volume</code> to view the current snapshots. Consider deleting some snapshots.

Too Many Snapshots in Vtree

Parameter	Description
Name	TOO_MANY_SNAPS_IN_VTREE
Message	Too many snapshots in VTree
Commands	<code>snapshot_volume</code>
Description	Taking a snapshot of the specified volume will exceed the allowed system limit of snapshots per volume
Action	Contact EMC Support

No volume to delete

Parameter	Description
Name	NO_VOLUME_TO_DELETE
Message	No volume to delete
Commands	<code>remove_volume</code>
Description	The combination of parameters resulted in an empty set of volumes to delete
Action	Use <code>query_volume</code> to view the current state, and review the command parameters accordingly

Too Many Devices in Storage Pool

Parameter	Description
Name	TOO_MANY_DEVICES_IN_STORAGE_POOL
Message	Too many devices in Storage Pool
Commands	add_sds, add_sds_device
Description	Adding a device to the specified Storage Pool will exceed the allowed system limit of SDS devices per Storage Pool
Action	Use query_sds to find the association of devices to Storage Pools

Volume not Found for Consistency Group

Parameter	Description
Name	VOL_NOT_FOUND_FOR_CONS_GROUP
Message	No volumes found for the given consistency group
Commands	remove_consistency_group
Description	No volume found for the specified consistency group
Action	Use query_all_volumes to view the existing consistency groups, and review command parameters accordingly

Too Many IPs

Parameter	Description
Name	TOO_MANY_IPS
Message	Too many IP addresses for SDS
Commands	add_sds_ip
Description	Addition of an IP address to the SDS exceeds the allowed system limit of IP addresses per SDS
Action	Use query_sds to view the SDS IP addresses

Cannot Remove Last SDS IP

Parameter	Description
Name	CANNOT_REMOVE_LAST_SDS_IP
Message	SDS must have at least one IP address
Commands	remove_sds_ip
Description	An SDS must have at least one IP address. Cannot remove the last remaining IP address.
Action	Use query_sds to view the SDS IP addresses.

SDS IP Not Found

Parameter	Description
Name	SDS_IP_NOT_FOUND
Message	SDS IP not found
Commands	remove_sds_ip
Description	The specified SDS IP address was not found
Action	Use query_sds to view the SDS IP addresses

No Default Storage Pool

Parameter	Description
Name	NO_DEFAULT_STORAGE_POOL
Message	No default Storage Pool. Storage Pool must be specified
Commands	Storage Pool related commands
Description	The Storage Pool was not specified. Since there are more than one Storage Pool in the Protection Domain, the command must specify a Storage Pool.
Action	Include the Storage Pool ID or name in the command

Volume Size too Large

Parameter	Description
Name	VOL_SIZE_TOO_LARGE
Message	Volume size too large
Commands	add_volume, modify_volume_capacity
Description	The specified volume size is too large
Action	Use a smaller volume size

Capacity too Low for Snapshot

Parameter	Description
Name	CAPACITY_TOO_LOW_FOR_SNAPSHOT
Message	Free capacity in the Storage Pool is too low to create new snapshots
Commands	snapshot_volume
Description	Snapshots are disabled when the free capacity in the Storage Pool is very low. The threshold is defined using the <code>set_capacity_alerts_threshold</code> command. The default threshold is 10% below the predefined spare.
Action	Add storage capacity, or free up space by removing some snapshots

IP Belongs to Other Target

Parameter	Description
Name	IP_BELONGS_TO_OTHER_TGT
Message	Provided IP address belongs to another SDS
Commands	add_sds, add_sds_ip
Description	The specified IP address is already assigned to another SDS
Action	Check command parameters

Invalid Port

Parameter	Description
Name	INVALID_PORT
Message	Specified SDS port is not in the valid range
Commands	add_sds, add_sds_ip
Description	The specified port must be greater than 1024
Action	Check command parameters

LIA package not installed

Parameter	Description
Name	LIA_PACKAGE_NOT_INSTALLED
Message	The package is not installed. Please install it.
Commands	LIA_MSG_TYPE__UNINSTALL_PACKAGE
Description	You are trying to uninstall the LIA package, but the package is not currently installed.
Action	Check why are you trying to uninstall a component that is not installed. Verify that you have the correct package name for the package that you want to uninstall.

LIA multiple packages installed

Parameter	Description
Name	LIA_MULTIPLE_PACKAGES_INSTALLED
Message	More than one package is installed. Please remove additional packages.
Commands	LIA_MSG_TYPE__UNINSTALL_PACKAGE
Description	More than one package of the specified component is installed.
Action	Uninstall the packages manually, as follows: Linux: - Find the package name by typing the command rpm -qa grep-i lia The LIA package name is displayed. For example: EMC-ScaleIO-lia-1.30-0.30.e16.x86_64 - Uninstall the package by typing the command rpm -e <PACKAGE_NAME> Windows: - Windows Control Panel › Add/Remove programs › emc-scaleio-lia

LIA command failed

Parameter	Description
Name	LIA_COMMAND_FAILED
Message	The command failed. Please try again.
Commands	LIA_MSG_TYPE__UPLOAD_PACKAGE LIA_MSG_TYPE__INSTALL_PACKAGE LIA_MSG_TYPE__UNINSTALL_PACKAGE LIA_MSG_TYPE__GET_LINUX_FLAVOUR LIA_MSG_TYPE__GET_INFO LIA_MSG_TYPE__CONFIGURE_CALL_HOME LIA_MSG_TYPE__UPDATE_CONF LIA_MSG_TYPE__GET_INSTALLED_COMPONENTS LIA_MSG_TYPE__PREPARE_DISK
Description	This is a general error message.
Action	Look for more information about the error in the LIA log: Linux: /opt/emc/scaleio/lia/logs Windows: C:\Program Files\emc\scaleio\ia\logs

LIA invalid password

Parameter	Description
Name	MOS_RC__LIA_INVALID_PASSWORD
Message	Token authentication failed. Please ensure that you are using the correct token.
Commands	
Description	The wrong LIA token was used, and authentication failed.
Action	Verify that you have the correct LIA password (token).

LIA operation not permitted

Parameter	Description
Name	LIA_OPERATION_NOT_PERMITTED
Message	The operation is not permitted by your configuration.
Commands	LIA_MSG_TYPE__INSTALL_PACKAGE LIA_MSG_TYPE__UNINSTALL_PACKAGE LIA_MSG_TYPE__GET_INFO LIA_MSG_TYPE__CONFIGURE_CALL_HOME LIA_MSG_TYPE__UPDATE_CONF
Description	LIA was configured to disallow the operation that you tried to perform.
Action	Contact your system administrator; change the LIA configuration in your system.

LIA file is too large

Parameter	Description
Name	LIA_FILE_IS_TOO_LARGE
Message	The file is too large to be sent back to the user.
Commands	LIA_MSG_TYPE__GET_INFO
Description	The file returned by the <code>get_info</code> command is larger than 500 MB, and therefore cannot be sent back to you.
Action	

LIA wrong ID

Parameter	Description
Name	LIA_WRONG_ID
Message	LIA installation ID verification failed
Commands	<code>lia_msg_type__install_package</code> and <code>lia_msg_type__uninstall_package</code>
Description	The LIA ID that was passed in the installation/uninstall package is different to the installation ID that LIA is currently using.
Action	Update LIA's installation ID by using the command <code>lia_msg_type__set_installation_id</code>

LIA disk does not exist

Parameter	Description
Name	LIA_DISK_DOES_NOT_EXIST
Message	The disk does not exist in the system
Commands	<code>lia_msg_type__prepare_disk</code>
Description	The disk name that was passed with the <code>prepare_disk</code> command does not exist in the system
Action	Check that you are using the correct the disk name

SDS IP address not found

Parameter	Description
Name	TGT_IP_NOT_FOUND
Message	The SDS IP address cannot be found.
Commands	modify_sds_ip remove_sds_ip
Description	You tried to remove or modify an SDS IP address that does not exist in the system.
Action	Verify that you are specifying the correct IP address in the command.

Bad threshold value

Parameter	Description
Name	BAD_THRESHOLD_VALUE
Message	The Threshold value is out of range.
Commands	set_capacity_alert_threshold
Description	The legal range for the capacity alert threshold is a percentage value between 0 and 100. The value specified for critical alerts must be less than the value for high alerts.
Action	Specify a value between 0 and 100. Ensure that the value for critical alerts is less than the value for high alerts.

Storage Pool has volumes

Parameter	Description
Name	STORAGE_POOL_HAS_VOLS
Message	The Storage Pool has volumes. Please remove all the volumes before removing the Storage Pool.
Commands	remove_storage_pool remove_protection_domain
Description	Only empty Storage Pools can be removed.
Action	Remove all volumes before removing the Storage Pool or Protection Domain.

Protection Domain and Storage Pool mismatch

Parameter	Description
Name	FD_AND_SP_MISMATCH
Message	The specified Storage Pool is not in the specified Protection Domain.
Commands	Any command which uses the combination of Storage Pool and Protection Domain.
Description	The operation could not be performed because the combination of Storage Pool and Protection Domain is incorrect and the Storage Pool could not be found.
Action	Use the correct combination of Storage Pool and Protection Domain in the command. Use the command <code>query_all</code> to list all the Storage Pools to find this information.

SDS IP address already exists

Parameter	Description
Name	TGT_IP_ALREADY_EXISTS
Message	This SDS IP address already exists. Please use a different IP address.
Commands	<code>add_sds_ip</code>
Description	The IP address used in the command is already in use in the system.
Action	Verify that you are using the correct IP address in the command, and that the address has not been assigned to any other SDSs.

IP Role already set

Parameter	Description
Name	ROLE_ALREADY_SET
Message	The IP role for this SDS has already been configured.
Commands	<code>modify_sds_ip</code>
Description	The IP role for the specified SDS has already been configured.
Action	Verify that you are configuring the intended SDS, and that you are specifying the correct IP address.

Cluster ID mismatch

Parameter	Description
Name	CLUSTER_ID_MISMATCH
Message	The ID number that you provided does not match the actual ID.
Commands	<code>query_poll</code> <code>query_properties</code> <code>query_object</code>
Description	The system ID number has been modified, and does not match the ID specified in the command.
Action	No action required - this code is provided for information purposes for advanced users.

Device already exists

Parameter	Description
Name	DEV_ALREADY_EXISTS
Message	A device with this name already exists in the SDS.
Commands	<code>add_sds_device</code>
Description	You tried to add a device to the system, using a name that is already defined in the SDS.
Action	Verify that the specified device has not already been added to the system.

Volume size is illegal

Parameter	Description
Name	VOL_SIZE_ILLEGAL
Message	The volume size that you provided is invalid. The size must be a multiple of 8 GB blocks.
Commands	add_volume modify_volume_size
Description	You tried to define a volume size that is not a multiple of 8 GB. Volume size can only be defined in multiples of 8 GB.
Action	Specify volume size in blocks of 8 GB.

SDC must be disconnected

Parameter	Description
Name	INI_MUST_BE_DISCONNECTED
Message	The SDC must be disconnected.
Commands	remove_sdc
Description	Only SDCs that are currently inactive (disconnected) can be removed.
Action	This command is intended to remove old, disconnected SDCs. Do not remove active SDCs.

Invalid Percentage

Parameter	Description
Name	INVALID_PERCENTAGE
Message	The percentage value that you provided is invalid. Please use a value between 1 - 100.
Commands	set_thick_volume_percentage
Description	The value that you entered was less than 0 or greater than 100.
Action	Use a value between 1 and 100 in the command.

Wrong Receive group

Parameter	Description
Name	WRONG_RECEIVE_GROUP
Message	The command was sent to the wrong receive group due to component software mismatch.
Commands	All commands
Description	There are different software versions installed on some components in your system, and this is causing a software mismatch error.
Action	Verify that the same software version is installed on all components, and fix, if necessary.

Mismatched SW ID

Parameter	Description
Name	MISMATCHING_SWID
Message	The license contains a mismatch of the SWID number. Please contact Customer Support.
Commands	<code>set_license</code>
Description	The SWID number that you entered does not match your license.
Action	Contact Customer Support

Invalid license issuer

Parameter	Description
Name	INVALID_LICENSE_ISSUER
Message	The issuer of the license you are attempting to add does not match that of the product.
Commands	<code>set_license</code>
Description	There is a problem with your license.
Action	Contact Customer Support

Number of parallel messages is too low

Parameter	Description
Name	NUM_PARALLEL_MSG_TOO_LOW
Message	The number of parallel messages is too low. Please use a number in the range 1 - 6.
Commands	<code>start_sds_network_test</code>
Description	You used a number less than 1 in the command.
Action	Use a number in the range of 1 to 6 for parallel messages in the command.

Number of parallel messages is too high

Parameter	Description
Name	NUM_PARALLEL_MSG_TOO_HIGH
Message	The number of parallel messages is too high. Please use a number in the range 1 - 6.
Commands	<code>start_sds_network_test</code>
Description	You used a number greater than 6 in the command.
Action	Use a number in the range of 1 to 6 for parallel messages in the command.

Network test size is too high

Parameter	Description
Name	NETWORK_TEST_SIZE_TOO_HIGH
Message	The network test size is too high. Please use a test size less than 10.
Commands	<code>start_sds_network_test</code>
Description	You used a number greater than 10 in the command.
Action	Use a number less than 10 for test size in the command.

Network test length too long

Parameter	Description
Name	NETWORK_TEST_LENGTH_TOO_HIGH
Message	The network test length is too long. Please use a test length less than 43200 seconds.
Commands	<code>start_sds_network_test</code>
Description	You used a number greater than 43200 for test length in the command.
Action	Use a number less than 43200 for test length in the command.

Network test must limit either time or size

Parameter	Description
Name	NETWORK_TEST_MUST_LIMIT_EITHER_TIME_OR_SIZE
Message	The network test must limit either time or size.
Commands	<code>start_sds_network_test</code>
Description	Your command did not contain a value for time or size.
Action	Include a value for either time or size in the command.

Not enough SDSs in Protection Domain for test

Parameter	Description
Name	NOT_ENOUGH_TGTS_IN_FD_FOR_TEST
Message	To start the test, there must be at least 2 SDSs in the Protection Domain.
Commands	<code>start_sds_network_test</code>
Description	There are less than two SDSs in the Protection Domain, and therefore the test operation cannot be performed.
Action	Ensure that there are at least 2 SDSs in the Protection Domain before attempting to test it.

Not allowed in Storage Pool with devices

Parameter	Description
Name	NOT_ALLOWED_IN_SP_WITH_DEVS
Message	This operation is only allowed when there are no devices in the Storage Pool. Please remove all devices from the Storage Pool.
Commands	<code>modify_zero_padding_policy</code>
Description	You can only modify the zero padding policy of empty Storage Pools.
Action	Ensure that all devices are removed from the Storage Pool before you attempt to modify its zero padding policy.

License capacity mismatch

Parameter	Description
Name	LICENSE_CAPACITY_MISMATCH
Message	The license contains a mismatch of the capacity values for basic and advanced features. Please contact Customer Support.
Commands	<code>set_license</code>
Description	The capacity allowed for basic and advanced features in your license do not match your installation.
Action	Contact Customer Support.

Exceeds system capacity limitations

Parameter	Description
Name	EXCEED_SYSTEM_CAPACITY_LIMITATIONS
Message	The request exceeds the system capacity limitations.
Commands	add_volume modify_volume_capacity
Description	The command specifies a volume larger in size than the maximum system capacity allowed by the system.
Action	Remove one or more volumes in the system, to make room for the new one.

Illegal number of IP addresses

Parameter	Description
Name	ILLEGAL_NUM_IPS
Message	Illegal number of IP addresses. The Primary MDM, the Secondary MDM, and the Tie-Breaker must each have the same number of IP addresses.
Commands	--add_secondary_mdm --add_tb
Description	You attempted to add a different number of IP addresses to the Secondary MDM or the Tie-Breaker, than the same number of IP addresses assigned to the Primary MDM.
Action	Ensure that Primary and Secondary MDMs and the Tie-Breaker each have the same number of IP addresses configured.

Overflow IP addresses

Parameter	Description
Name	OVERFLOW_IPS
Message	Too many IP addresses. Do not configure more than eight IP addresses.
Commands	--add_secondary_mdm --add_tb
Description	You attempted to add more IP addresses to the Secondary MDM or the Tie-Breaker, than the same number of IP addresses assigned to the Primary MDM.
Action	Ensure that Primary and Secondary MDMs and the Tie-Breaker each have the same number of IP addresses configured.

SDC mapped to too many volumes

Parameter	Description
Name	INI_MAPPED_TO_TOO_MANY_VOLS
Message	The SDC is mapped to too many volumes. Please remove some mapping.
Commands	map_volume_to_sdc
Description	You attempted to map more than the maximum allowed number of volumes (1024) to one or more SDCs.
Action	Avoid mapping more than 1024 volumes to the entire ScaleIO cluster.

Not enough devices in Storage Pool for removal

Parameter	Description
Name	NOT_ENOUGH_DEVICES_IN_STORAGE_POOL_FOR_REMOVAL
Message	Not enough devices in Storage Pool.
Commands	remove_sds remove_sds_device
Description	Each Storage Pool must contain at least two devices. If there are two or less devices in the Storage Pool and you try to remove one, the command will fail.
Action	Add devices to the Storage Pool before trying to remove this one.

Invalid network limits

Parameter	Description
Name	INVALID_TGT_NETWORK_LIMITS
Message	Bad limits given. Overall must be larger than both rebuild and rebalance and all limits must be over 5MB
Commands	sds_network_limits
Description	The total (overall) limit must be greater than the sum of the Rebuild limit and the Rebalance limit. All limits must be greater than 5 MB.
Action	Ensure that limit values are greater than 5 MB, and that the overall limit value is greater than Rebuild limit+Rebalance limit.

A device is currently being removed

Parameter	Description
Name	ONE_TGT_DEV_BEING_REMOVED
Message	This command cannot be completed; An SDS device is currently being removed.
Commands	<code>activate_sds_device</code> <code>--activate_all_devices</code>
Description	If a device is in the process of being removed, you cannot use the <code>activate_all_devices</code> command to activate the remaining ones.
Action	Wait until the device removal is complete, and try again.

A device is already active

Parameter	Description
Name	ONE_TGT_DEV_ALREADY_ACTIVE
Message	This command cannot be completed; An SDS device is currently active.
Commands	<code>activate_sds_device</code> <code>--activate_all_devices</code>
Description	A device is already active.
Action	Do not use the <code>--activate_all_devices</code> option in the command. Instead, specify each device individually in the command.

RAM Cache wrong state

Parameter	Description
Name	RMCACHE_WRONG_STATE
Message	Wrong RAM Cache state. Please wait a few seconds, and then try again.
Commands	enable_sds_rmcache disable_sds_rmcache set_sds_rmcache_size
Description	The cache is in transient state, so the requested operation cannot be executed.
Action	Wait for a few seconds and try again.

More than one mapping not allowed

Parameter	Description
Name	NOT_ALLOWED_MORE_THAN_ONE_MAPPING
Message	You are not allowed to map this volume more than once. If you want to enable multiple mapping, use the flag --allow_multi_map.
Commands	map_volume_to_ini map_volume_to_scsi_initiator
Description	The volume is already mapped and the 'allow multi map' flag is not set
Action	Use the flag --allow_multi_map

At least one SDS failed

Parameter	Description
Name	AT_LEAST_ONE_TGT_FAILED
Message	At least one SDS failed
Commands	enable_sds_rmcache disable_sds_rmcache set_sds_rmcache_size for the entire protection domain
Description	You tried to enable/disable or change size of cache for all SDSs in the Protection Domain, and this failed for at least one of the SDSs
Action	Check the state of cache in all the SDSs, and try again for the specific SDS with the problem.

A device is in incorrect test state

Parameter	Description
Name	ONE_TGT_DEV_WRONG_TEST_STATE
Message	This command cannot be completed; An SDS device is currently in incorrect test mode
Commands	activate_sds_device --activate_all_devices
Description	A device was not added with the --test_only option, so it cannot be activated with this command.
Action	It will activate itself on its own. No action required.

A device test is in progress

Parameter	Description
Name	ONE_TGT_DEV_WRONG_TEST_MODE
Message	This command cannot be completed; An SDS device test is currently in progress
Commands	<code>activate_sds_device</code> <code>--activate_all_devices</code>
Description	A device test is currently in progress, and the device cannot be activated until the test is finished.
Action	Wait for the device test to finish, and then try again.

Enterprise features not enabled

Parameter	Description
Name	ENTERPRISE_FEATURES_NOT_ENABLED
Message	Enterprise features are not enabled for this system.
Commands	Any command that requires a special license, such as: <code>add_vol</code> , <code>set_sdc_volume_limits</code> , <code>snapshot_volume</code> , <code>set_obfuscation_properties</code>
Description	The command that you tried to use cannot be used with the type of license that you currently have activated in your system.
Action	Verify that you are using a license with enterprise features enabled. If problems persist, contact Customer Support.

Invalid LUN number

Parameter	Description
Name	INVALID_LUN_NUM
Message	The LUN number is invalid. Please try a number between 0 and 255.
Commands	<code>map_volume_to_scsi_initiator</code> with the <code>--lun</code> option
Description	The <code>--lun</code> option must contain a value between 0 and 255.
Action	Ensure that you enter a LUN value within the range 0 - 255.

Volume already mapped to an SDC

Parameter	Description
Name	VOL_ALREADY_MAPPED_TO_AN_INI
Message	The volume is already mapped to an SDC
Commands	<code>map_volume_to_sdc</code> with the <code>--all_sdc</code> s option
Description	If the volume is already mapped to one or more SDCs, you cannot use the <code>--all_sdc</code> s option.
Action	Remove the volume's mapping to the SDCs, and then try again.

SDS already exists and is being removed

Parameter	Description
Name	TGT_ALREADY_EXISTS_AND_BEING_REMOVED
Message	The SDS already exists and is being removed. Please wait for the operation to finish.
Commands	<code>add_sds</code>
Description	If you try to add an SDS that already exists, and is in the process of being removed, this operation will fail. Note: If an <code>add_sds</code> command failed, the system will try to remove it automatically, without user intervention. Therefore, if you issue the same <code>add_sds</code> command twice in a row, and the first time failed, this return code may be generated (depending on why adding the SDS failed).
Action	Verify that you are adding the correct SDS. If you are adding an SDS which is in the process of being removed, wait for the removal process to finish before trying to add the SDS back to the system.

