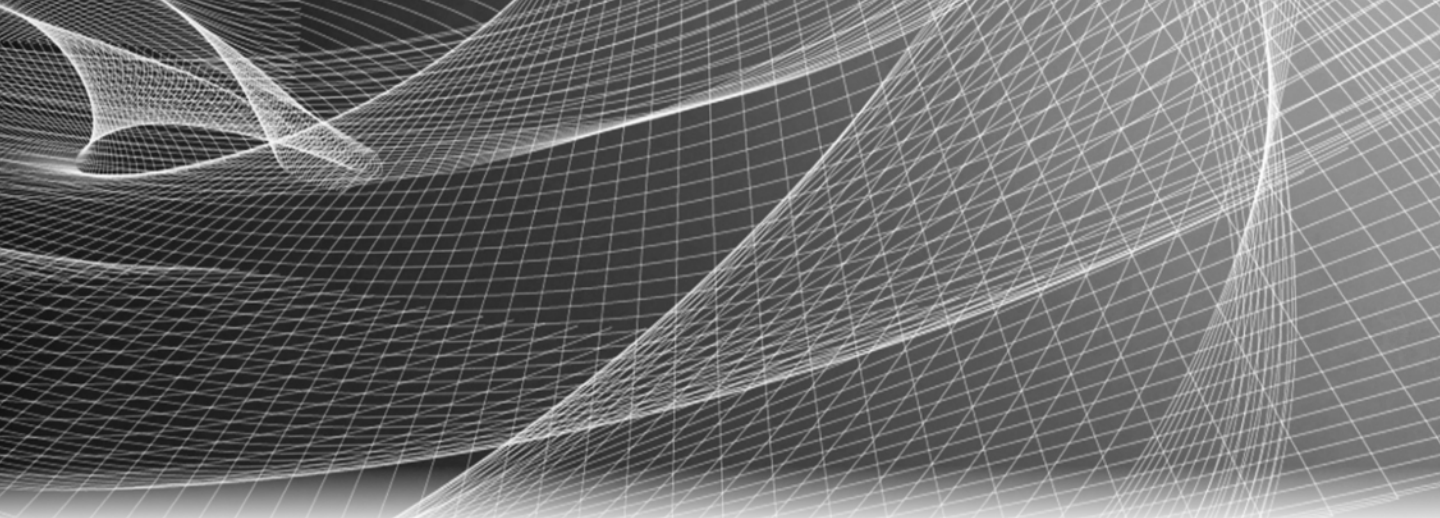




EMC ScaleIO™

V1.32

User Guide

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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.

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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 Quick Start Guide for Windows*
- ◆ *EMC ScaleIO Quick Start Guide for Linux*
- ◆ *EMC ScaleIO Security Configuration Guide*
- ◆ *EMC ScaleIO Fine-Tuning Performance for Flash Environments Technical Notes*
- ◆ *EMC ScaleIO Configuring ScaleIO and XtremCache Technical Notes*
- ◆ *EMC ScaleIO Automatic MDM Cluster Node Replacement Technical Notes*
- ◆ *EMC ScaleIO v1.3x Licensing Options Technical Notes*
- ◆ *EMC ScaleIO Write Splitter for RecoverPoint Technical Notes*

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NOTICE

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

EMC uses the following type style conventions in this document:

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”
()	Parentheses enclose content that the user must specify
...	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? 19](#)
- ◆ [System requirements 20](#)
- ◆ [What’s new in this version? 22](#)
- ◆ [Product limits..... 23](#)

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 disks (SSD), 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:

Table 1 System requirements for ScaleIO nodes (page 1 of 2)

Component	Requirement
Processor	One of the following: • Intel or AMD x86 64-bit (recommended) • Intel or AMD x86 32-bit (for Xen only)
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 26 .
Disk space	• 1 GB for each physical node or Xen hypervisor • 10 GB for VMware topologies
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, according to application demands. • 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 not used by any other application, and are open in the local firewall of the server: —MDM: 6611 and 9011 —SDS: 7072 —Tie-Breaker: 9011 —ScaleIO Gateway (includes REST Gateway, Installation Manager, and SNMP trap sender): 80 and 443 —Light Installation Agent (LIA): 9099 • The following port is open in the local firewall of the server: —SNMP traps: 162 Note: You can change the default ports. For more information, see “Changing default ports” on page 321.

Table 1 System requirements for ScaleIO nodes (page 2 of 2)

Supported operating systems	One of the following (for a complete list, see the EMC Support Matrix): - Linux: CentOS 6.0-7.0, Red Hat 6.0-7.0, SUSE 11 SP2 and SP3, or SUSE 12 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. Requirements for running the GUI: —Java 1.6, or higher —Screen resolution: 1366 x 768 minimum - Windows: 2008 R2, 2012, or 2012 R2 Requirements for running the GUI: —Java 1.7, or higher —Screen resolution: 1366 x 768 minimum Packages required for MDM components: —Install the EMC-provided PythonModulesInstall.exe on all MDM nodes. Download the file from the EMC Online Support site (search for ScaleIO Python Installation Modules) on https://support.emc.com. To install SDC on 2008 R2, ensure that Microsoft Security Update KB3033929 is installed. - Hypervisors: —VMware ESXi OS: 5.5 or 6.0, managed by vCenter 5.5 or 6.0 only —Hyper-V —XenServer 6.1 —RedHat KVM
-----------------------------	--

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

Table 2 System requirements for ScaleIO Gateway (page 1 of 2)

Supported operating systems	One of the following: - Windows 7, 2008 R2, or 2012 R2 - Linux RHEL 6.x or 7.0, SUSE 11 SP2 and SP3, or SUSE 12 Every server requires 2 cores and a minimum of 2 GB RAM.
Supported web browsers	The web client is supported on the following browsers: - Internet Explorer 10, or higher - Firefox, version 37, or higher - Chrome, version 41, or higher

Table 2 System requirements for ScaleIO Gateway (page 2 of 2)

Java requirements	• Linux—1.6 or higher, 64-bit • Windows—1.7 or higher, 32 or 64-bit (for better performance)
Other	• For a Windows Installation Manager (IM), the WMI service must be enabled on the IM server and on all Windows ScaleIO nodes. • The Gateway server must have connectivity to all the nodes that are being installed. If you are using separate networks for management and data, the server must be able to communicate with both networks.

ScaleIO requires that you use a minimum of three SDS servers, with a combined free capacity of at least 300 GB. These minimum values are true per system and per Storage Pool. For complete information on the minimum size of components, see the *ScaleIO User Guide*.

NOTICE

ScaleIO installation enables unlimited use of the product, in **non-production environments**. To obtain a license for production use, and to receive technical support, open a service ticket with EMC Support at <https://support.emc.com>.

For complete information on licensing, see the *ScaleIO User Guide*.

What's new in this version?

This version of ScaleIO provides the following new capabilities:

- ◆ Broader operating system support: ScaleIO supports ESX 6.0 and SLES 12.
- ◆ SDS devices up to 6 TB are now supported.
- ◆ The Installation Manager Wizard enables you to get a ScaleIO system up and running in the simplest manner, with preset node configuration. This mode is perfect for a single Protection Domain, fully-converged system.
- ◆ Introduction of the Background Device Scanner

The Background Device Scanner ("scanner") enhances the resilience of your ScaleIO system by constantly searching for, and fixing, device errors before they can affect your system, thus providing additional data reliability. The scanner runs in the background, not interrupting other Storage Pool activities (such as adding and removing volumes).

When scanning is enabled for a Storage Pool, the scanner seeks out corrupted sectors in the devices in that pool. The scanner also provides SNMP reporting about errors found.

You can configure the scanner with the CLI, REST API, and the ScaleIO GUI.

- ◆ Introduction of Configuration Flexibility

Configuration flexibility enables you to create the following objects:

- a Protection Domain without a Storage Pool
- a Storage Pool without devices
- an SDS components without devices.

This enables easier testing at user sites.

Configuration flexibility is supported with the CLI, REST API, the vSphere client plug-in, and the ScaleIO GUI.

- ◆ The RecoverPoint Splitter can be upgraded using the ScaleIO Installation Manager.
- ◆ ScaleIO installation enables unlimited use of the product, in **non-production environments**. To obtain a license for production use, and to receive technical support, open a service ticket with EMC Support at <https://support.emc.com>.

For complete information on licensing, see the *ScaleIO User Guide*.

- ◆ Improved SDS reconstruction on FAT systems.

Product limits

The following table lists product capabilities:

Table 3 Product limits (page 1 of 2)

Item	Limit
ScaleIO System raw capacity	300 GB—16 PB
Device size	100 GB—6 TB
Minimum Storage Pool capacity	300 GB
Volume size	8 GB—1 PB

Table 3 Product limits (page 2 of 2)

Item	Limit
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
Maximum devices (disks) per Storage Pool	300 ¹
Minimum devices (disks) per Storage Pool	3, on different SDSs
Maximum SDCs per system	1024 ²
Maximum volumes that can be mapped to a single SDC	8192
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

1. If more are needed, contact EMC Support.
2. When using replication with RecoverPoint, the maximum amount of SDCs is reduced by the amount of RPAs in the system.

CHAPTER 2

Architecture

This chapter describes the ScaleIO architecture. Topics include:

- ◆ System 25
- ◆ Storage definitions 27
- ◆ Protection and load balancing 32
- ◆ Networking 35
- ◆ Implementing ScaleIO 40
- ◆ Other functions 44
- ◆ Maintenance 46
- ◆ Snapshots 47
- ◆ Management tools 49
- ◆ Configuring direct attached storage (DAS) 50
- ◆ Implementing ScaleIO over a virtual system 51

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 that resides 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.

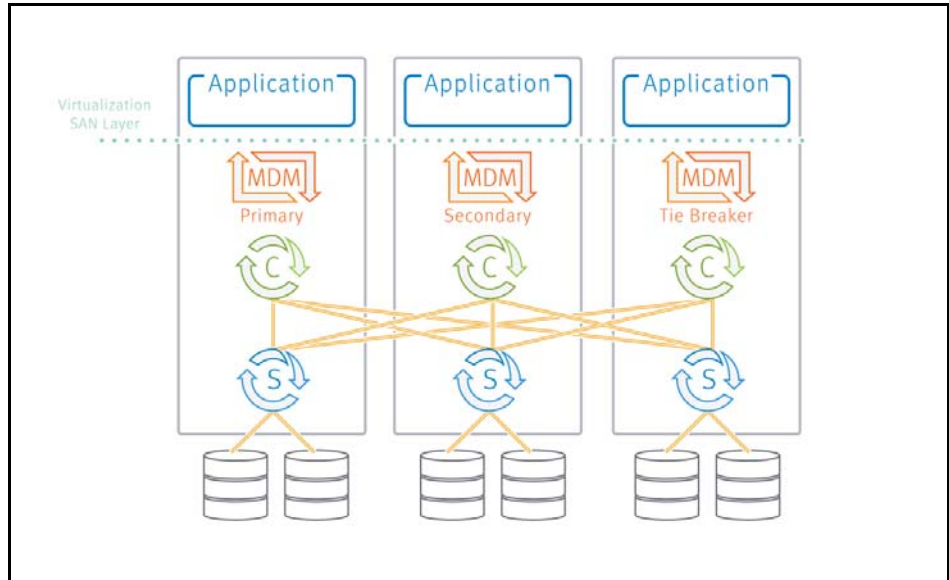


Figure 1 ScaleIO architecture

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 logical entity that contains a group of SDSs that provide backup for each other. 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 28](#) 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 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. In [Figure 2](#), there are 2 Storage Pools depicted.

When a volume is configured over the virtualization layer (see [“SAN virtualization layer” on page 43](#)), it is distributed over all devices residing in the same Storage Pool. Each volume block has two copies located on two different SDSs. This allows the system to maintain data availability following a single-point failure. The data will still be available following multiple failures, as long as each failure took place in a different storage pool.

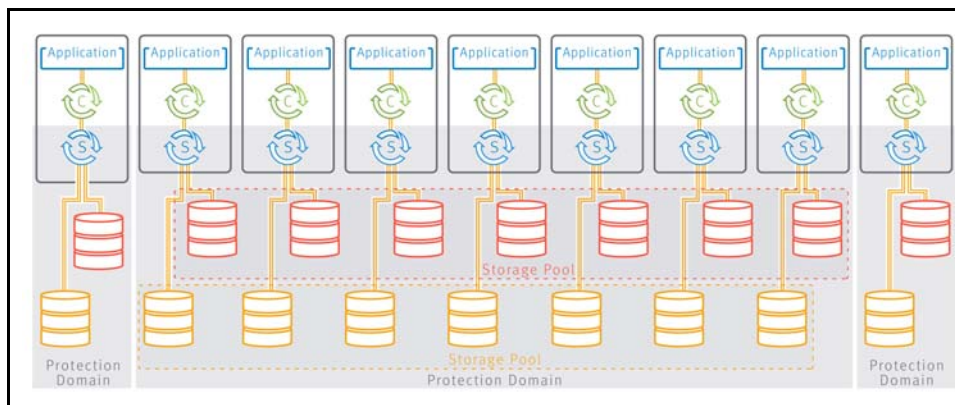


Figure 2 Protection Domains and Storage Pools

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.

Each Storage Pool can work in one of the following modes:

- ◆ **Zero padding enabled**
Ensures that every read from an area previously not written to returns zeros. Some applications might depend on this behavior. Furthermore, zero padding ensures that reading from a volume will not return information that was previously deleted from the volume.

This behavior incurs some performance overhead on the first write to every area of the volume.
- ◆ **Zero padding disabled (default)**
A read from an area previously not written to will return unknown content. This content might change on subsequent reads.

Zero padding *must be enabled* if you plan to do any of the following:

- ◆ Replicate volumes in this Storage Pool using RecoverPoint
- ◆ Use any other application that assumes that when reading from areas not written to before, the storage will return zeros or consistent data

Note: The zero padding policy cannot be changed after the addition of the first device to a specific 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).

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 a Fault Set, or an SDS not associated with a Fault Set (you may think of it as a Fault Set of a single SDS).

There must be enough capacity within at least 3 fault units to enable mirroring.

If Fault Sets are defined, you can use any combination of fault units, 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.

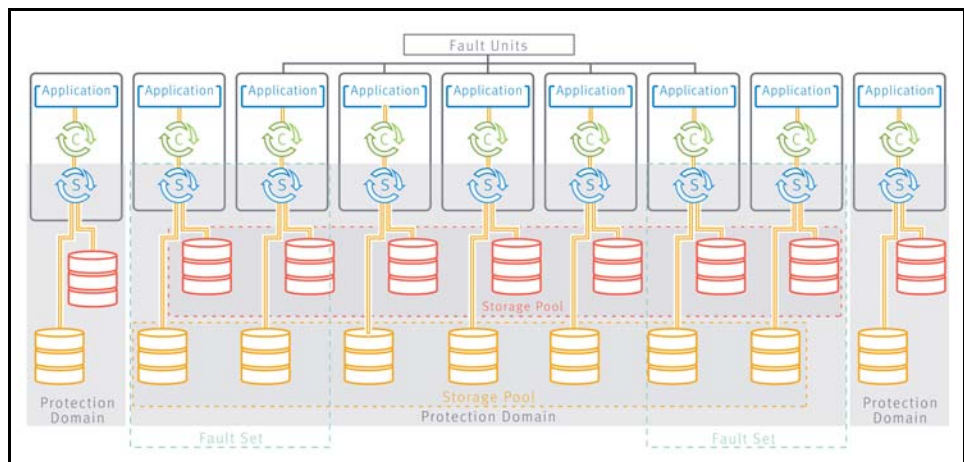


Figure 3 Protection Domains, Storage Pools, and Fault Sets

To use Fault Sets, you must work in the following order:

1. Ensure that a Protection Domain exists, or add a new one.
2. Ensure that a Storage Pool and Fault Sets (minimum of 3 fault units) exist, or add new ones.
3. Add the SDS, designating the PD and FS, and at the same time, adding the SDS devices into a Storage Pool.

The Installation Manager and VMware deployment wizard follow this order automatically.

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 the creation of the SDS.

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**.

Protection and load balancing

ScaleIO maintains the user data in a RAID-1 mesh mirrored layout. Each piece of data is stored on two different servers. The copies are randomly distributed over the storage devices. Rebuild and rebalance processes are fully automated, but are configurable.

Rebuild

When a failure occurs, such as on a server, device or network failure, ScaleIO immediately initiates a process of protecting the data. This process is called **Rebuild**, and comes in two flavors:

- ◆ **Forward rebuild** is the process of creating another copy of the data on a new server. In this process, all the devices in the Storage Pool work together, in a many-to-many fashion, to create new copies of all the failed storage blocks. This method ensures an extremely fast rebuild.
- ◆ **Backward rebuild** is the process of re-synchronization of one of the copies. This is done by passing to the copy only changes made to the data while this copy was inaccessible. This process minimizes the amount of data transferred over the network during recovery.

ScaleIO automatically selects the type of rebuild to perform. This implies that in some cases, more data will be transferred to minimize the time that the user data is not fully protected.

Rebuild throttling

Rebuild throttling sets the rebuild priority policy for a Storage Pool. The policy determines the priority between the rebuild I/O and the application IO when accessing SDS devices. Please note that application I/Os are continuously served.

Applying rebuild throttling will on one hand increase the time the system is exposed with a single copy of some of data, but on the other hand, will reduce the impact on the application. One has to make a decision and choose the right balance between the two.

The following possible priority policies may be applied:

- ◆ **No Limit:** No limit on rebuild I/Os.

Any rebuild I/O is submitted to the device immediately, without further queuing. Please note that rebuild I/Os are relatively large and hence setting this policy will speed up the rebuild, but will have the maximal effect on the application I/O.

- ◆ **Limit Concurrent I/O:** Limit the number of concurrent rebuild I/Os per SDS device (default).

The rebuild I/Os are limited to a predefined number of concurrent I/Os. Once the limit is reached, the next incoming rebuild I/O waits until the completion of a currently executed rebuild I/O. This will complete the Rebuild quickly for best reliability, however, there is a risk of host application impact.

- ◆ **Favor Application I/O:** Limit rebuild in both bandwidth and concurrent I/Os.

The rebuild I/Os are limited both in bandwidth and in the amount of concurrent I/Os. As long as the number of concurrent rebuild I/Os, and the bandwidth they consume, do not exceed the predefined limits, rebuild I/Os will be served. Once either threshold is reached, the rebuild I/Os wait until both I/O and bandwidth are below their thresholds. For example, setting the value to "1" will guarantee the device will only have one concurrent rebuild IO at any given moment, which will ensure the application IOs only wait for 1 rebuild IO at worst case.

This imposes bandwidth on top of the *Limit Concurrent I/Os* option, which is a prerequisite to using this policy.

- ◆ **Dynamic Bandwidth Throttling:** This policy is similar to *Favor Application I/O*, but extends the interval in which application I/Os are considered to be flowing by defining a minimal quiet period. This quiet period is defined as a certain interval in which no application I/Os occurred. Note that the limits on the rebuild bandwidth and concurrent I/Os are still imposed.
- ◆ **Default Values:** The default policy for rebuild is: *Limit Concurrent I/O*
 - Rebuild concurrent I/O Limit: **1 concurrent I/O**

Note: Rebuild throttling affects the system's performance and should only be used by advanced users.

Rebalance

Rebalance is the process of moving one of the data copies to a different server. It occurs when ScaleIO detects that the user data is not evenly balanced across the devices in a Storage Pool. This can occur as a result of several conditions such as: SDS addition/removal, device addition/removal, or following a recovery from a failure. ScaleIO will move copies of the data from the most utilized devices to the least utilized ones.

Both Rebuild and Rebalance compete with the application IO for the system resources. This includes network, CPU and disks. ScaleIO provides a very rich set of parameters that can control this resource consumption. While the system is factory-tuned for balancing between speedy rebuild/rebalance and minimization of the effect on the application IO, the user has very fine-grain control over the rebuild and rebalance behavior.

Rebalance throttling

Rebalance throttling sets the rebalance priority policy for a Storage Pool. The policy determines the priority between the rebalance I/O and the application IO when accessing SDS devices. Please note that application I/Os are continuously served. Rebalance, unlike rebuild, does not impact the system's reliability and therefore reducing its impact is logical.

The following possible priority policies may be applied:

- ◆ **No Limit:** No limit on rebalance I/Os.

Any rebalance I/O is submitted to the device immediately, without further queuing. Please note that rebalance I/Os are relatively large and hence setting this policy will speed up the rebalance, but will have the maximal effect on the application I/O.

- ◆ **Limit Concurrent I/O:** Limit the number of concurrent rebalance I/Os per SDS device.

The rebalance I/Os are limited to a predefined number of concurrent I/Os. Once the limit is reached, the next incoming rebalance I/O waits until the completion of a currently executed rebalance I/O. For example, setting the value to "1" will guarantee that the device will only have one rebalance IO at any given moment, which will ensure that the application IOs only wait for 1 rebalance IO in the worst case.

- ◆ **Favor Application I/O:** Limit rebalance in both bandwidth and concurrent I/Os.

The rebalance I/Os are limited both in bandwidth and in the amount of concurrent I/Os. As long as the number of concurrent rebalance I/Os, and the bandwidth they consume, do not exceed the predefined limits, rebalance I/Os will be served. Once either limiter is reached, the rebalance I/Os wait until such time that the limits are not met again.

This imposes a bandwidth limit on top of the *Limit Concurrent I/Os* option.

- ◆ **Dynamic Bandwidth Throttling:** This policy is similar to *Favor Application I/O*, but extends the interval in which application I/Os are considered to be flowing by defining a minimal quiet period. This quiet period is defined as a certain interval in which no application I/Os occurred. Note that the limits on the rebalance bandwidth and concurrent I/Os are still imposed.
- ◆ **Default Values:**
 - The default policy for rebalance is: *Favor Application I/O*
 - Rebalance concurrent I/O Limit: **1 concurrent I/O** per SDS device
 - Rebalance bandwidth limit: **10240 KB/s**

Note: Rebalance throttling affects the system's performance and should only be used by advanced users.

Networking

In ScaleIO, inter-node communication (for the purposes of managing data locations, rebuild and rebalance, and for application access to stored data) can be done on one IP network, or on separate IP networks. Management (via any of the management interfaces) can be done in the following ways:

- ◆ Via a separate network with access to the other ScaleIO components
- ◆ On the same network

These options can be configured a) during deployment in the full Installation Manager (via the CSV topology file) and using the VMware plug-in, as well as b) after deployment with the CLI.

This section describes how to choose from these options, depending on your organization's requirements, security considerations, performance needs, and IT environment.

ScaleIO networking considerations:

◆ **Single IP network**

All communications and IOs used for management and for data storage are performed on the same IP network. This setup offers the following benefits:

- Ease of use
- Fewer IP addresses required

◆ **Multiple separate IP networks**

Separate networks are used for management and for data storage, or separate networks are used within the data storage part of the system. This setup offers the following benefits:

- Security
- Redundancy
- Performance
- Separate IP roles in order to separate between customer data and internal management

Note: Network high availability can be implemented by using NIC-bonding (refer to relevant operating system vendor guidelines for best practices) or by using several data networks in ScaleIO.

For more information about MTU performance considerations and best practices, see the *EMC Fine-Tuning ScaleIO Performance Technical Notes*.

The following table describes the range of potential IP address configurations:

Table 4 IP address configurations in ScaleIO (based on CSV file)

Column in CSV file	MDM Mgmt IP	MDM IPs	SDS All IPs	SDS-SDS Only IPs	SDS-SDC Only IPs
Comments	Management Access	Control Network	Rebuild and Data Path Network	Rebuild Network	Data Path Network
	Optional, but recommended; not applicable for Tie-Breaker IP addresses that can be used to provide access to ScaleIO management applications, such as CLI, GUI, REST API, OpenStack. This IP address must be externally accessible.	Mandatory IP addresses used for MDM control communications with SDSs and SDCs, used to convey data migration decisions, but no user data passes through the MDM. Must be on the same network as the data network. Must be externally accessible if no MDM Management IP addresses are used.	IP addresses used for both SDS-SDS and SDS-SDC communications. These IP addresses will also be used to communicate with the MDM	IP addresses used for SDS-SDS communication only. These addresses are used for rebuild & rebalance operations. These IP addresses will also be used to communicate with the MDM.	IP addresses used for SDS-SDC communication. These addresses are only used for read-write user data operations.

The following combinations can be used for SDS/SDC:

- ◆ Only **SDS All IPs**
- ◆ Only **SDS-SDS Only IPs + SDS-SDC Only IPs**
- ◆ **SDS All IPs + either SDS-SDS Only IPs or SDS-SDC Only IPs** (can be used in cases of multiple networks; ensure that you do not use the same IP address more than once in the networks).
- ◆ **SDS All IPs + both SDS-SDS Only IPs and SDS-SDC Only IPs** (can be used in cases of multiple networks; ensure that you do not use the same IP address more than once in the networks).

Note: On Windows and Linux, only the MDM needs a management IP address. On VMware, all ScaleIO VMs need to have a management IP address as well as another address for the data network, the network on which traffic flows between SDSs and SDCs for read/writes, rebuild, and rebalance.

In the following example drawing for separate networks, a very simple example is shown, where the management and storage parts of the system are on different networks. In more complex configurations, MDMs, SDCs and SDSs can be on separate networks. Up to 8 separate networks per ScaleIO system are supported.

VMware limitation:

Multiple IP subnets used for the ScaleIO Data network cannot be on the same subnet in a VMWare setup.

For more information, see the VMWare limitation in the following link:

http://kb.vmware.com/selfservice/microsites/search.do?language=en_US&cmd=displayKC&externalId=2010877

ScaleIO only supports the following network configurations when deployed on VMware:

- ◆ A single data storage network
- ◆ Two or more data networks, each on separate IP subnets
- ◆ A single IP data network using several NIC-bonding configurations, or vSwitch load balancing

The following figures show example configurations and the corresponding fields in a CSV configuration file.

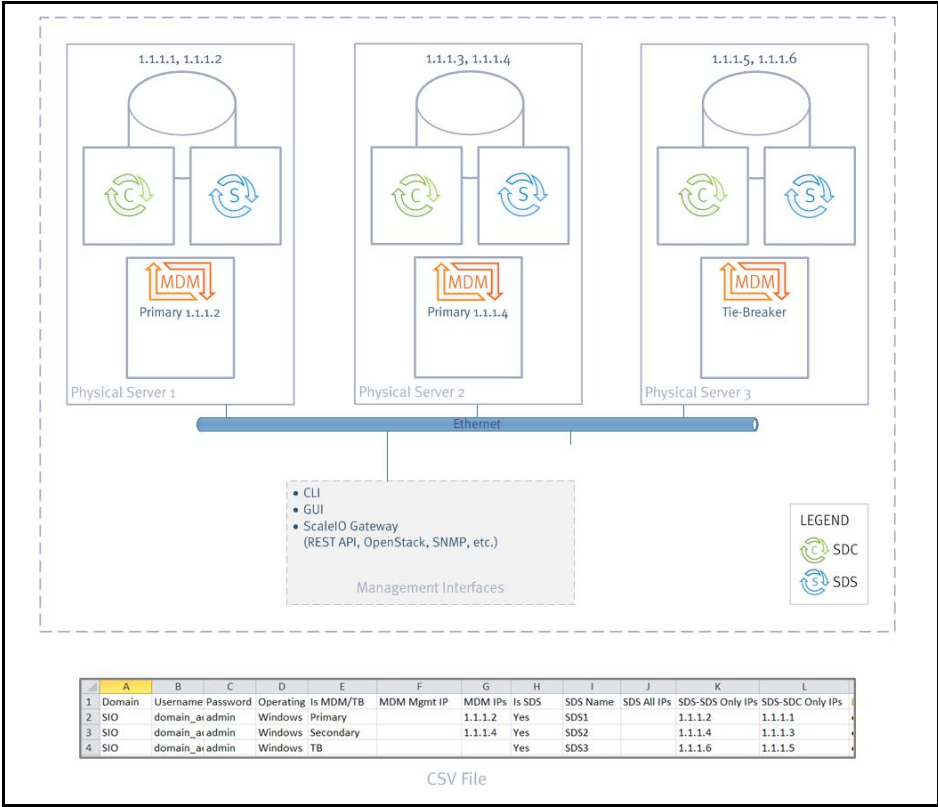


Figure 4 ScaleIO system deployed on a single network (Windows)

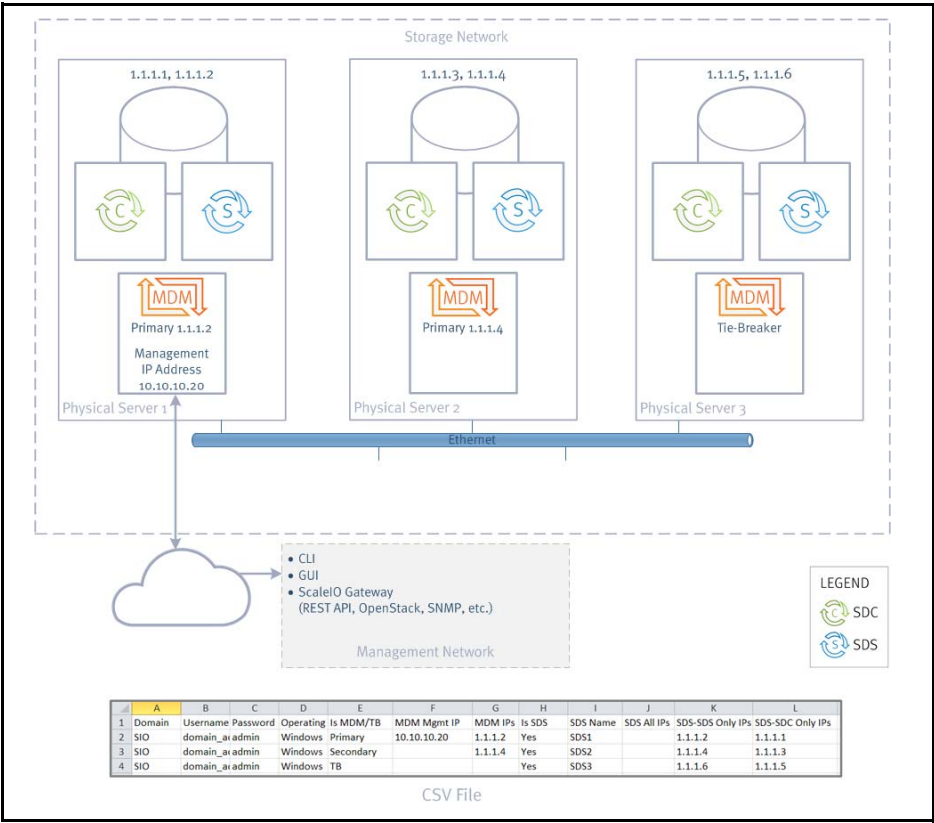


Figure 5 ScaleIO system deployed on separate networks (Windows)

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.

Note: MDMs do not require dedicated nodes. They can be installed on nodes hosting other ScaleIO components.

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 6 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, which are all described in the *ScaleIO Installation Guide*:

- ◆ ScaleIO Installation Manager
a CLI or web-client based tool
- ◆ ScaleIO VMware plug-in
a VMware plug-in
- ◆ Manual installation
manual installation procedures

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 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:

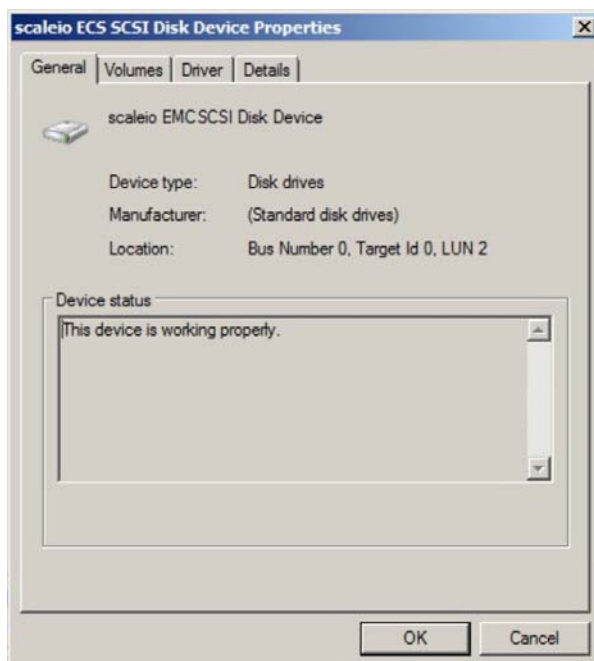
- Access control per volume exposed
- Shared nothing or shared everything volumes

Once an SDC is mapped to a volume, it immediately gets access to the volume and exposes it locally to the applications as a standard block device. These block 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:



The maximum amount of volumes that can be mapped to an SDC is listed in [Table 3, “Product limits.”](#)

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.

◆ 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.

◆ 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.

◆ Background Device Scanner

The Background Device Scanner ("scanner") enhances the resilience of your ScaleIO system by constantly searching for, and fixing, device errors before they can affect your system. This provides increased data reliability than the media's checksum scheme provides. The scanner seeks out corrupted sectors of the devices in that pool, provides SNMP reporting about errors found, and keeps statistics about its operation.

When a scan is completed, the process starts again, thus adding constant protection to your system.

You can set the scan rate (default: 1 MB/second per device), which limits the bandwidth allowed for scanning, and choose from the following scan modes:

• Device only mode

The scanner uses the device's internal checksum mechanism to validate the primary and secondary data. If a read succeeds in both devices, no action is taken. If a faulty area is read, an error will be generated.

If a read fails on one device, the scanner attempts to correct the faulty device with the data from the good device. If the fix succeeds, the error-fixes counter is increased. If the fix fails, a device error is issued.

Note: A similar algorithm is performed every time an application read fails on the primary device.

If the read fails on both devices, the scanner skips to the next storage block.

- **Data comparison mode** (only available if zero padding is enabled)

The scanner performs the same algorithm as above, with the following additions:

After successful reads of primary and secondary, the scanner calculates and compares their checksums. If this comparison fails, the compare errors counter is increased, and the scanner attempts to overwrite the secondary device with the data from the primary device. If this fails, a device error is issued.

The scanning function is enabled and disabled (default) at the Storage Pool level, and this setting affects all devices in the Storage Pool. You can make these changes at anytime, and you can add/remove volumes and devices while the scanner is enabled.

When adding a device to a Storage Pool in which the scanner is enabled, the scanning will start about 30 seconds after the device is added.

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 node 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.

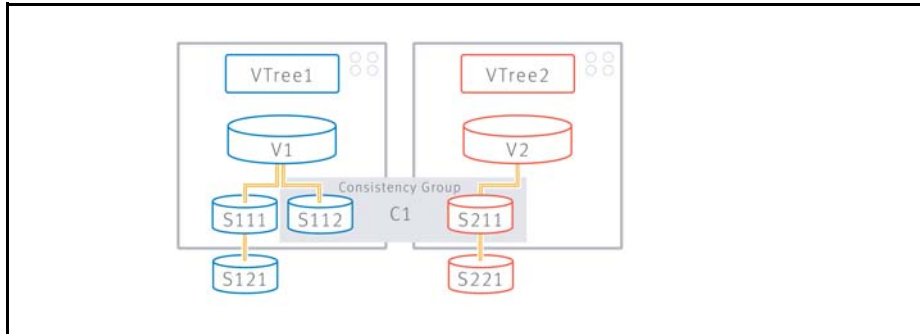


Figure 7 Snapshot operations

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 7](#) 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 7](#), 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 that 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 5, “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 10, “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 the ScaleIO Installation Guide.

For details, see [Chapter 11, “Using the VMware Plug-in.”](#)

- ◆ **OpenStack**

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

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

- ◆ **REST Gateway**

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 F, “REST API Reference.”](#)

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 [Chapter 5, “Command Quick Reference.”](#)

The following tool is also provided:

- ◆ **Installation Manager (IM)**

The IM is used for installing ScaleIO, upgrading and uninstalling components, as well as running the get-info operation. The IM is installed as part of the ScaleIO Gateway, and its use is described in the *ScaleIO Installation Guide*.

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.

For more information about preparing Windows devices, see [“Adding devices to SDS nodes on Windows servers” on page 155](#).

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, the MDM and SDS components are installed on a dedicated SVM, whereas the SDC is installed directly on the ESX host.

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

This implementation is illustrated in the following figure:

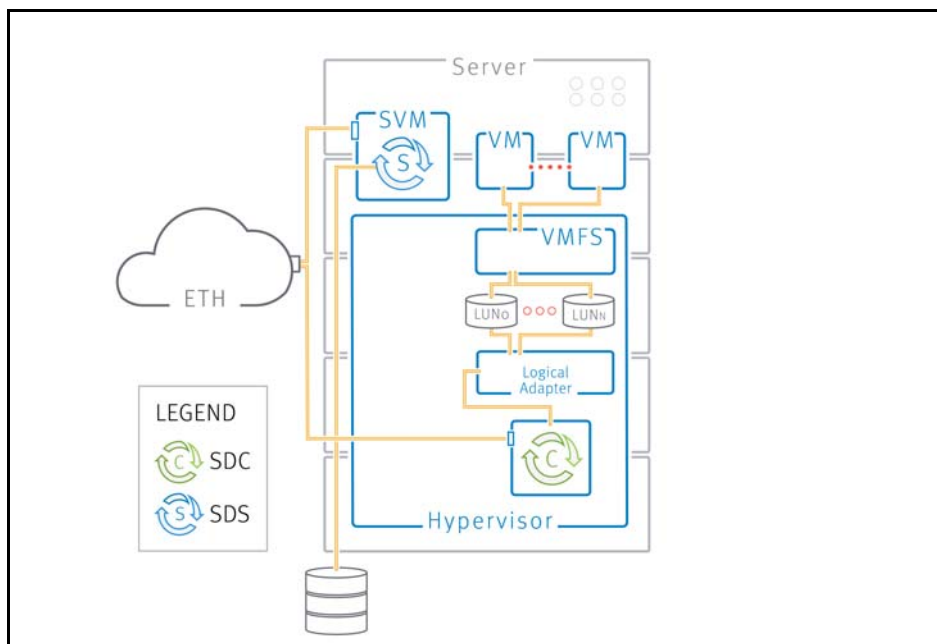


Figure 8 ScaleIO implementation on ESX

Note: The LUNs in the previous figure 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 the *ScaleIO Installation Guide*.

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.

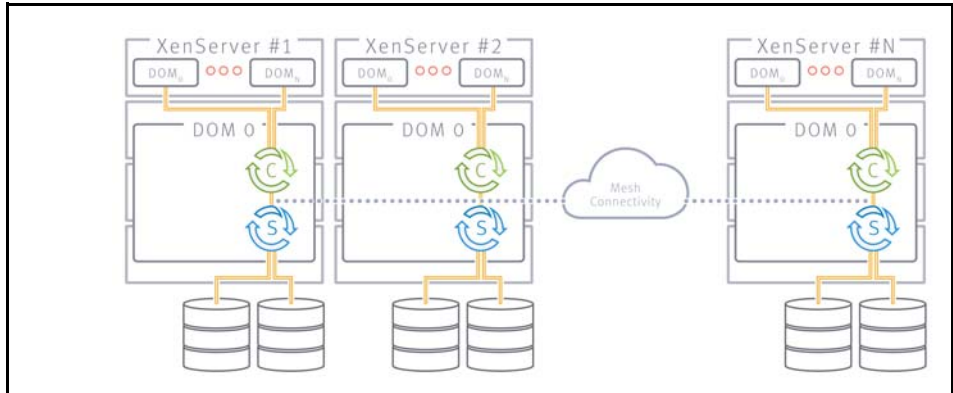


Figure 9 ScaleIO Xen virtual machine architecture

For information on provisioning in a Xen environment, see [Appendix D, “ScaleIO on Xen”](#).

PART 2

Getting Started

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

[Chapter 3, “Creating and Mapping Volumes”](#)

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

[Chapter 4, “Licensing”](#)

This chapter describes how to get and install the license key that is required for ScaleIO use in production environments.

CHAPTER 3

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 161](#).

Creating and mapping volumes

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

- ◆ [“Creating volumes” on page 58](#)
- ◆ [“Mapping a volume to an SDC” on page 60](#)
- ◆ [“Detecting new volumes” on page 61](#)

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 97](#).