Invalid spare percentage

Parameter	Description
Name	INVALID_SPARE_PERCENTAGE
Message	The spare percentage value that you provided is invalid. Please use a value between 0 - 99.
Commands	<code>modify_spare_policy</code>
Description	The spare percentage required in the command is invalid
Action	Verify that correct input parameters (a value between 0-99) are used with the command

APPENDIX D

Troubleshooting, FAQ, and Other Tasks

This appendix describes ScaleIO troubleshooting, frequently asked question, and other useful tasks. Topics include:

- ◆ [Troubleshooting](#) 477
- ◆ [Frequently asked questions](#)..... 479
- ◆ [Other tasks](#) 489

Troubleshooting

Most of the issues requiring troubleshooting are related to events and CLI return messages received from the ScaleIO system. [Appendix B, “System Events and Alerts,”](#) and [Appendix C, “Return Messages,”](#) include a detailed description of the reason that the messages were generated, and possible actions to address the situation.

Event notifications

Upon changes or events in the system, ScaleIO may generate a system event that will be logged in a file, and may be sent to an email address (depending on the initial system configuration). When addressing an event, look for the proper entry in [Appendix B, “System Events and Alerts,”](#) according to the name of the event received. For each event that requires attention, the entry will include a description of a possible action to take. Follow the instructions before contacting EMC Support.

CLI messages

When issuing a CLI command, ScaleIO generates a textual response describing the outcome of the command. In some cases, the result may be a failure. Upon receiving a failure message, you can address it by looking for the proper entry in [Appendix C, “Return Messages,”](#) according to the text of the message received.

For each return message that requires attention, the entry will include a description of a possible action to take. Follow the instructions before contacting EMC Support.

Application server does not see a ScaleIO volume

Perform the following steps:

1. Check if the ScaleIO system is operational by typing the following command:
scli --mdm_ip <mdm IP> --query_all
2. Check if the volume is mapped to any of the SDC servers by running the **--query_all_volumes** command.

Note: For ESX, in addition to the Linux command, check if the volume is mapped to an iSCSI initiator by typing the following command:

scli --mdm_ip <mdm IP> --query_all_scsi_initiators

Also, perform a rescan to discover new volumes.

3. Determine if the SDC is installed on the server by typing the following command:
rpm -qa | grep sdc
4. Determine if the SDC is connected to an MDM by typing the following command:
scli --mdm_ip <mdm IP> --query_all_sdc
5. Ensure that the MDM management IP address is up and running.
6. On an application server, rescan for new volumes by performing the following:
 - Linux
Type: **/opt/emc/scaleio/sdc/bin/drv_cfg --rescan**
 - ESX
Rescan for new devices.

ScaleIO CLI or GUI cannot connect to an MDM

Perform the following steps:

1. Ping the MDM IP address to ensure you have connectivity.
2. Ensure that you are connecting to the IP of the Primary MDM. If the MDM ownership has changed, try to connect to the IP address of the Secondary MDM.
3. Check if the MDM is running, by typing the following command:
ps -ef | grep mdm
4. Ensure that the management IP address is up and running.

Cannot log in to Installation Manager web client after upgrade

If you upgrade the IM, and are then unable to log in to the web page, restart the *EMC ScaleIO Gateway* service.

Installation with the Installation Manager fails

If the following error message appears when installing with the Installation Manager,

Command failed: Could not connect to <IP_address>

it could be that this node is not in the domain.

After SDC installation, the ScaleIO SVM does not start automatically

After deployment is completed, set all ScaleIOVMs to start automatically:

1. Right-click the SVM, and choose **Virtual Machine Startup and Shutdown**.
2. In the dialog box, select **Allow virtual machines to start and stop automatically with the system**.
3. Click **OK**.

Frequently asked questions

This section addresses answers and solutions to questions that are frequently asked.

Question covered:

- ◆ [“How do I use the same data network for different NICs?” on page 480](#)
- ◆ [“I am experiencing performance issues” on page 480](#)
- ◆ [“How do I change the SDS IP addresses?” on page 480](#)
- ◆ [“How do I change the MDM IP address in the SDC?” on page 481](#)
- ◆ [“How do I mount ScaleIO?” on page 482](#)
- ◆ [“How do I configure ScaleIO devices in Linux LVM?” on page 482](#)
- ◆ [“How do I make changes to the LIA configuration file?” on page 483](#)
- ◆ [“How do I assign IP addresses to SVMs to enable multi-pathing?” on page 483](#)
- ◆ [“How do I use the Installation Manager to deploy on RHEL 5.x servers” on page 484](#)
- ◆ [“Why isn’t the ScaleIO Gateway web server responding?” on page 485](#)
- ◆ [“How do I change the shutdown port for the Tomcat server?” on page 486](#)
- ◆ [“How do I upload a new OVA?” on page 486](#)
- ◆ [“How can I associate ScaleIO volumes with physical disks?” on page 486](#)

How do I use the same data network for different NICs?

This configuration is supported, but it could reduce efficiency of outgoing communication, and deny you the benefits of high availability of the multiple networks.

I am experiencing performance issues

ScaleIO is designed to generate the best performance possible from a given system configuration by using all possible nodes, and distributing the data evenly among them. If performance does not meet the desired numbers, check the following:

- ◆ Is the relevant volume allocated on a high-performance Storage Pool? For example, is it allocated to a pool consisting of SSDs only? If not, using such a Storage Pool will generate better performance.
- ◆ Does the relevant volume reside in a Storage Pool that consists of different storage drives with different performance? Having a low performance drive in the pool will slow down all members (waiting for it to respond). If possible, avoid mixing different types of drives.
- ◆ Ensure that the network being used is providing maximal network bandwidth to all ports in use by ScaleIO.

Contact EMC Support for professional analysis and assistance.

How do I change the SDS IP addresses?

Perform the following steps:

1. Configure the new IP address on the relevant server and verify connectivity to other SDSs and the MDM by pinging the new IP address from the other servers.
2. Add the new IP address to the SDS, by typing the following command:

```
scli --mdm_ip <mdm IP>
--add_sds_ip sds_name <SDS name> --new_sds_ip <IP>
```
3. Remove the old IP address, by typing the following command:

```
scli --mdm_ip <mdm IP>
--remove_sds_ip sds_name <SDS name>
--sds_ip_to_remove <IP>
```


How do I change the MDM IP address in the SDC?

You can configure MDM IP addresses that are configured in the SDC on-the-fly. When configuring the IP addresses, it is recommend to first add the new IP addresses, then validate connectivity, and only then to remove the old IP addresses.

If the new IP address is part of the MDM IP addresses already configured in the SDC, the SDC will connect to them automatically. Otherwise, the MDM IP addresses need to be added to the SDC configuration, as described in the following section.

To update MDM IP addresses in the SDC configuration, type the following command:

```
/opt/emc/scaleio/sdc/bin/drv_cfg --mod_mdm_ip --file
```

This command calls the kernel to modify the IP address list of an MDM node.

- ◆ Required parameters:

--ip <IP>

One of the previously-configured IP addresses for the MDM. This address is used to identify the MDM.

--new_mdm_ip <IP>

The new IP address list for this MDM

Note: All previously-configured MDM IP addresses are replaced by the list provided in this parameter. This list must contain *all* the known MDM IP addresses.

- ◆ Optional parameters:

--file

A configuration file to which the MDM information should be written. Using this flag makes the command changes persistent.

--only_cfg

Update the SDC configuration file without actually attempting to connect to the MDM. After restarting the server or the driver, the new configuration will be used to connect to the MDM.

If you need this SDC to work with another ScaleIO system, add the new MDM IP addresses, using this flag:

--add_mdm

- ◆ Required parameters:

--ip <IP>

IP address list for this MDM

- ◆ Optional parameters:

--file

A configuration file to which the MDM information should be written

--only_cfg

Do not call the kernel to actually connect

How do I mount ScaleIO?

The exposed ScaleIO volumes are connected to the servers via the network.

When configuring the mounting options of the ScaleIO Linux devices in `/etc/fstab` add `_netdev`.

Example:

```
example: /dev/scinia          /mnt_scinia      ext3_netdev      0 0
```

How do I configure ScaleIO devices in Linux LVM?

To configure ScaleIO devices, perform the following:

1. Edit the file `/etc/lvm/lvm.conf` by adding the following line:

```
types = [ "scini", 16 ]
```

2. If only ScaleIO scini devices are to be used, you can add the following filter:

```
filter = [ "a|/dev/scini*|", "r/.*/" ]
```

3. Once configured, the `lvmdiskscan` command should yield results similar to the following:

```
/dev/scinia [      96.00 GiB] LVM physical volume
/dev/scinib [     320.00 GiB] LVM physical volume
/dev/scinic1 [      56.00 GiB]
/dev/scinid [      32.00 GiB]
1 disk
1 partition
2 LVM physical volume whole disks
0 LVM physical volumes
```

4. Continue with normal LVM steps.

How do I make changes to the LIA configuration file?

You can change the default behavior of the LIA by editing the configuration file:

- ◆ Windows—C:\Program Files\emc\scaleio\LIA\cfg\conf.txt
- ◆ Linux—/opt/emc/scaleio/lia/cfg/conf.txt

The following values are some that are relevant to LIA behavior:

```
lia_token=5
lia_enable_install=1
lia_enable_uninstall=1
lia_enable_configure_call_home=0
lia_enable_configure_fetch_logs=1
```

How do I assign IP addresses to SVMs to enable multi-pathing?

To enable multi-pathing on ESX, you need to add the volume to two SDCs.

It is recommended to add the IP address of the SVM and the IP of the next SVM (on another ESX - where there is an SDC installed), thus enabling two paths.

These path needs to be configured according to the ScaleIO data network.

The following table illustrates how to do this, assuming that each system has three ESX hosts:

Table 29 Assigning IP addresses for multi-pathing (page 1 of 2)

Using this many networks	Make these pointers
1 network (management only)	On ESX1 • Point to ESX1 SVM Mgmt IP • Point to ESX2 SVM Mgmt IP On ESX2 • Point to ESX2 SVM Mgmt IP • Point to ESX3 SVM Mgmt IP On ESX3 • Point to ESX3 SVM Mgmt IP • Point to ESX1 SVM Mgmt IP

Table 29 Assigning IP addresses for multi-pathing (page 2 of 2)

Using this many networks	Make these pointers
2 networks (management and data)	On ESX1 • Point to ESX1 SVM Data IP • Point to ESX2 SVM Data IP On ESX2 • Point to ESX2 SVM Data IP • Point to ESX3 SVM Data IP On ESX3 • Point to ESX3 SVM Data IP • Point to ESX1 SVM Data IP
3 networks (1 management and 2 data)	On ESX1 • Point to ESX1 SVM Data IP 1 and Data IP 2 • Point to ESX2 SVM Data IP 1 and Data IP 2 On ESX2 • Point to ESX2 SVM Data IP 1 and Data IP 2 • Point to ESX3 SVM Data IP 1 and Data IP 2 On ESX3 • Point to ESX3 SVM Data IP 1 and Data IP 2 • Point to ESX1 SVM Data IP 1 and Data IP 2

How do I use the Installation Manager to deploy on RHEL 5.x servers

When using the Installation Manager (IM) to deploy ScaleIO components on RHEL 5.x servers, the minimum required RAM for the IM server is 6 GB (as opposed to the standard 2 GB).

When using the IM to deploy ScaleIO components on *more than 20* RHEL 5.x servers, you must allocate additional Java virtual memory to the IM server, and then restart the IM server before performing the deployment.

To modify the Java memory, perform the following:

Windows

1. From the command line run **C:\Program Files\EMC\ScaleIO\Gateway\bin\tomcat7w.exe //ES//ScaleIO-Gateway**

Note: In 32-bit installations on 64-bit operating system, run
C:\Program Files (x86)\EMC\ScaleIO\Gateway\bin\tomcat7w.exe //ES//ScaleIO-Gateway

2. In the window that appears, select the **Java** tab and set the **Maximum memory pool** to the required MB, as listed in [Table 30 on page 485](#).
3. Restart the Installation Manager server.

Linux

1. Open the `/opt/emc/scaleio/gateway/bin/setenv.sh` file and modify the value of the `CATALINA_OPTS` parameter from `"-Xms128m -Xmx1024m"` to `"-Xms128m -Xmx<New_Requirement>m"`

where *New_Requirement* is the required MB, as listed in [Table 30 on page 485](#)

For example, for up to 95 nodes: `"-Xms128m -Xmx<4096m>m"`

2. Restart the Installation Manager server.

Table 30 Deploying ScaleIO on RHEL 5.x nodes—Java memory requirements

Number of ScaleIO RHEL 5.x nodes to install	JVM requirement
Up to 20 nodes	No change needed to Java memory
Up to 45 nodes	2048 MB (2 GB) Java memory required
Up to 70 nodes	3072 MB (3 GB) Java memory required
Up to 95 nodes	4096 MB (4 GB) Java memory required
Over 95 nodes	Deploy the first 95 nodes, then extend

Why isn't the ScaleIO Gateway web server responding?

The ScaleIO Gateway web server isn't responsive and the following error appears in the `tomcat.log` file:

Windows—`C:\Program Files\EMC\ScaleIO\Gateway\logs\tomcat.log`

Linux—`/opt/emc/scaleio/gateway/logs`

```
2014-06-21 22:50:57,113 [main] ERROR
o.a.coyote.http11.Http11NioProtocol - Failed to initialize end
point associated with ProtocolHandler ["http-nio-443"]
java.net.BindException: Address already in use: bind
```

Solution

Find the service/daemon that is currently occupying that port and stop them, using **netstat -anb** on Windows or **netstat -altp** on Linux. On windows, one of the common application that occupies this port is the VMware workstation, which uses this port for the shared VM feature. You can configure VMware workstation to use a different port via the Settings dialog, or you can disable the shared VM feature.

Once the port is free, restart the ScaleIO Gateway service/daemon.

Alternatively, you can run the ScaleIO Gateway web server on a non-standard port by modifying the `server.xml` file in the `conf` directory. Change the two instances of `port="443"` to another valid and non-occupied port of your choice and restart the ScaleIO Gateway service/daemon. Access the Gateway with the new port. For example: `https://<host>:<port>`

How do I change the shutdown port for the Tomcat server?

By default, Tomcat listens on port 8005 for the *shutdown* command; all applications within this context are shutdown.

You can change the port number by changing the settings in the `server.xml` file (`/conf/server.xml`), as follows:

Original—`<Server port="8005" shutdown="SHUTDOWN">`

Edited—`<Server port="8008" shutdown="SHUTDOWN">`

How do I upload a new OVA?

If you have already used the OVA to create a template, you cannot create another template with the same name in the same datacenter.

Either remove the original template first, or use the `ScaleIOPluginSetup-1.31.XXX.X.ps1` script, option #3, to assign a different name to the new template.

You can also upload the OVA manually using the VMware OVA upload tools. Configure the networks manually, after deployment or during the wizard menus. For more information, see the VMware user guides.

How can I associate ScaleIO volumes with physical disks?

This section describes how to associate volumes with physical disks.

Get ScaleIO volume information, by running the `scli --query_all_volumes` (or `--query_all`, or `--query_volume`) command.

Output, similar to the following appears:

```
Query-all-volumes returned 10 volumes
Protection Domain 0728185d00000000 Name: pd1
Storage Pool ad99eaab00000000 Name: default
<No volumes defined>

Storage Pool ad99eaab00000000 Name: sp1
Volume ID: fac22a6300000000 Name: vol0 Size: 152.0 GB (155648 MB) Mapped to 1 SDC Thick-provisioned
Volume ID: fac22a6400000001 Name: vol1 Size: 400.0 GB (409600 MB) Mapped to 1 SDC Thin-provisioned
Volume ID: fac22a6500000002 Name: vol2 Size: 80.0 GB (81920 MB) Mapped to 1 SDC Thick-provisioned
Volume ID: fac22a6600000003 Name: vol3 Size: 392.0 GB (401408 MB) Mapped to 1 SDC Thick-provisioned
Volume ID: fac22a6700000004 Name: vol4 Size: 96.0 GB (98304 MB) Mapped to 1 SDC Thin-provisioned
Volume ID: fac22a6800000005 Name: vol5 Size: 112.0 GB (114688 MB) Mapped to 1 SDC Thick-provisioned
Volume ID: fac22a6900000006 Name: vol6 Size: 96.0 GB (98304 MB) Mapped to 1 SDC Thin-provisioned
Volume ID: fac22a6a00000007 Name: vol7 Size: 176.0 GB (180224 MB) Mapped to 1 SDC Thick-provisioned
Volume ID: fac22a6b00000008 Name: vol8 Size: 272.0 GB (278528 MB) Mapped to 1 SDC Thick-provisioned
Volume ID: fac22a6c00000009 Name: vol9 Size: 360.0 GB (368640 MB) Mapped to 1 SDC Thin-provisioned
```

This output shows the Volume ID and name, as well as other volume information.

Linux

On the SDC host, get the operating system volume information that correlates to the ScaleIO *scini* device name, by running the following command:

```
# ls -l /dev/disk/by-id/ | grep scini
```

Output, similar to the following appears:

```
lrwxrwxrwx 1 root root 12 Aug 25 19:40 emc-vol-62c093a52d14aec7-fac22a6300000000 -> ../../scinia
lrwxrwxrwx 1 root root 12 Aug 25 19:40 emc-vol-62c093a52d14aec7-fac22a6400000001 -> ../../scinic
lrwxrwxrwx 1 root root 12 Aug 25 19:40 emc-vol-62c093a52d14aec7-fac22a6500000002 -> ../../scinib
lrwxrwxrwx 1 root root 12 Aug 25 19:41 emc-vol-62c093a52d14aec7-fac22a6600000003 -> ../../scinie
lrwxrwxrwx 1 root root 12 Aug 25 19:41 emc-vol-62c093a52d14aec7-fac22a6700000004 -> ../../scinid
lrwxrwxrwx 1 root root 12 Aug 25 19:42 emc-vol-62c093a52d14aec7-fac22a6800000005 -> ../../scinif
lrwxrwxrwx 1 root root 12 Aug 25 19:42 emc-vol-62c093a52d14aec7-fac22a6900000006 -> ../../scinig
lrwxrwxrwx 1 root root 12 Aug 25 19:42 emc-vol-62c093a52d14aec7-fac22a6a00000007 -> ../../scinii
lrwxrwxrwx 1 root root 12 Aug 25 19:42 emc-vol-62c093a52d14aec7-fac22a6b00000008 -> ../../scinih
lrwxrwxrwx 1 root root 12 Aug 25 19:43 emc-vol-62c093a52d14aec7-fac22a6c00000009 -> ../../scinij
```

This output shows the *scini* volume name and the volume ID.

By matching the volume ID in both outputs, you can match the operating system names, *sciniX*, with the ScaleIO volume name.

For example:

- ◆ **scinia** = fac22a6300000000 = **vol0**
- ◆ **scinic** = fac22a6400000001 = **vol1**

Alternatively, run the `sg_inq /dev/sciniX` SCSI query command. The result of this command includes the EMC volume ID at the bottom, as illustrated in the following figure:

```
Vendor identification: EMC
Product identification: ScaleIO
Product revision level: 1.3
Unit serial number: EMC-62c093a52d14aec7-fac22a6300000000
```

Note: Running this command requires that the **sg3_utils** are installed on the Linux host.

Windows

The `sg_inq.exe` file was added to the MSI installation and can be found in the following location: `C:\Program Files\EMC\ScaleIO\SDC\diag\`

Run the **sg_inq HardiskX** SCSI query command. The result of this command includes the EMC volume ID at the bottom.

How do I configure session timeout parameters?

When a user is authenticated by the system, all commands performed will be done with their respective role until a logout is performed, or until the session expires, by reaching one of the following timeouts:

- ◆ Maximum session length (default: 8 hours)
- ◆ Session idle time (default: 10 minutes)

You can modify these parameters, by editing the `MDM conf.txt` file:

- ◆ **Linux**
`/opt/emc/scaleio/mdm/cfg/conf.txt`
- ◆ **Windows**
`C:\Program Files\emc\scaleio\mdm\cfg\conf.txt`

To configure maximum session length, edit the value of the `user_session_hard_timeout_secs` parameter. The minimum is 10 seconds, maximum 10 years, and default 8 hours.

To configure session idle time, edit the value of the `user_session_timeout_secs` parameter. The minimum is 10 seconds, maximum 3 months, default 10 minutes.

After changing the parameters, you must restart the MDM service (delete and create service) for the changes to take effect.

Other tasks

This section describes other tasks that you can perform in ScaleIO. Topics include:

- ◆ [Manual registration of the ScaleIO plug-in](#) 489
- ◆ [Automated installation of ScaleIO components](#) 491
- ◆ [Installation manager CLI commands](#) 493

Manual registration of the ScaleIO plug-in

This section describes an advanced way to use PowerCLI to register the ScaleIO plug-in on a vCenter.

The plug-in is provided as a ZIP file that can be downloaded by the vSphere web client servers in your environment. The ZIP file can be downloaded directly from the EMC Online Support site, or, if the web servers may not have internet access, from a file server.

Before you begin, ensure that there is communication between the vSphere web client server and the web server storing the plug-in.

1. You can upload the ZIP file to an HTTP or an HTTPS server. If you are uploading the ZIP file to an HTTP server, perform the following:
 - a. On the computer where the vSphere Web client is installed, locate the `webclient.properties` file.
 - Windows 2003:
`%ALLUSERPROFILE%\Application Data\VMware\vsphere Web Client`
 - Windows 2008:
`%ALLUSERSPROFILE%\VMware\vsphere Web Client`
 - Windows 2012:
`C:\ProgramData\VMware\vsphere Web Client`
 - Linux:
`/var/lib/vmware/vsphere-client`

b. Add the following line to the file:

```
allowHttp=true
```

c. Restart the **VMware vSphere Web Client** service.

2. Using PowerCLI for VMware, and set to *Run as administrator*, run **Set-ExecutionPolicy RemoteSigned**
3. Close PowerCLI, and reopen it, set as *Run as administrator*.
4. Extract EMC-ScaleIO-vSphere-plugin-installer-1.31-XXX.X.zip
5. Upload EMC-ScaleIO-vSphere-web-plugin-1.30-XXX.X.zip to the HTTP/HTTPS server.
6. Use **cd** to get to the proper directory, then run the `ScaleIOPluginSetup-1.31-XXX.X.ps1` script, in interactive mode, using these parameters:
 - **vcenter**
vCenter name
 - **userUrl**
The URL of the `plugin.zip` file (this is not necessary for the standard setup)

If communication is successful, you will be prompted to approve the HTTPS server thumb print. Alternatively, you will need to enter it (separate hexadecimal characters with “:”).