Creating volumes

Command

`add_volume`

Syntax

```
scli --add_volume (((--protection_domain_id <ID> |
--protection_domain_name <NAME>) --storage_pool_name <NAME>)
| --storage_pool_id <ID>) --size_gb <SIZE> [--volume_name
<NAME>] [Options] [Obfuscation Options] [Use RAM Read 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 23](#).

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 60](#).

Hint: You can change the default using the `set_obfuscation_properties` command, as described in [“Setting data obfuscation” on page 113](#).

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 195](#).

User-defined names are optional. You can define volume 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, using the volume’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.

Note: If you use the `--storage_pool_id` parameter in the command, it is not necessary to also specify the Protection Domain ID\name and the Storage Pool name.

Parameters

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

For Linux devices, the `scini` device name can change on reboot. It is recommended to mount a mapped volume to the ScaleIO unique ID, a persistent device name, rather than to the `scini` device name.

To identify the unique ID, run the `ls -l /dev/disk/by-id/` command. For more information, see [“Associating ScaleIO volumes with physical disks” on page 322](#).

Parameters

Parameter	Description
<code>--volume_id <ID></code>	Volume ID
<code>--volume_name <NAME></code>	Volume name
<code>--sdc_id <ID></code>	SDC ID
<code>--sdc_name <NAME></code>	SDC name
<code>--sdc_guid <GUID></code>	SDC GUID
<code>--sdc_ip <IP></code>	SDC IP address

<code>--allow_multi_map</code>	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 [“Mounting ScaleIO” on page 315](#).

Parameters

Not applicable.

CHAPTER 4

Licensing

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

- ◆ Overview..... 63
- ◆ Activating entitlements and installing a license file 66
- ◆ License file example..... 72
- ◆ Error messages 73

Overview

ScaleIO installations are enabled to be fully functional, for non-production environments.

Using ScaleIO in a production environment requires a license. The license is installed on the MDM cluster, using the **set_license** command.

To obtain a license for production use, and to receive technical support, open a service ticket with EMC Support at <https://support.emc.com>.

ScaleIO supports the following license options:

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

For more information about the features enabled per license type, see the *ScaleIO Licensing Options Technical Note*, available for download from EMC Online Support.

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 thirty days after installation. After this time elapses, the system will continue to operate, however no configuration changes will be allowed until a permanent license is installed.

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 66](#). Then, you install the licenses on your ScaleIO system, as described in [“Installing the license” on page 72](#).

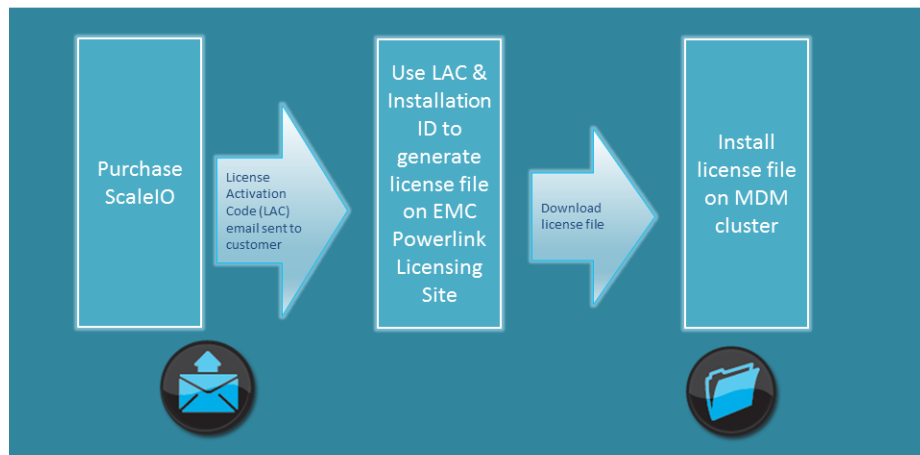
You can view current license information using the CLI or the GUI.

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 10 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 98](#).

- 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 68](#).

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.

LAC Status

This screen shows the activation status of the license entitlements associated with your License Authorization Code (LAC).
Status of LAC: [REDACTED]
Entitlements with "Available" status are available for you to activate.

- Select the "Activate" link to activate your entitlements.
- Select the "Go to Home Page" link to view, [Rehost](#) or Download your previously activated License Key(s).

Part Number	Description	Status	Total Qty	Qty Active	Qty Available	Action
456-105-135	XtremCache Software - QTY 5=1A	Available	6	0	6	Activate
456-105-135	XtremCache Software - QTY 5=1A	Active	4	4	0	
456-105-133	EMC XtremCache software=1A	Active	2	2	0	Go to Home Page
456-105-155	X-Pack - XtremCache software=1A	Active	1	1	0	

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.

EMC Powerlink Licensing

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

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

Search Entitlements to Activate ?

Return

Enter your LAC to find your Entitlements or select Search Entitlements to perform an open search. Check the check box next to each entitlement you want to activate, and then click Activate.

LAC: 1W2V9WP38YF7J7Z63J [Clear LAC] [Add more LACs]

Parent Company: SIOTEST CO. - 16 Digit Installation ID: L [L]

Search Entitlements [Advanced Search] [Advanced Batch Activation] Search Tips

Showing: 1 of 2 [Start Activation Process] [Select All] [Clear All]

LAC	Entitlement	Site	Avail Qty	Total Qty
1W2V9WP38YF7J7Z63J SIOTEST CO.	☐ EMC SCALEIO SOFTWARE CAPACITY=CB Product # 456-106-154	SIOTEST CO.	500	500
	☐ EMC SCALEIO ENTERPRISE FEATURES=CB Product # 456-106-155	SIOTEST CO.	500	500

Showing: 1 of 2 [Start Activation Process] [Select All] [Clear All]

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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.

EMC² Powerlink Licensing

Home | 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 | Next >

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.

Move to site: [Add Site] [Full Site]

The company and user listed below are the registered company and user for this transaction.

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

Cancel Activation | Next >

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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.

Activate Entitlements ?

Search | Register | Activate | Confirm | Complete

Cancel Activation | < Back | Next >

Please provide required information. Enter or validate Quantity then click Next.

Machine Name: SIO_SYSTEM_1 Machine Information

ScaleIO Installation ID: 0123456789ABCDEF [Lockdown ID Help]

Change Machine

Activate all | Clear all

Qty	Avail	Installed	Entitlement	
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

Activate all | Clear all

Cancel Activation | < Back | Next >

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.

12. 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.

13. 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.

License file example

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

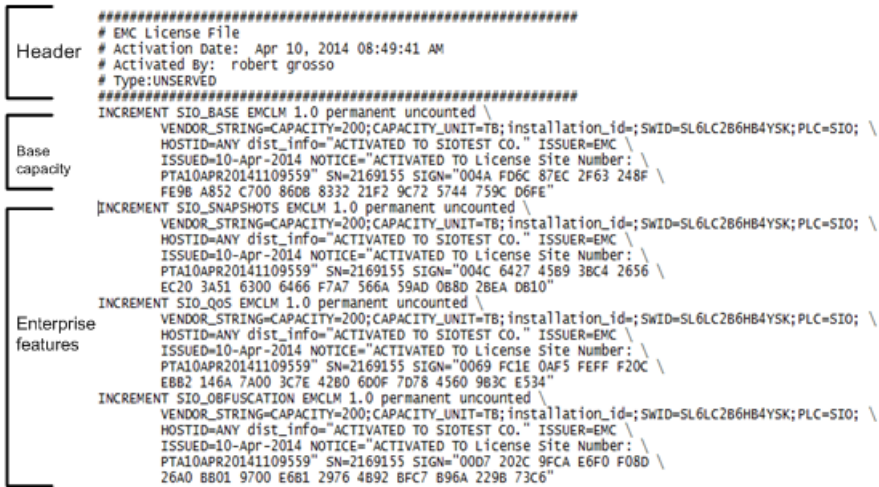


Figure 11 License file example

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

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.

Table 6 Licensing error messages (continued)

Error Message	Description	Solution
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 5, “Command Quick Reference”](#)

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

[Chapter 6, “Security and User Management”](#)

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

[Chapter 7, “Setting up and Configuring the System”](#)

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

[Chapter 8, “Monitoring System Status”](#)

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

[Chapter 9, “Managing System Objects”](#)

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

[Chapter 10, “Using the Graphical User Interface”](#)

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

[Chapter 11, “Using the VMware Plug-in”](#)

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

CHAPTER 5

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.....](#) 78
- ◆ [MDM activities and monitoring.....](#) 79
- ◆ [Protection Domain activities and monitoring](#) 81
- ◆ [SDC activities and monitoring](#) 82
- ◆ [SDS activities and monitoring](#) 83
- ◆ [Storage Pool activities and monitoring](#) 85
- ◆ [User management activities and monitoring.....](#) 87
- ◆ [Volume activities and monitoring](#) 88
- ◆ [Other activities and monitoring](#) 89

You can see all CLI commands, in alphabetical order at [“Alphabetical command list” on page 91](#).

For information on using the ScaleIO CLI, see [“CLI basics” on page 93](#).

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 97](#).

Device activities and monitoring

Table 7 Device activities and monitoring (page 1 of 2)

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
Rename a device		rename_device	Backend › navigate to, and select the device › Rename	
Update original device path		update_device_original_path		
	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	

Table 7 Device activities and monitoring (page 2 of 2)

To do this	To view this	Use this CLI command	Use the GUI	Use the plug-in
	Retrieve device statistics	query_device_latency_meters	Backend > navigate to, and select the device > Property Sheet	
	Retrieve device test results	query_device_test	Backend > navigate to, and select the device > Property Sheet	

MDM activities and monitoring

Table 8 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
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		
Set data obfuscation		set_obfuscation_properties		
Set the license		set_license		
Switch MDM cluster ownership		switch_mdm_ownership		

Table 8 MDM activities and monitoring (page 2 of 2)

To do this	To view this	Use this CLI command	Use the GUI	Use the plug-in
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		
Set the management application ID		set_manager_id		
	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		

Protection Domain activities and monitoring

Table 9 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
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 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		
Remove a Fault Set		remove_fault_set		Deployment Wizard + Basic configuration
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		
	Fault Sets query	query_all_fault_sets		

Table 9 Protection Domain activities and monitoring (page 2 of 2)

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

SDC activities and monitoring

Table 10 SDC activities and monitoring (page 1 of 2)

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		
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		
Modify MDM IP addresses or GUID configured on an ESX-based SDC		esxcli system module parameters get -m scini²		
Abort SDC removal		abort_remove_sdc		
	SDC query	query_sdc		

Table 10 SDC activities and monitoring (page 2 of 2)

To do this	To view this	Use this CLI command	Use the GUI	Use the plug-in
	All SDCs query	<code>query_all_sdc</code>	Dashboard > Cluster > Clients pane	Used for viewing
	Query all active tgt objects	<code>drv_cfg --query_tgts¹</code>		
	Query GUIDs	<code>drv_cfg --query_guid¹</code>		
	Query SCSI initiators	<code>drv_cfg --query_scsi_initiators¹</code>		
	Query to determine to which MDM an SDC is connected	<code>drv_cfg --query_mdms¹</code>		
	Query GUID and MDM IP addresses on an ESX-based SDC	<code>esxcli system module parameters get -m scini²</code>		
	Query SDC state on an ESX-based SDC	To display the SDC state on the ESX server, type the following command: <code>esxcli system module list grep scini²</code>		

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

SDS activities and monitoring

Table 11 SDS activities and monitoring (page 1 of 3)

To do this	To view this	Use this CLI command	Use the GUI	Use the plug-in
Add an IP address to an SDS		<code>add_sds_ip</code>	Backend > navigate to, and select SDS > Configure IP Addresses	

Table 11 SDS activities and monitoring (page 2 of 3)

To do this	To view this	Use this CLI command	Use the GUI	Use the plug-in
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)	
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		

Table 11 SDS activities and monitoring (page 3 of 3)

To do this	To view this	Use this CLI command	Use the GUI	Use the plug-in
	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	
	Query SDS connectivity status	query_sds_connectivity_status	Dashboard › SDSs tile Backend › Filter by SDSs and toggle between various table views	

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.

Storage Pool activities and monitoring

Table 12 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
Add a Storage Pool		add_storage_pool	Backend › navigate to, and select a Protection Domain › Add Storage Pool	Deployment Wizard + Basic configuration

Table 12 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
Modify spare capacity policy		modify_spare_policy	Backend › navigate to, and select the Storage Pool › Configure Spare Percentage Policy	
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 12 Storage Pool activities and monitoring (page 3 of 3)

To do this	To view this	Use this CLI command	Use the GUI	Use the plug-in
Set parallelism limit (concurrent rebuild and rebalance activities)		set_rebuild_rebalance_parallelism		
Enable background device scanner		enable_background_device_scanner	Backend › navigate to, and select the Storage Pool › Set Background Device Scanner Mode	
Disable background device scanner		disable_background_device_scanner	Backend › navigate to, and select the Storage Pool › Set Background Device Scanner Mode	
Reset background device scanner error counters		reset_scanner_error_counters	Backend › navigate to, and select the Storage Pool › Reset Background Device Scanner Counters	
	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	

User management activities and monitoring

Table 13 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
Add a user		add_user		
Change a user's password		set_password		
Delete a user		delete_user		

Table 13 User management activities and monitoring (page 2 of 2)

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

Volume activities and monitoring

Table 14 Volume activities and monitoring (page 1 of 2)

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 --rescan¹		
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

Table 14 Volume activities and monitoring (page 2 of 2)

To do this	To view this	Use this CLI command	Use the GUI	Use the plug-in
Remove consistency group snapshots		remove_consistency_group_snapshots		
Rename a volume		rename_volume		
Set volume bandwidth limits		set_sdc_volume_limits		
Take a snapshot of a volume		snapshot_volume		
Unmap a volume		unmap_volume_from_sdc		Advanced configuration
	All volumes query	query_all_volumes	Dashboard > System Overview> Volumes tile	
	Single volume query	query_volume	Dashboard > System Overview> Volumes tile	
	Volume tree query	query_volume_tree		
	Retrieve volume bandwidth limits	query_sdc_volume_limits		

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.

Other activities and monitoring

Table 15 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
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	

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

To do this	To view this	Use this CLI command	Use the GUI	Use the plug-in
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		
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		

Alphabetical command list

The following table lists all CLI commands in alphabetical order:

Table 16 CLI commands (page 1 of 2)

Command...Page	Command...Page	Command...Page
abort_remove_sds 174	abort_remove_sds_device 179	activate_protection_domain 225
activate_sds_device 187	add_fault_set 115	add_primary_mdm 108
add_protection_domain 114	add_sdc 241	add_sds 120
add_sds_device 175	add_sds_ip 170	add_secondary_mdm 109
add_storage_pool 116	add_tb 110	add_user 100
add_volume 58	clear_fault_set 231	clear_sds_device_error 181
delete_user 101	disable_background_device_scanner 229	disable_sds_rmcache 201
drv_cfg --add_mdm 207	drv_cfg --load_cfg_file 209	drv_cfg --mod_mdm_ip 208
drv_cfg --query_guid 155	drv_cfg --query_mdms 153	drv_cfg --query_scsi_initiators 155
drv_cfg --query_tgts 154	drv_cfg --query_vols 154	drv_cfg --rescan 61
enable_background_device_scanner 227	enable_sds_rmcache 200	help 96
inactivate_protection_domain 224	login 98	logout 99
map_volume_to_sdc 60	modify_management_ip 111	modify_sds_device_capacity 180
modify_sds_ip_role 171	modify_sds_port 173	modify_spare_policy 118
modify_user 101	modify_volume_capacity 166	modify_zero_padding_policy 226
query_all 125	query_all_approved_sdc 146	query_all_device_latency_meters 158
query_all_fault_sets 148	query_all_sdc 153	query_all_sds 151
query_all_volumes 157	query_cluster 144	query_device_latency_meters 190
query_device_test 186	query_fault_set 147	query_license 159
query_network_latency_meters 191	query_properties 133	query_protection_domain 146

Table 16 CLI commands (page 2 of 2)

Command...Page	Command...Page	Command...Page
query_remote_read_only_limit_state 145	query_remote_syslog 159	query_restricted_sdc_mode 145
query_sdc 152	query_sdc_volume_limits 205	query_sds 150
query_sds_connectivity_status 150	query_sds_network_test_results 190	query_storage_pool 149
query_user 103	query_users 102	query_volume 156
query_volume_tree 157	remove_consistency_group_snapshots 164	remove_fault_set 232
remove_protection_domain 216	remove_sdc 241	remove_sds 173
remove_sds_device 178	remove_sds_ip 172	remove_secondary_mdm 235
remove_storage_pool 216	remove_tb 236	remove_volume 165
rename_device 184	rename_fault_set 232	rename_protection_domain 214
rename_sdc 206	rename_sds 169	rename_storage_pool 215
rename_system 243	rename_volume 162	reset_admin 105
reset_password 103	reset_scanner_error_counters 230	set_capacity_alerts_threshold 119
set_drl_properties 193	set_license 113	set_manager_id 242
set_num_of_io_buffers 194	set_obfuscation_properties 113	set_password 104
set_rebalance_mode 218	set_rebalance_policy 221	set_rebuild_mode 217
set_rebuild_policy 219	set_rebuild_rebalance_parallelism 223	set_remote_read_only_limit_state 239
set_restricted_sdc_mode 240	set_rmcache_usage 198	set_rmcache_write_handling_mode 199
set_sdc_volume_limits 204	set_sds_network_limits 192	set_sds_rmcache_size 202
set_syslog_facility 332	set_volume_rmcache_usage 197	showevents.py 330
snapshot_volume 162	start_device_test 185	start_remote_syslog 331
start_sds_network_test 188	stop_remote_syslog 332	switch_mdm_ownership 235
switch_to_cluster_mode 111	switch_to_single_mode 234	unmap_volume_from_sdc 167
update_device_original_path 183		

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.

To avoid using the `--mdm_ip` parameter in every command, or avoid having to install the CLI on servers other than the MDM, use SSH to log in to the shell running on the MDM.

It is not possible to execute CLI commands on the Secondary MDM. However, you can send a command from the secondary MDM by adding the IP address of the Primary MDM to the command, using the `--mdm_ip` parameter.

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 98](#).

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
<code>--o1 <V2></code>	o1 description with possible V2 input values
<code>--o2</code>	o2 description
Options: CHOOSE SEVERAL	
<code>--so1 <V3></code>	so1 description with possible V3 input values
<code>--so2</code>	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 6

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 97](#)
- ◆ [Adding and modifying users 99](#)

Authenticating with the MDM

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

- ◆ [“Logging in” on page 98](#)
- ◆ [“Logging out” on page 99](#)

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 --password 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 100](#)
- ◆ [“Deleting users” on page 101](#)
- ◆ [“Modifying user credentials” on page 101](#)
- ◆ [“Displaying system users and their roles” on page 102](#)
- ◆ [“Displaying information about a specific user” on page 103](#)
- ◆ [“Resetting user passwords” on page 103](#)
- ◆ [“Changing user passwords” on page 104](#)
- ◆ [“Resetting the admin user password” on page 105](#)

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

Description/Notes

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

Parameters

Parameter	Description
--user_ID <ID>	ID of the user to be deleted
--username <NAME>	User name of the user to be deleted

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 7

Setting up and Configuring the System

This chapter describes how to use the CLI to set up and configure ScaleIO. Topics include:

- ◆ [Preparing the MDM 107](#)
- ◆ [Adding capacity 114](#)
- ◆ [Creating and mapping volumes 124](#)

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 108](#)
- ◆ [“MDM cluster setup” on page 109](#)
- ◆ [“Setting up the secondary MDM” on page 109](#)
- ◆ [“Adding a Tie-Breaker \(TB\)” on page 110](#)
- ◆ [“Activating the MDM cluster” on page 111](#)
- ◆ [“Setting the license” on page 113](#)
- ◆ [“Setting data obfuscation” on page 113](#)

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
--primary_mdm_ip <IP>	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.
--mdm_management_ip <IP>	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.
--accept_license	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
--secondary_mdm_ip <IP>	A comma-separated list (no space after the commas) of IP addresses associated with the Secondary MDM
--secondary_mdm_port <PORT>	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 144](#).

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

```
scli --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 that 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 plug-in 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
<code>--license_file <LICENSE_FILE></code>	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.

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 114](#)
- ◆ [“Adding a Fault Set” on page 115](#)
- ◆ [“Adding a Storage Pool” on page 116](#)
- ◆ [“Modifying spare policy” on page 118](#)
- ◆ [“Setting a capacity alert threshold” on page 119](#)
- ◆ [“Adding SDS nodes and devices” on page 120](#)

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 Protection Domain 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, using the Protection Domains' IDs.

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.

Note: When defining Fault Sets, you must follow the guidelines described in [“Fault Sets” on page 30](#). Failure to do so may prevent creation of volumes.

You can define Fault Set 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, using the Fault Sets’ IDs.

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>	The ID of the Protection Domain to which the Fault Set will be added
--protection_domain_name <NAME>	The name of the Protection Domain to which the Fault Set will be added
--fault_set_name	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>] [--use_rmcache | --dont_use_rmcache]
[--rmcache_write_handling_mode <passthrough/cached>
```

Description/Notes

Add a Storage Pool to a Protection Domain. A Storage Pool is a group of devices within a Protection Domain. Each time that you add devices to the system, you must map them to Storage Pools. Create Storage Pools before you start adding SDSs and devices to the system.

Note: If you intend to use the replication feature via RecoverPoint, ensure that zero padding is enabled on the Storage Pool to be replicated, *before* you add any devices to the Storage Pool. For more information, see [“Modifying Storage Pool zero padding policy” on page 226](#).

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

You can define Storage Pool 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, using the Storage Pools’ IDs.

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

<code>--use_rmcache</code>	Use RAM read cache on all SDSs in the Storage Pool (default). You can change this setting later on specific SDSs (they can be individually configured not to use RAM read cache). For more information, see “Managing RAM read cache” on page 195 .
<code>--dont_use_rmcache</code>	Do not use RAM read cache on any SDSs in the Storage Pool
<code>--rmcache_write_handling_mode <CACHED PASSTHROUGH></code>	Determines whether the system stores the data of this Storage Pool's writes in the SDS RAM read cache or not. The default is to store the write data in cache (cached). You can change this setting later. For more information, see “Managing RAM read cache” on page 195 .

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_name <NAME>) | --storage_pool_id <ID>)
--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).

Note: If you use the `--storage_pool_id` parameter in the command, it is not necessary to also specify the Protection Domain ID\name and the Storage Pool name.

Parameters

Parameter	Description
<code>--protection_domain_id <ID></code>	Protection Domain ID
<code>--protection_domain_name <NAME></code>	Protection Domain name
<code>--storage_pool_id <ID></code>	Storage Pool ID
<code>--storage_pool_name <NAME></code>	Storage Pool name
<code>--spare_percentage <PERCENT></code>	Percentage of the total capacity to be set aside as spare
<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 192.168.1.200 --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>]
((--protection_domain_id <ID> |
--protection_domain_name <NAME>) |
(((--protection_domain_id <ID> |
--protection_domain_name <NAME>) --storage_pool_name
<NAME>) | --storage_pool_id <ID>) --device_path <PATHS>
[--device_name <NAMES>])) [--sds_name <NAME>]
[--fault_set_id <ID> | --fault_set_name <NAME>]
[--rmcache_size_mb <SIZE>] [--enable_rmcache |
--disable_rmcache] [--num_of_io_buffers <VALUE>]
[--sds_port <PORT>] [--force_clean]
[--test_time <TIME>] [Test Options] [--i_am_sure]
```

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 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, the SDS' first IP address.

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 *sdc_only* and *sds_only*

A situation where all IP addresses are either `sdc_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.

Note: If you use the `--storage_pool_id` parameter in the command, it is not necessary to also specify the Protection Domain ID\name and the Storage Pool name.

Parameters

Parameter	Description
<code>--sds_ip <IP></code>	A comma-separated list (no space after the commas) of IP addresses or host names associated with the SDS over which the data will be transferred
<code>--sds_ip_role <IP></code>	A comma-separated list of IP roles associated with the SDS IP addresses. Each role is either <code>sdc_only</code> , <code>sds_only</code> , or <code>all</code> .
<code>--protection_domain_id <ID></code>	Protection Domain ID
<code>--protection_domain_name <NAME></code>	Protection Domain name
<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 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.

--storage_pool_id <ID>	A comma-separated list (no space after the commas) of Storage Pool IDs to be associated with the storage devices, respectively. 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.
--device_path <PATHS>	The full path to the devices to be added, comma-separated. A device can be a disk, an unmounted partition, or a file that represents free space on a mounted device. The maximum amount of devices per SDS is described in Table 3 on page 23 .
--device_name <NAMES>	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.
--sds_name <NAME>	Name to be associated with the SDS
--fault_set_id <ID>	Fault Set ID
--fault_set_name <NAME>	Fault Set name
--rmcache_size_mb <SIZE>	Size of the SDS RAM cache in MB (default: 128 MB)
--enable_rmcache	Enables RAM cache on the SDS
--disable_rmcache	Disables RAM cache on the SDS
--num_of_io_buffers <VALUE>	Number of I/O buffers on the SDS
--sds_port <PORT>	Port associated with the SDS (default: 7072)
--force_clean	Clean a previous SDS configuration
--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.
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
--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_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 3, "Creating and Mapping Volumes."](#)

CHAPTER 8

Monitoring System Status

This chapter describes how to use the CLI to monitor the current ScaleIO system status. Topics include:

- ◆ Overview query 125
- ◆ Properties query..... 133
- ◆ MDM queries 144
- ◆ Protection Domain query..... 146
- ◆ Fault Set queries 147
- ◆ Storage Pool query 149
- ◆ SDS queries 150
- ◆ SDC queries 152
- ◆ Volume queries 156
- ◆ All device latency meters query 158
- ◆ License query..... 159

You can monitor the ScaleIO system using the following CLI queries or by using the GUI. For more information on GUI monitoring, see [Chapter 10, “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. [Table 17 on page 128](#) summarizes sample output of this query.

Parameters

Not applicable.

Example

```
scli --mdm_ip 192.168.1.200 --query_all
```

Example output

System Info:

```
Product:  EMC ScaleIO Version: R1_32.321.0
ID:       20d34e7173edf668
Manager ID: 0000000000000000
```

License info:

```
Installation ID: 6127c1c65a3fb1a1
SWID:
Maximum capacity: Unlimited
Usage time left: Unlimited (Non-Production License)
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 17 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
Manager ID	The ID of the management application that controls the MDM
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
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 17 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 17 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 17 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 17 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 17 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 18 on page 135 .
--properties <PROPERTIES>	Queries a comma-separated list of properties. For a list of properties that can be queried per object type, see Table 18 on page 135 .
--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 46fec7ec00000001:
    IPS                                127.0.0.9,127.0.0.101
    PORT                              7073
    PROTECTION_DOMAIN_ID              543664ed00000000
    RMCACHE_ENABLED                   Yes

SDS 46fec7ed00000002:
    IPS                                127.0.0.9,127.0.0.101,127.0.0.102
    PORT                              7074
    PROTECTION_DOMAIN_ID              543664ed00000000
    RMCACHE_ENABLED                   Yes
```

Table 18 Object properties and presets (page 1 of 10)

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 18 Object properties and presets (page 2 of 10)

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 18 Object properties and presets (page 3 of 10)

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 18 Object properties and presets (page 4 of 10)

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 18 Object properties and presets (page 5 of 10)

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 18 Object properties and presets (page 6 of 10)

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 18 Object properties and presets (page 7 of 10)

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 18 Object properties and presets (page 8 of 10)

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 18 Object properties and presets (page 9 of 10)

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 18 Object properties and presets (page 10 of 10)

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 --protection_domain_name pd18
--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
--protection_domain_id <ID>	Protection Domain ID
--protection_domain_name <NAME>	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_name <NAME>) | --storage_pool_id <ID>)
```

Description/Notes

This command provides aggregated information about all objects in a single Storage Pool.

Note: If you use the `--storage_pool_id` parameter in the command, it is not necessary to also specify the Protection Domain ID\name and the Storage Pool name.

Parameters

Parameter	Description
<code>--protection_domain_id <ID></code>	Protection Domain ID
<code>--protection_domain_name <NAME></code>	Protection Domain name
<code>--storage_pool_id <ID></code>	Storage Pool ID
<code>--storage_pool_name <NAME></code>	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 SDS connectivity status

Command

```
query_sds_connectivity_status
```

Syntax

```
scli --query_sds_connectivity_status  
(--protection_domain_id <ID> |  
--protection_domain_name <NAME>)
```

Description/Notes

This command provides connectivity status for the SDSs 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_sds_connectivity_status  
--protection_domain_name pd_18
```

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> | --sdc_ip <IP>
```

Description/Notes

This command provides information about the specified SDC.

Parameters

Parameter	Description
--sdc_id <ID>	SDC ID
--sdc_name <NAME>	SDC name
--sdc_guid <GUID>	SDC GUID
--sdc_ip <IP>	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
```

Volume queries

Volume query

Command

```
query_volume
```

Syntax

```
scli --query_volume (--volume_id <ID> | --volume_name
<NAME>)
```

Description/Notes

This command provides information about the specified volume.