The script registers the plug-in and the following message appears:

```
Registering ScaleIO extension...
The extension was registered successfully
```

7. Log out, and log back in to the vSphere web client.

Troubleshooting plug-in registration issues

You can use the following logs to assist in troubleshooting problems that may occur during registration of the VMware plug-in. To find relevant log entries, search for *scaleio* in the log file.

The Virgo logs are located in the following directories:

- ◆ **Windows**
C:\ProgramData\VMware\vSphere Web Client\serviceability\logs

- ◆ **Linux**

```
/var/log/vmware/vsphere-client/
```

Other relevant logs:

- ◆ **Windows**

```
C:\Windows\System32\config\systemprofile\AppData\Roaming\
VMware\scaleio
```

- ◆ **Linux**

```
/opt/.vmware/scaleio
```

Automated installation of ScaleIO components

This section describes how to perform automated, non-interactive installation.

To install in non-interactive mode, you prepare and run a script file that contains the installation commands. This mode does not require any monitoring, and the installation progresses from stage to stage automatically.

You can run the script file from the IM CLI window, or without the CLI window.

Prepare the script file, by performing the following:

1. Create a new text file.

2. Enter the following commands at the beginning of the file:

```
• im login --host <hostname/ip> --port <IM_port>
  --username <user name> --password <password>

• im install --path <path to CSV file>
  --mdm_password <New MDM login password>
  [--lia_password <LIA password>] --non_interactive true
```

where *IM_port* is by default, 443

where *New MDM login password* is a new password for the MDM that will be automatically configured, during the installation

where *LIA password* is the password that will be used to authenticate communication between the IM and the LIA

Note: If you do not enter a LIA password, the LIA will not be installed.

The passwords must meet the following criteria:

- Between 6 and 31 characters
- Include at least 3 of the following groups: [a-z], [A-Z], [0-9], special characters (!@#\$...)
- No white spaces

3. Add the following commands to the file in separate lines:

- **installation set_install_state**
- **installation set_configure_state**

4. Save the file as a TXT format.

5. Run the script file:

- ◆ From the IM CLI window, by running the following command:

```
script --file <path to script file>
```

- ◆ From a standard command prompt, run the following command:

```
java -jar install-CLI.jar script --file <path to script file>
```

The installation progress appears on the screen, similar to the following:

```
Running...
7 commands remaining
...
2 commands remaining
Done!
All commands completed successfully!
Run 'installation set_install_state' to proceed from upload to
install phase
ScaleIO Installation Manager CLI>installation set_install_state
Running...
7 commands remaining
..
2 commands remaining
Done!
All commands completed successfully!
Run 'installation set_configure_state' to proceed from install to
configure phase
ScaleIO Installation Manager CLI>installation
set_configure_state
Running...
10 commands remaining
..
1 commands remaining
Done!
```

```
All commands completed successfully!
Installation completed
```

ScaleIO installation is complete. Proceed to “Creating volumes.”

Installation manager CLI commands

The following table describes all of the CLI commands that can be used in the installation manager.

Table 31 CLI commands for the installation manager

Command	Description
!	Allows execution of operating system (OS) commands
*/	End of block comment
/*	Start of block comment
//	Inline comment markers (start of line only)
;	Inline comment markers (start of line only)
date	Displays the local date and time
exit	Exits the shell
help	Lists all command usage
im abort_commands	Abort running and pending commands, and archive completed commands
im configure_call_home	Configure the call home on all MDM nodes based either on a CSV file or on configuration from the MDM and using LIA
im delete_package	Delete an installation package from the Installation Manager
im get_info	Runs get_info script on all nodes and retrieves the result, based either on a CSV file, or via the LIA with configuration information from the MDM
im install	Uploads a configuration CSV file and installs based on that file
im list_packages	List all packages currently uploaded to the Installation Manager
im login	Log in to the Installation Manager
im logout	Log out from the Installation Manager

Table 31 CLI commands for the installation manager

Command	Description
im retry_commands	Retry the recently failed/aborted commands (for non
im set_configure_state	Switch the Installation Manager to configure state
im set_install_state	Switch the Installation Manager to install state
im uninstall	Uninstalls the system, based either on a CSV file, or via the LIA with configuration information from the MDM
im upgrade	Upgrades the system with the latest packages, based either on a CSV file, or via the LIA with configuration information from the MDM
im upload_package	Upload an installation package to the Installation Manager
quit	Exits the shell
script	Parses the specified resource file and executes its commands
system properties	Shows the shell's properties

APPENDIX E

ScaleIO on Xen

This section describes topics that relate to using ScaleIO on XEN. Topics include:

- ◆ [Adding a volume](#) 495
- ◆ [Removing a ScaleIO volume from Xen](#) 496
- ◆ [Modifying the size of a ScaleIO volume](#) 497

ScaleIO best practice is to install all ScaleIO components on dom0. The installation and configuration of ScaleIO objects are the same as in a regular Linux system.

By default, dom0 comes with approximately 800 MB of memory. This might not be enough if an SDS and MDM are installed together.

It is recommended to increase dom0 memory to 4 GB. For details how to do this, see <http://support.citrix.com/article/CTX134951>.

This appendix contains additional commands that must be performed on the hypervisor when adding or removing a ScaleIO volume or changing its volume.

Note: In Xen, RAM read cache is limited to 1GB.

NOTICE

In the Xen environment, all ScaleIO CLI commands begin with **siocli**, and not **scli**.

Adding a volume

1. Use the ScaleIO CLI to add and map a ScaleIO volume, as described in [“Creating volumes” on page 116](#).
2. Use the Xen command line to add the ScaleIO volumes.
3. Get the host UUID by running the following command:

```
xe host-list
```

4. Edit the file `/etc/lvm/lvm.conf` by adding the following line:
`types = [ "scini", 16 ]`
5. Use the retrieved host UUID while running the `sr-create` command.

Note: ScaleIO provides a unique ID to each volume.

It is highly recommended to use the unique ID when running on Xen.

For example, the ScaleIO volume name in the hypervisor is

`/dev/disk/by-id/scaleio-vol-4a7987a751237ae0-3d467d3900000000.0000.`

Example

```
xe sr-create
host-uuid=09fa5d27-aa08-4c71-86bb-71dc73e9f59f
content-type="ScaleIO" name-label="ScaleIO"
shared=true
device-config-device=/dev/disk/by-id/scaleio-vol-4a798
7a751237ae0-3d467d3900000000 type=lvm
```

Removing a ScaleIO volume from Xen

Before unmapping a volume, perform the following:

1. Get the SR UUID by running the following command:

```
xe sr-list
```

2. Get the UUID by running the following command, together with the SR UUID from the previous step:

```
xe pbd-list
```

3. Unplug and destroy the PBD, and then run the following command:

```
sr-forget
```

Example

```
xe sr-list
xe pbd-list sr-uuid=4232efb0-7610-b18f-51ee-46bf377021d2
xe pbd-unplug uuid=c478e01f-eb5a-237f-9ed3-9c1c9173431b
xe pbd-destroy uuid=c478e01f-eb5a-237f-9ed3-9c1c9173431b
xe sr-forget uuid=4232efb0-7610-b18f-51ee-46bf377021d2>
```

For details on how to use the CLI to remove a volume, see [“Removing a volume” on page 221](#).

Modifying the size of a ScaleIO volume

1. Use the CLI to modify the ScaleIO volume size.
For more information, see [“Managing volumes” on page 217](#).
2. Use the Xen command line to modify the volume size.

In the following example the volume name in Dom0 is

```
/dev/disk/by-id/scaleio-vol-4a7987a751237ae0-3d467d3900000000
```

Example

1. Issue the following commands in the Xen command line.

```
pvresize  
/dev/disk/by-id/scaleio-vol-4a7987a751237ae0-3d467d3900000000  
pvs
```

2. Check the output to validate that the new size is set.
3. Read the **UUID** from `xe sr-list`.
4. In the Xen command line, issue the following command with the **UUID** that was obtained with `xe sr-list` as `<UUID>`.

```
xe sr-scan uuid=<UUID>
```


APPENDIX F

Deployment in OpenStack Environments

This appendix contains information about ScaleIO deployment in an OpenStack cloud operating system environment. Topics include:

- ◆ Overview..... 499
- ◆ Environment and system requirements..... 501
- ◆ Volume limitations 502
- ◆ Supported operations 502
- ◆ Installation..... 502
- ◆ QoS functionality 506
- ◆ Thin provisioning 506
- ◆ Configuration script..... 509
- ◆ Multiple Protection Domains and Storage Pools 507

Overview

OpenStack is a cloud operating system that controls large pools of compute, storage, and networking resources throughout a data center. These are all managed using a dashboard or a command line interface that gives administrators control, while allowing their users to provision resources through a web-based interface. OpenStack is used in a wide variety of industries and use cases, and is supported by more than 400 leading IT hardware and software companies, who have contributed to development of the OpenStack project.

In the case of Block storage, OpenStack provides the Cinder solution, which is a block storage solution for use with servers and applications. Cinder is designed to work with widely available virtualization technologies, bare metal, and high-performance computing configurations. It can integrate with legacy systems and with third-party technologies, such as EMC ScaleIO.

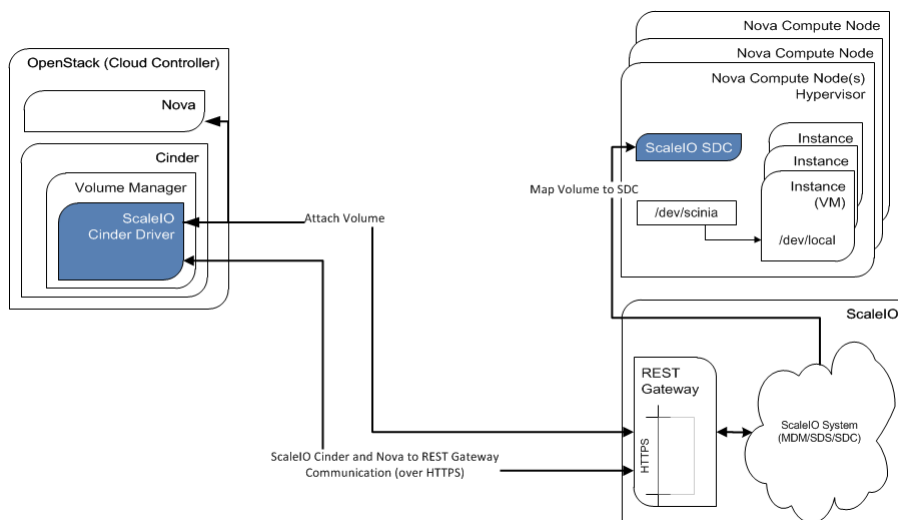
The ScaleIO elastic storage solution includes a Cinder driver, which interfaces between ScaleIO and OpenStack, and presents volumes to OpenStack as block devices which are available for block storage. It also includes an OpenStack Nova driver, for handling compute and instance volume related operations. The ScaleIO driver executes the volume operations by communicating with the backend ScaleIO MDM through the ScaleIO REST Gateway.

The following figure shows a typical flow for mapping a volume. The OpenStack flow is as follows:

- ◆ *Create volume* (Cinder operation)—calls the ScaleIO *add_volume* command
- ◆ *Attach volume to instance*—initiated by Nova:
 1. Nova compute manager *attach_volume* is called.
 2. Triggers the Cinder driver to perform the volume attach operation at the storage side (*initialize_connection*)—not needed in the ScaleIO scenario.
 3. Nova *LibvirtDriver attach_volume* is called, which calls the *connect_volume* of the specific *LibvirtVolumeDriver* (determined by the *volume_driver_type* that the Cinder driver returns in the connection information) to finish the attach operation on the Hypervisor side.

This calls the ScaleIO *map_volume_to_SDC* command and then verifies that the volume is exposed to the hypervisor.

4. After the volume is attached to the compute node, it is passed through to the VM by OpenStack.



Environment and system requirements

The following environment is supported:

- ◆ Icehouse and Juno releases, with either all-in-one OpenStack installation, or multi-node (Compute nodes) installation
- ◆ RHEL 6.4, 6.5 or 7.0 (or their CentOS equivalents), using KVM as the hypervisor engine
- ◆ The ScaleIO SDC component must be installed and configured on the OpenStack compute node
- ◆ The ScaleIO gateway (which includes the REST gateway) must be installed, as part of the ScaleIO deployment. This gateway is typically installed at the beginning of ScaleIO installation. For more information, see [“Installation” on page 51](#). The ScaleIO gateway must be accessible from the OpenStack cloud controller. Ensure that you know the IP address of the ScaleIO gateway, and its user name and password, because they are required for the Cinder driver’s installation and configuration procedures.
- ◆ ScaleIO REST Gateway certificate validation—the OpenStack ScaleIO driver communicates with the REST Gateway through https, (over SSL). By default, the driver ignores verification of the ScaleIO REST Gateway’s SSL certificate, but it can verify the certificate if the following configuration parameters are defined:
 - `verify_server_certificate`—set to `True`, if the server’s certificate must be verified, and to `False` if no verification is required.
 - `server_certificate_path`—If the parameter `verify_server_certificate` is set to `True`, specify the location of the `.pem` file containing the server’s certificate.

For instructions for generating a self-signed certificate using Keytool, see [“Generating a self-signed certificate using “Keytool”” on page 524](#).
- ◆ The OpenStack driver does not support storage pool and domain names that contain special characters, including URL escape characters such as `#`, `/`, and so on. If you would like to create a volume on such a storage pool or domain in OpenStack, ensure that you specify the storage pool or domain using its ID, and not its name.

Volume limitations

ScaleIO volume size is limited to a basic granularity of 8 GB. If volume size is not a multiple of 8, the size is rounded up. For example: a request to create a volume of 10 GB will create a volume of 16 GB. In OpenStack, the volume will be displayed with its requested size (10) instead of its actual size (16). A corresponding warning message will be printed to the Cinder log.

ScaleIO has a limitation of 31 snapshots per volume.

Supported operations

The ScaleIO Cinder driver supports the following operations:

- ◆ Create volume
- ◆ Delete volume
- ◆ Attach volume
- ◆ Detach volume
- ◆ Create snapshot
- ◆ Delete snapshot
- ◆ Create volume from snapshot
- ◆ Create cloned volume
- ◆ Copy image to volume
- ◆ Copy volume to image
- ◆ Extend volume

Installation

This section provides an overview of the installation activities that are required to deploy ScaleIO in an OpenStack environment. For general information on the ScaleIO installation procedures, see [“Installation” on page 51](#). You can install the required drivers manually or using a script. Topics in this section include:

- ◆ [Manual installation](#) 503
- ◆ [Installation script](#) 505

Manual installation

To install the driver on a Nova compute host (also known as a compute node), perform the following:

1. Install and configure the SDC component.
2. Copy the file `scaleiolibvirtdriver.py` to the `nova/virt/libvirt` directory.
3. In Icehouse environments only, use a text editor to edit the `libvirt_volume_drivers` key in the Nova configuration file `/etc/nova/nova.conf`. Add the text that is marked in **bold font** below:

```
libvirt_volume_drivers =
iscsi=nova.virt.libvirt.volume.LibvirtISCSIVolumeDriver,iser=no
va.virt.libvirt.volume.LibvirtISERVVolumeDriver,local=nova.virt.
libvirt.volume.LibvirtVolumeDriver,fake=nova.virt.libvirt.volum
e.LibvirtFakeVolumeDriver,rbd=nova.virt.libvirt.volume.LibvirtN
etVolumeDriver,shoopdog=nova.virt.libvirt.volume.LibvirtNetVolu
meDriver,nfs=nova.virt.libvirt.volume.LibvirtNFSVolumeDriver,ao
e=nova.virt.libvirt.volume.LibvirtAOEVolumeDriver,glusterfs=nov
a.virt.libvirt.volume.LibvirtGlusterfsVolumeDriver,fibre_channe
l=nova.virt.libvirt.volume.LibvirtFibreChannelVolumeDriver,scal
ity=nova.virt.libvirt.volume.LibvirtScalityVolumeDriver,scaleio
=nova.virt.libvirt.scaleiolibvirtdriver.LibvirtScaleIOVolumeDri
ver
```

4. Add the same text mentioned in the previous step to the `volume_drivers` key.
5. Copy the file `scaleio.filters` to the location `/etc/nova/rootwrap.d`

To install the driver on a Cinder host (usually the cloud controller node), perform the following steps:

1. Install and configure the SDC component.

Note: SDC is required on the Cinder host for the operations: *copy volume to image*, and *copy image to volume*.

2. Copy the file `scaleio.py` to `/cinder/volume/drivers/emc`
3. Copy the file `scaleio.filters` to the location `/etc/cinder/rootwrap.d`

4. Use a text editor to edit lines in the file `cinder.config` file in `/etc/cinder/cinder.conf`, as follows:

```
volume_driver=cinder.volume.drivers.emc.scaleio.ScaleIODriver
cinder_scaleio_config_file=/etc/cinder/cinder_scaleio.config
```

5. Create a ScaleIO driver configuration file called `/etc/cinder/cinder_scaleio.config`, containing parameters for the REST Gateway, Protection Domain and Storage Pool. The file must contain:

- A `[scaleio]` section header
- The IP address of the REST Gateway with which the ScaleIO driver will communicate
- The username of the REST Gateway
- The password of the REST Gateway

Optional parameters:

- In case only one Storage Pool and Domain is used:
 - Either the Protection Domain name (`protection_domain_name`), or Protection Domain ID (`protection_domain_id`)
 - Either the Storage Pool name (`storage_pool_name`), or Storage Pool ID (`storage_pool_id`)

Note: If the Storage Pool name or ID is not specified, the driver will use the default Storage Pool.

- `round_volume_capacity` – provides ability to control behavior of creating or extending a volume to a size which is a non-multiple of 8GB.
 - When set to **True**, every request will be rounded up with a warning message written to log stating the requested and actual size of the volume.
 - When set to **False**, every request for a size which is not a multiple of 8 will fail with a specific error message

The default, when this parameter is not configured, or is empty, is **True**.

- `force_delete` – allows force deletions of volumes that don't exist in ScaleIO due to an error in creation, for example if a volume of size 10GB is requested and `round_volume_capacity` parameter is set to **False**.

- When set to **True**, deletion of a volume that exists in OpenStack but not in ScaleIO will succeed.
- When set to **False**, such a deletion will fail.

The default, when this parameter is not configured, or is empty, is **False**.

- `unmap_volume_before_deletion` – ensure that the volume is not mapped to any SDC before deletion, since in OpenStack, a volume can be deleted automatically when terminating instances.
 - When set to **True** – a volume will be unmapped from any SDC before deletion (an error in an unmap operation will be ignored if the volume is not mapped)
 - When set to **False** – no unmap operation will be performed before deletion

The default, when this parameter is not configured, or is empty, is **False**.

For example:

```
[scaleio]
rest_server_ip=10.76.92.146
rest_server_username=admin
rest_server_password=
protection_domain_name=Lab
storage_pool_name=default
round_volume_capacity=False
force_delete=True
```

6. Restart the `cinder-volume` and `nova-compute` services, using the commands:

```
service openstack-nova-compute restart
service openstack-cinder-volume restart
```

Installation script

To ease the installation process, an installation script, `scaleio_install.py`, is provided. The script can install the Nova part, the Cinder part, or both.

The Nova and Cinder locations may vary in different OpenStack installations, and thus should be specified during the script run. The following locations are the default locations that will be used:

```
/user/lib/python2.6/site-packages/cinder
```

```
/user/lib/python2.6/site-packages/nova
```

The script copies the Python file to the right location, and in the Nova installation, edits the configuration file to include the ScaleIO Nova driver, while renaming the old configuration file with a `.orig` suffix.

The script also places the `scaleio.filters` files in the correct locations.

The Cinder configuration file is not changed, and should be edited manually if necessary.

Services should be restarted manually when needed.

QoS functionality

The ScaleIO Cinder Driver allows limiting the IOPS and bandwidth that one SDC generates for a volume. This is done with Cinder Volume Type and Extra Specs. The following keys should be added to the volume type to set the SDC's limits for volumes of this type:

- ◆ `sio:iops_limit` – limit the volume IOPS. The number of IOPS must be larger than 10. The 0 value represents unlimited IOPS.
- ◆ `sio:bandwidth_limit` – limit the volume network bandwidth. The bandwidth is in KB/Sec. The 0 value represents unlimited bandwidth.

Since the limits are per SDC, they will be applied after the volume is attached to an instance, and thus to a compute node/SDC.

Thin provisioning

The Cinder driver supports creation of thin provisioned volumes, in addition to thick provisioning. The provisioning type settings should be added as an extra specification of the volume type, as follows:

`sio:provisioning_type` – thick/thin

If the provisioning type is not specified, the default value of **thick** will be used.

Multiple Protection Domains and Storage Pools

The ScaleIO OpenStack plug-in supports two modes for working with user defined Storage Pools and Protection Domains: static configuration mode, and dynamic mode.

Static configuration mode

Static configuration mode only supports a single Storage pool and Protection domain. Use the `protection_domain_name` or `protection_domain_id` and `storage_pool_name` or `storage_pool_id` in the driver configuration file `cinder_scaleio.config`. When the Storage Pool name or ID is omitted, the Default storage pool is used.

Dynamic mode

This section describes how to configure Dynamic mode, and includes the following topics:

- ◆ [“Configuring dynamic mode” on page 507](#)
- ◆ [“Dynamic mode example using the CLI” on page 508](#)
- ◆ [“Example notes” on page 509](#)
- ◆ [“Defaults and missing arguments” on page 509](#)

Dynamic mode lets you work with multiple Storage Pools and Protection Domains. The fields in the file `cinder_scaleio.config` for Storage Pools and Protection Domains are not mandatory.

Cinder’s `VolumeType` is used to define a Storage Pool and Protection Domain, and to override the Protection Domain and Storage Pool settings specified in the configuration file.

Configuring dynamic mode

1. Create volume types using either the Horizon dashboard or the CLI.
2. Using the CLI `set` command, assign extra specifications to each volume type, to give it some meaningful data, which is basically meta data that is assigned to the volume.

Note: *Volume Type* is an abstraction of various properties of a volume. Everything meaningful about the volume type is stored as a key-value pair in the `volume_type_extra_spec` table and can be viewed using the `cinder extra-specs-list` command. The ScaleIO cinder driver lets you choose a specific Protection Domain and a Storage Pool by using the meta data of the volume during creation.

Dynamic mode example using the CLI

The following example shows the creation of two volume types: *High Performance* and *Standard Performance*.

For High Performance, `sio:sp_name` is set to `Performance_Storage` and `sio:pd_name` is set to `common`.

Similarly, for Standard Performance, `sio:sp_name` is set to `Capacity_Storage` and `sio:pd_name` is set to `common`.

Then, an 8GB volume is created with the volume type `High_Performance`, which means it will be created in the `common` Protection Domain, over the Storage Pool `Performance_Storage`.

```
cinder --os-username admin --os-tenant-name admin type-create
"High_Performance"

cinder --os-username admin --os-tenant-name admin type-create
"Standard_Performance"

cinder --os-username admin --os-tenant-name admin type-key
"High_Performance" set sio:sp_name=Performance_Storage

cinder --os-username admin --os-tenant-name admin type-key
"High_Performance" set sio:pd_name=common

cinder --os-username admin --os-tenant-name admin type-key
"Standard_Performance" set sio:sp_name=Capacity_Storage

cinder --os-username admin --os-tenant-name admin type-key
"Standard_Performance" set sio:pd_name=common

cinder --os-username admin --os-tenant-name admin create
-volume_type High_Performance -display_name test_multi 8
```

Example notes

1. Either `sio:sp_name` or `sio:sp_id` should be set, but not both. The same principle applies for Protection Domain: either `sio:pd_name` or `sio:pd_id` should be set, but not both.
2. Volume Type names `High_Performance` and `Standard_Performance` are user-defined and can hold any arbitrary strings. Extra spec keys `sio:pd_id`, `sio:pd_name`, `sio:sp_id`, and `sio:sp_name` are reserved strings, and must appear exactly as shown in this example.
3. The extra spec value `Capacity_Storage` is your ScaleIO Storage Pool name. The extra spec value `common` is your ScaleIO Protection Domain name.

Defaults and missing arguments

The driver will search for `volume_type` first. If `volume_type` is specified when creating a volume, the driver will search for the `volume_type` definition, and will find the matching Storage Pool and Protection Domain. If `volume_type` is not specified, the driver will fall back to use the Storage Pool and Protection Domain defined in `cinder_scaleio.config`. The settings defined in the configuration file will also be used as a fall back if the requested `volume_type` has no Storage Pool or Protection Domain definition.

Configuration script

For easing configuration of Volume Types and Extra Specs for supporting multiple Protection Domains, Storage Pools and Thin/Thick provisioning, an interactive script, `scaleio_config.py` is provided.

The script allows:

- `config`:
 - Creates the ScaleIO cinder configuration file (if it's missing) with the mandatory info of REST server IP address, username and password.
 - Displays the existing volume types and its Storage Pools and Protection Domains
 - Displays the optional pairs of Storage Pools and Protection Domains that can be created

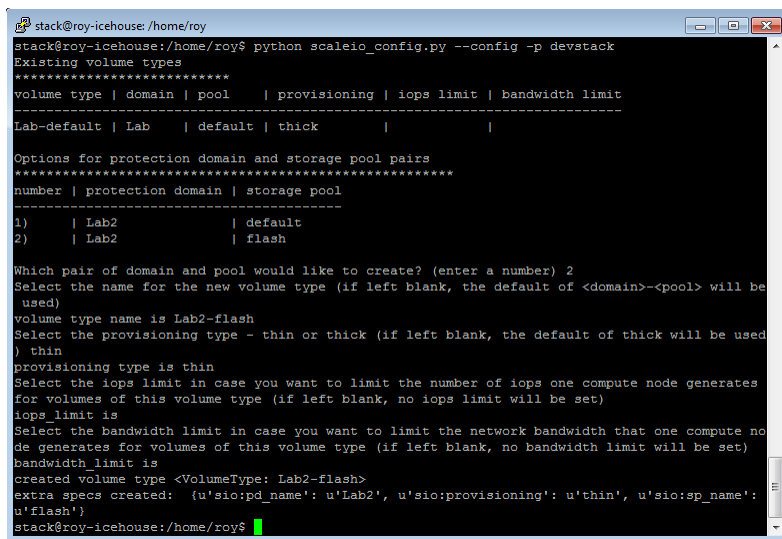
- Allows the choice of a pair of Storage Pool and Protection Domain, and creates a volume type containing this information and thin/thick provisioning
- clear:
 - Deletes a specific volume type, according to its name
- clear_all:
 - Deletes all volume types and extra specs
- list_volumes:
 - Lists all ScaleIO volumes created with the OpenStack cinder driver, and shows the conversion from the OpenStack ID to the ScaleIO volume name
- convert_id <OPENSTACK_ID>:
 - Returns the corresponding volume name in ScaleIO

Note: When a volume is created in OpenStack, the OpenStack GUID is converted to a shorter ID by decoding from base 16, and encoding into base 64. This is passed as the requested name in the create volume request.

The `scaleio_config.py` configuration script can map a specific cinder volume as reported by `cinder list` to the corresponding ScaleIO volume as reported by `scli --query_all_volumes`.

The following figure shows an example of the configuration script in use. A **volume type** called **Lab-Default** already existed, defining a **protection domain** called **Lab**, a **storage pool** called **default**, and **thick provisioning**.

In this run of the script, a new **volume type** called **Lab2-flash** was created, with a **protection domain** called **Lab2**, a **storage pool** called **flash**, and **thin provisioning**.



```

stack@roy-icehouse: /home/roy$ python scaleio_config.py --config -p devstack
Existing volume types
*****
volume type | domain | pool | provisioning | iops limit | bandwidth limit
-----
Lab-default | Lab | default | thick | | 
Options for protection domain and storage pool pairs
*****
number | protection domain | storage pool
-----
1) | Lab2 | default
2) | Lab2 | flash

Which pair of domain and pool would like to create? (enter a number) 2
Select the name for the new volume type (if left blank, the default of <domain>-<pool> will be used)
volume type name is Lab2-flash
Select the provisioning type - thin or thick (if left blank, the default of thick will be used)
) thin
provisioning type is thin
Select the iops limit in case you want to limit the number of iops one compute node generates for volumes of this volume type (if left blank, no iops limit will be set)
iops_limit is
Select the bandwidth limit in case you want to limit the network bandwidth that one compute node generates for volumes of this volume type (if left blank, no bandwidth limit will be set)
bandwidth_limit is
created volume type <VolumeType: Lab2-flash>
extra specs created: {u'sio:pd_name': u'Lab2', u'sio:provisioning': u'thin', u'sio:sp_name': u'flash'}
stack@roy-icehouse: /home/roy$

```

Figure 29 Configuration script example

Pool-aware scheduler support for Juno

The cinder driver was enhanced to support the new OpenStack feature, the pool-aware scheduler. The driver now reports capacities per pool, and not for the whole system, as in previous versions.

The pools that are reported are user-defined pools in the new configuration parameter `storage_pools`, in the file `/etc/cinder/cinder_scaleio.config`.

To configure the pool-aware scheduler, perform the following steps:

1. Use a text editor to edit lines in the file `/etc/cinder/cinder_scaleio.config`
2. For the `storage_pools` parameter, add comma-separated pairs of domain and pool that you want to work with in OpenStack. The format of the pair must be: `<domain_name>:<pool_name>`

For example:

```
storage_pools=Lab:default, Lab2:flash
```


APPENDIX G

REST API Reference

This appendix describes the REST API exposed by ScaleIO. You can use this API to monitor your ScaleIO system.

Topics include:

- ◆ [Before you begin](#) 513
- ◆ [Type resources](#) 526
- ◆ [Responses](#) 601

Before you begin

The REST API is served from the ScaleIO Gateway (which includes the REST gateway). The ScaleIO Gateway can be installed on any operating system that is supported by ScaleIO for its core components (MDM/SDS/SDC/etc.). The ScaleIO Gateway connects to a single MDM and serves requests by querying the MDM, and reformatting the answers it receives from the MDM in a RESTful manner, back to a REST client. The gateway is stateless, and requires an MDM user name and password on every request, except for a few initial infrastructural commands. Every ScaleIO SCLI command is also available in the ScaleIO REST API. The responses returned by the ScaleIO Gateway are formatted in JSON format.

The API is available as part of the ScaleIO Gateway package. If you used the installation manager to install ScaleIO, the ScaleIO Gateway has already been installed and configured with the MDM details.

Note: The gateway uses port 443 (secured, default) and port 80 (non-secured, default) for communication purposes.

If port 80 is already in use by another application, you can change the gateway's port number by editing the following lines in the file {gateway installation directory}\conf\server.xml

```
Connector port="80" protocol="HTTP/1.1"
connectionTimeout="20000"
redirectPort="443"
```

If port 443 is already in use by another application, you can change the gateway's port number by editing it in the following lines in the file {gateway installation directory}\conf\server.xml

```
redirectPort="443"
Connector port="443"
```

If port 443 is busy, refer to the troubleshooting procedure [“Why isn’t the ScaleIO Gateway web server responding?” on page 485](#).

To manually install the ScaleIO Gateway, follow this procedure:

Windows

1. Ensure that Java is in the system path:
 - 32 bit—C:\Program Files (x86)\Java\jre7\bin
 - 64 bit—C:\Program Files\Java\jre7\bin
2. Copy the gateway MSI to the ScaleIO Gateway server:
 - 32-bit: EMC-ScaleIO-gateway-1.31-XXX.X-x86.msi
 - 64-bit: EMC-ScaleIO-gateway-1.31-XXX.X-x64.msi
3. Run the file, and enter a new **Gateway Admin Password** that will be used to access the ScaleIO Gateway.

The ScaleIO Gateway server is ready to continue.

Linux

1. Ensure that Java is in the system path:
 - /usr/bin/java
2. Copy the ScaleIO Gateway package to the ScaleIO Gateway server.
3. Install it by running one of the following commands, depending on whether you want to the gateway service to use a customized Java configuration:
 - No special Java configuration:


```
GATEWAY_ADMIN_PASSWORD=<new_GW_admin_password>
rpm -U /tmp/EMC-ScaleIO-gateway-1.31-XXX.X.noarch.rpm
```

- Include customized Java configuration:
GATEWAY_ADMIN_PASSWORD=<new_GW_admin_password>
SIO_GW_JAVA=<path_to_java> rpm -U
/tmp/EMC-ScaleIO-gateway-1.31-XXX.X.noarch.rpm

where <new_GW_admin_password> is a password that you define to access the installation manager administration commands and web interface, and <path_to_java> is the path to the desired Java files.

Note: You can install the ScaleIO Gateway without adding the GATEWAY_ADMIN_PASSWORD variable. Add this variable later, in one of the following ways:

- Use a REST URI command (see [“Configuring MDM properties in the ScaleIO Gateway” on page 516](#))
 - Edit the user properties file, and then restart the **scaleio-gateway** service (see [“Configuring the gatewayAdminPassword manually” on page 519.](#))
-

Before you start using this API:

1. If you installed the ScaleIO Gateway manually, ensure that the MDM’s connection properties are configured correctly in the ScaleIO Gateway configuration file. For more information, see [“Configuring MDM properties in the ScaleIO Gateway” on page 516](#). If the Installation Manager was used to install ScaleIO, the ScaleIO Gateway is already configured, and no action is required.
2. Run a self-test to verify connectivity and correct configuration via a browser by navigating to the test page at this URL: **https://<REST_SERVER>/rest.html**. In addition, there is a link from the REST maintenance page (**maintain.html**) to the REST test page (**rest.html**).

Hint: You can also run this test from the link in the Installation Manager Maintenance screen.

The remainder of this section covers the following topics:

- ◆ [Configuring MDM properties in the ScaleIO Gateway](#) 516
- ◆ [Certificate management for ScaleIO Gateway](#)..... 520
- ◆ [OpenStack interoperation with the ScaleIO Gateway](#) 524
- ◆ [Generating a self-signed certificate using “Keytool”](#)..... 524
- ◆ [Troubleshooting](#)..... 524

Configuring MDM properties in the ScaleIO Gateway

This section describes how to configure MDM connection properties in the ScaleIO Gateway. If the Installation Manager was used to install ScaleIO, the ScaleIO Gateway is already configured, and there is no need to perform these steps.

Topics in this section include:

- [“Configuring the ScaleIO Gateway using REST-API commands” on page 516](#)
- [“Configuring the ScaleIO Gateway by editing a file” on page 518](#)
- [“Configuring the ScaleIO Gateway using a CLI tool” on page 519](#)
- [“Configuring the gatewayAdminPassword manually” on page 519](#)

Configuring the ScaleIO Gateway using REST-API commands

If the ScaleIO Gateway was installed manually *after* ScaleIO was installed, you can use the following REST-API commands to configure it.

Note: When connecting to the ScaleIO Gateway to configure it, use the following connection properties:

User: admin

Password: <GATEWAY_ADMIN_PASSWORD>

When connecting to the ScaleIO Gateway to configure ScaleIO, use the following connection properties:

User: admin

Password: <MDM_PASSWORD>

- ◆ Read (GET) the configuration:

```
HTTPS://<server_ip>:443/api/Configuration
```

- ◆ Set (POST) the configuration:

```
HTTPS://<server_ip>:443/api/updateConfiguration
{
  "mdmAddresses": ["<MDM_MANAGEMENT_IP_ADDRESS1>",
    "<MDM_MANAGEMENT_IP_ADDRESS2>"],
  "mdmPort": "<MDM_PORT>",
  "gatewayAdminPassword": "<ADMIN_PASSWORD>",
  "liaPassword": "<LIA_PASSWORD>"
}
```

For example:

```
HTTPS://10.76.61.100:443/api/updateConfiguration
```

```
{
  "mdmAddresses": ["10.76.61.32", "10.76.61.33"],
  "mdmPort": "6611",
  "gatewayAdminPassword": "123",
  "liaPassword": "Abc12!"
}
```

Configuration is complete.

Using REST API for adding the primary MDM:

Post `/api/instances/System/action/addPrimaryMdm` with a body that contains the property `updateConfiguration true` and `mdmAddresses` in the REST Gateway configuration is left empty.

The `mdmAddresses` field will be populated with the MDM IP addresses according to the request. `addPrimaryMdm` creates a new user called **admin** with the password **admin**. This password must be changed before you continue working with the MDM cluster, as follows:

POST `/api/instances/User/action/setPassword`

Body:

```
{"oldPassword": "admin", "newPassword": <new password>}
```

Note: `addSecondaryMdm` does not add the IP addresses to the `mdmAddresses` field. They must be updated manually (for more information, see below [“Examples for updating the mdmAddresses field” on page 517](#)).

Examples for updating the mdmAddresses field

POST `/api/updateConfiguration` body contains `mdmAddresses` with comma-separated MDM IP addresses. For example:

```
{"mdmAddresses": ["10.76.60.150", "10.76.60.11"]}
```

You can also update this field manually and restart the gateway service, by editing the `mdm.ip.addresses` key in the file:

```
{gateway installation directory}/webapps/ROOT/WEB-INF/
classes/gatewayUser.properties
```

The IP addresses must be semicolon-separated. For example:

```
mdm.ip.addresses=10.76.60.50;10.76.40.11;10.76.80.55
```

Configuring the ScaleIO Gateway by editing a file

If the ScaleIO Gateway was installed manually *after* ScaleIO was installed, you can configure it by editing a file.

1. On the ScaleIO Gateway node, open the following file in a text editor:
 - **Windows:**
 - C:\Program Files\EMC\ScaleIO\Gateway\webapps\ROOT\WEB-INF\classes\gatewayUser.properties
 - When installing the 32 bit installation on a 64 bit Operating System:
C:\Program Files (x86)\EMC\ScaleIO\Gateway\webapps\ROOT\WEB-INF\classes\gatewayUser.properties
 - **Linux:** /opt/emc/scaleio/gateway/webapps/ROOT/WEB-INF/classes/gatewayUser.properties
2. Edit these fields, as follows:


```
mdm.port=<MDM_PORT> (default=6611)

gateway-admin.password=<ADMIN_PASSWORD>

mdm.ip.addresses=<MDM_MANAGEMENT_IP_ADDRESS1>;
<MDM_MANAGEMENT_IP_ADDRESS1>

lia.password=<LIA_PASSWORD> (LIA password configured during
installation)
```
3. Save the file, and close it.
4. Restart the **scaleio-gateway** service:
 - **Linux:** type the command **service scaleio-gateway restart**
 - **Windows:** restart the **EMC ScaleIO Gateway** service from the Windows **Services** management window.

Configuration is complete.

Configuring the ScaleIO Gateway using a CLI tool

This section provides an example of gateway configuration using the CURL CLI tool.

Syntax

```
curl -k -v --basic --user <gateway admin user>:<gateway
admin password> -X POST -H "Content-Type:
application/json" -d '{"mdmAddresses":["<address a>",
"<address b>"], "mdmPort":"6611",
"gatewayAdminPassword":"<gateway admin new password>",
"liaPassword":"<LIA new password>"}' https://<host
address>/api/updateConfiguration
```

Example

```
curl -k -v --basic --user admin:OldPassword -X POST -H
"Content-Type: application/json" -d
'{"mdmAddresses":["10.76.60.1", "10.76.60.2"],
"mdmPort":"6611",
"gatewayAdminPassword":"NewPassword",
"liaPassword":"NewLiaPassword"}'
https://gateway.scaleio.com/api/updateConfiguration
```

Where:

- the `-k` flag is for skipping the SSL certificate verification
- the `-v` is an optional flag for extra output verbosity

Configuring the gatewayAdminPassword manually

If the `gateway-admin.password` variable was not defined during installation of the ScaleIO Gateway on Linux, you can add it by manually editing the `gatewayUser.properties` file. This requires a restart of the **scaleio-gateway** service, and therefore, it is preferable to configure the password using a REST URI command, as described in [“Configuring MDM properties in the ScaleIO Gateway” on page 516](#).

To manually define the password, perform the following steps:

1. On the ScaleIO Gateway node, open the following file in a text editor:
 - **Windows:**
 - C:\Program Files\EMC\ScaleIO\Gateway\webapps\ROOT\WEB-INF\classes\gatewayUser.properties
 - When installing the 32 bit installation on a 64 bit Operating System:
C:\Program Files (x86)\EMC\ScaleIO\Gateway\webapps\ROOT\WEB-INF\classes\gatewayUser.properties
 - **Linux:** /opt/emc/scaleio/gateway/webapps/ROOT/WEB-INF/classes/gatewayUser.properties
2. Edit the password for the variable gateway-admin.password.
3. Save the file, and close it.
4. Restart the **scaleio-gateway** service:
 - **Linux:** type the command **service scaleio-gateway restart**
 - **Windows:** restart the **scaleio-gateway** service from the Windows **Services** management window.

Configuration is complete.

Certificate management for ScaleIO Gateway

This section explains how to replace the ScaleIO gateway's self-signed security certificate with your organization's "trusted" certificate, and how to create a new "trusted" certificate. The ScaleIO gateway automatically creates its own self-signed security certificate when it is installed or upgraded. If your organization has no special security certificate requirements, you can keep working with the default certificate.

This section includes the following topics:

- ◆ [“Replacing the default self-signed security certificate with your own trusted certificate” on page 521](#)
- ◆ [“Replacing the default self-signed security certificate with your own self-signed certificate” on page 523](#)

Replacing the default self-signed security certificate with your own trusted certificate

You can create your own trusted certificate, and then replace the default certificate with the one that you created.

1. Find the location of `keytool` on your server, and open it. It is a part of the Java (JRE or JDK) installation on your server, in the `bin` directory. For example:

- `C:\Program Files\Java\jdk1.7.0_25\bin\keytool.exe`
- `/usr/bin/keytool`

2. Generate your RSA private key, by typing this command:

```
keytool -genkey -alias <YOUR_ALIAS> -keyalg RSA -keystore  
<PATH_TO_NEW_KEYSTORE_FILE>
```

- If you want to define a password, add the following parameters to the command: **-storepass <KEYSTORE_PASSWORD> -keypass <KEYSTORE_PASSWORD>** (use the same password for both parameters)

Note: Specify a directory outside the ScaleIO Gateway installation directory for the newly created keystore file. This will prevent it from being overwritten when the ScaleIO Gateway is upgraded or reinstalled.

3. If you already have a Certificate Signing Request (CSR), skip this step. If you need a CSR, generate one by typing the command (if you did not define a keystore password in the previous step, omit the password flags):

```
keytool -certreq -keyalg RSA -alias <YOUR_ALIAS> -file  
certreq.txt -keystore <PATH_TO_NEW_KEYSTORE_FILE>  
-storepass <KEYSTORE_PASSWORD> -keypass  
<KEYSTORE_PASSWORD>
```

4. If you already have an SSL certificate, skip this step. If you need an SSL certificate, use your CSR to obtain a new certificate from a third-party trusted SSL certificate provider. Save the certificate file on your server, outside the ScaleIO Gateway installation directory.
5. Import the Trusted Root, by typing this command (if you did not define a keystore password, omit the password flags):

```
keytool -import -alias root -keystore
<PATH_TO_NEW_KEYSTORE_FILE> -trustcacerts -file <LOCATION
OF_YOUR_root.cer_FILE> -storepass <KEYSTORE_PASSWORD>
-keypass <KEYSTORE_PASSWORD>
```

Note: The certificate must be in x.509 format.

If a message appears saying that the root is already in the system-wide store, import it anyway.

6. Import the intermediate certificates, by typing the command (if you did not define a keystore password, omit the password flags):

```
keytool -import -alias intermediateCA -keystore
<PATH_TO_NEW_KEYSTORE_FILE> -trustcacerts -file
<LOCATION_OF_YOUR_intermediate.cer_FILE> -storepass
<keystore password> -keypass <keystore password>
```

You must provide a unique alias name for every intermediate certificate that you upload with this step.

7. Install the SSL Certificate under the same alias that the CSR was created from (<YOUR_ALIAS> in previous steps), by typing the command (if you did not define a keystore password, omit the password flags):

```
keytool -import -alias <YOUR_ALIAS> -keystore
<PATH_TO_NEW_KEYSTORE_FILE> -trustcacerts -file
<LOCATION_OF_SSL_CERTIFICATE> -storepass <keystore
password> -keypass <keystore password>
```

8. Edit the following items in the file <ScaleIO_GATEWAY_INSTALLATION DIRECTORY>\conf\catalina.properties:

- keystore.file =<PATH_TO_NEW_KEYSTORE_FILE>
- keystore.password=<PASSWORD_DEFINED_DURING_KEYSTORE_CREATION>

If you did not define a password, the default password is changeit.