Parameters

Parameter	Description
--volume_id <ID>	The ID of the volume to query
--volume_name <NAME>	The volume name

Example

```
scli --query_volume --volume_name vol_18
```

Volume tree query

Command

`query_volume_tree`

Syntax

```
scli --query_volume_tree (--volume_id <ID> |  
--volume_name <NAME>)
```

Description/Notes

This command provides information about the entire snapshot tree for the specified volume.

Parameters

Parameter	Description
--volume_id <ID>	The ID of the volume to query
--volume_name <NAME>	The volume name

Example

```
scli --query_volume_tree --volume_name vol_18
```

All volumes query

Command

`query_all_volumes`

Syntax

```
scli --query_all_volumes [(((--protection_domain_id  
<ID> | --protection_domain_name <NAME>)  
--storage_pool_name <NAME>) | --storage_pool_id <ID>)]
```

Description/Notes

This command provides information about all volumes in the system.

Parameters

Parameter	Description
--protection_domain_id <ID>	Protection Domain ID
--protection_domain_name <NAME>	Protection Domain name
--storage_pool_name <NAME>	Storage Pool name
--storage_pool_id <ID>	Storage Pool ID

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. If you want to query the devices in a specific SDS, use the command `--query_device_latency_meters`, described in [“Retrieving SDS device latency meters” on page 190](#).

Note: If the background device scanner is enabled, several device read statistics are dramatically affected.

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 9

Managing System Objects

This chapter describes how to use the CLI to manage ScaleIO system objects. Topics include:

- ◆ [Managing volumes](#) 161
- ◆ [Managing the SDS](#)..... 168
- ◆ [Managing RAM read cache](#) 195
- ◆ [Managing the SDC](#)..... 204
- ◆ [Managing Protection Domains](#)..... 213
- ◆ [Managing Fault Sets](#)..... 231
- ◆ [Managing the MDM cluster](#)..... 233
- ◆ [Naming or renaming the system](#) 243

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 162](#)
- ◆ [“Taking a snapshot of a volume” on page 162](#)
- ◆ [“Removing consistency group snapshots” on page 164](#)
- ◆ [“Removing a volume” on page 165](#)
- ◆ [“Increasing a volume size” on page 166](#)
- ◆ [“Unmapping a volume” on page 167](#)

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

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 snapshot 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, using the volume’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: 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
--volume_name_from_file <FILE>	A file containing a new-line-separated list of volume names
--snapshot_name <NAME>	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.
--snapshot_name_from_file <FILE>	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

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.

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 [“Snapshot operations” on page 49](#).

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_id <ID> | --sdc_name
<NAME> | --sdc_guid <GUID> | --sdc_ip <IP> |
--all_sdc) [--ignore_scsi_initiators] [--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
--sdc_guid <GUID>	SDC GUID
--sdc_ip <IP>	SDC IP Address

<code>--all_sdc</code>	Unmap the volume from all SDCs
<code>--ignore_scsi_initiators</code>	Ignore all SCSI initiators
<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 169](#)
- ◆ [“Adding an IP address to an SDS” on page 170](#)
- ◆ [“Modifying the role of an IP on an SDS” on page 171](#)
- ◆ [“Removing an IP address from an SDS” on page 172](#)
- ◆ [“Modifying an SDS port” on page 173](#)
- ◆ [“Removing an SDS” on page 173](#)
- ◆ [“Aborting the removal of an SDS” on page 174](#)
- ◆ [“Managing SDS devices” on page 175](#)
 - [“Adding a device to an SDS” on page 175](#)
 - [“Removing a device from an SDS” on page 178](#)
 - [“Aborting removal of a device from an SDS” on page 179](#)
 - [“Modifying the capacity of an SDS device” on page 180](#)
 - [“Clearing an SDS device error” on page 181](#)
 - [“Updating an SDS device’s path” on page 183](#)

- “Renaming an SDS device” on page 184
- ◆ “Testing an SDS device” on page 184
 - “Starting a device test” on page 185
 - “Retrieving SDS device test results” on page 186
 - “Activating an SDS device” on page 187
- ◆ “Testing the network” on page 188
 - “Starting an SDS network test” on page 188
 - “Retrieving SDS network test results” on page 190
 - “Retrieving SDS device latency meters” on page 190
 - “Retrieving SDS device network statistics” on page 191
- ◆ “SDS network limits” on page 192
- ◆ “Setting DRL properties” on page 193
- ◆ “Configuring I/O memory buffers” on page 194

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 120](#).

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. Scenarios where this command could be used include:

- ◆ In a setup with an SDS that contains more than one NIC (network interface card), one might want to divert the usage of one of the NICs to a different purpose.
- ◆ Changing an IP range—for example, an SDS may be using an IP address in a certain range. Due to organizational expansion, the IT department asks the Data department to change its IP address range to a different one, in order to free the previously used addresses.

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
<code>--sds_id <ID></code>	SDS ID
<code>--sds_name <NAME></code>	SDS name
<code>--sds_ip <IP></code>	SDS IP address
<code>--new_sds_port <PORT></code>	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_name <NAME>)
| --storage_pool_id <ID>) [--test_time] [Test Options]
```

Description/Notes

This command adds a device to the devices managed by the given SDS.

NOTICE

This command destroys all existing data on the device.

Note: If you intend to use the replication feature via RecoverPoint, ensure that zero padding is enabled on the Storage Pool to be replicated, *before* you add any devices to the Storage Pool. For more information, see [“Modifying Storage Pool zero padding policy” on page 226](#).

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 SDS device 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 a default system-defined name, using the SDS’s first IP address.

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

<code>--device_path <PATH></code>	The full path to the device to be added. A device can be a disk, an unmounted partition, or a file that represents free space on a mounted device.
<code>--device_name <NAME></code>	Assigns a name to the device
<code>--storage_pool_id <ID></code>	Storage Pool ID
<code>--storage_pool_name <NAME></code>	Storage Pool name
<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. When <code>no_test</code> is selected, this switch is ignored.
Test_Options: CHOOSE ONE	
<code>--test_only</code>	Devices will be tested, but not used. To start using their capacity, run the <code>activate_sds_device</code> command.
<code>--no_test</code>	Device capacity will be used without any device testing
<code><blank></code>	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 amount of an SDS device's storage capacity that is made available to ScaleIO, which can assist in balancing storage.

Use this command to reduce (or increase) the device capacity that is available to ScaleIO, without affecting the physical disk size. Ensure that the modified capacity is less than the total physical size of the device. If you reduce capacity, data will be moved to other devices, in an asynchronous fashion.

Note: When reducing capacity, the excess device capacity is not accessible to the user.

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). The size must be within the device size limits (described in Table 3 on page 23), and slightly less than the full 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
```

Updating an SDS device’s path

Command

update_device_original_path

Syntax

```
scli --update_device_original_path (--device_id <ID> |  
(--sds_id <ID> | --sds_name <NAME> | --sds_ip <IP>)  
(--device_name <NAME> | --device_path <PATH>)))
```

Description

Updates the SDS device’s original path configuration to the current device path.

The device path on the SDS may have changed after a server restart. If the current device path is different from the original path created during SDS configuration, you may not be able to identify the device. You can still identify the device with its name or ID, or use this command to update the SDS configuration with the current SDS device path.

Note: When you query an SDS, you will receive device information similar to:

```
2: Name: N/A Path: /tmp/mos_sim_dev_4_1 Original-path:  
/tmp/mos_sim_dev_4_1 ID: bb8871ac00040001
```

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 current path of the SDS device
--device_name <NAME>	SDS storage device name or file

Example

```
scli--update_device_original_path --device_id  
bb8871ac00040001
```

Renaming an SDS device

Command

rename_device

Syntax

```
scli --rename_device (--device_id <ID> | ((--sds_id <ID> | --sds_name <NAME> | --sds_ip <IP>)
(--device_name <NAME> | --device_path <PATH>)))
--new_name <NAME>
```

Description

This command assigns a name to an SDS device, or renames an SDS device.

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
--new_name <NAME>	New name to be assigned to the SDS device

Example

```
scli --rename_device --sds_ip 8.8.8.100 --device_name
flash_18 --new_name flash_10018
```

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>)) [Options]
[Control] [--i_am_sure]
```

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.

Note: If you use the `--storage_pool_id` parameter in the command, it is not necessary to also specify the Protection Domain ID\name and the Storage Pool name.

Parameters

Parameter	Description
<code>--sds_id <ID></code>	SDS ID
<code>--sds_name <NAME></code>	SDS name
<code>--sds_ip <IP></code>	IP address associated with the SDS
<code>--device_id <ID></code>	Device ID
<code>--device_path <PATH></code>	The path of the SDS device
<code>--device_name <NAME></code>	SDS storage device name or file
<code>--protection_domain_id <ID></code>	Protection Domain ID
<code>--protection_domain_id <NAME></code>	Protection Domain name
<code>--storage_pool_id <ID></code>	Storage Pool ID

<code>--storage_pool_name <NAME></code>	Storage Pool name
<code>--i_am_sure</code>	Skip the safety questions for command execution (For example: "This could damage the stored data. Are you sure?")
Options: CHOOSE SEVERAL	
<code>--io_type <read/write></code>	The I/O type, either read (default) or write. If the storage device is in use, only read testing can be performed.
<code>--io_pattern <random/sequential></code>	The I/O pattern, either random (default) or sequential
<code>--io_size_kb <SIZE></code>	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
```

Syntax

```
scli --query_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>))
```

Description/Notes

This command returns the SDS device test results. Every SDS saves results for the last two tests per device.

Note: If you use the `--storage_pool_id` parameter in the command, it is not necessary to also specify the Protection Domain ID\name and the Storage Pool name.

Parameters

Parameter	Description
<code>--device_id <ID></code>	Device ID
<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>--device_path <PATH></code>	File path to storage device
<code>--protection_domain_id <ID></code>	Protection Domain ID
<code>--protection_domain_name <NAME></code>	Protection Domain name
<code>--storage_pool_id <ID></code>	Storage Pool ID
<code>--storage_pool_name <NAME></code>	Storage Pool name

Example

```
scli --mdm_ip 192.168.1.200 --query_device_test
--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 latency meters

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. If you want to query all the devices in the system, use the command

`--query_all_device_latency_meters`, described in [“All device latency meters query” on page 158](#).

Note: If the background device scanner is enabled, several device read statistics are dramatically affected.

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

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 (--sds_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
<code>--protection_domain_id <ID></code>	Protection Domain ID
<code>--protection_domain_name <NAME></code>	Protection Domain name
<code>--rebuild_limit <LIMIT></code>	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 more buffers added, the more I/Os the SDS can handle in parallel.

This number is mainly derived by the devices attached to the SDS. Typical values are:

- ◆ 1 (default), which fits lower performance (such as HDDs only)
- ◆ 3 for higher performance (such as an SSD environment)
- ◆ 5 for use with the replication splitter for RecoverPoint.

Note: This setting controls the balance between memory usage and better performance. Before using this command, see the *Fine-Tuning ScaleIO Performance Technical Notes*.

Parameters

Parameter	Description
--sds_id <ID>	SDS ID
--sds_name <NAME>	SDS name
--sds_ip <IP>	The IP address of the SDS
--num_of_io_buffers <VALUE>	The new number of I/O buffers to use; range: 1 (default)—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. When Storage Pools are created, caching is automatically enabled by default, unless the `--dont_use_rmcache` option is added to the `add_storage_pool` command. Write handling mode

can also be configured via the `add_storage_pool` command, or in a separate command. For more information about the `add_storage_pool` command, see [“Adding a Storage Pool” on page 116](#).

- ◆ 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.

The amount of RAM you can allocate for cache is limited by the amount of RAM on the SDS server:

- ◆ If the RAM is less than 32 GB, 50% of memory can be used for cache
- ◆ If the RAM is more than 32 GB, 75% of memory can be used for cache

The maximum amount of RAM cache is 128 GB.

Note: Only blocks up to 128 k in size will be cached. Any blocks larger than 128k will be ignored by caching.

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 197](#)
- ◆ [“Using the RAM read cache of a Storage Pool” on page 198](#)
- ◆ [“Setting the RAM read cache write handling mode” on page 199](#)
- ◆ [“Enabling the RAM read cache of an SDS” on page 200](#)
- ◆ [“Disabling the RAM read cache of an SDS” on page 201](#)
- ◆ [“Setting RAM read cache size of an SDS” on page 202](#)

Configuring RAM read cache usage of a volume

Command

set_volume_rmcache_usage

Syntax

```
scli --set_volume_rmcache_usage (--volume_id <ID> |
--volume_name <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 58](#)), 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 200](#).

Note: If you use the `--storage_pool_id` parameter in the command, it is not necessary to also specify the Protection Domain ID\name and the Storage Pool name.

Parameters

Parameter	Description
<code>--protection_domain_id <ID></code>	Protection Domain ID
<code>--protection_domain_name <NAME></code>	Protection Domain name
<code>--storage_pool_id <ID></code>	Storage Pool ID
<code>--storage_pool_name <NAME></code>	Storage Pool name
<code>--use_rmcache</code>	Use RAM read cache in the Storage Pool (default)
<code>--dont_use_rmcache</code>	Do not use RAM read cache in the Storage Pool
<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_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
(((--protection_domain_id <ID> |
--protection_domain_name <NAME>) --storage_pool_name
<NAME>) | --storage_pool_id <ID>)
--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.

Note: If you use the `--storage_pool_id` parameter in the command, it is not necessary to also specify the Protection Domain ID\name and the Storage Pool name.

Parameters

Parameter	Description
<code>--protection_domain_id <ID></code>	Protection Domain ID
<code>--protection_domain_name <NAME></code>	Protection Domain name
<code>--storage_pool_id <ID></code>	Storage Pool ID

<code>--storage_pool_name <NAME></code>	Storage Pool name
<code>--rmcache_write_handling_mode <PASSTHROUGH / CACHED></code>	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 (default)
<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_rmcache_write_handling_mode
--protection_domain_name pd1 --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>) | (--protection_domain_id <ID>
| --protection_domain_name <NAME>)) [--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
--sds_id <ID>	SDS ID
--sds_name <NAME>	SDS name
--sds_ip <IP>	SDS IP address
--protection_domain_id <ID>	Protection Domain ID
--protection_domain_name <NAME>	Protection Domain name
--i_am_sure	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
--protection_domain_name pd01
```

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>) | (--protection_domain_id <ID>
| --protection_domain_name <NAME>)) [--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
--protection_domain_ID <ID>	Protection Domain ID
--protection_domain_name <NAME>	Protection Domain name
--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
--protection_domain_name pd01
```

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>) |
(--protection_domain_id <ID> |
--protection_domain_name <NAME>)) --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. The amount of RAM you can allocate for cache is limited by the amount of RAM on the SDS server:

- ◆ If the RAM is less than 32 GB, 50% of memory can be used for cache
- ◆ If the RAM is more than 32 GB, 75% of memory can be used for cache

The maximum amount of RAM cache is 128 GB.

Note: In case of NUMA (Non-Uniform Memory Access), the total RAM refers to the first node only.

Parameters

Parameter	Description
--sds_id <ID>	SDS ID
--sds_name <NAME>	SDS name
--sds_ip <IP>	SDS IP address
--protection_domain_id <ID>	Protection Domain ID
--protection_domain_name <NAME>	Protection Domain name
--rmcache_size_mb <SIZE>	New size of RAM read cache in MB (default: 128 MB). Note: Maximum is 128 GB. For higher allocations, contact EMC Support.
--i_am_sure	Skip the safety questions for command execution (For example: “This could damage the stored data. Are you sure?”)

Example

```
scli --set_sds_rmcache_size --protection_domain_name
pd01 --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 239](#).

Topics include:

- ◆ [“Setting volume bandwidth limits” on page 204](#)
- ◆ [“Retrieving volume bandwidth limits” on page 205](#)
- ◆ [“Naming or renaming an SDC” on page 206](#)
- ◆ [“Adding an MDM using drv_cfg” on page 207](#)
- ◆ [“Modifying an MDM IP address using drv_cfg” on page 208](#)
- ◆ [“Loading a configuration file using drv_cfg” on page 209](#)
- ◆ [“Modifying configuration parameters on ESX servers” on page 210](#)
- ◆ [“Checking the SDC state on ESX servers” on page 212](#)

Setting volume bandwidth limits

Command

```
set_sdc_volume_limits
```

Syntax

```
scli --set_sdc_volume_limits (--volume_id <ID> |  
--volume_name <NAME>) (--sdc_id <ID> | --sdc_name  
<NAME> | --sdc_guid <GUID> | --sdc_ip <IP>) (Options)  
[--i_am_sure]
```

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).

Parameters

Parameter	Description
--volume_id <ID>	Volume ID

--volume_name <NAME>	Volume name
--sdc_id <ID>	SDC ID
--sdc_guid <GUID>	SDC GUID
--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_id <ID> | --sdc_name
<NAME> | --sdc_guid <GUID> | --sdc_ip <IP>)
```

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_name <NAME>	SDC name
--sdc_guid <GUID>	SDC GUID
--sdc_ip <IP>	SDC IP address

Example

```
scli --mdm_ip 192.168.1.200 --query_sdc_volume_limits
--volume_name voll --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_guid <GUID> | --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_guid <GUID>	The GUID 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.

This command can not be used on ESX servers. Instead, follow the steps described in [“Modifying configuration parameters on ESX servers” on page 210](#).

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 208](#)), 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 111](#).

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.

This command can not be used on ESX servers. Instead, follow the steps described in [“Modifying configuration parameters on ESX servers” on page 210](#).

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 111](#).

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
```

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.

This command can not be used on ESX servers. Instead, follow the steps described in [“Modifying configuration parameters on ESX servers” on page 210](#).

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
```

Modifying configuration parameters on ESX servers

On an SDC running on an ESX server, `esxcli` commands can be used in the following cases:

- ◆ MDM IP addresses need to be added to the existing list on an SDC
- ◆ MDM IP addresses need to be replaced on an SDC
- ◆ The SDC's GUID needs to be changed

Specifically, the SDC's GUID or IP address needs to be identified, and then used to add or modify the MDM IP addresses or GUID (depending on the parameter that you want to modify). If you want to add additional MDM IP addresses to existing ones, you must list both old and additional IP addresses in the `esxcli` command.

For more information about SDC tuning, see *Fine-Tuning ScaleIO Performance for Flash Environments Technical Notes*.

Note: These procedures require a server restart to apply the new configuration. The configuration will remain persistent after future server restarts.

To configure MDM IP addresses on the SDC, perform these steps:

1. Find the SDC's GUID and the MDM IP addresses configured on the ESX, by typing the command

```
esxcli system module parameters get -m scini
```

2. In the output of the command, find the existing GUID and MDM IP addresses. For example, in the output excerpt below, the GUID and IP addresses are marked in bold:

`IoctlIniGuidIdStr` string

39b89295-5cfc-4a42-bf89-4cc7e55a1e5b Ini Guid, for example: 12345678-90AB-CDEF-1234-567890ABCDEF

`IoctlMdmIPStr` string **9.99.101.22,9.99.101.23** Mdms IPs, IPs for MDM in same cluster should be comma separated. To configure more than one cluster use '+' to separate between IPs. For Example:

10.20.30.40,50.60.70.80+11.22.33.44. Max 1024 characters

3. To configure the MDM IP addresses on the SDS, type the command

```
esxcli system module parameters set -m scini -p
"IoctlIniGuidIdStr=<GUID> IoctlMdmIPStr=<MDM_IPS>
```

where <GUID> is the existing SDC GUID that you identified in the previous step, and <MDM_IPS> is the list of MDM IP addresses. A maximum of 1024 characters is allowed.

- To replace the old MDM IP addresses with new MDM IP addresses, omit the old addresses from the command.
- To add MDM IP addresses to the existing IP addresses, type both the existing IP addresses, and the new IP addresses in the command.

MDM IP addresses for MDMs in same cluster must be comma-separated. To configure more than one cluster, use '+' to separate between IP addresses in different clusters. For example:

```
esxcli system module parameters set -m scini -p
"IoctlIniGuidIdStr=39b89295-5cfc-4a42-bf89-4cc7e55a1e5b
IoctlMdmIPStr=10.20.30.40,50.60.70.80+11.22.33.44"
```

4. To apply the new configuration, restart the ESX server.

To change the GUID of the SDC, perform these steps:

1. Find the SDC's GUID and the MDM IP addresses configured on the ESX, by typing the command

```
esxcli system module parameters get -m scini
```

2. In the output of the command, find the existing GUID and MDM IP addresses. For example, in the output excerpt below, the GUID and IP addresses are marked in bold:

`IoctlIniGuidIdStr` string

39b89295-5cfc-4a42-bf89-4cc7e55a1e5b Ini Guid, for example: 12345678-90AB-CDEF-1234-567890ABCDEF

`IoctlMdmIPStr` string **9.99.101.22,9.99.101.23** Mdms IPs, IPs for MDM in same cluster should be comma separated. To configure more than one cluster use '+' to separate between IPs. For Example:
10.20.30.40,50.60.70.80+11.22.33.44. Max 1024 characters

3. To change the GUID on the SDS, type the command

```
esxcli system module parameters set -m scini -p
"IoctlIniGuidIdStr=<NEW_GUID> IoctlMdmIPStr=<MDM_IPS>
```

where `<NEW_GUID>` is the new SDC GUID, and `<MDM_IPS>` is the list of MDM IP addresses that you identified in the previous step. You must include these IP addresses in the command.

For example:

```
esxcli system module parameters set -m scini -p
"IoctlIniGuidIdStr=28a78184-4beb-4a42-bf89-4cc7e55a1e5b
IoctlMdmIPStr=9.99.101.22,9.99.101.23"
```

4. To apply the new configuration, restart the ESX server.

Checking the SDC state on ESX servers

On an SDC running on an ESX server, an `esxcli` command can be used to check the current state of the SDC.

To display the SDC state on the ESX server, type the following command:

```
esxcli system module list |grep scini
```

The following examples show typical outputs of the command:

- ◆ Output where driver is installed and enabled to load, but not loaded:

```
Name Is Loaded Is Enabled
-----
scini false true
```

- ◆ Example of SDC in correct state (enabled and loaded):

```
Name Is Loaded Is Enabled
-----
scini true true
```

Managing Protection Domains

This section describes how to use the CLI to manage Protection Domains. Topics include:

- ◆ [“Renaming a Protection Domain” on page 214](#)
- ◆ [“Renaming a Storage Pool” on page 215](#)
- ◆ [“Removing a Protection Domain” on page 216](#)
- ◆ [“Removing a Storage Pool” on page 216](#)
- ◆ [“Setting the rebuild mode” on page 217](#)
- ◆ [“Setting the rebalance mode” on page 218](#)
- ◆ [“Setting the rebuild policy” on page 219](#)
- ◆ [“Setting the rebalance policy” on page 221](#)
- ◆ [“Setting concurrent rebuild/rebalance per Storage Pool” on page 223](#)
- ◆ [“Inactivating a Protection Domain” on page 224](#)
- ◆ [“Activating a Protection Domain” on page 225](#)
- ◆ [“Modifying Storage Pool zero padding policy” on page 226](#)
- ◆ [“Enabling the background device scanner” on page 227](#)
- ◆ [“Disabling the background device scanner” on page 229](#)
- ◆ [“Resetting background scanner error counters” on page 230](#)

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 114](#).

Parameters

Parameter	Description
<code>--protection_domain_id <ID></code>	Protection Domain ID
<code>--protection_domain_name <NAME></code>	Protection Domain name
<code>--new_name <NAME></code>	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_name <NAME>) | --storage_pool_id <ID>)
--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 114](#).

Note: If you use the `--storage_pool_id` parameter in the command, it is not necessary to also specify the Protection Domain ID/name and the Storage Pool name.

Parameters

Parameter	Description
<code>--protection_domain_id <ID></code>	Protection Domain ID
<code>--protection_domain_name <NAME></code>	Protection Domain name
<code>--storage_pool_id <ID></code>	Storage Pool ID
<code>--storage_pool_name <NAME></code>	Storage Pool name
<code>--new_name <NAME></code>	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_name <NAME>) | --storage_pool_id <ID>)
```

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.