9. Restart the scaleio-gateway service:

- **Linux:** type the command **service scaleio-gateway restart**
- **Windows:** restart the **ScaleIO-Gateway** service from the Windows **Services** management window.

Replacement of the security certificate is complete.

Replacing the default self-signed security certificate with your own self-signed certificate

1. Find the location of `keytool` on your server, and open it. It is usually a part of the Java (JRE or JDK) installation on your server, in the `path` or `bin` directory. For example:

- `C:\Program Files\Java\jdk1.7.0_25\bin\keytool.exe`
- `/usr/bin/keytool`

2. Type the following command. If you want to use the password generated by default (`changeit`), omit the `-keypass` and `-keystore` parameters from the command.

```
keytool -genkey -alias <YOUR_ALIAS> -keyalg RSA -validity  
360 -keysize 2048 -storepass <KEYSTORE_PASSWORD>  
-keypass <KEYSTORE_PASSWORD> -keystore <PATH_TO  
_THE_CREATED_KEYSTORE_FILE>
```

Note: Store your keystore file in a directory outside the ScaleIO Gateway installation directory. This will prevent it from being overwritten when the ScaleIO Gateway is upgraded or reinstalled.

3. Edit the following items in the file `<ScaleIO_GATEWAY_INSTALLATION_DIRECTORY>\conf\catalina.properties`:

- `keystore.file =<PATH_TO_NEW_KEYSTORE_FILE>`
- `keystore.password=<PASSWORD_DEFINED_DURING_KEYSTORE_CREATION>`

If you did not define a password, the default password is `changeit`.

4. Restart the `scaleio-gateway` service:
 - **Linux:** type the command **`service scaleio-gateway restart`**
 - **Windows:** restart the **ScaleIO-Gateway** service from the Windows **Services** management window.

Replacement of the security certificate is complete.

OpenStack interoperation with the ScaleIO Gateway

The OpenStack ScaleIO Cinder driver communicates with the ScaleIO Gateway through https (in other words, over SSL). By default, the driver ignores the gateway SSL certificate verification. However, the ScaleIO Cinder driver can be configured to verify the certificate.

Note: You can generate a self-signed certificate (.PEM file), using *Keytool*. For more information, see [“Generating a self-signed certificate using “Keytool”” on page 524](#).

To enable certificate verification, add the following parameters to the file `/etc/cinder/cinder_scaleio.config` on the Cinder node:

```
verify_server_certificate=true
server_certificate_path=<PATH_TO_PEM_FILE>
```

Generating a self-signed certificate using “Keytool”

This section describes how to generate self-signed certificates, using *Keytool*. The certificates can be used by the OpenStack ScaleIO driver, to communicate with the ScaleIO Gateway. For more information about configuring the driver, see [“OpenStack interoperation with the ScaleIO Gateway” on page 524](#).

To generate a self-signed certificate using *Keytool*, perform the following steps:

1. Create a keystore file (.JKS) by typing the command:

```
keytool -genkeypair -keysize 1024 -alias herong_key
-keypass keypass -keystore herong.jks -storepass jkspass
```

2. Export the keystore file to a .PEM file, by typing the command:

```
keytool -exportcert -alias herong_key -keypass keypass
-keystore herong.jks -storepass jkspass -rfc -file
keytool_cert.pem
```

The certificate is stored in the file `<keytool_cert.pem>`. During configuration of the Cinder driver, the path to this .PEM file is required.

Troubleshooting

If there are connectivity problems with the ScaleIO Gateway, ensure that the gateway is enabled, by following these steps:

1. On the ScaleIO Gateway node, open the following file in a text editor:
 - **Windows:**
 - C:\Program Files\EMC\ScaleIO\Gateway\webapps\ROOT\WEB-INF\classes\gatewayUser.properties
 - When installing the 32 bit installation on a 64 bit Operating System:
C:\Program Files (x86)\EMC\ScaleIO\Gateway\webapps\ROOT\WEB-INF\classes\gatewayUser.properties
 - **Linux:** /opt/emc/scaleio/gateway/webapps/ROOT/WEB-INF/classes/gatewayUser.properties
2. In the **Features Enabler** section of the file, ensure that the property **features.enable_gateway_and_IM** is set to **true**.
3. If you made changes to the file, save the file, and then restart the **scaleio-gateway** service:
 - **Linux:** type the command **service scaleio-gateway restart**
 - **Windows:** restart the **EMC ScaleIO Gateway** service from the Windows **Services** management window.

Type resources

This section describes information about type resources for the following:

- ◆ General information 526
- ◆ System 534
- ◆ Protection Domain 547
- ◆ SDS 556
- ◆ Storage Pool 567
- ◆ Device 575
- ◆ Volume 581
- ◆ VTree 587
- ◆ ScsiInitiator 590
- ◆ SDC 593
- ◆ User 596
- ◆ Fault Set 597

General information

This section describes general information for the ScaleIO REST API, including REST API version in header fields, URIs, HTTP authentication, response fields, and ScaleIO Gateway configuration.

REST API version

The REST API version should be added to the `Accept` parameter in the header field. For example: `Accept: application/json;version=1.0`

If no `Accept` header field is present, it is assumed that the client accepts all media types and versions.

HTTP authentication

- ◆ To perform authentication, invoke the HTTP GET request, with the URI: `/api/login`, with MDM user\password passes in HTTP Basic authentication. A token is returned.

For example:

`https://10.76.60.190:443/api/login`



This token is valid for 8 hours from the time it was created, unless there has been no activity for 10 minutes, or if the client has sent a logout request.

HTTP token invalidation (logout):

The invalidation is done by invoking the HTTP GET request, with the URI: `/api/logout`

The token mentioned above is the password in the HTTP Basic authentication (the user is ignored - it can be empty).

For every REST API request that *does not require* the gatewayAdminPassword, the authentication is done by passing the token mentioned above as the password in the HTTP Basic authentication (the user is ignored - it can be empty).

Requests that *require* the gatewayAdminPassword work similarly, except that instead of `/api/login`, invoke an HTTP GET request, `/api/gatewayLogin` with user: admin password: <gatewayAdminPassword> in HTTP Basic authentication. A token is returned. Instead of invoking `/api/logout`, invoke `/api/gatewayLogout` with the token received when you logged in.

Note: Requests that requires gatewayAdminPassword are:

GET:

`/api/Configuration`
`/api/gatewayLogout`

POST:

`/api/updateConfiguration`
`/api/instances/System/action/addPrimaryMdm`

Response fields

The order of the fields in the responses may change. More fields may be added in the future.

URIs

- ◆ POST (create) / GET all objects for a given type:
`/api/types/{type}/instances`
- ◆ GET by id:
`/api/instances/{type:id}`
- ◆ POST a special action on an object:
`/api/instances/{type:id}/action/{actionName}`
- ◆ POST a special action on a given type:
`/api/types/{type}/instances/action/{actionName}`
- ◆ Get current API version:
`/api/version`
- ◆ Every row in the Object's Parent table appears as a link in the response of get object:
`/api/instances/{type:id}`
- ◆ Every row in the Object's Relationships table appears as a link in the response of get object:
`/api/instances/{type:id}/relationships/{Relationship name}`
- ◆ GET all instances
`/api/instances/`

Response

Property	Type	Note
sessionTag		
isDirty	boolean	The version on some objects changed while the MDM created the response
system	System	
lastSystemVersion		
protectionDomainList	List of Protection Domain objects	
lastProtectionDomainVersion		
sdsList	List of SDS objects	
lastSdsVersion		
storagePoolList	List of Storage Pool objects	
lastStoragePoolVersion		
deviceList	List of Device objects	
lastDeviceVersion		
volumeList	List of Volume objects	
lastVolumeVersion		
vTreeList	List of VTree objects	
lastVTreeVersion		
scsilInitiator	List of ScsilInitiator objects	
lastScsilInitiatorVersion		
sdclList	List of SDC objects	
lastSdcVersion		
faultSetList	List of Fault Set objects	
lastFaultSetVersion		

◆ Change configuration of ScaleIO Gateway (POST)

`/api/updateConfiguration/`

Request:

Parameters (AND\OR):

- `mdmAddresses`—List of MDM IP addresses that the ScaleIO Gateway will use to connect to the MDM (for performance improvement, place the primary MDM IP addresses before the secondary ones)
- `mdmPort`—MDM port
- `gatewayAdminPassword`—Password for installation manager, get/update ScaleIO gateway configuration, and add primary MDM
- `systemId`—ID of the system configured by `mdmAddresses`. If `systemId` is left empty, it will be populated on the first invocation of `/api/login`. At every `/api/login`, the system ID value is compared to the ID of the ScaleIO cluster (MDM).

If the IDs are different (`mdmAddresses` points to a cluster that does not match the `systemId`), an error message is displayed, and all login tokens (`/api/login`, `/api/gatewayLogin`) are invalidated. None of the gateway clients will be able to send requests to the MDM until one of the following happens:

- `systemId` is configured to the correct value
- `mdmAddresses` is configured to the correct IP addresses
- `systemId` is set to an empty value. In this case, on the first invocation of `/api/login`, the value for `systemId` will be populated according to the ID of the matching `mdmAddresses`.

If the value for `systemId` is different to the configured `systemId` (and the configured `systemId` is not empty), all login tokens (`/api/login`, `/api/gatewayLogin`) are invalidated.

For example:

```
{
  "mdmAddresses": ["10.76.60.150", "10.76.60.11"],
  "mdmPort": "6611",
  "gatewayAdminPassword": "Password1",
  "systemId": "7f5d8fc72a3d7f3d"
}
```

◆ Get configuration of ScaleIO Gateway (GET)

`/api/Configuration/`

Response:

- `mdmAddresses`—List of MDM IP addresses that the ScaleIO Gateway will use to connect to the MDM
- `mdmPort`—MDM port
- `systemId`—ID of the system, configured by `mdmAddresses` (see detailed explanation above, for *Change configuration of ScaleIO Gateway (POST)*)

For example:

```
{
  "mdmPort": "6611",
  "mdmAddresses": [
    "10.76.60.150",
    "10.76.60.135"
  ],
  "systemId": "7f5d8fc72a3d7f3d"
}
```

◆ Query selected statistics (POST)

`/api/instances/querySelectedStatistics`

Request:

Required parameters:

- `selectedStatisticsList`—list of objects containing:
 - `type`—object type
 - `properties`—list of properties to fetch

The following parameters are not relevant to the System type (can be omitted):

`ids`—list of objects ids

or

`allIds`—with empty value

Response:

The response contains a list of all requested types, the ids, and properties, according to the request parameters.

The System type does not contain an id.

Types for which the requested ids do not exist in the cluster will appear with an empty {} - see `FaultSet` in the example below.

Any id (from the ids parameters in the request) that does not exist in the cluster will not appear in the response. The following will appear in the `scaleio.log`:

```
Got no statistics for <type>::<id>.
```

In the following example, **Sds::022beb2300000004** does not exist in the cluster, so it does not appear in the response. Instead, this will appear in the `scaleio.log`:

```
Got no statistics for Sds::id: 022beb2300000004
```

Example:

```
POST https://localhost:8443/api/instances/
querySelectedStatistics
```

Body:

```
{ "selectedStatisticsList": [
  { "type": "ProtectionDomain", "ids": ["cc480c9b00000000"],
    "properties": ["capacityInUseInKb"] },
  { "type": "Volume",
    "ids": ["022beb25000000006", "022beb23000000004"],
    "properties": ["numOfMappedSdcs", "userDataWriteBwc",
      "numOfMappedScsiInitiators"] },
  { "type": "Sds",
    "ids": ["c919d820000000001", "022beb23000000004"],
    "properties": ["capacityInUseInKb"] },
  { "type": "System", "allIds": "",
    "properties": ["rmcacheSizeInKb"] },
  { "type": "FaultSet",
    "ids": ["c919d820000000001", "022beb23000000004"],
    "properties": ["numOfSds"] },
  { "type": "StoragePool", "allIds": "",
    "properties": ["unreachableUnusedCapacityInKb",
      "numOfThinBaseVolumes"] }
] }
```

The response:

```
{
  "FaultSet":{
  },
  "Volume":{
    "022beb2300000004":{
      "userDataWriteBwc":{
        "numOccured":0,
        "totalWeightInKb":0,
        "numSeconds":1
      },
      "numOfMappedSdcs":0,
      "numOfMappedScsiInitiators":0
    },
    "022beb2500000006":{
      "userDataWriteBwc":{
        "numOccured":0,
        "totalWeightInKb":0,
        "numSeconds":1
      },
      "numOfMappedSdcs":0,
      "numOfMappedScsiInitiators":0
    }
  },
  "StoragePool":{
    "7db925c200000003":{
      "numOfThinBaseVolumes":0,
      "unreachableUnusedCapacityInKb":0
    },
    "7db925bf00000000":{
      "numOfThinBaseVolumes":2,
      "unreachableUnusedCapacityInKb":0
    },
    "7db925c000000001":{
      "numOfThinBaseVolumes":0,
      "unreachableUnusedCapacityInKb":0
    },
    "7db925c100000002":{
      "numOfThinBaseVolumes":0,
      "unreachableUnusedCapacityInKb":0
    }
  },
  "ProtectionDomain":{
    "cc480c9b00000000":{
      "capacityInUseInKb":50331648
    }
  },
  "System":{
    "rmcacheSizeInKb":524288
  },
  "Sds":{
    "c919d82000000001":{
      "capacityInUseInKb":12509184
    }
  }
}
```

System

Object

Properties	Type
id	
name	
systemVersionName	
primaryMdmActorIpList	List
primaryMdmActorPort	
secondaryMdmActorIpList	List
secondaryMdmActorPort	
tiebreakerMdmIpList	List
tiebreakerMdmPort	
mdmMode	Single or Cluster
mdmClusterState	NotClustered or ClusteredNormal or ClusteredDegraded or ClusteredTiebreakerDown or ClusteredDegradedTiebreakerDown
mdmManagementIpList	List
mdmManagementPort	
capacityAlertHighThresholdPercent	
capacityAlertCriticalThresholdPercent	
installId	
swid	
daysInstalled	
maxCapacityInGb	
capacityTimeLeftInDays	
enterpriseFeaturesEnabled	
defaultIsVolumeObfuscated	
isInitialLicense	
restrictedSdcModeEnabled	
remoteReadOnlyLimitState	

Relationships

Name	Type	Note
ProtectionDomain	List of Protection Domain objects	
SDC	List of SDC objects	
ScsiInitiator	List of ScsiInitiator objects	
User	List of User objects	
Statistics		

Statistics

Object (page 1 of 3)

Properties	Type	Note
numOfProtectionDomains		
numOfSdc		
numOfSds		
numOfVolumes		
numOfDevices		
numOfScsiInitiators		
numOfVtrees		
numOfStoragePools		
rmcacheSizeInKb		
capacityLimitInKb		
maxCapacityInKb		
capacityInUseInKb		
thickCapacityInUseInKb		
thinCapacityInUseInKb		
snapCapacityInUseInKb		
snapCapacityInUseOccupiedInKb		
unreachableUnusedCapacityInKb		
protectedVacInKb		
degradedHealthyVacInKb		
degradedFailedVacInKb		
failedVacInKb		
inUseVacInKb		
activeMovingInFwdRebuildJobs		
pendingMovingInFwdRebuildJobs		
activeMovingOutFwdRebuildJobs		
pendingMovingOutFwdRebuildJobs		
activeMovingInBckRebuildJobs		
pendingMovingInBckRebuildJobs		
activeMovingOutBckRebuildJobs		
pendingMovingOutBckRebuildJobs		
activeMovingInRebalanceJobs		
pendingMovingInRebalance		

Object (page 2 of 3)

Properties	Type	Note
activeMovingRebalanceJobs		activeMovingOutRebalanceJobs
pendingMovingRebalanceJobs		pendingMovingOutRebalanceJobs
primaryVacInKb		
secondaryVacInKb		
primaryReadBwc	BWC	
primaryReadFromDevBwc	BWC	
primaryWriteBwc	BWC	
secondaryReadBwc	BWC	
secondaryReadFromDevBwc	BWC	
secondaryWriteBwc	BWC	
totalReadBwc	BWC	
totalWriteBwc	BWC	
fwdRebuildReadBwc	BWC	
fwdRebuildWriteBwc	BWC	
bckRebuildReadBwc	BWC	
bckRebuildWriteBwc	BWC	
rebalanceReadBwc	BWC	
rebalanceWriteBwc	BWC	
spareCapacityInKb		
capacityAvailableForVolumeAllocationInKb		
protectedCapacityInKb		
degradedHealthyCapacityInKb		
degradedFailedCapacityInKb		
failedCapacityInKb		
movingCapacityInKb		
activeMovingCapacityInKb		
pendingMovingCapacityInKb		
fwdRebuildCapacityInKb		
activeFwdRebuildCapacityInKb		
pendingFwdRebuildCapacityInKb		
bckRebuildCapacityInKb		
activeBckRebuildCapacityInKb		
pendingBckRebuildCapacityInKb		

Object (page 3 of 3)

Properties	Type	Note
rebalanceCapacityInKb		
activeRebalanceCapacityInKb		
pendingRebalanceCapacityInKb		
atRestCapacityInKb		
numOfUnmappedVolumes		
numOfMappedToAllVolumes		
numOfThickBaseVolumes		
numOfThinBaseVolumes		
numOfSnapshots		
numOfVolumesInDeletion		

BWC

Properties	Type
totalWeightInKb	
numOccured	
numSeconds	

Operations (page 1 of 6)

Operation	URI	Method	Parameters	Notes	Return
	/api/types/System/instances	GET			List of all System objects
	/api/instances/System::<{id}	GET			System object
	/api/instances/System::<{id}/relationships/ProtectionDomain	GET			List of Protection Domain objects that are connected to the System
	/api/instances/System::<{id}/relationships/Sdc	GET			List of SDC objects that are connected to the System
	/api/instances/System::<{id}/relationships/ScsiInitiator	GET			List of ScsiInitiator objects that are connected to the System
	/api/instances/System::<{id}/relationships/User	GET			List of User objects that are connected to the System
	/api/instances/System::<{id}/relationships/Statistics	GET			List of Statistics for the System

Operations (page 2 of 6)

Operation	URI	Method	Parameters	Notes	Return
	/api/types/System/instances/action/querySelectedStatistics	POST	Required: <u>properties</u> - list of properties to fetch (to see available properties look at Statistics)		All selected properties
	/api/types/System/instances/action/queryIdByKey	POST			id
	/api/instances/System::{id}/action/setCapacityAlertThresholds	POST	Required: <u>capacityAlertHighThresholdPercent</u> AND/OR <u>capacityAlertCriticalThresholdPercent</u>		
	/api/instances/System/action/addPrimaryMdm	POST	Required: <u>mdmlp</u> – IP address of the primary MDM. Optional: <u>primaryMdmActorIpList</u> – list of IP addresses, <u>mdmManagementIps</u> – list of IP addresses, <u>updateConfiguration</u> – TRUE or FALSE. If set to TRUE and “mdmAddresses” in ScaleIO Gateway configuration is empty, “mdmAddresses” will be populated according to the values in the request.	If “mdmAddresses” is defined in the ScaleIO Gateway configuration, mdmlp should be one of the IP addresses in it.	