Note: If you use the `--storage_pool_id` parameter in the command, it is not necessary to also specify the Protection Domain ID\name and the Storage Pool name.

Parameters

Parameter	Description
<code>--protection_domain_id <ID></code>	Protection Domain ID
<code>--protection_domain_name <NAME></code>	Protection Domain name
<code>--storage_pool_id <ID></code>	Storage Pool ID
<code>--storage_pool_name <NAME></code>	Storage Pool name

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_name
<NAME>) | --storage_pool_id <ID>) (--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.

Note: If you use the `--storage_pool_id` parameter in the command, it is not necessary to also specify the Protection Domain ID\name and the Storage Pool name.

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_name <NAME>) | --storage_pool_id <ID>)
(--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.

Note: If you use the `--storage_pool_id` parameter in the command, it is not necessary to also specify the Protection Domain ID\name and the Storage Pool name.

Parameters

Parameter	Description
<code>--protection_domain_id <ID></code>	Protection Domain ID
<code>--protection_domain_name <NAME></code>	Protection Domain name
<code>--storage_pool_id <ID></code>	Storage Pool ID
<code>--storage_pool_name <NAME></code>	Storage Pool name
<code>--enable_rebuild</code>	Enable rebalancing of the specified Storage Pool
<code>--disable_rebuild</code>	Disable rebalancing of the specified Storage Pool
<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_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_name <NAME>) | --storage_pool_id <ID>)
--policy <POLICY> [Options] [--i_am_sure]
```

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.

Note: If you use the `--storage_pool_id` parameter in the command, it is not necessary to also specify the Protection Domain ID\name and the Storage Pool name.

Parameters

Parameter	Description
<code>--protection_domain_id <ID></code>	Protection Domain ID
<code>--protection_domain_name <NAME></code>	Protection Domain name
<code>--storage_pool_id <ID></code>	Storage Pool ID
<code>--storage_pool_name <NAME></code>	Storage Pool name
<code>--policy <POLICY></code>	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
<code>--i_am_sure</code>	Skip the safety questions for command execution (For example: “This could damage the stored data. Are you sure?”)
Options: CHOOSE ONE OR SEVERAL	
<code>--concurrent_io_limit <LIMIT></code>	The maximum number of concurrent rebuild IOs per device (default: 1)

<code>--bandwidth_limit <BANDWIDTH></code>	The maximum bandwidth of rebuild IOs, in KB per second, per device (Valid range: 1024-1048576, 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 favor_application_io
--bandwidth_limit 5120
```

Setting the rebalance policy

Command

```
set_rebalance_policy
```

Syntax

```
scli --set_rebalance_policy (((--protection_domain_id
<ID> | --protection_domain_name <NAME>)
--storage_pool_name <NAME>) | --storage_pool_id <ID>)
--policy <POLICY> [Options] [--i_am_sure]
```

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.

Note: If you use the `--storage_pool_id` parameter in the command, it is not necessary to also specify the Protection Domain ID\name and the Storage Pool name.

Parameters

Parameter	Description
<code>--protection_domain_id <ID></code>	Protection Domain ID
<code>--protection_domain_name <NAME></code>	Protection Domain name
<code>--storage_pool_id <ID></code>	Storage Pool ID
<code>--storage_pool_name <NAME></code>	Storage Pool name
<code>--policy <POLICY></code>	Policy to use for rebalance IO priority. Can be one of the following options. <code>no_limit</code> —Rebalance IOs are not limited <code>limit_concurrent_io</code> —Limit the number of allowed concurrent rebalance IOs <code>favor_application_io</code> —Limit the number and bandwidth of rebalance IOs when application IOs are in-progress (default) <code>dynamic_bandwidth_throttling</code> —Limit the number and bandwidth of rebalance IOs when application IOs are in-progress or have been in a defined quiet period
<code>--i_am_sure</code>	Skip the safety questions for command execution (For example: “This could damage the stored data. Are you sure?”)
Options: CHOOSE ONE OR SEVERAL	
<code>--concurrent_io_limit <LIMIT></code>	The maximum number of concurrent rebuild IOs per device (default: 1)
<code>--bandwidth_limit <BANDWIDTH></code>	The maximum bandwidth of rebuild IOs, in KB per second, per device (Valid range: 1024-1048576, 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_rebalance_policy --protection_domain_name
pd1 --storage_pool_name sp1 --policy
favor_application_io --bandwidth_limit 5120
```

Setting concurrent rebuild/rebalance per Storage Pool

Command

```
set_rebuild_rebalance_parallelism
```

Syntax

```
scli --set_rebuild_rebalance_parallelism
(((--protection_domain_id <ID> |
--protection_domain_name <NAME>) --storage_pool_name
<NAME>) | --storage_pool_id <ID>) (--limit <LIMIT>)
```

Description

Set the maximum number of concurrent rebuild and rebalance activities on all SDSs within the specified Storage Pool.

Note: If you use the `--storage_pool_id` parameter in the command, it is not necessary to also specify the Protection Domain ID\name and the Storage Pool name.

Parameters

Parameter	Description
--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
--limit <LIMIT>	The maximum number of concurrent rebuild and rebalance activities (1..10) on SDSs in the Storage Pool

Example

```
scli --set_rebuild_rebalance_parallelism
--protection_domain_name pd_18 --storage_pool_name
flash_18 --limit 5
```

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_name <NAME>) | --storage_pool_id <ID>)
(--enable_zero_padding | --disable_zero_padding)
```

Description

This command modifies the zero padding policy of the Storage Pool. If you intend to use the replication feature via RecoverPoint, ensure that zero padding is enabled on the Storage Pool to be replicated. For more information, see [“Storage Pools” on page 28](#).

Note: The zero padding policy cannot be changed after the addition of the first device to a specific Storage Pool.

Note: If you use the `--storage_pool_id` parameter in the command, it is not necessary to also specify the Protection Domain ID\name and the Storage Pool name.

Parameters

Parameter	Description
<code>--protection_domain_id <ID></code>	Protection Domain ID
<code>--protection_domain_name <NAME></code>	Protection Domain name
<code>--storage_pool_name <NAME></code>	Storage Pool name
<code>--storage_pool_id <ID></code>	Storage Pool ID
<code>--zero_padding_enabled</code>	Enable zero padding in this Storage Pool
<code>--zero_padding_disabled</code>	Disable zero padding in this Storage Pool

Example

```
scli --modify_zero_padding_policy
--protection_domain_name pd10 --storage_pool_name sp1
--zero_padding_disabled
```

Enabling the background device scanner

Command

```
enable_background_device_scanner
```

Syntax

```
scli --enable_background_device_scanner
(((--protection_domain_id <ID> |
--protection_domain_name <NAME>) --storage_pool_name
<NAME>) | --storage_pool_id <ID>) --scanner_mode
<device_only/data_comparison>
[--scanner_bandwidth_limit <LIMIT>]
```

Description

This command enables the background device scanner on the devices in the specified Storage Pool. There are two modes: device only mode, and data comparison mode (see explanation in the Parameters table below). Zero padding must be enabled in order to set the background device scanner to data comparison mode. You can check

the error detected by the background device scanner by querying SDSs, using the command `--query_sds`. Information about errors will be provided in event reports. For more information about viewing events, see [“Viewing events” on page 329](#). For more information about this specific event, see [“Background device scanner comparison error” on page 347](#).

Note: High bandwidth should be used very carefully, and for extreme cases only (such as an urgent need to check some devices), as it may create negative impact on system performance. Setting the background device scanner bandwidth should take into account maximum bandwidth of the devices.

Note: If you use the `--storage_pool_id` parameter in the command, it is not necessary to also specify the Protection Domain ID\name and the Storage Pool name.

Parameters

Parameter	Description
<code>--protection_domain_id <ID></code>	Protection Domain ID
<code>--protection_domain_name <NAME></code>	Protection Domain name
<code>--storage_pool_name <NAME></code>	Storage Pool name
<code>--storage_pool_id <ID></code>	Storage Pool ID
<code>--scanner_mode <device_only/data_comparison></code>	Scanner mode of operation: <code>device_only</code> Perform read operations. Fix from peer on errors <code>data_comparison</code> Perform the <code>device_only</code> test, and compare the data content with peer
<code>--scanner_bandwidth_limit</code>	Bandwidth limit in KB per second per device. The given value should be in the range 10 KB...10 MB (default = 1 MB).

Example

```
scli --enable_background_device_scanner
--protection_domain_name pd120 --storage_pool_name
sp18 --scanner_mode device_only
--scanner_bandwidth_limit 2000
```

Disabling the background device scanner

Command

`disable_background_device_scanner`

Syntax

```
scli --disable_background_device_scanner
(((--protection_domain_id <ID> |
--protection_domain_name <NAME>) --storage_pool_name
<NAME>) | --storage_pool_id <ID>)
```

Description

This command disables the background device scanner on the specified Storage Pool.

Note: If you use the `--storage_pool_id` parameter in the command, it is not necessary to also specify the Protection Domain ID\name and the Storage Pool name.

Parameters

Parameter	Description
<code>--protection_domain_id <ID></code>	Protection Domain ID
<code>--protection_domain_name <NAME></code>	Protection Domain name
<code>--storage_pool_name <NAME></code>	Storage Pool name
<code>--storage_pool_id <ID></code>	Storage Pool ID

Example

```
scli --disable_background_device_scanner
--protection_domain_name pd120 --storage_pool_name
sp180
```

Resetting background scanner error counters

Command

`reset_scanner_error_counters`

Syntax

```
scli --reset_scanner_error_counters
(((--protection_domain_id <ID> |
--protection_domain_name <NAME>) --storage_pool_name
<NAME>) | --storage_pool_id <ID>)
[--reset_data_compare_error_counter]
[--reset_corrected_read_error_counter]
```

Description

This command resets background device scanner error counters for the specified Storage Pool. You can use this command to reset counters for data comparison errors, or corrected read errors, or both counter types.

Note: If you use the `--storage_pool_id` parameter in the command, it is not necessary to also specify the Protection Domain ID\name and the Storage Pool name.

Parameters

Parameter	Description
<code>--protection_domain_id <ID></code>	Protection Domain ID
<code>--protection_domain_name <NAME></code>	Protection Domain name
<code>--storage_pool_name <NAME></code>	Storage Pool name
<code>--storage_pool_id <ID></code>	Storage Pool ID
<code>--reset_data_compare_error_counter</code>	Reset data compare error counter
<code>--reset_corrected_read_error_counter</code>	Reset corrected read error counter

Example

```
scli --reset_scanner_error_counters
--protection_domain_name pd120 --storage_pool_name
sp120 --reset_data_compare_error_counter
```

Managing Fault Sets

This section describes how to use the CLI to manage Fault Sets. Topics include:

- ◆ [“Removing SDSs from a Fault Set” on page 231](#)
- ◆ [“Removing a Fault Set” on page 232](#)
- ◆ [“Renaming an existing Fault Set” on page 232](#)

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
<code>--protection_domain_id <ID></code>	Protection Domain ID
<code>--protection_domain_name <NAME></code>	Protection Domain name
<code>--fault_set_id <ID></code>	Fault Set ID
<code>--fault_set_name <NAME></code>	Fault Set name
<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 --clear_fault_set --protection_domain_name pd18  
--fault_set_name sio-fs1
```

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 231](#).

Parameters

Parameter	Description
<code>--protection_domain_id <ID></code>	Protection Domain ID
<code>--protection_domain_name <NAME></code>	Protection Domain name
<code>--fault_set_id <ID></code>	Fault Set ID
<code>--fault_set_name <NAME></code>	Fault Set name

Example

```
scli --remove_fault_set --protection_domain_name pd18
--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 --protection_domain_name pd18
--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 234](#)
- [“Switching MDM ownership” on page 235](#)
- [“Removing the secondary MDM” on page 235](#)
- [“Removing a tie-breaker” on page 236](#)
- [“Updating the SDC driver with IP changes” on page 236](#)
- [“Changing an MDM server or changing an MDM IP address” on page 236](#)
- [“Limiting remote clients to read-only access” on page 239](#)
- [“Managing SDC access to the MDM” on page 239](#)

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
<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 192.168.1.200 --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.

Note: On ESXi, GUID and MDM lists are stored as module parameters, and not in a `drv_cfg.txt` file. To modify these parameters, use **esxcli** commands.

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\sdv\bin\drv_cfg --mod_mdm_ip
--ip <EXISTING_MDM_IP_ADDRESS>
--new_mdm_ip <NEW_MDM_IP_ADDRESSES>
```

2. Verify the changes, by typing the following command:

```
C:\Program Files\emc\scaleio\sdv\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 typing the following command:

```
/opt/emc/scaleio/sdv/bin/drv_cfg --mod_mdm_ip
--ip <EXISTING_MDM_IP_ADDRESS>
--new_mdm_ip <NEW_MDM_IP_ADDRESSES>
```

2. Verify the changes, by typing the following command:

```
/opt/emc/scaleio/sdv/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 configure the system.

Parameters

Parameter	Description
--remote_read_only_limit_state (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, the following 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 240](#)
- ◆ [“Restricting an SDC’s access to the MDM” on page 241](#)
- ◆ [“Canceling an SDC’s restricted access and removing an SDC” on page 241](#)

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 239](#).

Parameters

Parameter	Description
<code>--restricted_sdc_mode (enabled disabled)</code>	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
<code>--sdc_ip <IP></code>	The IP address of the SDC
<code>--sdc_guid <GUID></code>	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.
<code>--sdc_name <NAME></code>	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. For more information on Restricted SDC mode, see ["Restricting an SDC's access to the MDM" on page 241](#).

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
```

Storing a management application ID on the MDM**Command**

```
set_manager_id
```

Syntax

```
scli --set_manager_id --manager_id <ID> [--force]
```

Description

This command sets the manager ID for this system. The MDM can store the ID of a management application that controls it, and can produce this ID using a query command (the ID will be shown in the **System Info** section, in the output of the `--query_all` command).

The management application that controls the MDM can use this field to verify that it is the designated management application of this MDM (in a multiple management application setup).

Parameters

Parameter	Description
<code>--manager_id <ID></code>	Manager ID of the management application
<code>--force</code>	Allow override of the previous manager ID

Example

```
scli --set_manager_id --manager_id ddaff0d500000002
--force
```

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
<code>--new_name <NAME></code>	New Name to be associated with the system

Example

```
scli --rename_system --new_name sio-prod-sys2
```


CHAPTER 10

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”](#) provides more detailed information about the objects and properties displayed in the GUI. [Chapter 5, “Command Quick Reference,”](#) 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 250
See detailed information about one or more system objects, in table format (filtering available)	Backend view—see “Backend view” on page 257
See very detailed information about a specific system object	Property Sheets—see “Property Sheets” on page 267
Minimize the main window to a floating widget	Widget— “Widget (10)” on page 251
See a list of errors and alerts currently active in the system	Alerts view—see “Alerts view” on page 265
Add, remove, or configure a system object	Backend view—see “Configuring system properties” on page 272
Monitor various aspects of your system	Backend view—see “Monitoring and viewing system information” on page 270
Find information about your system’s license	Preferences menu—see “Viewing licensing information” on page 271

Topics in this chapter include:

- ◆ Opening the GUI and logging in 246
- ◆ General GUI overview 247
- ◆ Monitoring and viewing system information 270
- ◆ Configuring system properties 272

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 6, “Security and User Management.”](#)



Figure 12 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 250](#)).
- ◆ 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 247](#)
- ◆ [“Dashboard view” on page 250](#)
- ◆ [“Backend view” on page 257](#)
- ◆ [“Alerts view” on page 265](#)
- ◆ [“Property Sheets” on page 267](#)

GUI conventions

This section describes conventions used in the ScaleIO GUI. Topics include:

- ◆ [“Alerts indicators” on page 247](#)
- ◆ [“Color codes” on page 248](#)

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 265](#).



Figure 13 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. The color codes are used in a variety of elements and views in the user interface.

Table 19 GUI color codes

Color	Meaning	Dashboard View	Backend View
GREEN (protected)	Available protected, healthy storage	✓	✓
YELLOW	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 capacity. This capacity exists physically, but has been disabled (typically to allow maintenance tasks on devices).	✓	

Table 19 GUI color codes (continued)

Color	Meaning	Dashboard View	Backend View
BLUE (spare)	Capacity reserved for recovery purposes	✓	
BRONZE	Volume capacity	✓	
DARK BLUE	Indicates selected items in the filter		✓

Table 20 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 14 Dashboard controls

- | | |
|--|--|
| <ul style="list-style-type: none">1 Navigation toggle—Displays navigation tree2 Current view—Displays object currently being applied to the dashboard3 Dashboard—Displays the Dashboard view4 Backend—Displays the Backend view5 Alerts—Displays the Alert view | <ul style="list-style-type: none">6 Preferences—User name, Preferences, Logout, About7 Color code legend—Displays the legend8 I/O Workload toggles—control the information displayed in this tile. For more information, see Table 24 on page 290.9 Dimmer toggle—Enables\disables the dimmer10 Widget toggle—Minimizes the display to a widget |
|--|--|

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 289](#).
- 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 271](#).

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.

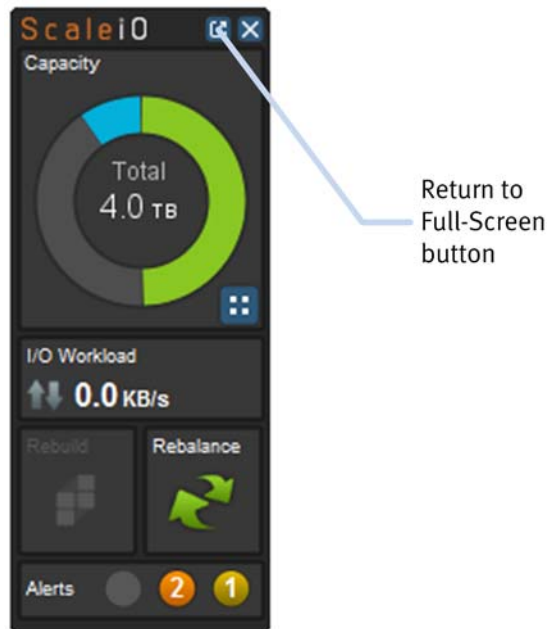


Figure 15 Widget

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 289](#).

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.

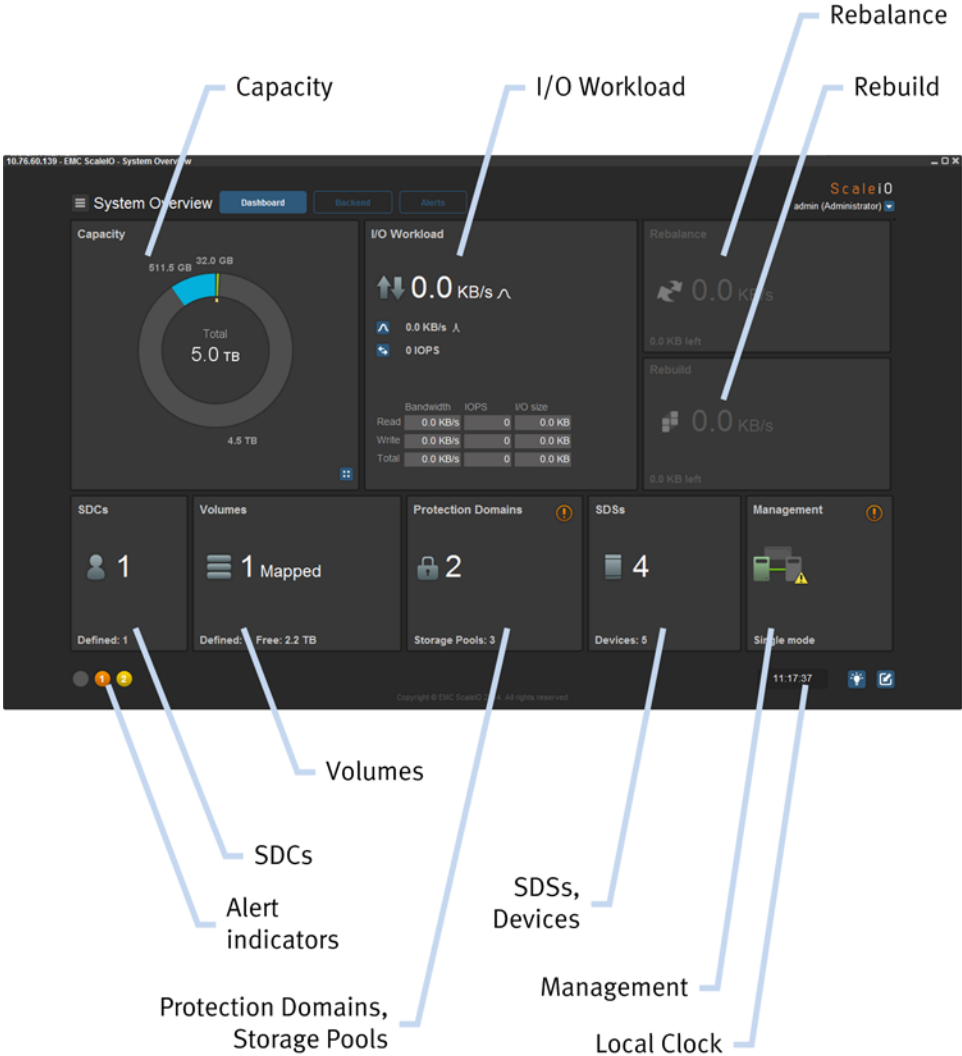


Figure 16 Dashboard tiles

The following table describes the tiles displayed on the **Dashboard**.

Table 21 Dashboard tiles (page 1 of 3)

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 289) 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 21 Dashboard tiles (page 2 of 3)

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 289) 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 21 Dashboard tiles (page 3 of 3)

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 256 . 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 22 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 260](#).
- ◆ **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 267](#). For more information about the terminology used in the Property Sheets, see the [“Glossary”](#).

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.

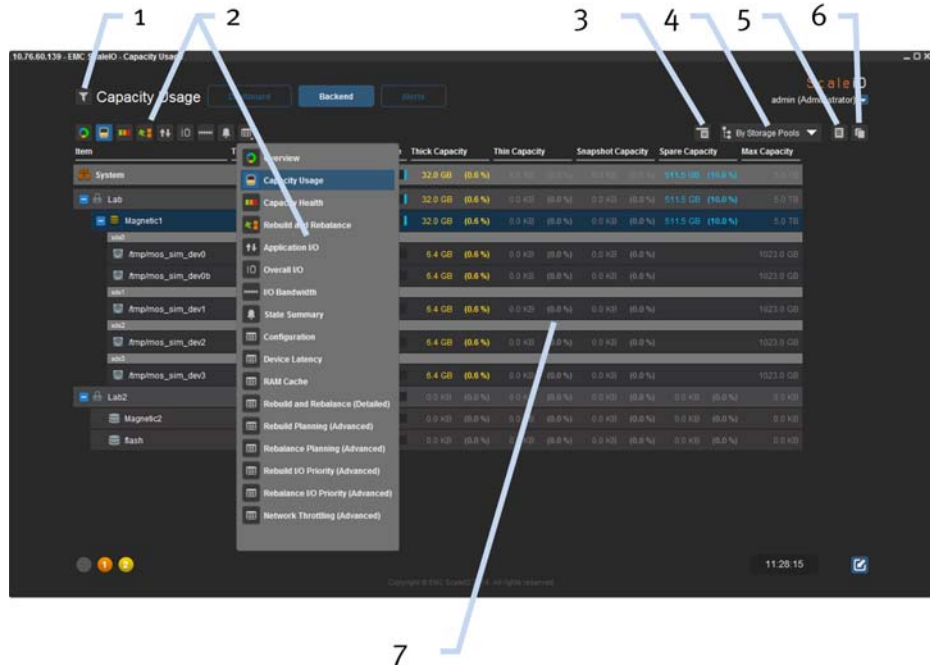


Figure 17 Backend view

- 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 260](#).
- 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 260](#).
- 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 18 on page 260](#) 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**.

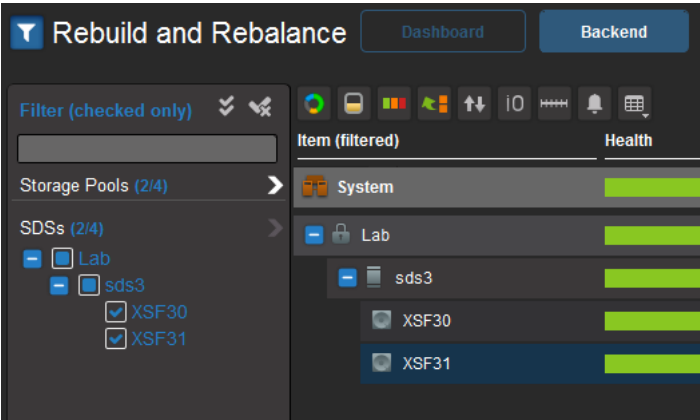


Figure 18 Backend filter

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 248](#) 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 23 Table view options (page 1 of 5)

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 21 on page 254.
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 23 Table view options (page 2 of 5)

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 23 Table view options (page 3 of 5)

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 272. The Related Objects section of the Property Sheet helps you to identify related objects to the one selected in the table.
Device Details 	Average Read Latency, Average Write latency, Average Read Size, Average Write Size, Scanned Capacity, Resolved Errors, Data Conflicts Related Property Sheet sections: Device Latency, Background Device Scanner	Provides an overview of performance information, and Background Device Scanner results, per device. When the table is sorted by SDSs, the Down arrow in each SDS row reveals all the devices in the SDS. Notes: Information is shown only at Device level, and there is no aggregation of information at higher levels. If the background device scanner is enabled, several device read statistics are dramatically affected.
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 23 Table view options (page 4 of 5)

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 23 Table view options (page 5 of 5)

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 349](#).

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 [“Property Sheets” on page 267](#).

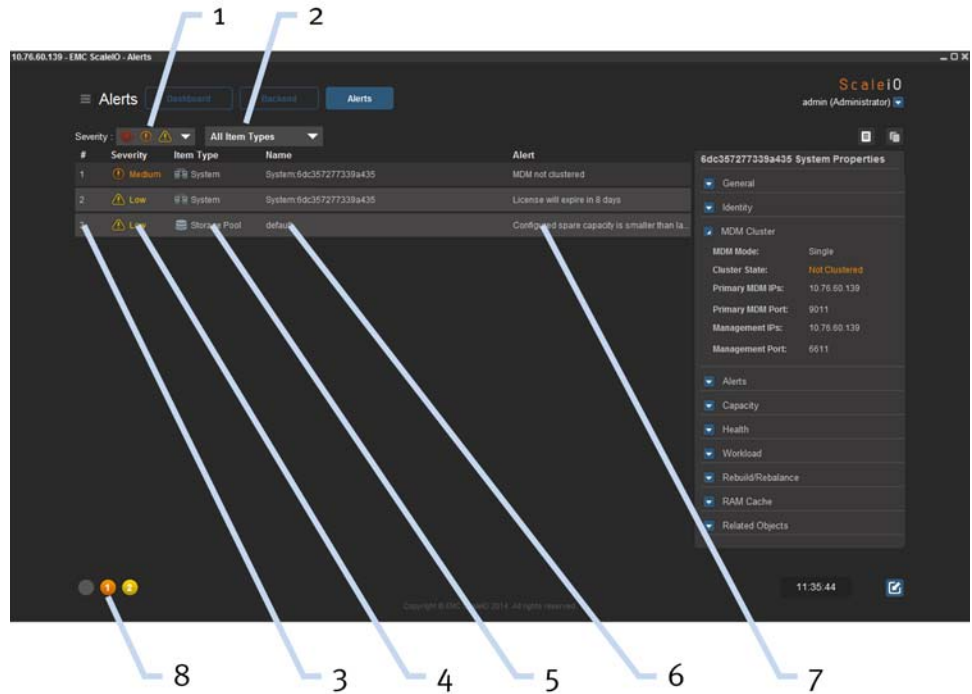


Figure 19 Alerts view

- 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
- **Identity**—identifying information, such as an object’s ID number, name, IP addresses, port usage, VM usage
- **MDM Cluster** details, such as cluster mode and state, IP addresses and ports used for management and MDM functions
- **Alerts**—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.
- **Device Latency** averages for Read and Write, and average I/O size, for the device selected in the table

Note: If the background device scanner is enabled, several device read statistics are dramatically affected.

- **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 Test Results** for the device selected in the table, if any tests have been performed
- **Background Device Scanner** results for the device selected in the table, if the scanner is enabled
- **Network throttling** configuration for the selected SDS, including bandwidth limit per job, and queue length, for both Rebuilding and Rebalancing.

- **I/O Priority** 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.

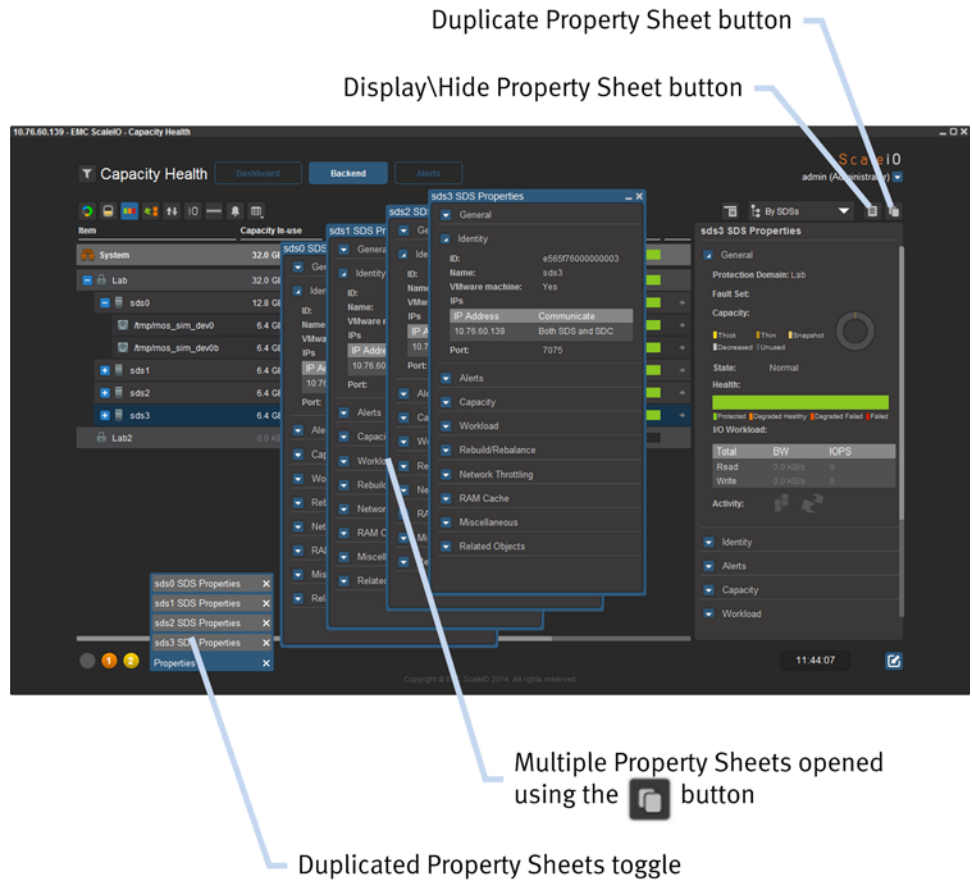


Figure 20 Multiple floating Property Sheets

The following figure shows a typical Property Sheet for an SDS, with the **Identity** section of the Property Sheet expanded.

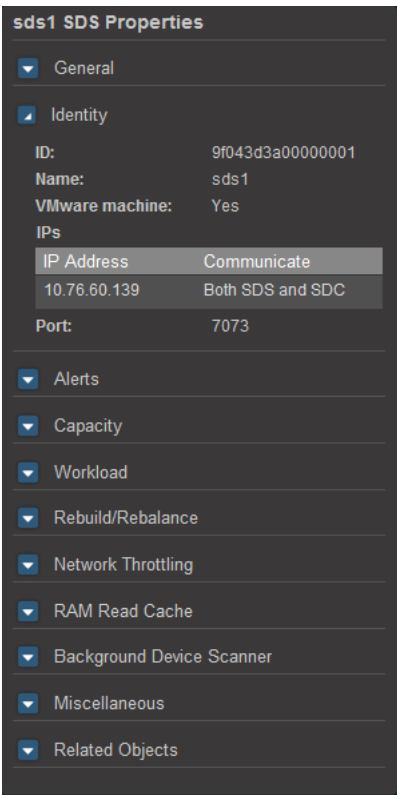


Figure 21 Example of a Property Sheet for an SDS, displaying identifying details

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..... 271](#)
- ◆ [Viewing licensing information 271](#)
- ◆ [Verifying your connection to the Management cluster 271](#)

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 256](#).

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.....](#) 272
- ◆ [Configuring Workload settings \(advanced\).....](#) 281
- ◆ [Enabling and disabling Rebuild\Rebalance \(advanced\)](#) 284
- ◆ [Configuring RAM Read Cache \(advanced\).....](#) 284
- ◆ [Using the background device scanner](#) 286
- ◆ [Renaming objects](#) 289
- ◆ [Customizing system preferences](#) 289

Configuring capacity

This section contains procedures for adding, removing, and managing SDSs and devices. Topics include:

- [“Adding SDSs and devices” on page 272](#)
- [“Removing SDSs and devices” on page 276](#)
- [“Adding, removing, and activating and inactivating capacity” on page 277](#)
- [“Activating devices” on page 281](#)
- [“Clearing device errors” on page 281](#)
- [“Setting device capacity limits” on page 281](#)

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 120](#).

Before you begin, ensure that at least one suitable Storage Pool is defined in the required Protection Domain.

Note: Devices can be tested before going online. Various testing options are available the **Advanced** part of the window (default: **Test and Activate**).

Note: If you intend to replicate Storage Pools using RecoverPoint, enable zero padding before adding devices to the Storage Pools. You cannot enable zero padding after adding the devices. For more information, see [“Modifying Storage Pool zero padding policy” on page 226](#), and [“Storage Pools” on page 28](#).

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 that contain orange explanation marks are mandatory.
- You must add at least one device to the new SDS at this stage. You can add more devices later.

Note: If you want to add an SDS without any devices, you can do so using the CLI. For more information, see [“Adding SDS nodes and devices” on page 120](#).

- 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 23 on page 276](#)).

5. Click **Close**. If you chose the **Test only** option in step 3, activate the devices as described in [“Activating devices” on page 281](#).

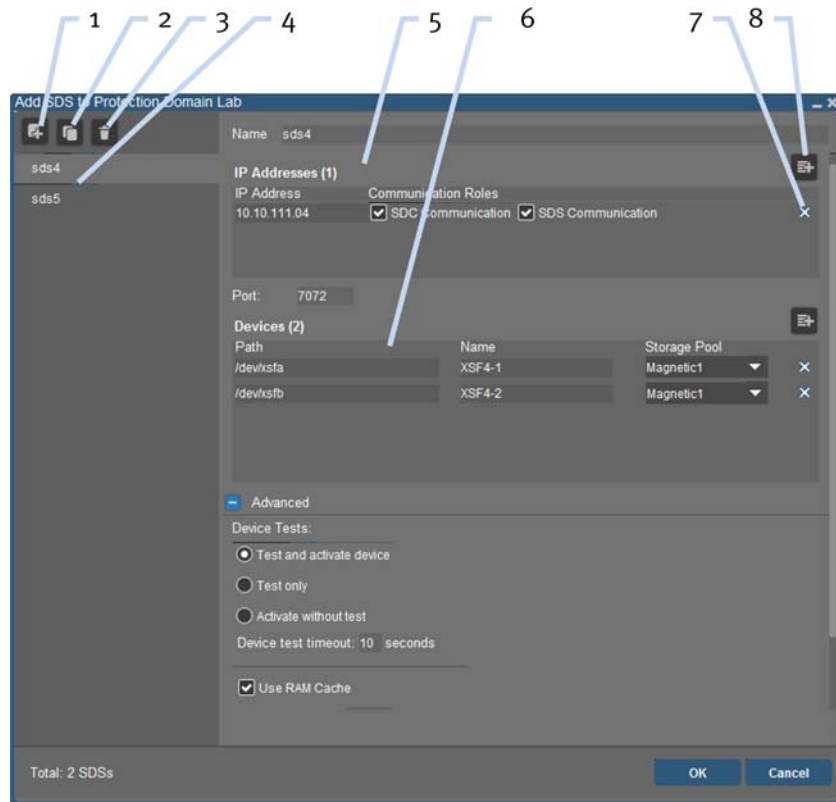


Figure 22 Add SDS window

- | | |
|--|--------------------------------|
| 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 |

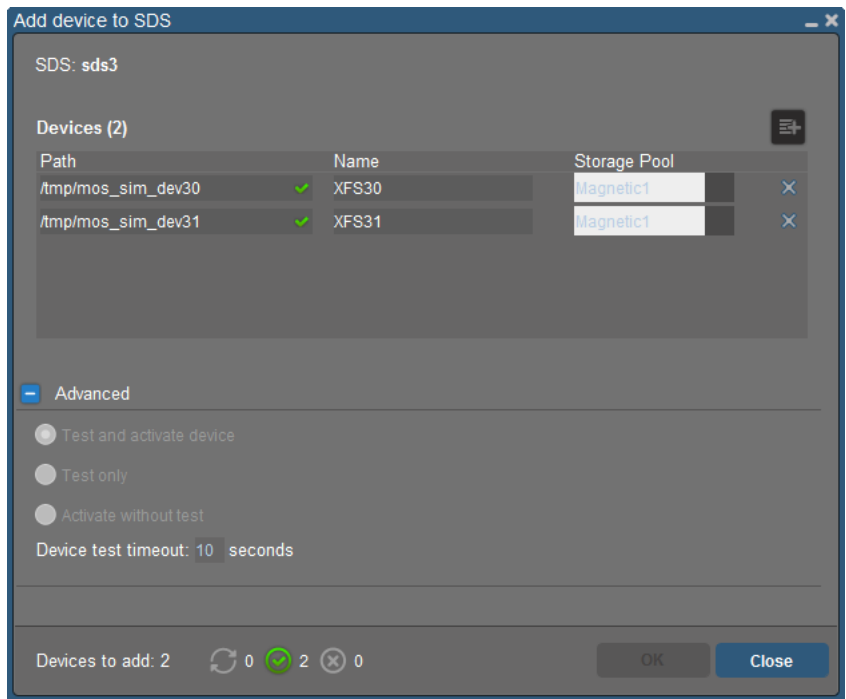


Figure 23 Add Device window showing command validation

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 281](#).

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**.

NOTICE

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 23 on page 276](#)). 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 or the VMware plug-in. For more information, see [“Creating and Mapping Volumes” on page 57](#), and [“Creating, mapping, and unmapping volumes” on page 298](#), respectively.

Topics in this section include:

- ◆ [“Adding, removing, activating and inactivating Protection Domains” on page 278](#)
- ◆ [“Adding Fault Sets” on page 279](#)
- ◆ [“Adding and removing Storage Pools” on page 280](#)

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 (temporarily disable) application I/O and disable access to volumes.
- Move the DRL mode of all SDSs to harden, in preparation for 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 23 on page 276](#)).

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. You can now add SDSs, Storage Pools and Fault Sets to the Protection Domain. Before you add devices, ensure that at least one suitable Storage Pool is defined in the Protection Domain.

To remove Protection Domains, perform these steps:

1. In the **Backend** view, navigate to, and select one or more Protection Domains.
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.

Note: When defining Fault Sets, you must follow the guidelines described in [“Fault Sets” on page 30](#). Failure to do so may prevent creation of volumes.

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 [“Managing Fault Sets” on page 231](#).

Adding and removing Storage Pools

A Storage Pool is a group of devices within a Protection Domain. Each time that you add devices to the system, you must map them to Storage Pools. Create Storage Pools *before* you start adding devices to the system.

Note: If you intend to replicate Storage Pools using RecoverPoint, enable zero padding before adding devices to the Storage Pools. You cannot enable zero padding after adding the devices. For more information, see [“Modifying Storage Pool zero padding policy” on page 226](#), and [“Storage Pools” on page 28](#).

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 195](#)

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 should first 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. The capacity assigned to the SDS device must be smaller than its actual physical size.

Note: Decreased capacity is shown on the Dashboard, using pale gray, on the outer ring on the Capacity tile.

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 \(advanced\)](#) 282
- ◆ [System IOPS and bandwidth \(advanced\)](#) 282

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.

NOTICE

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 282](#)
- ◆ [“Configuring Network Throttling” on page 283](#)

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 219](#) and in [“Setting the rebalance policy” on page 221](#).

NOTICE

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.

NOTICE

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**.

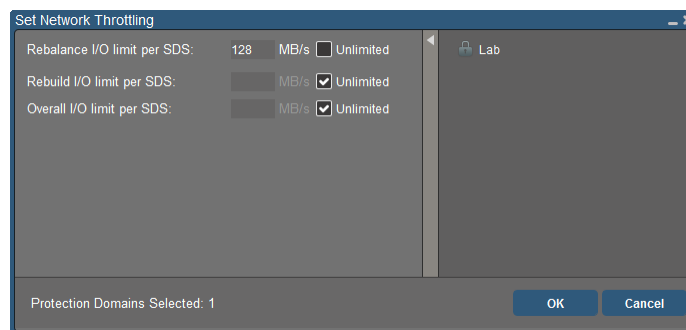


Figure 24 Set Network Throttling window

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.

NOTICE

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** (default) 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 197](#).

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**.

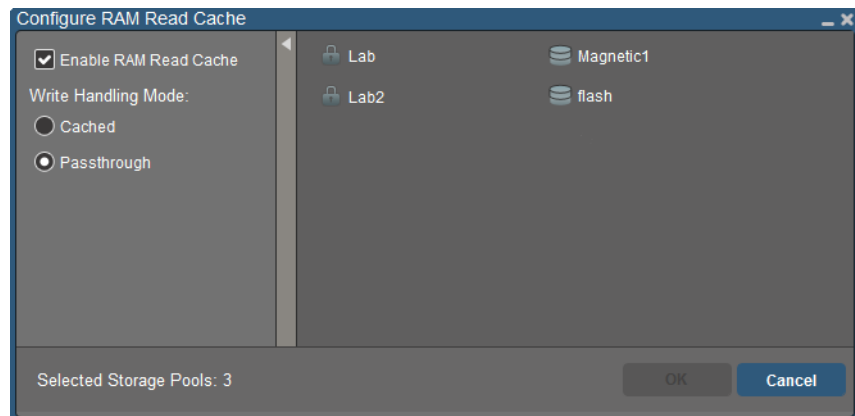


Figure 25 RAM Read Cache configuration at Storage Pool level

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**.