Operations (page 3 of 6)

Operation	URI	Method	Parameters	Notes	Return
	/api/instances/System/action/addSecondaryMdm	POST	Optional: <u>secondaryMdmActorIpList</u> , <u>secondaryMdmActorPort</u>		
	/api/instances/System/action/addTiebreaker	POST	Optional: <u>tiebreakerMdmIpList</u> , <u>tiebreakerMdmPort</u> , <u>forceClean</u> – TRUE or FALSE. TRUE: Clean previous configuration of the Tie-Breaker		
	/api/instances/System/action/removeSecondaryMdm	POST			
	/api/instances/System/action/removeTiebreaker	POST			
	/api/instances/System/action/setManagementIps	POST	Optional: <u>clearAll</u> – "TRUE" or "FALSE" <u>mdmManagementIpList</u> – list of IP addresses	For example: { "clearAll": "FALSE", "mdmManagementIpList": ["10.76.60.150", "10.76.60.168"] }	
	/api/instances/System/action/switchMdmOwnership	POST			
	/api/instances/System/action/setMdmMode	POST	Required: <u>mdmMode</u> – single or cluster		

Operations (page 4 of 6)

Operation	URI	Method	Parameters	Notes	Return
	/api/instances/System:: <id>/action/setLicense</id>	POST	Required: <u>key</u>	See example after this table.	
	/api/instances/System:: <id>/action/removeConsistencyGroupSnapshots</id>	POST	Required: <u>snapGroupIid</u>		numberOfVolumes – number of volumes that were removed because of this operation
	/api/instances/System:: <id>/action/snapshotVolumes</id>	POST	Required: snapshotDefs – a list of combination of “volumeId” volume ID and “snapshotName” (optional field) snapshot name. For example: { “snapshotDefs”: [{ “volumeId”:”2dd9132300000000”, “snapshotName”:”snap1”, {“volumeId”:”1234” }] }		volumeIdList snapshotGroupIid for example: { “volumeIdList”:[“2dd9132400000001”], “snapshotGroupIid”:”d2e53daf00000001” }

Operations (page 5 of 6)

Operation	URI	Method	Parameters	Notes	Return
	/api/instances/ /System::{id}/a ction/getDelta	POST	Required: <u>sessionTag</u> <u>deltaDefs</u> - a list of combination of “type” and “lastVersion”. <u>type</u> - can be: "ProtectionDomain", "Sds", "StoragePool", "Device", "Volume", "VTree", "ScsilInitiator", "Sdc", “Faultset” <u>lastVersion</u> – is the last version of the data. When lastVersion is “0” all the data is fetched for the correlated type. For example: { "sessionTag": "1", "deltaDefs": [{ "type": "Sds", "lastVersion": "10" }, { "type": "Volume", "lastVersion": "1" }] }		Delta
	/api/instances/ /System::{id}/a ction/setDrlMo de	POST	Required: <u>drlMode</u> - "Volatile" or "NonVolatile"		
	/api/instances/ /System::{id}/a ction/setObfus cationPropertie s	POST	Required: <u>isObfuscated</u>		
	/api/instances/ /System::{id}/act ion/setSystem Name	POST	Required: <u>newName</u>		

Operations (page 6 of 6)

Operation	URI	Method	Parameters	Notes	Return
	/api/instances/System:: <id>/action/startRemoteSyslog</id>	POST	Required: <u>hostIp</u> Optional: <u>hostPort</u> , <u>facility</u>		
	/api/instances/System:: <id>/action/setSyslogFacility</id>	POST	Required: <u>facility</u>		
	/api/instances/System:: <id>/action/stopRemoteSyslog</id>	POST			
	/api/instances/System:: <id>/action/setRestrictedSdcModeEnabled</id>	POST	Required: <u>restrictedSdcModeEnabled</u> - TRUE or FALSE		
	/api/instances/System:: <id>/action/setRemoteReadOnlyLimitState</id>	POST	Required: <u>remoteReadOnlyLimitState</u> - TRUE or FALSE		

Example for setLicense:

```
/api/instances/System::4b1b90ae67c0d11d/action/setLicense
with body:
{"key": "START_LICENSE INCREMENT SIO_CAPACITY EMCLM 1.0
22-jul-2014 uncounted
VENDOR_STRING=installation_id=0000000000001234;SWID=PV
J4LNCMFLKQDB;CAPACITY=unlimited; HOSTID=ANY ISSUER=EMC
ISSUED=19-nov-2013 NOTICE=\"EMC Corporation\"
SIGN=\"0002 7DAB 72CF 7C84 01D8 1732 8DBE 5D00 E350
0C53 4B0C 0F6C 0658 34B6 0F8F\" INCREMENT
SIO_REPLICATION EMCLM 1.0 22-jul-2014 uncounted
VENDOR_STRING=installation_id=0000000000001234;SWID=PV
J4LNCMFLKQDB;CAPACITY=unlimited; HOSTID=ANY ISSUER=EMC
```



```
ISSUED=19-nov-2013 NOTICE=\"EMC Corporation\"
SIGN=\"0086 9B3B 25E6 B740 F441 3462 4409 6600 95EA
A267 34C5 E4E7 25B5 E64A 545E\" END_LICENSE\"}
```

Delta (page 1 of 2)

	Type
sessionTag	
isDirty	boolean
protectionDomainsPartial	boolean
protectionDomainList	List of Protection Domain objects
deletedProtectionDomainIdList	List of IDs
lastProtectionDomainVersion	
sdsIsPartial	boolean
sdsList	List of SDS objects
deletedSdsIdList	List of IDs
lastSdsVersion	
storagePoolsPartial	boolean
storagePoolList	List of Storage Pool objects
deletedStoragePoolIdList	List of IDs
lastStoragePoolVersion	
devicesPartial	boolean
deviceList	List of Device objects
deletedDeviceIdList	List of IDs
lastDeviceVersion	
volumesPartial	boolean
volumeList	List of Volume objects
deletedVolumeIdList	List of IDs
lastVolumeVersion	

Delta (page 2 of 2)

	Type
vTreelsPartial	boolean
vTreeList	List of VTree objects
deletedVTreeldList	List of IDs
lastVTreeVersion	
scsilInitiatorIsPartial	boolean
scsilInitiator	List of ScsilInitiator objects
deletedScsilInitiatorIdList	List of IDs
lastScsilInitiatorVersion	
sdclsPartial	boolean
sdclList	List of SDC objects
deletedSdcIdList	List of IDs
lastSdcVersion	
faultSetIsPartial	boolean
faultSetList	List of Fault Set objects
deletedFaultSetIdList	List of IDs
lastFaultSetVersion	

Protection Domain

Object

Properties	Type	Required\Optional for POST
id		-
name		Required
protectionDomainState		-
rebuildNetworkThrottlingEnabled		-
rebalanceNetworkThrottlingEnabled		-
overallIoNetworkThrottlingEnabled		-
rebuildNetworkThrottlingInKbps		-
rebalanceNetworkThrottlingInKbps		-
overallIoNetworkThrottlingInKbps		-
systemId		-
overallIoNetworkThrottlingEnabled		-
overallIoNetworkThrottlingInKbps		-

Parent

Name	Type	Note
System		

Relationships

Name	Type	Note
SDS	List of SDS objects	
StoragePool	List of Storage Pool objects	
FaultSet	List of Fault Set objects	
Statistics		

Statistics

Object (page 1 of 3)

Properties	Type	Note
numOfSds		
numOfStoragePools		
numOfFaultSets		
rmcacheSizeInKb		
capacityLimitInKb		
maxCapacityInKb		
capacityInUseInKb		
thickCapacityInUseInKb		
thinCapacityInUseInKb		
snapCapacityInUseInKb		
snapCapacityInUseOccupiedInKb		
unreachableUnusedCapacityInKb		
protectedVacInKb		
degradedHealthyVacInKb		
degradedFailedVacInKb		
failedVacInKb		
inUseVacInKb		
activeMovingInFwdRebuildJobs		
pendingMovingInFwdRebuildJobs		
activeMovingOutFwdRebuildJobs		
pendingMovingOutFwdRebuildJobs		
activeMovingInBckRebuildJobs		
pendingMovingInBckRebuildJobs		
activeMovingOutBckRebuildJobs		
pendingMovingOutBckRebuildJobs		
activeMovingInRebalanceJobs		
pendingMovingInRebalanceJobs		
activeMovingRebalanceJobs		activeMovingOutRebalanceJobs
pendingMovingRebalanceJobs		pendingMovingOutRebalanceJobs
primaryVacInKb		
secondaryVacInKb		

Object (page 2 of 3)

Properties	Type	Note
primaryReadBwc	BWC	
primaryReadFromDevBwc	BWC	
primaryWriteBwc	BWC	
secondaryReadBwc	BWC	
secondaryReadFromDevBwc	BWC	
secondaryWriteBwc	BWC	
totalReadBwc	BWC	
totalWriteBwc	BWC	
fwdRebuildReadBwc	BWC	
fwdRebuildWriteBwc	BWC	
bckRebuildReadBwc	BWC	
bckRebuildWriteBwc	BWC	
rebalanceReadBwc	BWC	
rebalanceWriteBwc	BWC	
spareCapacityInKb		
capacityAvailableForVolumeAllocationInKb		
protectedCapacityInKb		
degradedHealthyCapacityInKb		
degradedFailedCapacityInKb		
failedCapacityInKb		
movingCapacityInKb		
activeMovingCapacityInKb		
pendingMovingCapacityInKb		
fwdRebuildCapacityInKb		
activeFwdRebuildCapacityInKb		
pendingFwdRebuildCapacityInKb		
bckRebuildCapacityInKb		
activeBckRebuildCapacityInKb		
pendingBckRebuildCapacityInKb		
rebalanceCapacityInKb		
activeRebalanceCapacityInKb		
pendingRebalanceCapacityInKb		
atRestCapacityInKb		

Object (page 3 of 3)

Properties	Type	Note
numOfUnmappedVolumes		
numOfMappedToAllVolumes		
numOfThickBaseVolumes		
numOfThinBaseVolumes		
numOfSnapshots		
numOfVolumesInDeletion		

Operations (page 1 of 3)

Operation	URI	Method	Parameters	Notes	Return
	/api/types/ProtectionDomain/instances	GET			List of all Protection Domain objects
Get delta for ProtectionDomain	/api/types/ProtectionDomain/instances?systemId={system id}&sessionTag={session tag}&lastVersion={last version}	GET			Delta
	/api/instances/ProtectionDomain:::{id}	GET			Protection Domain object
	/api/instances/ProtectionDomain:::{id}/relationships/Sds	GET			List of SDS objects that are connected to the Protection Domain
	/api/instances/ProtectionDomain:::{id}/relationships/StoragePool	GET			List of Storage Pool objects that are connected to the Protection Domain
	/api/instances/ProtectionDomain:::{id}/relationships/FaultSet	GET			List of Fault Set objects that are connected to the Protection Domain
	/api/instances/ProtectionDomain:::{id}/relationships/Statistics	GET			List of Statistics for the Protection Domain

Operations (page 2 of 3)

Operation	URI	Method	Parameters	Notes	Return
	/api/types/ProtectionDomain/instances/action/querySelectedStatistics	POST	Required: <u>ids</u> - list of objects IDs or <u>allIds</u> - with empty value properties - list of properties to fetch (to see available properties look at Statistics)	If <u>allIds</u> appears, <u>ids</u> list is ignored and a list of selected properties is returned for every ProtectionDomain.	List of: id and the selected properties. For example: <code>https://localhost:443/api/types/ProtectionDomain/instances/action/querySelectedStatistics</code> with: <code>{"properties":["capacityInUseInKb"], "allIds":""}</code> Returns: { "ce475c1800000001":{ "capacityInUseInKb":0 }, "ce475c1700000000":{ "capacityInUseInKb":33554432 } }
	/api/types/ProtectionDomain/instances/action/queryIdByKey	POST	Required: <u>name</u>		id
	/api/types/ProtectionDomain/instances/action/queryBySelectedIds	POST	Required: <u>ids</u>		List of ProtectionDomain objects matching the <u>ids</u> See the example immediately after this table.
Remove a protection domain	/api/instances/ProtectionDomain:::{id}/action/removeProtectionDomain	POST			
	/api/types/ProtectionDomain/instances	POST	According to “Required\Optional for POST” column in Protection Domain object.		id

Operations (page 3 of 3)

Operation	URI	Method	Parameters	Notes	Return
	/api/instances/ProtectionDomain:: <id>/action/setProtectionDomainName</id>	POST	Required: <u>name</u>		
	/api/instances/ProtectionDomain:: <id>/action/activateProtectionDomain</id>	POST	Required: <u>forceActivate</u>		
	/api/instances/ProtectionDomain:: <id>/action/inactivateProtectionDomain</id>	POST	Required: <u>forceShutdown</u> - "TRUE" or "FALSE"		
Start devices test	/api/instances/ProtectionDomain:: <id>/action/setSdsNetworkLimits</id>	POST	Required: <u>rebuildLimitInKbps</u> AND\OR <u>rebalanceLimitInKbps</u> AND\OR <u>overallLimitInKbps</u>		
	/api/instances/ProtectionDomain:: <id>/action/setSdsNetworkLimits</id>	POST	Required: <u>rebuildLimitInKbps</u> AND\OR <u>rebalanceLimitInKbps</u> AND\OR <u>overallLimitInKbps</u>		
	/api/instances/ProtectionDomain:: <id>/action/queryProtectionDomainNetwork</id>	POST			Response: List of SdsPeerConnectionState
	/api/instances/ProtectionDomain:: <id>/action/setSdsRmcacheEnabled</id>	POST	Required: <u>rmcacheEnabled</u> - TRUE or FALSE		
	/api/instances/ProtectionDomain:: <id>/action/setSdsRmcacheSize</id>	POST	Required: <u>rmcacheSize</u> <u>nMB</u>		

Example for **queryBySelectedIds** (ProtectionDomain objects matching the IDs):

```
/api/types/ProtectionDomain/instances/action/queryBySelectedIds
Body:
{"ids":["2c3071a200000001"]}
```

```
Response:
[
{
"name":"Lab2",
"systemId":"57b89a5b22b0bc80",
"protectionDomainState":"Active",
"rebuildNetworkThrottlingInKbps":null,
"rebalanceNetworkThrottlingInKbps":null,
"overallIoNetworkThrottlingInKbps":null,
"rebuildNetworkThrottlingEnabled":false,
"rebalanceNetworkThrottlingEnabled":false,
"overallIoNetworkThrottlingEnabled":false,
"id":"2c3071a200000001",
"links":[
{
"rel":"self",
"href":"/api/instances/ProtectionDomain::2c3071a200000001"
},
{
"rel":"/api/ProtectionDomain/relationship/Statistics",
"href":"/api/instances/ProtectionDomain::2c3071a200000001/relationships/Statistics"
},
{
"rel":"/api/ProtectionDomain/relationship/FaultSet",
"href":"/api/instances/ProtectionDomain::2c3071a200000001/relationships/FaultSet"
},
{
"rel":"/api/ProtectionDomain/relationship/StoragePool",
"href":"/api/instances/ProtectionDomain::2c3071a200000001/relationships/StoragePool"
},
{
"rel":"/api/ProtectionDomain/relationship/Sds",
"href":"/api/instances/ProtectionDomain::2c3071a200000001/relationships/Sds"
},
{
"rel":"/api/parent/relationship/systemId",
"href":"/api/instances/System::57b89a5b22b0bc80"
}
]
}
```

Delta

Properties	Type
SessionTag	
IsDirty	boolean
ProtectionDomainIsPartial	boolean
ProtectionDomainList	List of Protection Domain objects
DeletedProtectionDomainIdList	List of IDs
LastProtectionDomainVersion	

SdsConnectionState

Properties	Type
sdsId	
peerConnectionStates	List of SdsPeerConnectionStates

SdsPeerConnectionState

Properties	Type
peerSdsId	
connections	List of SingleConnectionStates

SingleConnectionState

Properties	Type
peerHostname	
isConnected	
connectionCount	

DeviceTestResults

Properties	Type
deviceId	
deviceTestResults	List of DeviceTestResult

DeviceTestResult

Properties	Type
testTime	
totalIOInKb	
numOfIos	
millis	
testNum	
pattern	
rc	

SDS

Object

Properties	Type	Required\Optional for POST
id		-
name		Optional
ipList	SdsIp list	Required—name of the property for POST: sdsIpList
port		Optional—name of the property for POST: sdsPort
sdsState	Normal or RemovePending	-
membershipState	JoinPending or Joined or Decoupled	-
mdmConnectionState	Connected or Disconnected	-
drlMode	Volatile or NonVolatile	Optional
rmcacheEnabled		Optional
rmcacheSizeInKb		Optional
rmcacheFrozen		Optional
protectionDomainId		Required
isOnVmWare		-
faultSetId		Optional
numOfIoBuffers		Optional
RmcacheMemoryAllocationState	RmcacheMemoryAllocationState	-

Parent

Name	Type	Note
ProtectionDomain	Protection Domain	
FaultSet	Fault Set	

Relationships

Name	Type	Note
Device	List of Device objects	
Statistics		

Sdslp

Properties	Type
ip	
role	sdsOnly or sdcOnly or all

Statistics

Object (page 1 of 3)

Properties	Type	Note
numOfDevices		
rebuildWaitSendQLength		
rebalanceWaitSendQLength		
rebuildPerReceiveJobNetThrottlingInKbps		
rebalancePerReceiveJobNetThrottlingInKbps		
rmcacheSizeInUseInKb		
rmcacheEntryEvictionSizeCountInKb		
rmcacheBigBlockEvictionSizeCountInKb		
rmcacheEntryEvictionCount		
rmcacheBigBlockEvictionCount		
rmcacheNoEvictionCount		
rmcache4kbEntryCount		
rmcache8kbEntryCount		
rmcache16kbEntryCount		
rmcache32kbEntryCount		
rmcache64kbEntryCount		
rmcache128kbEntryCount		
rmcacheCurrNumOf4kbEntries		
rmcacheCurrNumOf8kbEntries		
rmcacheCurrNumOf16kbEntries		
rmcacheCurrNumOf32kbEntries		
rmcacheCurrNumOf64kbEntries		
rmcacheCurrNumOf128kbEntries		
rmcacheSkipCountLargelo		
rmcacheSkipCountUnaligned4kblo		
rmcacheSkipCountCacheAllBusy		
capacityLimitInKb		
maxCapacityInKb		
capacityInUseInKb		
thickCapacityInUseInKb		
thinCapacityInUseInKb		
snapCapacityInUseInKb		

Object (page 2 of 3)

Properties	Type	Note
snapCapacityInUseOccupiedInKb		
unreachableUnusedCapacityInKb		
protectedVacInKb		
degradedHealthyVacInKb		
degradedFailedVacInKb		
failedVacInKb		
inUseVacInKb		
activeMovingInFwdRebuildJobs		
pendingMovingInFwdRebuildJobs		
activeMovingOutFwdRebuildJobs		
pendingMovingOutFwdRebuildJobs		
activeMovingInBckRebuildJobs		
pendingMovingInBckRebuildJobs		
activeMovingOutBckRebuildJobs		
pendingMovingOutBckJobs		
activeMovingInRebalanceJobs		
pendingMovingRebalanceJobs		
activeMovingRebalanceJobs		activeMovingOutRebalanceJobs
pendingMovingRebalanceJobs		pendingMovingOutRebalanceJobs
primaryVacInKb		
secondaryVacInKb		
primaryReadBwc	BWC	
primaryReadFromDevBwc	BWC	
primaryWriteBwc	BWC	
secondaryReadBwc	BWC	
secondaryReadFromDevBwc	BWC	
secondaryWriteBwc	BWC	
totalReadBwc	BWC	
totalWriteBwc	BWC	
fwdRebuildReadBwc	BWC	
fwdRebuildWriteBwc	BWC	
bckRebuildReadBwc	BWC	

Object (page 3 of 3)

Properties	Type	Note
bckRebuildWriteBwc	BWC	
rebalanceReadBwc	BWC	
rebalanceWriteBwc	BWC	

Operations (page 1 of 5)

Operation	URI	Method	Parameters	Notes	Return
	/api/types/Sds/instances	GET			List of all SDS objects
Get delta for SDS	/api/types/Sds/instances?systemId={system id}&sessionTag={session tag}&lastVersion={last version}	GET			Delta
	/api/instances/Sds::{id}	GET			SDS object
	/api/instances/Sds::{id}/relationships/Device	GET			List of Devices that are connected to the SDS
	/api/instances/Sds::{id}/relationships/Statistics	GET			List of Statistics for the SDS
	/api/types/Sds/instances/action/querySelectedStatistics	POST	Required: <u>ids</u> - list of object IDs or <u>allIds</u> - with empty value <u>properties</u> - list of properties to fetch (to see available properties look at Statistics)	If <u>allIds</u> appears, <u>ids</u> list is ignored and a list of selected properties is returned for every SDS.	List of id and the selected properties. See the example immediately following this table.
	/api/types/Sds/instances/action/queryIdByKey	POST	Required: <u>name</u>		id

Operations (page 2 of 5)

Operation	URI	Method	Parameters	Notes	Return
	/api/types/Sds/instances/action/queryBySelecte dIds	POST	Required: <u>ids</u>		List of SDS objects matching the ids
	/api/instances/Sds::{id}/ action/removeSds	POST			
	/api/instances/Sds::{id}/ action/abortRemoveSds	POST		This request attempts to abort the removal of a server. If done at a late stage, this request might fail and the server will be removed.	

Operations (page 3 of 5)

Operation	URI	Method	Parameters	Notes	Return
	/api/types/Sds/instances	POST	According to “Required\Optional for POST” column in SDS object. Plus: Required: deviceInfoList – list of: "devicePath", "storagePoolId" and "deviceName" (optional) Optional: forceClean – TRUE or FALSE deviceTestTimeSecs - The maximal test run-time in seconds or 128 MB data. Default limit is 10 seconds. Not relevant for noTest. deviceTestMode – testOnly or noTest or testAndActivate. testOnly, Devices will be tested but not used. Later issue activateDevice to start using their capacity. noTest, Devices capacity will be used without any device testing.		id
	/api/instances/Sds::{id}/action/setSdsName	POST	Required: name		

Operations (page 4 of 5)

Operation	URI	Method	Parameters	Notes	Return
	/api/instances/Sds::{id}/action/setSdsPort	POST	Required: <u>sdsPort</u>		
	/api/instances/Sds::{id}/action/setDrlMode	POST	Required: <u>drlMode</u> - "Volatile" or "NonVolatile"		
Add an IP address to a SDS	/api/instances/Sds::{id}/action/addSdsIp	POST	Required: <u>ip</u> <u>role</u>		
Remove an IP address from a SDS	/api/instances/Sds::{id}/action/removeSdsIp	POST	Required: <u>ip</u>		
Set new role to existing IP address	/api/instances/Sds::{id}/action/setSdsIpRole	POST	Required: <u>sdsIpToSet</u> – IP that its role is about to change <u>newRole</u> – new role		
Clear error from all devices in a SDS	/api/instances/Sds::{id}/action/clearDevicesError	POST			
Activate all devices which completed their tests	/api/instances/Sds::{id}/action/activateDevices	POST			
Start devices test	/api/instances/Sds::{id}/action/queryDevicesTestResults	POST			Response: List of DeviceTestResults
	/api/instances/Sds::{id}/action/setSdsRmcacheEnabled	POST	Required: <u>rmcacheEnabled</u> – TRUE or FALSE		
	/api/instances/Sds::{id}/action/setSdsRmcacheSize	POST	Required: <u>rmcacheSizeInMB</u>		
	/api/instances/Sds::{id}/action/purgeRmcache	POST			

Operations (page 5 of 5)

Operation	URI	Method	Parameters	Notes	Return
	/api/instances/Sds::{id}/action/setRmcacheFrozen	POST	Required: <u>rmcacheFrozen</u> - TRUE or FALSE		
	/api/instances/Sds::{id}/action/querySdsNetworkLatencyMeters	POST			NetBwc list
	/api/instances/Sds::{id}/action/setNumOfloBuffers	POST	Required: <u>numOfloBuffers</u>		
	/api/instances/Sds/action/queryDisconnectedSds	POST			List of SDS objects which are disconnected, i.e. their MDM is disconnected or their membership state is not "joined"

Example return output from querySelectedStatistics:

Body:

```
{ "ids": ["ead4729d00000000", "ead4729e00000001"],  
  "properties": ["rmcacheSkipCountLargeIo", "primaryReadFromDevBwc", "degradedHealthyVacInKb", "snapCapacityInUseInKb"] }
```

Response:

List of id and the requested statistics properties

```
{  
  "ead4729d00000000": {  
    "primaryReadFromDevBwc": {  
      "numOccured": 0,  
      "totalWeightInKb": 0,  
      "numSeconds": 0  
    },  
    "rmcacheSkipCountLargeIo": 0,  
    "snapCapacityInUseInKb": 2097152,  
    "degradedHealthyVacInKb": 0  
  },  
  "ead4729e00000001": {  
    "primaryReadFromDevBwc": {  
      "numOccured": 0,  
      "totalWeightInKb": 0,  
      "numSeconds": 0  
    },  
  },  
}
```

```
"rmcacheSkipCountLargeIo":0,  
"snapCapacityInUseInKb":1048576,  
"degradedHealthyVacInKb":0  
}  
}
```

Delta

	Type
sessionTag	
isDirty	boolean
sdsIsPartial	boolean
sdsList	List of SDS objects
deletedSdsIdList	List of IDs
lastSdsVersion	

NetBwc

Properties	Type
sendSizeBwc	MosBwcQueryWindowSize
sendLatencyBwc	MosBwcQueryWindowLatency
sdsId	
sdsIp	