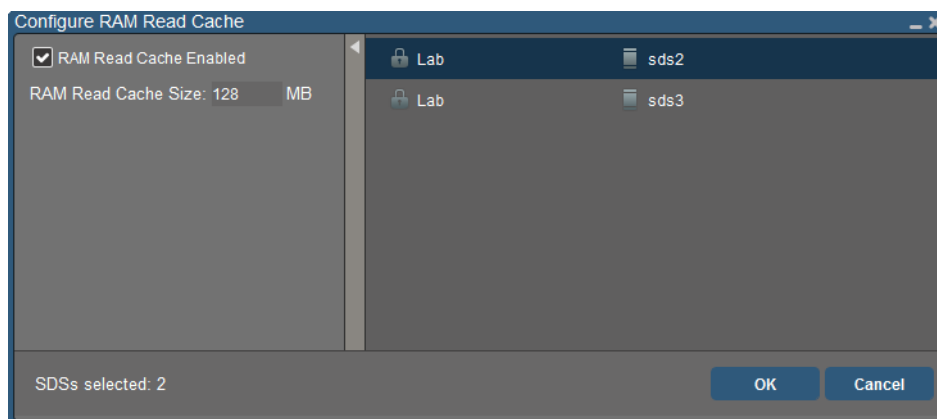


Figure 26 RAM Read Cache configuration at SDS level

Using the background device scanner

The background device scanner scans devices in the system to check for errors. Information about errors will be provided in event reports. For more information about viewing events, see [“Viewing events” on page 329](#). For more information about this specific event, see [“Background device scanner comparison error” on page 347](#).

This section includes the following topics:

- ◆ [“Enabling and disabling the background device scanner” on page 287](#)
- ◆ [“Resetting the background device scanner counters” on page 288](#)

Enabling and disabling the background device scanner

The scanner can be enabled on all the devices in the specified Storage Pool. There are two modes: **device only** mode, and **data comparison** mode:

- ◆ **Device only**—Perform read operations. Fix from peer on errors.
- ◆ **Data comparison**—Perform the device-only test, and compare the data content with peer. Zero padding must be enabled in order to set the background device scanner to data comparison mode.

To enable or disable the background device scanner, follow 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 **Set Background Device Scanner Mode**. The **Configure Storage Pool Background Device Scanner** window is displayed. The right pane of the window shows the Storage Pools that you are configuring.
3. For the **Enable Background Device Scanner** option, do one of the following:
 - To enable the scanner, select the check box, and proceed to the next step.
 - To disable the scanner, clear the check box, and click **OK** to finish.
4. Select an option (selected=enable; clear=disable):
 - **Device only**
 - **Data comparison**
5. In the **Bandwidth Limit** box, accept the default or type a number in KB per second (per device). The given value should be in the range 10 KB-10 MB (default = 1 MB).

Note: High bandwidth should be used very carefully for extreme cases only (such as an urgent need to check some devices), as it may create negative impact on system performance. Setting the background device scanner bandwidth should take into account maximum bandwidth of the devices.

6. Click **OK**.

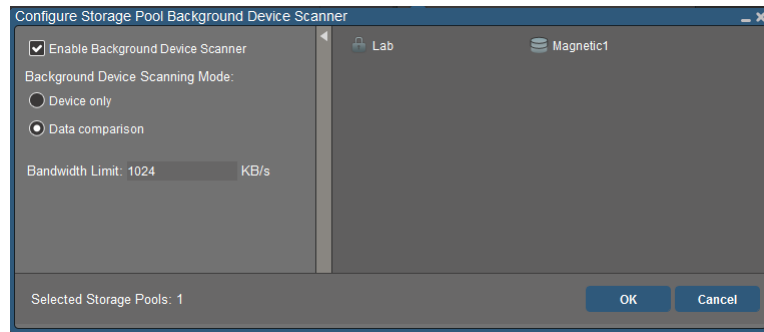


Figure 27 Background device scanner configuration

Resetting the background device scanner counters

You can reset background device scanner error counters for specified Storage Pools. Counters for data comparison errors, or corrected read errors, or both counter types can be reset.

To reset counters, follow 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 **Reset Background Device Scanner Counters**. The **Reset Background Device Scanner Counters** window is displayed. The right pane of the window shows the Storage Pools that you are configuring.
3. Select or clear the option that you require, or both options (selected=enable; clear=disable).
4. Click **OK**.

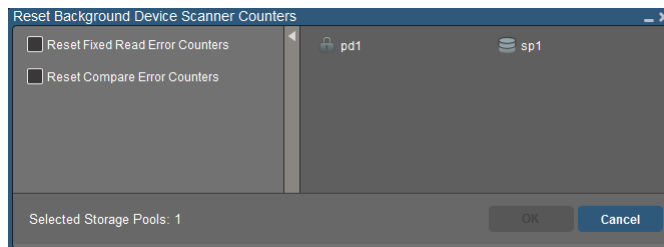


Figure 28 Reset Background Device Scanner Counters window

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
 - Clear host history from previous sessions
 - Calculation of I/O workload average rate shown on the Dashboard
 - System clock display
 - Advanced display mode for Dashboard, Backendinternals, 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**.

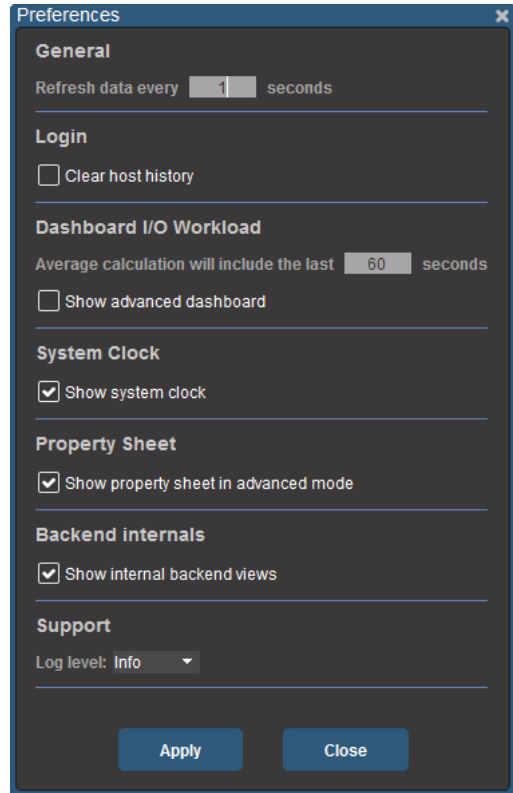


Figure 29 Preferences window

Table 24 Preferences (page 1 of 2)

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 24 Preferences (page 2 of 2)

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 11

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](#) 295
- ◆ [Viewing components](#) 304

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:

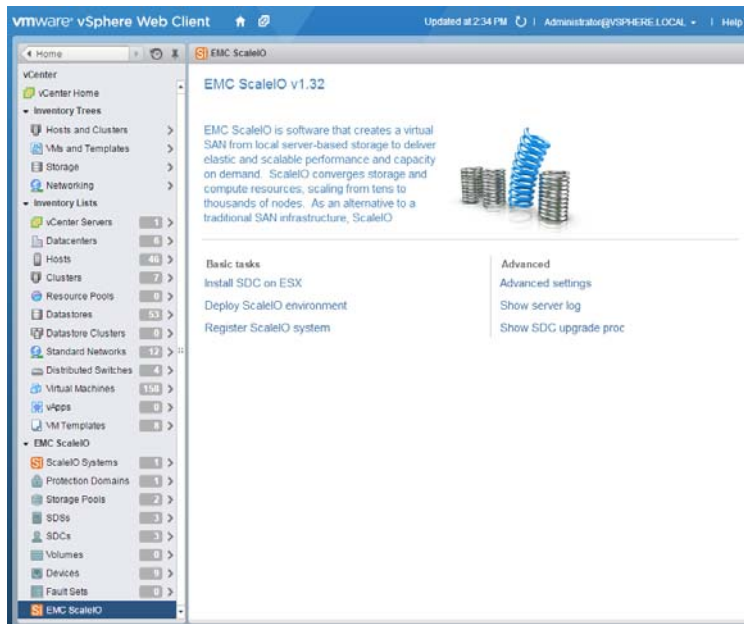
- Creating a volume
- Mapping the volume to all SDCs

This set of manual tasks is automated in the plug-in, as described in [“Creating, mapping, and unmapping volumes” on page 298](#).

To use the plug-in, it must be registered in your vCenter. For more information, see the *ScaleIO Installation Guide*.

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 settings each have a unique dialog box, each of which is described on its own in [“Configuring components—advanced” on page 298](#).

The following table lists the activities you can perform, and categorizes each as *basic* or *advanced*:

Table 25 Plug-in activity matrix (page 1 of 2)

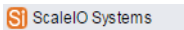
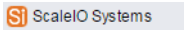
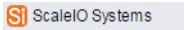
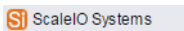
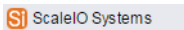
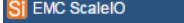
Object	Perform this activity	Basic or advanced	Access from this screen
System	Deploy ScaleIO system	Advanced. See the <i>EMC ScaleIO Installation Guide</i> .	
	Register an existing system	Basic—Enter the system Primary MDM IP address, user name, and password.	
	Unregister a system	Basic	
	Update system credentials	Basic—Enter new user name and password	
ScaleIO Gateway	Register/Update Gateway	Basic—Enter IP address, OS user name, and OS password.	
	Open Gateway	Basic—Navigates to the Gateway Installation Manager	
Protection Domain	Create a Protection Domain	Basic	
	Remove a Protection Domain	Basic	

Table 25 Plug-in activity matrix (page 2 of 2)

Object	Perform this 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	Install SDC on ESX	Advanced. See the <i>EMC ScaleIO Installation Guide</i> .	
	Upgrade SDC	Advanced	 SDCs
Volume	Create and map volumes	Advanced	 Storage Pools
	Map a volume	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 ³	 Protection Domains
Device	Clear a device error Note: Removes the error message. Can be performed only after clearing the error.	Basic	 Devices
	Add a device to an SDS	Advanced	 SDSs
	Remove a device from an SDS	Basic	 Devices

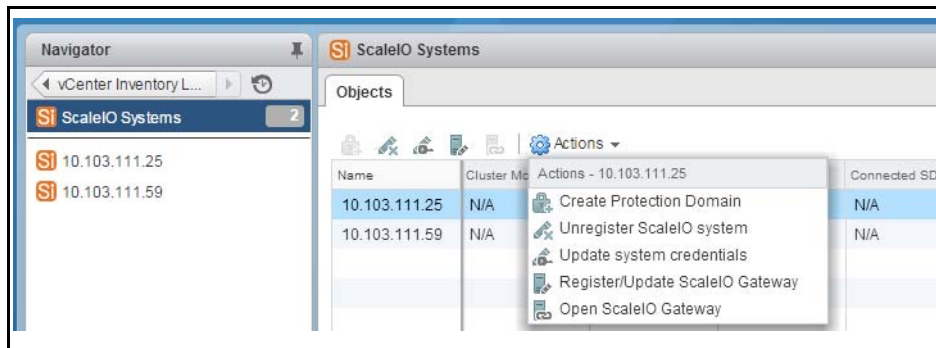
1. For RAM Read Cache to work on a volume, both the volume and its Storage Pool must have the feature enabled.
2. This task can be performed only with the assistance of EMC Support.
3. When defining Fault Sets, you must follow the guidelines described in [“Fault Sets” on page 30](#). Failure to do so may prevent creation of volumes.

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.

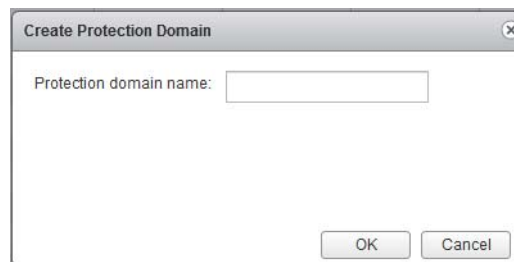
For example, to create a Protection Domain from the **ScaleIO Systems** screen, perform the following:

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.

Note: If you intend to enable zero padding on a Storage Pool, you must do so *before* you add any devices to the Storage Pool. For more information, see [“Modifying Storage Pool zero padding policy” on page 226](#).

Configuring components—advanced

This section describes how to perform the following activities:

- ◆ “Registering an existing system”
- ◆ “Creating, mapping, and unmapping volumes”
- ◆ “Adding devices to an SDS”
- ◆ “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, mapping, and unmapping volumes

This section describes how to use the plug-in to create, map, and unmap 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**.

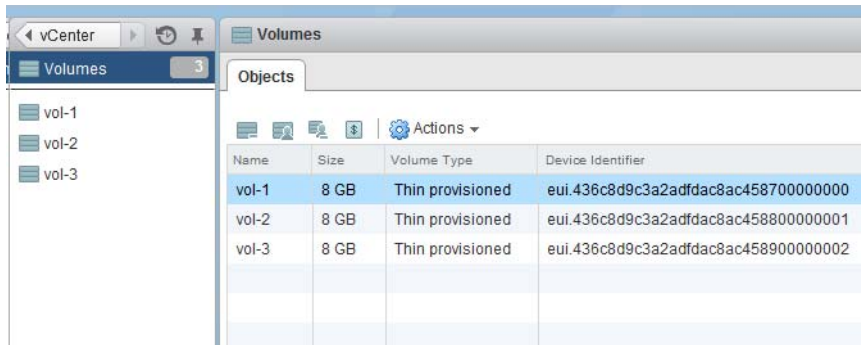
The **Create Volume** dialog appears:

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:



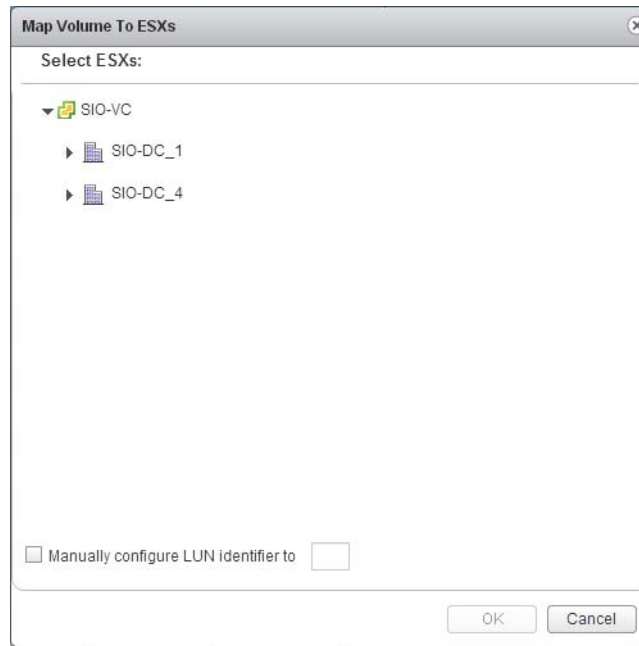
Name	Size	Volume Type	Device Identifier
vol-1	8 GB	Thin provisioned	eui.436c8d9c3a2adfdac8ac458700000000
vol-2	8 GB	Thin provisioned	eui.436c8d9c3a2adfdac8ac458800000001
vol-3	8 GB	Thin provisioned	eui.436c8d9c3a2adfdac8ac4589000000002

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.



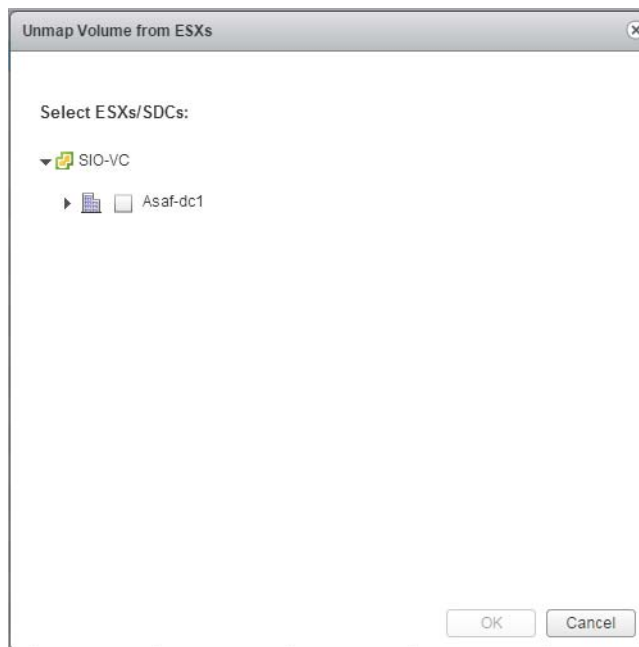
2. Select the clusters or ESXs to which this volume should be mapped.
3. To configure the LUN identifier manually, select **Manually configure LUN identifier to** and enter the identifier ID.
4. Click **OK**.

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.

Note: If you intend to enable zero padding on a Storage Pool, you must do so *before* you add any devices to the Storage Pool. For more information, see [“Modifying Storage Pool zero padding policy” on page 226](#).

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:

	Device Type	Device Name	Available Capacity	SSD Device	Create Vmdk	Storage Pool
☐	DGC /RAID 5	naa.600601600dc02d00d3b5855a84c0e21	50 GB	☐	☐	
☐	LSIMR9261-8i	naa.600605b004832340173c9b600dd5fe2	62 GB	☐	☐	
☐	EMC /SYMMETRIX	naa.600009700001949004155330303445	202 GB	☐	☐	
☐	EMC /SYMMETRIX	naa.600009700001949004155330303444	75 GB	☐	☐	
☐	EMC /SYMMETRIX	naa.600009700001949004155330303446	81 GB	☐	☐	
☐	EMC /SYMMETRIX	naa.600009700001949004155330303530	348 GB	☐	☐	
☐	EMC /SYMMETRIX	naa.600009700001949004155330303531	517 GB	☐	☐	
☐	EMC /SYMMETRIX	naa.600009700001949004155330303533	505 GB	☐	☐	

OK Cancel

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**.

Upgrading an SDC

Upgrading an SDC is performed with the plug-in. This topic is described in the *ScaleIO Installation Guide*.

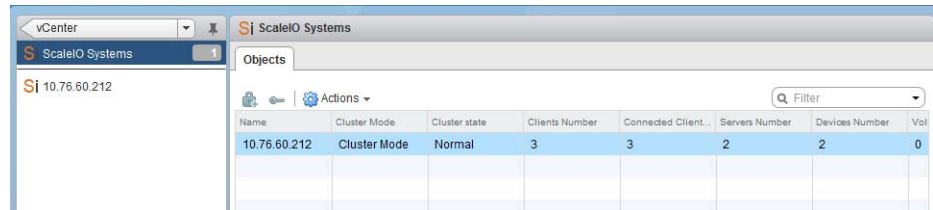
Viewing components

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.

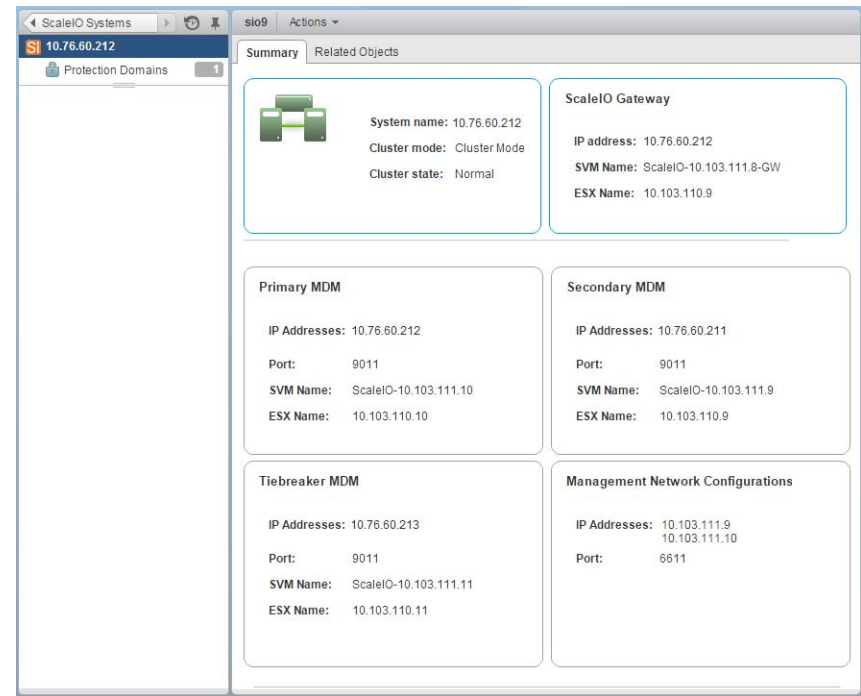
For example, when you select **ScaleIO systems**, the following system details appear:



The screenshot shows the vCenter interface with the 'ScaleIO Systems' tab selected. A table lists the installed systems. The first row is highlighted, showing details for the system with IP 10.76.60.212.

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 selected ScaleIO system. It includes a summary of system information and specific configuration details for various components.

System name: 10.76.60.212
Cluster mode: Cluster Mode
Cluster state: Normal

ScaleIO Gateway
IP address: 10.76.60.212
SVM Name: ScaleIO-10.103.111.8-GW
ESX Name: 10.103.110.9

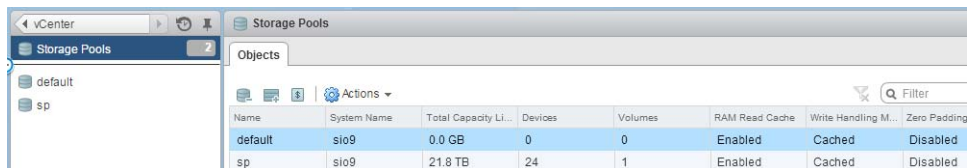
Primary MDM
IP Addresses: 10.76.60.212
Port: 9011
SVM Name: ScaleIO-10.103.111.10
ESX Name: 10.103.110.10

Secondary MDM
IP Addresses: 10.76.60.211
Port: 9011
SVM Name: ScaleIO-10.103.111.9
ESX Name: 10.103.110.9

Tiebreaker MDM
IP Addresses: 10.76.60.213
Port: 9011
SVM Name: ScaleIO-10.103.111.11
ESX Name: 10.103.110.11

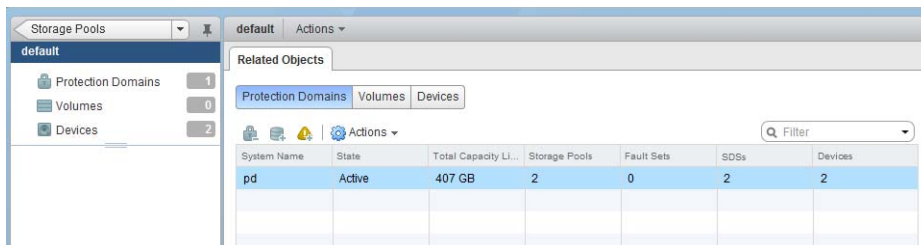
Management Network Configurations
IP Addresses: 10.103.111.9
10.103.111.10
Port: 6611

When you select **Storage Pools**, the following details appear:



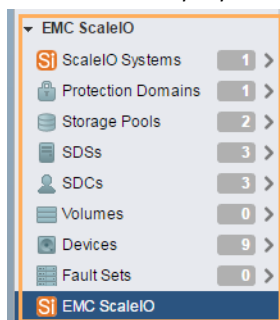
Name	System Name	Total Capacity Li...	Devices	Volumes	RAM Read Cache	Write Handling M...	Zero Padding
default	sio9	0.0 GB	0	0	Enabled	Cached	Disabled
sp	sio9	21.8 TB	24	1	Enabled	Cached	Disabled

When you drill-down on this screen, the following details appear:



System Name	State	Total Capacity Li...	Storage Pools	Fault Sets	SDSs	Devices
pd	Active	407 GB	2	0	2	2

You can view the properties of all the ScaleIO components in the menu:



EMC ScaleIO	
ScaleIO Systems	1 >
Protection Domains	1 >
Storage Pools	2 >
SDSs	3 >
SDCs	3 >
Volumes	0 >
Devices	9 >
Fault Sets	0 >
EMC ScaleIO	

PART 4

Reference

The appendices in this part of the guide describe various topics related to advanced management. Chapters include:

[Appendix A, “Troubleshooting and FAQ”](#)

This appendix describes troubleshooting steps and frequently asked questions.