MosBwcQueryWindowSize

Properties	Type
numOccured	
totalWeightInKB	
numSeconds	

MosBwcQueryWindowLatency

Properties	Type
numOccured	
totalWeightInMicroseconds	
numSeconds	

Storage Pool

Object

Properties	Type	Required\Optional for POST
Id		-
Name		Optional
sparePercentage		Optional
rebuildEnabled		Optional
rebalanceEnabled		Optional
rebuildIoPriorityPolicy	unlimited or limitNumOfConcurrentIos or favorAppIos or dynamicBwThrottling	-
rebalanceIoPriorityPolicy		-
rebuildIoPriorityNumOfConcurrentIosPerDevice		-
rebalanceIoPriorityNumOfConcurrentIosPerDevice		-
rebuildIoPriorityBwLimitPerDeviceInKbps		-
rebalanceIoPriorityBwLimitPerDeviceInKbps		-
rebuildIoPriorityAppIopsPerDeviceThreshold		-
rebalanceIoPriorityAppIopsPerDeviceThreshold		-
rebuildIoPriorityAppBwPerDeviceThresholdInKbps		-
rebalanceIoPriorityAppBwPerDeviceThresholdInKbps		-
rebuildIoPriorityQuietPeriodInMsec		-
rebalanceIoPriorityQuietPeriodInMsec		-
numOfParallelRebuildRebalanceJobsPerDevice		-
protectionDomainId		Required
zeroPaddingEnabled		Optional
useRmcache		Optional
rmcacheWriteHandlingMode	Passthrough or Cached	Optional

Parent

Name	Type	Note
ProtectionDomain	Protection Domain	

Relationships

Name	Type	Note
Device	List of Device objects	
VTree	List of VTree objects	
Volume	List of Volume objects	
Statistics		

Statistics

Object (page 1 of 3)

Properties	Type	Note
numOfDevices		
numOfVtrees		
numOfVolumes		
capacityLimitInKb		
maxCapacityInKb		
capacityInUseInKb		
thickCapacityInUseInKb		
thinCapacityInUseInKb		
snapCapacityInUseInKb		
snapCapacityInUseOccupiedInKb		
unreachableUnusedCapacityInKb		
protectedVacInKb		
degradedHealthyVacInKb		
degradedFailedVacInKb		
failedVacInKb		
inUseVacInKb		
activeMovingInFwdRebuildJobs		
pendingMovingInFwdRebuildJobs		
activeMovingOutFwdRebuildJobs		
pendingMovingOutFwdRebuildJobs		
activeMovingInBckRebuildJobs		
pendingMovingInBckRebuildJobs		
activeMovingOutBckRebuildJobs		
pendingMovingOutBckJobs		
activeRebalanceMovingInJobs		
pendingRebalanceMovingInJobs		
activeMovingRebalanceJobs		
pendingMovingRebalanceJobs		
primaryVacInKb		
secondaryVacInKb		
primaryReadBwc	BWC	
primaryReadFromDevBwc	BWC	

Object (page 2 of 3)

Properties	Type	Note
primaryWriteBwc	BWC	
secondaryReadBwc	BWC	
secondaryReadFromDevBwc	BWC	
secondaryWriteBwc	BWC	
totalReadBwc	BWC	
totalWriteBwc	BWC	
fwdRebuildReadBwc	BWC	
fwdRebuildWriteBwc	BWC	
bckRebuildReadBwc	BWC	
bckRebuildWriteBwc	BWC	
rebalanceReadBwc	BWC	
rebalanceWriteBwc	BWC	
spareCapacityInKb		
capacityAvailableForVolumeAllocationInKb		
protectedCapacityInKb		
degradedHealthyCapacityInKb		
degradedFailedCapacityInKb		
failedCapacityInKb		
movingCapacityInKb		
activeMovingCapacityInKb		
pendingMovingCapacityInKb		
fwdRebuildCapacityInKb		
activeFwdRebuildCapacityInKb		
pendingFwdRebuildCapacityInKb		
bckRebuildCapacityInKb		
activeBckRebuildCapacityInKb		
pendingBckRebuildCapacityInKb		
rebalanceCapacityInKb		
activeRebalanceCapacityInKb		
pendingRebalanceCapacityInKb		
atRestCapacityInKb		
numOfUnmappedVolumes		
numOfMappedToAllVolumes		

Object (page 3 of 3)

Properties	Type	Note
numOfThickBaseVolumes		
numOfThinBaseVolumes		
numOfSnapshots		
numOfVolumesInDeletion		

Operations (page 1 of 4)

Operation	URI	Method	Parameters	Notes	Return
	/api/types/StoragePool/instances	GET			List of all Storage Pool objects
Get delta for StoragePool	/api/types/StoragePool/instances?systemId={system id}&sessionTag={session tag}&lastVersion={last version}	GET			Delta
	/api/instances/StoragePool:: <id></id>	GET			Storage Pool object
	/api/instances/StoragePool:: <id>/relationships/Device</id>	GET			List of Device objects that are connected to the Storage Pool
	/api/instances/StoragePool:: <id>/relationships/VTree</id>	GET			List of VTree objects that are connected to the Storage Pool
	/api/instances/StoragePool:: <id>/relationships/Volume</id>	GET			List of Volume objects that are connected to the Storage Pool
	/api/instances/StoragePool:: <id>/relationships/Statistics</id>	GET			List of Statistics for the Storage Pool

Operations (page 2 of 4)

Operation	URI	Method	Parameters	Notes	Return
	/api/types/StoragePool/instances/action/querySelectedStatistics/	POST	Required: <u>ids</u> - list of objects IDs or <u>allIds</u> - with empty value <u>properties</u> - list of properties to fetch (to see available properties, see Statistics)	If <u>allIds</u> appears, <u>ids</u> list is ignored and a list of selected properties is returned for every StoragePool.	List of id and the selected properties
	/api/types/StoragePool/instances/action/queryIdByKey	POST	Required: <u>name</u> AND <u>protectionDomainId</u> or <u>protectionDomainName</u>		id
	/api/types/StoragePool/instances/action/queryBySelectedIds	POST	Required: <u>ids</u>		List of Storage Pool objects matching the ids
Remove a StoragePool	/api/instances/StoragePool:: <id>/action/removeStoragePool</id>	POST			
	/api/types/StoragePool/instances	POST	According to “Required\Optional for POST” column in Storage Pool object.		id
	/api/instances/StoragePool:: <id>/action/setStoragePoolName</id>	POST	Required: <u>name</u>		

Operations (page 3 of 4)

Operation	URI	Method	Parameters	Notes	Return
	/api/instances/StoragePool:: <id>/action/setSparePercentage</id>	POST	Required: <u>sparePercentage</u>		
Start devices test	/api/instances/StoragePool:: <id>/action/queryDevicesTestResults</id>	POST			Response: List of DeviceTestResults
	/api/instances/StoragePool:: <id>/action/setZeroPaddingPolicy</id>	POST	Required: <u>zeroPadEnabled</u> – TRUE or FALSE		
	/api/instances/StoragePool:: <id>/action/setUseRmcache</id>	POST	Required: <u>useRmcache</u>		
	/api/instances/StoragePool:: <id>/action/setRebuildIoPriorityPolicy</id>	POST	Required: <u>policy</u> - unlimited or limitNumOfConcurrentIos or favorAppIos or dynamicBwThrottling		
	/api/instances/StoragePool:: <id>/action/setRebalanceIoPriorityPolicy</id>	POST	Optional: <u>numOfConcurrentIosPerDevice</u> , <u>bwLimitPerDeviceInKbps</u> , <u>appIopsPerDeviceThreshold</u> , <u>appBwPerDeviceThresholdInKbps</u> , <u>quietPeriodInMsec</u>		
	/api/instances/StoragePool:: <id>/action/setRmcacheWriteHandlingMode</id>	POST	Required: <u>rmcacheWriteHandlingMode</u> - Passthrough or Cached		

Operations (page 4 of 4)

Operation	URI	Method	Parameters	Notes	Return
	/api/instances/StoragePool::{id}/action/setRebuildEnabled	POST	Required: <u>rebuildEnabled</u>		
	/api/instances/StoragePool::{id}/action/setRebalanceEnabled	POST	Required: <u>rebalanceEnabled</u>		
	/api/instances/StoragePool::{id}/action/setRebuildRebalanceParallelism	POST	Required: <u>limit</u>		

Delta

Properties	Type
sessionTag	
isDirty	boolean
storagePoolsPartial	boolean
storagePoolList	List of Storage Pool objects
deletedStoragePoolIdList	List of IDs
lastStoragePoolVersion	

Device

Object

Properties	Type	Required\Optional for POST
id		-
name		Optional
deviceCurrentPathname		Required
deviceOriginalPathname		-
deviceState	InitialTest or InitialTestDone or Normal or NormalTesting or RemovePending	-
errorState	None or Error	-
capacityLimitInKb		Optional
maxCapacityInKb		-
storagePoolId		Optional
sdsId		Required

Parent

Name	Type	Note
StoragePool	Storage Pool	
SDS	SDS	

Relationships

Name	Type	Note
Statistics		

Statistics

Object (page 1 of 2)

Properties	Type	Note
fixedReadErrorCount		
avgReadSizeInBytes		
avgWriteSizeInBytes		
avgReadLatencyInMicrosec		
avgWriteLatencyInMicrosec		
capacityInUseInKb		
thickCapacityInUseInKb		
thinCapacityInUseInKb		
snapCapacityInUseInKb		
snapCapacityInUseOccupiedInKb		
unreachableUnusedCapacityInKb		
protectedVacInKb		
degradedHealthyVacInKb		
degradedFailedVacInKb		
failedVacInKb		
inUseVacInKb		
activeMovingInFwdRebuildJobs		
pendingMovingInFwdRebuildJobs		
activeMovingOutFwdRebuildJobs		
pendingMovingOutFwdRebuildJobs		
activeMovingInBckRebuildJobs		
pendingMovingInBckRebuildJobs		
activeMovingOutBckRebuildJobs		
pendingMovingOutBckJobs		
activeRebalanceMovingInJobs		
pendingRebalanceMovingInJobs		
activeMovingRebalanceJobs		activeMovingOutRebalanceJobs
pendingMovingRebalanceJobs		pendingMovingOutRebalanceJobs
primaryVacInKb		
secondaryVacInKb		
primaryReadBwc	BWC	
primaryReadFromDevBwc	BWC	

Object (page 2 of 2)

Properties	Type	Note
primaryWriteBwc	BWC	
secondaryReadBwc	BWC	
secondaryReadFromDevBwc	BWC	
secondaryWriteBwc	BWC	
totalReadBwc	BWC	
totalWriteBwc	BWC	
fwdRebuildReadBwc	BWC	
fwdRebuildWriteBwc	BWC	
bckRebuildReadBwc	BWC	
bckRebuildWriteBwc	BWC	
rebalanceReadBwc	BWC	
rebalanceWriteBwc	BWC	

Operations (page 1 of 4)

Operation	URI	Method	Parameters	Notes	Return
	/api/types/Device/instances	GET			List of all Device objects
Get delta for Device	/api/types/Device/instances?systemId={system id}&sessionTag={session tag}&lastVersion={last version}	GET			Delta
	/api/instances/Device:::id	GET			Device object
	/api/instances/Device:::id/relationships/Statistics	GET			List of Statistics for the Device

Operations (page 2 of 4)

Operation	URI	Method	Parameters	Notes	Return
	/api/types/Device/instances/action/querySelectedStatistics	POST	Required: <u>ids</u> - list of object IDs or <u>allIds</u> - with empty value <u>properties</u> - list of properties to fetch (to see available properties, see Statistics)	If <u>allIds</u> appears, <u>ids</u> list is ignored and a list of selected properties is returned for every Device.	List of id and the selected properties
	/api/types/Device/instances/action/queryIdByKey	POST	Required: <u>name</u> AND <u>sdsId</u> or <u>sdsName</u>		id
	/api/types/Device/instances/action/queryBySelectedIds	POST	Required: <u>ids</u>		Matching ids
Remove a device	/api/instances/Device::{id}/action/removeDevice	POST	Required: <u>force</u> - TRUE or FALSE.		
	/api/instances/Device::{id}/action/abortRemoveDevice	POST		This request attempts to abort the removal of a device. If done at a late stage, this request might fail and the device will be removed.	

Operations (page 3 of 4)

Operation	URI	Method	Parameters	Notes	Return
	/api/types/Device/instances	POST	According to “Required\Optional for POST” column in Device object. Plus: Optional: <u>testTimeSecs</u> - The maximal test run-time in seconds or 128 MB data. Default limit is 10 seconds. Not relevant for noTest. <u>testMode</u> – testOnly or noTest or testAndActivate. testOnly, Devices will be tested but not used. Later, issue activateDevice to start using their capacity. noTest, Devices capacity will be used without any device testing.	If testMode is not part of the request body, a read and write test will be run on devices before their capacity will be used.	id
	/api/instances/Device:: <id>/action/setDeviceCapacityLimit</id>	POST	Required: <u>capacityLimitInGB</u>		
	/api/instances/Device:: <id>/action/clearDeviceError</id>	POST		Clear device error state without checking if the device error was fixed. If the error continues to exist, the device will return to an error state as soon as it is accessed.	

Operations (page 4 of 4)

Operation	URI	Method	Parameters	Notes	Return
Activate a device which completed its test	/api/instances/Device:: <id>/action/activateDevice</id>	POST	Required: <u>sdsId</u>	Device created with testOnly parameter will not be used by the system until activateDevice is sent.	
Start Device test	/api/instances/Device:: <id>/action/queryDeviceTestResults</id>	POST			Response: List of DeviceTestResults
	/api/instances/Device:: <id>/action/setDeviceName</id>	POST	Required: <u>newName</u>		
	/api/instances/Device:: <id>/action/updateDeviceOriginalPathname</id>	POST		Sets deviceOriginalPathname to the value of deviceCurrentPathname	
	/api/instances/Device/action/queryFailedDevices	POST			List of Device objects which are in error state.

Delta

Properties	Type
sessionTag	
isDirty	boolean
devicesPartial	boolean
deviceList	List of Device objects
deletedDeviceIdList	List of IDs
lastDeviceVersion	

Volume

Object

Properties	Type	Required\Optional for POST
Id		-
Name		Optional
volumeSizeInKb		Required
isObfuscated		-
creationTime		-
volumeType	ThickProvisioned or ThinProvisioned or Snapshot	Optional (only ThickProvisioned and ThinProvisioned)
consistencyGroupId		-
mappingToAllSdcsEnabled		-
mappedSdcInfoList	List of SdcMappingInfo	-
mappedScsiInitiatorInfoList	List of ScsiInitiatorMappingInfo	-
ancestorVolumeId		-
vtreeId		-
storagePoolId		Optional
useRmcache	Boolean	Optional

Parent

Name	Type	Note
VTree	VTree	
StoragePool	Storage Pool	
Volume	Volume	Ancestor volume

Relationships

Name	Type	Note
Statistics		

Statistics

Object

Properties	Type	Note
numOfMappedSdcs		
numOfMappedScsilInitiators		
numOfChildVolumes		
numOfDescendantVolumes		
userDataReadBwc	Bwc	
userDataWriteBwc	Bwc	

SdcMappingInfo

Properties	Type	Note
sdclId		
sdclp		
limitIops		
limitBwInMbps		

ScsilInitiatorMappingInfo

Properties	Type	Note
scsilInitiatorId		
scsilInitiatorName		
scsilInitiatorIqn		
lun		

Operations (page 1 of 4)

Operation	URI	Method	Parameters	Notes	Return
	/api/types/Volume/instances	GET			List of all Volume objects
Get delta for Volume	/api/types/Volume/instances?systemId={systemId}&sessionTag={sessionTag}&lastVersion={lastVersion}	GET			Delta
	/api/instances/Volume:::id	GET			Volume object
	/api/instances/Volume:::id/relationships/Statistics	GET			List of Statistics for the Volume
	/api/types/Volume/instances/action/querySelectedStatistics	POST	Required: <u>ids</u> - list of object IDs or <u>allIds</u> - with empty value <u>properties</u> - list of properties to fetch (to see available properties, see Statistics)	If <u>allIds</u> appears, <u>ids</u> list is ignored and a list of selected properties is returned for every Volume.	List of id and the selected properties
	/api/types/Volume/instances/action/queryByIdByKey	POST	Required: <u>name</u>		
	/api/types/Volume/instances/action/queryBySelectedIds	POST	Required: <u>ids</u>		

Operations (page 2 of 4)

Operation	URI	Method	Parameters	Notes	Return
	/api/instances/Volume:: <id>/action/removeVolume</id>	POST	Required: <u>removeMode</u> – "ONLY_ME" or "INCLUDING_DESCENDANTS" or "DESCENDANTS_ONLY" or "WHOLE_VTREE"		
	/api/types/Volume/instances	POST	According to "Required\Optional for POST" column in Volume object. Plus: Required: <u>protectionDomainId</u>		id
	/api/instances/Volume:: <id>/action/setVolumeSize</id>	POST	Required: <u>sizeInGB</u>	New volume size in GB. Basic allocation granularity is 8 GB	
	/api/instances/Volume:: <id>/action/setVolumeName</id>	POST	Required: <u>newName</u>		
Map a volume to one or all SDC nodes	/api/instances/Volume:: <id>/action/addMappedSdc</id>	POST	Required: <u>sdcId</u> – SDC ID Optional: <u>allowMultipleMappings</u> - "TRUE" or "FALSE"	If <u>allSdcs</u> appears, map volume to all clients. Map - exposes a volume to all SDC nodes. The exposure will also include SDC nodes that will be added after the execution of this request.	

Operations (page 3 of 4)

Operation	URI	Method	Parameters	Notes	Return
Unmap a volume from one or all SDC nodes	/api/instances/Volume:: <id>/action/removeMappedSdc</id>	POST	Required: <u>sdcId</u> – SDC ID or <u>allSdcs</u> Optional: <u>ignoreScsilInitiators</u> - "TRUE" or "FALSE"	If allSdcs appears, unmap volume from all SDCs.	
Map a volume to ScsilInitiator	/api/instances/Volume:: <id>/action/addMappedScsilInitiator</id>	POST	Required: <u>scsilInitiatorId</u> – ScsilInitiator ID Optional: <u>lun</u> - LUN number to assign to the mapping. Defaults to the next available LUN. The LUN can be between 0 and 255. Optional: <u>allowMultipleMappings</u> - "TRUE" or "FALSE"		

Operations (page 4 of 4)

Operation	URI	Method	Parameters	Notes	Return
Unmap volume from ScsilInitiator	/api/instances/Volume:: <id>/action/removeMappedScsilInitiator</id>	POST	Required: <u>scsilInitiatorId</u> – ScsilInitiator ID or <u>allScsilInitiator</u>	If allScsilInitiator appears, unmap from all ScsilInitiators.	
Set limits to the IOPS and bandwidth that one SDC generates for the specified volume.	/api/instances/Volume:: <id>/action/setMappedSdcLimits</id>	POST	Required: <u>sdId</u> Optional: <u>bandwidthLimitInKbps</u> - Limit the volume network bandwidth. 0 is unlimited <u>iopsLimit</u> - Limit the volume IOPS. The number of IOPS must be larger than 10. 0 is unlimited.		
	/api/instances/Volume:: <id>/action/setVolumeUseRmcache</id>	POST	Required: <u>useRmcache</u> - TRUE or FALSE		

Delta

Properties	Type
sessionTag	
isDirty	boolean
volumesPartial	boolean
volumeList	List of Volume objects
deletedVolumeIdList	List of IDs
lastVolumeVersion	

VTree

Object

Properties	Type	Note
id		
name		
baseVolumeId		
storagePoolId		

Parent

Name	Type	Note
Volume	Volume	Base volume
StoragePool	Storage Pool	

Relationships

Name	Type	Note
Volume	List of Volume objects	
Statistics		

Statistics

Object

Properties	Type	Note
numOfVolumes		
netCapacityInUseInKb		
baseNetCapacityInUseInKb		
snapNetCapacityInUseInKb		
trimmedCapacityInKb		

Operations (page 1 of 2)

Operation	URI	Method	Parameters	Notes	Return
	/api/types/VTree/instances	GET			List of all VTree objects
Get delta for VTree	/api/types/VTree/instances?systemId={system id}&sessionTag={session tag}&lastVersion={last version}	GET			Delta
	/api/instances/VTree::{id}	GET			VTree object
	/api/instances/VTree::{id}/relationships/Volume	GET			List of Volume objects that are connected to the VTree

Operations (page 2 of 2)

Operation	URI	Method	Parameters	Notes	Return
	/api/instances/VTree::{id}/relationships/Statistics	GET			List of Statistics for the VTree
	/api/types/VTree/instances/action/querySelectedStatistics	POST	Required: <u>ids</u> - list of object IDs or <u>allIds</u> - with empty value. <u>properties</u> - list of properties to fetch (to see available properties, see Statistics)	If <u>allIds</u> appears, <u>ids</u> list is ignored and a list of selected properties is returned for every VTree.	List of: id and the selected properties See the example immediately after this table.
	/api/types/VTree/instances/action/queryBySelectedIds	POST	Required: <u>ids</u>		List of VTree objects matching the ids

Example of return output for querySelectedStatistics:

Body:

```
{ "ids": ["a7e798d100000000"], "properties": ["netCapacityInUseInKb", "numOfVolumes"] }
```

Response:

```
{
  "a7e798d100000000": {
    "numOfVolumes": 1,
    "netCapacityInUseInKb": 0
  }
}
```

Delta (page 1 of 2)

Properties	Type
sessionTag	
isDirty	boolean
vTreelsPartial	boolean

Delta (page 2 of 2)

Properties	Type
vTreeList	List of VTree objects
deletedVTreeIdList	List of IDs
lastVTreeVersion	

ScsiInitiator

Object

Properties	Type	Notes	Required\Optional for POST
id			-
name			Optional
iqn		iSCSI qualified name	Required
systemId			-

Parent

Name	Type	Note
System	System	

Relationships

Name	Type	Note
Volume	List of Volume objects	Mapped volumes
Statistics		

Statistics

Object

Properties	Type	Note
numOfMappedVolumes		

Operations (page 1 of 2)

Operation	URI	Method	Parameters	Notes	Return
	/api/types/Scsilni tiator/instances	GET			List of all Scsilinitiator objects
Get delta for ScsilInitiator	/api/types/Scsilni tiator/instances?s ystemId={system id}&sessionTag={s ession tag}&lastVersion={ last version}	GET			Delta
	/api/instances/Sc silInitiator::{id}	GET			Scsilinitiator object
	/api/instances/Sc silInitiator::{id}/rel ationships/Volum e	GET			List of Volume objects that are connected to the ScsilInitiator
	/api/instances/Sc silInitiator::{id}/rel ationships/Statisti cs	GET			List of Statistics for the ScsilInitiator

Operations (page 2 of 2)

Operation	URI	Method	Parameters	Notes	Return
	/api/types/Scsilni tiator/instances/a ction/querySelect edStatistics	POST	Required: <u>ids</u> - list of object IDs or <u>allIds</u> - with empty value. <u>properties</u> - list of properties to fetch (to see available properties, see Statistics)	If <u>allIds</u> appears, ids list is ignored and a list of selected properties is returned for every ScsilInitiator.	List of id and the selected properties
	/api/types/Scsilni tiator/instances/a ction/queryIdByKe y	POST	Required: <u>name</u>		id
	/api/types/Scsilni tiator/instances/a ction/queryBySele ctedIds	POST	Required: <u>ids</u>		List of ScsilInitiator objects matching the ids
	/api/instances/Sc silInitiator::{id}/act ion/removeScsilni tiator	POST	Required: <u>force</u> - TRUE or FALSE.		
	/api/types/Scsilni tiator/instances	POST	According to “Required\Opti onal for POST” column in ScsilInitiator object.		id

Delta

Properties	Type
sessionTag	
isDirty	boolean
scsilInitiatorIsPartial	boolean
scsilInitiator	List of ScsilInitiator objects
deletedScsilInitiatorIdList	List of IDs
lastScsilInitiatorVersion	

SDC

Object

Properties	Type	Required\Optional for POST
id		
name		Optional
sdclp		Required
sdCGuid		
isOnVmWare		
mdmConnectionState	Connected or Disconnected	
systemId		
sdsApproved		

Parent

Name	Type	Note
System	System	

Relationships

Name	Type	Note
Volume	List of Volume objects	Mapped volumes
Statistics		

Statistics

Object

Properties	Type	Note
numOfMappedVolumes		
userDataReadBwc	BWC	
userDataWriteBwc	BWC	

Operations (page 1 of 2)

Operation	URI	Method	Parameters	Notes	Return
	/api/types/Sdc/instances	GET			List of all SDC objects
Get delta for SDC	/api/types/Sdc/instances?systemId={systemId}&sessionTag={sessionTag}&lastVersion={lastVersion}	GET			Delta
	/api/instances/Sdc::{id}	GET			SDC object
	/api/instances/Sdc::{id}/relationships/Volume	GET			List of Volume objects that are connected to the SDC
	/api/instances/Sdc::{id}/relationships/Statistics	GET			List of Statistics for the SDC

Operations (page 2 of 2)

Operation	URI	Method	Parameters	Notes	Return
	/api/types/Sdc/instances/action/querySelectedStatistics	POST	Required: <u>ids</u> - list of object IDs or <u>allIds</u> - with empty value <u>properties</u> - list of properties to fetch (to see available properties look at Statistics)	If <u>allIds</u> appears, ids list is ignored and a list of selected properties is returned for every Sdc.	List of id and the selected properties
	/api/types/Sdc/instances/action/queryAllApprovedSdc	POST			List of approved SDC objects
	/api/types/Sdc/instances/action/queryByIdByKey	POST	Required: <u>IP address</u>		id
	/api/types/Sdc/instances/action/queryBySelectedIds	POST	Required: <u>ids</u>		List of SDC objects matching the ids
	/api/instances/Sdc::{id}/action/removeSdc	POST			
	/api/instances/Sdc::{id}/action/setSdcName	POST	Required: <u>sdcName</u>		
	/api/types/Sdc/instances	POST	According to "Required\Optional for POST" column in SDC object.		

Delta

Properties	Type
sessionTag	
isDirty	boolean
sdclsPartial	boolean
sdclList	List of SDC objects
deletedSdcIdList	List of IDs
lastSdcVersion	

User

Object

Properties	Type	Required\Optional for POST
id		-
name		Required
userRole	Monitor or Configure or Admin	Required
passwordChangeRequired	boolean	-
systemId		-

Parent

Name	Type	Note
System	System	

Operations

Operation	URI	Method	Parameters	Notes	Return
	/api/types/User/instances	GET			List of all User objects
	/api/instances/User::{id}	GET			User object
	/api/instances/User::{id}/action/removeUser	POST			
	/api/types/User/instances	POST	According to “Required\Optional for POST” column in User object.		id defaultPassword
	/api/instances/User::{id}/action/setUserRole	POST	Required: <u>userRole</u>		
	/api/instances/User/action/setPassword	POST	Required: <u>oldPassword</u> , <u>newPassword</u>		
	/api/instances/User::{id}/action/resetPassword				defaultPassword

Fault Set

Object

Properties	Type	Required\Optional for POST
id		-
name		Optional
protectionDomainId		Required

Parent

Name	Type	Note
ProtectionDomain	Protection Domain	

Relationships

Name	Type	Note
SDS	List of SDS objects	
Statistics		

Statistics

Object

Properties	Type	Note
numOfSds		

Operations (page 1 of 2)

Operation	URI	Method	Parameters	Notes	Return
	/api/types/FaultSet/instances	GET			List of all Fault Set objects
Get delta for FaultSet	/api/types/FaultSet/instances?systemId={system id}&sessionTag={session tag}&lastVersion={last version}	GET			Delta
	/api/instances/FaultSet::{id}	GET			Fault Set object
	/api/instances/FaultSet::{id}/relationships/Sds	GET			List of SDS objects that are connected to the Fault Set
	/api/instances/FaultSet::{id}/relationships/Statistics	GET			List of Statistics for the Fault Set

Operations (page 2 of 2)

Operation	URI	Method	Parameters	Notes	Return
	/api/types/FaultSet/instances/action/querySelecte dStatistics	POST	Required: <u>ids</u> - list of object IDs or <u>allIds</u> - with empty value. <u>properties</u> - list of properties to fetch (to see available properties, see Statistics)	If <u>allIds</u> appears, ids list is ignored and a list of selected properties is returned for every FaultSet	List of id and the selected properties
	/api/types/FaultSet/instances/action/queryIdByKey	POST	Required: <u>name</u> AND <u>protectionDo mainId</u> or <u>protectionDo mainName</u>		id
	/api/types/FaultSet/instances/action/queryBySelec tedIds	POST	Required: <u>ids</u>		List of FaultSet objects matching the ids
	/api/instances/FaultSet::{i d}/action/removeFaultSet	POST			
	/api/types/FaultSet/instances	POST	According to “Required\Op tional for POST” column in Fault Set object.		id
	/api/types/FaultSet::{id}/i nstances/action/clearFault Set	POST			
	/api/types/FaultSet::{id}/ins tances/action/setFaultSetN ame	POST	Required: <u>newName</u>		

Delta

Properties	Type
sessionTag	
isDirty	boolean
faultSetIsPartial	boolean
faultSetList	List of Fault Set objects
deletedFaultSetIdList	List of IDs
lastFaultSetVersion	

Responses

Output Content Format

The supported content format is JSON:

Content-Type: application/json

Return Codes

See http://en.wikipedia.org/wiki/List_of_HTTP_status_codes for standard HTTP status codes. In this interface, the following codes are used:

Return codes (page 1 of 2)

Status Code	Name	ScaleIO usage
200	OK	Successful GET. Body contains requested resource.
201	Created	POST has created the specified resource. Body contains minimal representation of that resource - ID and self link. (Future: etag will be in header.)
202	Accepted	Not in use yet, will be used to return async task resource for long running jobs
204	No Content	Successful action POST, no body content. (Future: For modify, new etag will be in header.)
400	Bad Request	Badly formed URI, parameters, headers, or body content. Essentially a request syntax error.
403	Forbidden	Not allowed - authentication/authorization failure
404	Not Found	Resource doesn't exist - either an invalid type name for instances list (GET, POST) or an invalid ID for a specific instance (GET, POST /action)
405	Method Not Allowed	This code will be returned if you try to use a method that is not documented as a supported method.
406	Not Acceptable	Accept headers do not meet requirements (for example, output format, version, language)
409	Conflict	The request could not be completed due to a conflict with the current state of the resource. This code is only allowed in situations where it is expected that the user might be able to resolve the conflict and resubmit the request. The response body SHOULD include enough information for the user to correct the issue.
422	Unprocessable Entity	Semantically invalid content on a POST, which could be a range error, inconsistent properties, or something similar

Return codes (page 2 of 2)

Status Code	Name	ScaleIO usage
500	Internal Server Error	This code is returned for internal errors - file an AR. It also is returned in some platform management cases when PAPI cannot return a decent error. Best practice is to avoid filing an AR.
501	Not Implemented	Not currently used
503	Service Unavailable	This code should be returned under 2 conditions: • Apache is up but Tomcat is not, or • Apache and Tomcat are up, but Spring is not up Wait, and then try again.

For all 4xx and 5xx return codes, the body may contain an Error instance with more specifics about the failure.

APPENDIX H

SNMP Trap Support

This section describes ScaleIO support for SNMP. Topics include:

- ◆ General 603
- ◆ Supported Alerts 604
- ◆ Event numbering conventions 604
- ◆ Configuration 606
- ◆ ScaleIO.mib file 608

General

SNMP traps are implemented as part of the REST Gateway, using SNMP v2. UDP transport is used for SNMP, and the default port for trap communication is 162.

The SNMP trap sender includes a proprietary/custom MIB called `scaleio.mib`. This MIB file is located on the REST gateway server, in the folder `/gateway/webapps/ROOT/WEB-INF/classes`. A copy of the MIB is included in “[ScaleIO.mib file](#)” on [page 608](#). A general trap type with a unique identification number (OID) is defined in the MIB, so that the SNMP traps are configured to contain alert data within themselves, and use a single OID (as opposed to granular traps). All the SNMP traps contain variable bindings for severity type, which is the alert classification; the ID of the source object for which the alert was created; and an action code, which is the event number.

The alerts are calculated based on MDM polling. The polling interval is configurable.

Only TRAP commands/messages are supported, and are initiated by the ScaleIO SNMP traps manager. GET/SET operations are not supported (or more specifically, GET/GET NEXT/GET BULK/SET/INFORM/RESPONSE).

Both the REST gateway and the SNMP trap receiver must be configured, and the REST gateway must be restarted after configuration.

Supported Alerts

The following alerts can be sent as SNMP traps by the ScaleIO system:

Table 32 Alerts

Alert	Severity
System	
License expired	High
License is about to expire	Medium
MDM not clustered	Single mode: Medium Clustered mode (cluster failure): High
Protection Domain	
Protection Domain inactive	Low
Storage Pools	
Capacity utilization above critical threshold	High
Capacity utilization above high threshold	Medium
Storage pool has failed capacity	High
Storage pool has degraded capacity	Medium
Failure recovery capacity below threshold - actual spare + free capacity is below prescribed spare capacity	Medium
SDS	
SDS disconnected	Medium
Device	
Device failed - device is in error state	Medium

Event numbering conventions

All events are numbered in the following format:

<CLASS>.<TYPE>.<ISSUE>

CLASS/ISSUE:

- ◆ System = 1
 - Capacity = 1
 - License = 2
- ◆ MDM = 2
 - MDM_Cluster = 1
 - Protection_Domain = 2
 - Fault_Set = 3
 - Storage_Pool = 4
- ◆ SDS = 3
 - SDS = 1
 - Device = 2
- ◆ SDC = 4
- ◆ Volume = 5

The same conventions will be applied in the future to additional system events.

Alert	Classification	Number	Severity
System			
License Expired	System.License.License_Expired	1.2.1	
License is About to Expire	System.License.License_Is_About_To_Expire	1.2.2	
MDM			
MDM Not Clustered	MDM.MDM_Cluster.MDM_Not_Clustered	2.1.1	Critical
MDM Not Clustered	MDM.MDM_Cluster.MDM_Not_Clustered_Manually	2.1.2	Warning
MDM Failed to Connect	MDM.MDM_Cluster.Failed_To_Connect	2.1.1	Critical
Protection Domain			

Alert	Classification	Number	Severity
Protection Domain Inactive	MDM.Protection_Domain.Protection_Inactive	2.2.1	
Storage Pool			
Storage Pool has Failed Capacity	MDM.Storage_Pool.Storage_Pool_has_Failed_Capacity	2.4.1	
Storage Pool has Degraded Capacity	MDM.Storage_Pool.Storage_Pool_has_Degraded_Capacity	2.4.2	
Capacity Utilization Above Critical Threshold	MDM.Storage_Pool.Capacity_Utilization_Above_Critical_Threshold	2.4.3	
Capacity Utilization Above High Threshold	MDM.Storage_Pool.Capacity_Utilization_Above_High_Threshold	2.4.4	
Failure Recovery Capacity Below Threshold	System.Capacity.Failure_Recovery_Capacity_Below_Threshold	2.4.5	
SDS			
SDS Disconnected	SDS.SDS.SDS_Disconnected	3.1.1	
Device			
Device Failed	SDS.Device.Device_Failed	3.2.1	

Configuration

The ScaleIO SNMP Traps sender will be invoked every defined interval, will query the MDM, will calculate the defined alerts, and will send them one by one as SNMP traps to the SNMP receiver. These parameters are configured by editing text files on the ScaleIO Gateway node.

To configure the required parameters, perform the following steps:

1. On the ScaleIO Gateway node, open the following file in a text editor:

- **Windows:**
 - C:\Program Files\EMC\ScaleIO\Gateway\webapps\ROOT\WEB-INF\classes\gatewayUser.properties

- When installing the 32 bit installation on a 64 bit Operating System:
C:\Program Files (x86)\EMC\ScaleIO\Gateway\
webapps\ROOT\WEB-INF\classes\gatewayUser.properties
 - **Linux:** /opt/emc/scaleio/gateway/webapps/ROOT/WEB-INF/
classes/gatewayUser.properties
2. In the **SNMP properties** section of the file, edit values for the following properties:
 - **snmp.mdm.username**—the MDM user name
 - **snmp.mdm.password**—the password for the MDM user name
 - **snmp.sampling_frequency**—MDM sampling frequency in seconds (default=30)

If sampling frequency is set to 0, the SNMP traps sender will be disabled, and no sampling to the MDM will be performed.
 - **snmp.traps_receiver_ip**—the SNMP trap receiver's IP address
 - **snmp.port**—the port number used for SNMP traps (default=162)
 3. In the **Features Enabler** section of the file, edit values for the following properties:
 - **features.enable_snmp**—true
 - **features.enable_gateway_and_IM**—controls the port used by the ScaleIO gateway (for REST) and the Installation Manager (default=port 443). You can disable the port by setting the property to **false** (default=true).
 4. Save the file.
 5. Restart the scaleio-gateway service:
 - **Linux:** type the command **service scaleio-gateway restart**
 - **Windows:** restart the **EMC ScaleIO Gateway** service from the Windows **Services** management window.

Configuration is complete.

ScaleIO.mib file

The following text is the content of the `scaleio.mib` file.

```
SCALEIO-MIB DEFINITIONS ::= BEGIN
```

```
IMPORTS
```

```
    MODULE-IDENTITY, OBJECT-TYPE, Integer32 FROM SNMPv2-SMI
```

```
    TRAP-TYPE                FROM RFC-1215
```

```
    DisplayString             FROM RFC1213-MIB;
```

```
scaleio MODULE-IDENTITY
```

```
    LAST-UPDATED "201411060000Z"
```

```
    ORGANIZATION "EMC Corporation"
```

```
    CONTACT-INFO
```

```
        "EMC Corporation"
```

```
        www.emc.com"
```

```
    DESCRIPTION
```

```
        "The Structure of Management Information for the EMC SCALEIO enterprise."
```

```
    REVISION   "201411060000Z"
```

```
    DESCRIPTION
```

```
        "Initial version of this MIB."
```

```
    ::= { emc 101 }
```

```
-- 1.3.6.1.4.1.1139.101.1
```

```
scaleioAlert OBJECT IDENTIFIER ::= { scaleio 1 }
```


-- 1.3.6.1.4.1.1139.101.1.1

scaleioAlertSeverity OBJECT-TYPE

SYNTAX DisplayString (SIZE (0..255))

ACCESS not-accessible

STATUS current

DESCRIPTION

"Severity of the event"

::= { scaleioAlert 1 }

-- 1.3.6.1.4.1.1139.101.1.2

scaleioAlertType OBJECT-TYPE

SYNTAX DisplayString (SIZE (0..255))

ACCESS not-accessible

STATUS current

DESCRIPTION

"Type of the alert"

::= { scaleioAlert 2 }

-- 1.3.6.1.4.1.1139.101.1.3

scaleioAlertSourceObjectId OBJECT-TYPE

SYNTAX DisplayString (SIZE (0..255))

ACCESS not-accessible

STATUS current

DESCRIPTION

"Object id for which the alert was created"

::= { scaleioAlert 3 }

```
-- 1.3.6.1.4.1.1139.101.1.4
```

```
scaleioAlertActionCode OBJECT-TYPE
```

```
    SYNTAX DisplayString (SIZE (0..255))
```

```
    ACCESS not-accessible
```

```
    STATUS current
```

```
    DESCRIPTION
```

```
        "Action code of the alert"
```

```
    ::= { scaleioAlert 4 }
```

```
scaleioAEAlert NOTIFICATION-TYPE
```

```
    OBJECTS { scaleioAlertSeverity, scaleioAlertType, scaleioAlertSourceObjectId,
scaleioAlertDescription, scaleioAlertActionCode }
```

```
    STATUS current
```

```
    DESCRIPTION "ScaleIO Alert"
```

```
    ::= { scaleio 1 }
```

```
END
```

GLOSSARY

This glossary contains terms related to ScaleIO. These terms are used in ScaleIO management tools.

A

- Active Backward Rebuild** A copy of stored data is currently being restored and updated to a recovered server.
- Active Forward Rebuild** A copy of stored data is currently being rebuilt on another server, due to planned or unplanned shutdown of a server.

B

- Backward Rebuild** Backward rebuilds of data are performed on servers which went offline and became active again. Forward rebuilds can take a long time, and therefore, it can be quicker to restore and update the data on a server which has come back online, than it is to do an entire rebuild on a different server.

- BWC** Bandwidth counters

C

- Cache** Random access electronic storage used to retain frequently used data for faster access by the channel. ScaleIO can be configured to use RAM cache on the storage devices in the system, to improve system performance.
- Cache Hit Rate** The percentage of I/Os from cache.
- Cache Skip** Data is written directly to storage, bypassing the cache. Reasons for cache skips include: I/Os were too large, the cache device was busy, or I/Os were unaligned. The cache can also be configured to always work in passthrough mode.
- Cache Writes Handling Mode** The caching write-mode used by the system: passthrough mode (writes to storage only), or cached mode (writes both to cache and to storage).

Cluster Mode ScaleIO is controlled by a cluster of MDM nodes, consisting of a primary, secondary, and tie-breaker node.

D

Degraded Capacity The capacity is available, but is not protected in case of another failure

Device Physical storage device, such as a flash drive, or magnetic disk

F

Failed Capacity The capacity is inaccessible due to a failure, and data integrity is at risk

Fault Sets A Fault Set ensures that SDS data is backed up on SDSs belong to other Fault Sets, thus preventing double-point-of-failure scenarios if rack power outages occur.

Forward Rebuild Data in storage will be rebuilt on another server, due to planned or unplanned shutdown of a server.

I

ID Identifier, a unique sequence of characters that identifies a component in the system. In some CLI commands, an ID can be used to specify a system component.

M

Management IPs The IP addresses of the MDMs defined in the system that can be used to access the MDM from CLI, GUI and REST.

Management Port The Port number used by the MDM for purposes of communicating with the nodes in the ScaleIO network.

MDM The Meta Data Manager, which configures and monitors the ScaleIO system.

P

Pending Backward Rebuild A backward rebuild is waiting in a queue, and will be performed when possible, according to rebuild throttling policy.

Primary MDM IP The IP address of the primary MDM, used for managing the ScaleIO network.

Protected Capacity	Capacity that has an accessible copy in the system, in case of failure
Protection Domain	A Protection Domain is a unique group of SDSs.
R	
RAM Cache	RAM that is reserved for caching storage devices in storage pool.
Rebalance	When ScaleIO detects lopsided use of storage capacity in the network, or when new nodes are added, it redistributes data across the nodes, in order to improve network performance.
Restricted MDM Mode	Command can only be performed from MDM machine.
Restricted SDC Mode	Only approved SDCs can be mapped to volumes.
Rebuild	When ScaleIO detects a failure in the network, it creates a new copy of the data from the failed component, in a new location, to ensure data integrity.
Role	The role of the IP address configured for an SDS. Each SDS can have several IP addresses associated with it. Each IP address can serve a different purpose, or role. IP roles include: SDS, SDC, or both SDS and SDC.
S	
SDC	ScaleIO Data Client, which is a lightweight device driver that exposes ScaleIO volumes as block devices to the application residing on the same server on which the SDC is installed.
SDS	ScaleIO Data Server, which manages the capacity of a single server and acts as a back-end for data access. The SDS is installed on all servers contributing storage devices to the ScaleIO system.
Single Mode	A single MDM manages the ScaleIO network. This mode has no backup protection.
Snapshot Capacity	The amount of capacity occupied by snapshots of volumes
Spare Capacity	Capacity that is reserved for system use, when recovery from failure is required. This capacity cannot be used for storage purposes.

Spare Percentage Policy This policy determines the amount of capacity that must always be reserved as free space.

Storage Pool A sub-set of physical storage devices in a Protection Domain. Each storage device can only belong to one Storage Pool.

T

Thick Capacity Capacity allocated for thick volumes

Thick Provisioned Volume Volume which has all its capacity pre-allocated on creation

Thin Capacity Capacity allocated for thin volumes

Thin Provisioned Volume Volume for which capacity is allocated on demand (by writing to the volume).

Throttling Throttling controls resource prioritization for rebuild and rebalancing processes. Throttling can be controlled per Protection Domain or per Storage Pool (by configuring rebuild and rebalance policies).

U

Unavailable Capacity Capacity that is not being used, but is also unavailable (due to server outage)

Unused Capacity Capacity that is not currently being used for any purpose in the system

V

volume A general term referring to a storage device. In the ScaleIO system, a volume corresponds to a group of physical devices that are presented to applications or users as a single volume, or disk.

W

widget The full screen view can be minimized into a widget, which is a small window that floats on your screen, over other applications. Property sheets can also be minimized into widgets.