[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, “ScaleIO on Xen”](#)

This appendix describes steps to take when deploying ScaleIO in the Xen environment.

[Appendix E, “Deployment in OpenStack Environments”](#)

This appendix describes ScaleIO deployment in an OpenStack cloud operating system environment.

[Appendix F, “REST API Reference”](#)

This appendix describes the REST API exposed by ScaleIO.

[Appendix G, “SNMP Trap Support”](#)

This appendix describes the SNMP alert functionality.

[“Glossary”](#)

The glossary defines many important concepts used in ScaleIO.

APPENDIX A

Troubleshooting and FAQ

This appendix describes ScaleIO troubleshooting and frequently asked questions. Topics include:

- ◆ [Troubleshooting.....](#) 309
- ◆ [Frequently asked questions.....](#) 313

Troubleshooting

This section describes solutions to issues that may arise.

Most of the issues requiring troubleshooting are related to events and CLI return messages:

- ◆ Event notifications

Upon changes or events in the system, ScaleIO may generate a system event that will be logged in a file, and, using the Call Home function, can be sent to an email address. 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.
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.

The VMware plug-in responds slowly

- ◆ In an environment with a large-scale of volumes, the plug-in response may slow down. To solve this, increase the maximum memory size to 2GB and then restart the vSphere web client service.
 - Windows

In the configuration file, `C:\Program Files\VMware\Infrastructure\vsphereWebClient\server\bin\service\conf\wrapper.conf`, look for a string similar to `= -Xmx` (the line should also start with `wrapper.java.additional`), and change the value to `2048M`.
 - Linux

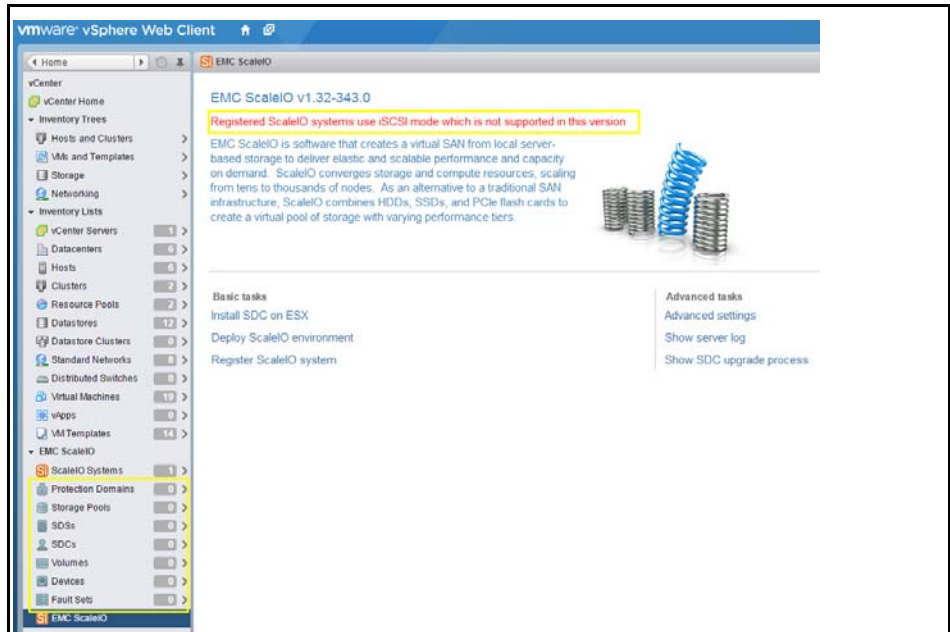
In the configuration file, `usr/lib/vmware-vmtoolsd/server/wrapper/conf/wrapper.conf`, look for `wrapper.java.maxmemory=` and change the value to `2048`.

In the VMware plug-in, ScaleIO systems appear disconnected, or not supported

If *any* of your registered ScaleIO systems contain an SDC that is installed on SVM (using iSCSI initiators instead of being directly installed on the ESX), *all* of your systems will appear to be unsupported or disconnected.

On the main **EMC ScaleIO** screen, an error message is displayed; in the **ScaleIO Systems** screen, the cluster state of all systems (even those that do not have SDC on SVM) will appear as *Disconnected - not supported iSCSI*.

In addition, all of your ScaleIO objects will appear with values of 0, as illustrated in the following figure:



To fix this problem, you must first locate, and then unregister all systems in which the SDC on SVM is present. When that is done, your other systems will become active.

Before you can re-register the systems that you unregistered, you will need to switch those SDCs to be installed directly on ESX, something that can be done only with the assistance of EMC Support. When that is complete, it is recommended to upgrade the entire system to the current version, as described in the *EMC ScaleIO Installation Guide*.

To identify which systems have SDC installed on SVM, log in to the Primary MDM, and run this command:

```
scli --query_all_scsi_initiators
```

The following output indicates that there are no iSCSI initiators, thus no SDC on SVM:

```
Query all SCSI Initiators returned 0 initiators
```

Output similar to the following indicates that there are at least one SDC installed on SVM in the system:

```
Query all SCSI Initiators returned 1 initiators.
```


ID: 94a3553c00000000 Name: N/A IQN: aaa Not mapped to any volume

Frequently asked questions

This section addresses the following frequently asked question:

- ◆ [“Using the same data network for different NICs” on page 313](#)
- ◆ [“Solving performance issues” on page 313](#)
- ◆ [“Changing the SDS IP addresses” on page 314](#)
- ◆ [“Changing the MDM IP address in the SDC” on page 314](#)
- ◆ [“Mounting ScaleIO” on page 315](#)
- ◆ [“Configuring ScaleIO devices in Linux LVM” on page 316](#)
- ◆ [“Changing the LIA configuration file” on page 317](#)
- ◆ [“The ScaleIO Gateway web server isn’t responding” on page 317](#)
- ◆ [“Fixing keytool errors” on page 319](#)
- ◆ [“Upgrading the Gateway when a custom certificate is used” on page 320](#)
- ◆ [“Changing the shutdown port for the Tomcat server” on page 321](#)
- ◆ [“Uploading a new OVA” on page 321](#)
- ◆ [“Changing default ports” on page 321](#)
- ◆ [“Associating ScaleIO volumes with physical disks” on page 322](#)
- ◆ [“Configuring session timeout parameters” on page 324](#)

Using 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.

Solving 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.

Changing 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>
```

Changing 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

Mounting ScaleIO

The exposed ScaleIO volumes are connected to the servers via the network. To configure mounting options of ScaleIO devices, follow the instructions for your OS.

Use persistent device names, described in full in [“Associating ScaleIO volumes with physical disks” on page 322](#).

To mount, perform the following:

1. Determine the `/dev/disk/by-id` correlation to `/dev/sciniX` by running the following command:

```
ls -l /dev/disk/by-id/ |grep scini
```

Output, similar to the following, appears:

```
lrwxrwxrwx 1 root root 12 Mar 2 05:35 emc-vol-7ec27ef55b8f2108-85a0f0330000000a -> ../../scinia
lrwxrwxrwx 1 root root 12 Mar 2 05:35 emc-vol-7ec27ef55b8f2108-85a0f03200000009 -> ../../scinib
lrwxrwxrwx 1 root root 12 Mar 2 05:35 emc-vol-7ec27ef55b8f2108-85a0f02c00000003 -> ../../scinic
```

2. Run the mount command:

```
mount /dev/disk/by-id/<EMC-vol-id>
```

Example

```
mount /dev/disk/by-id/emc-vol-7ec27ef55b8f2108-85a0f0330000000a /mnt_scinia
```

3. To make the mount command persistent, edit the `/etc/fstab` file, according to the instructions for your operating system:

- RHEL

In `/etc/fstab` use a text editor to add `_netdev` to the ScaleIO mount lines:

Example:

```
/dev/disk/by-id/emc-vol-7ec27ef55b8f2108-85a0f0330000000a  
/mnt_scinia ext3_netdev 0 0
```

Ensure that you comply with the `netdev` and syntax rules for your file system, as described in the `man` page.

- SLES

In `/etc/fstab` use a text editor to add `nofail` to the ScaleIO mount lines:

Example:

```
/dev/disk/by-id/emc-vol-7ec27ef55b8f2108-85a0f0330000000a  
/mnt_scinia ext3 nofail 0 0
```

Ensure that you comply with the `nofail` and syntax rules for your file system, as described in the `man` page.

Configuring 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.

Changing 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
```

The ScaleIO Gateway web server isn't responding

The ScaleIO Gateway (REST service, Installation Manager) may be disabled:

The ScaleIO Gateway seems to be locked or disabled, and returns the HTTP status code 401 or 403.

Solution

- ◆ Ensure that the Gateway is enabled, as described in the *EMC ScaleIO Installation Guide*.

- ◆ In the `gatewayUser.properties` file, ensure that the **gateway-admin.password** property has a non-blank password. If the password is blank, the gateway has been locked. Unlock it by using the Installation Manager CLI command `im generate_password`, described in the *EMC ScaleIO Installation Guide*.
- ◆ The following table shows the location of the `gatewayUser.properties` file:

Gateway installed on	Location of <code>gatewayUser.properties</code> file
Windows, 32-bit	C:\Program Files (x86)\EMC\ScaleIO\Gateway\webapps\ROOT\WEB-INF\classes\
Windows, 64-bit	C:\Program Files\EMC\ScaleIO\Gateway\webapps\ROOT\WEB-INF\classes\
Linux	/opt/emc/scaleio/gateway/webapps/ROOT/WEB-INF/classes

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

Perform one of the following:

- ◆ Find the service/daemon that is currently occupying that port and stop it, using **netstat -anb** on Windows or **netstat -altp** on Linux. On Windows, one of the common applications 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:

- **Windows**
Restart the **EMC ScaleIO Gateway** service

- **Linux**

Type the command **service scaleio-gateway restart**

- ◆ Change the ScaleIO Gateway web server to run on a different port, as described in [“Changing default ports” on page 321](#).

After doing so, restart the ScaleIO Gateway service/daemon, as described above. Access the Gateway with the new port. For example:

`https://<host>:<port>`

Fixing keytool errors

Error during rpm installation command

Error message No keytool path was found. Please pass SIO_GW_KEYTOOL as an argument to the rpm installation command.

If a message similar to this is displayed after executing the rpm command to install the Gateway, add the location of the /bin/keytool file on your server to the command.

Example rpm command:

```
SIO_GW_KEYTOOL=/usr/lib/jvm/java-1.6.0-openjdk-1.6.0.0.x86_64/jre rpm -U <gateway_installation_file_name>.rpm
```

Error during rpm upgrade command

Error message: No keytool path was found.
Set the environment variable SIO_GW_KEYTOOL

If a message similar to this is displayed after executing the rpm command to upgrade the Gateway, add the location of the /bin/keytool file on your server to the command.

Example command:

```
SIO_GW_KEYTOOL=/usr/java/default/bin/ rpm -Uvh /tmp/EMC-ScaleIO-gateway-1.32-363.0.noarch.rpm
```

Error during log in to Installation Manager CLI

Error message cannot find keytool utility
Could not log in

If a message similar to this is displayed when running the `im login` command with a certificate, it is caused by the inability to find the `keytool` utility, which is located in the Java path. To correct this issue, add the location of the `java_path` to the command. This is only necessary when providing a certificate; if using the `--no_certificate_validation` flag, it is not necessary.

Example command:

```
im login --host 10.76.61.35 --username admin --password 123
--port 443 --cer "C:\InstallationManager\ScaleIO.cer"
--java_flag <java_path>
```

Upgrading the Gateway when a custom certificate is used

If a custom security certificate is used on the ScaleIO Gateway (Windows and Linux environments), you must save a copy of the certificate (*.keystore file) and the `catalina.properties` file before you upgrade the gateway. After the upgrade is complete, you must copy these files back to their original location.

The default file locations, per operating system, are:

Linux:

```
/opt/emc/scaleio/gateway/conf/catalina.properties
/opt/emc/scaleio/gateway/conf/certificates/.keystore
```

Windows (64 bit):

```
C:\Program Files\EMC\ScaleIO\Gateway\conf\
catalina.properties
C:\Program Files\EMC\ScaleIO\Gateway\conf\certificates\
.keystore
```

Windows (32-bit):

```
C:\Program Files (x86)\EMC\ScaleIO\Gateway\conf\
catalina.properties
C:\Program Files (x86)\EMC\ScaleIO\Gateway\conf\
certificates\keystore
```


What to do when the default self-signed certificate expires

If the default self-signed security certificate is used on the ScaleIO Gateway, it expires after approximately one year. When you upgrade the gateway, the self-signed certificate is automatically replaced with a new one. If your self-signed security certificate expires, you can create a new one using the Java keytool utility.

For more information, see “Certificate management for ScaleIO Gateway” in the *EMC ScaleIO Installation Guide*.

Changing 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">`

Uploading 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.

Changing default ports

The following table lists the TCP ports that are used by ScaleIO. Prior to installing or upgrading a system, ensure that these ports are not in use by other processes.

If they are, either free these ports or change the ScaleIO ports to another available port.

Port used by	Port #	File to change	Field to modify (or to add, if it does not exist)
MDM listener	6611	Notice: Cannot be modified, and must be available	
Cluster listener	9011	/opt/emc/scaleio/mdm/cfg/conf.txt	actor_cluster_port=<new-port>
Tie Breaker listener	9011	/opt/emc/scaleio/tb/cfg/conf.txt	voter_cluster_port=<new-port>
SDS listener	7072	/opt/emc/scaleio/sds/cfg/conf.txt	tgt_port=<new-port>
LIA listener	9099	/opt/emc/scaleio/lia/cfg/conf.txt	lia_port=<new-port>
Gateway (secure)	443	{gateway installation directory}\conf\server.xml	redirectPort=<new-port> ¹ Connector port=<new-port>
Gateway (not secure)	80	{gateway installation directory}\conf\server.xml	Connector port=<new-port> ¹

1. After changing either of the Gateway ports, you must restart the Gateway service/daemon, as described in [“The ScaleIO Gateway web server isn’t responding” on page 317](#).

Associating 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 ad99eaac00000001 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.

Configuring 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.

APPENDIX B

System Events and Alerts

This appendix describes ScaleIO system events and alerts. Topics include:

- ◆ [Event format.....](#) 328
- ◆ [Viewing events.....](#) 329
- ◆ [Event list.....](#) 333
- ◆ [Alert List.....](#) 349

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 330](#)).

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:	
--min_severity <SEVERITY>	Displays events with at least the specified minimum severity
--severity <SEVERITY>	Displays events with the specified severity
--from_id <ID>	Displays all events starting from the given ID
--to_id <ID>	Displays all events ending at the given ID
--from_date <ID>	Displays all events starting from the given date
--to_date <ID>	Displays all events ending at the given date
--grep <TEXT>	Displays events containing the specified text
--full	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> [--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 (maximum of two 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>
```

Description/Notes

Stops posting events to remote syslog servers.

Parameters

Parameter	Description
--remote_syslog_server_ip <IP>	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> --syslog_facility <FACILITY>
```

Description/Notes

Configures the facility field of the syslog events.

Parameters

Parameter	Description
<code>--remote_syslog_server_ip <IP ADDRESSES></code>	A comma-separated list of IP addresses of syslog servers
<code>--syslog_facility <FACILITY></code>	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
```

Call-Home—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.

Event list

This section lists all ScaleIO events, grouped by the following categories:

- ◆ [“Authentication” on page 334](#)
- ◆ [“CLI commands” on page 334](#)
- ◆ [“License and installation” on page 337](#)
- ◆ [“MDM” on page 339](#)
- ◆ [“SDC” on page 341](#)
- ◆ [“SDS” on page 343](#)
- ◆ [“Rebuild” on page 348](#)

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

Background device scanner comparison error

Parameter	Description
Name	SCANNER_COMPARE_REPORT
Message	Background device scanner on device ID 2301536800030001 reported compare error (Device Path: <device path>, SDS: <SDS name and ID>, Peer Device Path: <peer device path>, Peer SDS: <peer SDS name and ID>, Volume name: <volume name>, Volume offset: <volume offset>)
Severity	Error
Description	Background device scanner error report, which provides details about comparison errors found during comparison of two copies of data on different devices.
Action	Check storage device 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 265](#). Some alerts are also converted into SNMP traps. For more information, see [“Supported alerts and event numbering conventions” on page 520](#).

Table 26 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 26 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 26 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
FIXED_READ_ERROR_COUNT_ABOVE_THRESHOLD	Device has fixed read errors	Yes
SCANNER_COMPARE_ERROR	Background device scanning has found data conflicts	Yes

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)

Message list

The following section lists all ScaleIO return messages.

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> , <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 resources
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	A timeout occurred
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_RECONF_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	TGT_ADD_DEV_OPEN_ERROR
Message	Could not open 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	TGT_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 23 .
Action	Validate the command parameters, and set the device size appropriately

SDS add device IO error

Parameter	Description
Name	TGT_ADD_DEV_IO_ERROR
Message	Add SDS device IO 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	TGT_ACTIVE_ATTACH_TO_THIS_MDM
Message	SDS is 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	TGT_ALREADY_ATTACH_TO_THIS_MDM
Message	SDS is 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 <code>remove_sds</code> , 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 <code>--force_clean</code> flag.

SDS active attach to other MDM

Parameter	Description
Name	TGT_ACTIVE_ATTACH_TO_OTHER_MDM
Message	SDS is actively attached to another MDM
Commands	add_sds
Description	SDS is already managed by another MDM. <i>Actively</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	TGT_ALREADY_ATTACH_TO_OTHER_MDM
Message	SDS is 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	TGT_NOT_FOUND
Message	Could not find SDS
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	Could not find the volume
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	INI_NOT_FOUND
Message	Could not find the SDC
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	VOL_ALREADY_MAPPED_TO_THIS_INI
Message	The volume is already mapped to this SDC
Commands	<code>map_volume_to_sdc</code> (when mapping to a single SDC)
Description	The specified volume is already mapped to the specified SDC
Action	Check the command parameters, and use <code>query_all_volumes</code> to validate the current mapping

Volume already mapped to all SDCs

Parameter	Description
Name	VOL_ALREADY_MAPPED_TO_ALL_INIS
Message	The volume is already mapped to all SDCs
Commands	<code>map_volume_to_sdc</code> (when mapping to all SDCs)
Description	The specified volume is already mapped to all SDCs
Action	Check the command parameters, and use <code>query_all_volumes</code> to validate the current mapping

Volume not mapped to SDC

Parameter	Description
Name	VOL_NOT_MAPPED_TO_INI
Message	The volume is 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 mapped to all SDCs

Parameter	Description
Name	VOL_MAPPED_TO_ALL_INIS
Message	The volume is 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	There are too many mappings
Commands	map_volume_to_sdc
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_VOL_ID
Message	Invalid volume ID. Please try again with a valid 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_TGT_ID
Message	Invalid SDS ID. Please try again with a valid 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_INI_ID
Message	Invalid SDC ID. Please try again with a valid 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	Could not find the host
Commands	All SDS commands
Description	The specified host name was not found
Action	Check the specified host name

Duplicate host name

Parameter	Description
Name	DUP_HOST_NAME
Message	Duplicate host name
Commands	add_sds
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	TGT_ADDR_AND_PORT_IN_USE
Message	The SDS IP address and port already in use. Please try with different ones.
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_TGTS_IN_FDOM
Message	There are 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_TGTS
Message	There are 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_FD
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_VOLS
Message	There are 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	TGT_NAME_IN_USE
Message	SDS name is already in use. Please use a different name.
Commands	add_sds, rename_sds
Description	The specified SDS name is already in use by another SDS
Action	Use <code>query_all_sds</code> to validate existing names, and issue the command with another name

Volume name in use

Parameter	Description
Name	VOL_NAME_IN_USE
Message	Volume name already in use. Please use a different name.
Commands	add_volume, rename_volume
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_TGT_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 address

Parameter	Description
Name	DUPLICATE_SDC_IP
Message	More than one SDC exists for the same IP address. Use name or ID instead, or remove the duplicate SDC.
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	TGT_NOT_UNDER_REMOVAL
Message	SDS is not being removed
Commands	<code>abort_remove_sds</code>
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	TGT_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	VOL_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	The MDM cluster state is incorrect
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 switch_to_single_mode 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	add_tb
Description	A Tie-Breaker is already configured in the system
Action	Only one Tie-Breaker can be configured. Use query_cluster to check the current configuration.

Tie-Breaker not configured

Parameter	Description
Name	VOTER_NOT_CONFIG
Message	The Tie-Breaker is not configured. Please configure the Tie-Breaker.
Commands	remove_tb, switch_to_cluster_mode
Description	A Tie-Breaker is not configured. Cannot remove it, and cannot switch to cluster mode.
Action	Use add_tb to configure a Tie-Breaker

Primary MDM already configured

Parameter	Description
Name	PRIMARY_MDM_ALREADY_CONFIG
Message	The primary MDM is 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	The MDM is already in single mode
Commands	<code>switch_to_single_mode</code>
Description	Cluster is already in Single mode
Action	None

MDM already in cluster mode

Parameter	Description
Name	ALREADY_IN_CLUSTER_MODE
Message	The MDM is already in cluster mode
Commands	<code>switch_to_cluster_mode</code>
Description	MDM Cluster is already in Cluster mode
Action	None

Secondary MDM not configured

Parameter	Description
Name	SECONDARY_MDM_NOT_CONFIG
Message	The secondary MDM is not configured. Please configure it and try again.
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	The secondary MDM is not connected
Commands	switch_mdm_ownership
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	Could not configure secondary MDM
Commands	add_tb
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 host name

Parameter	Description
Name	BAD_HOSTNAME
Message	An invalid IP or host-name specified
Commands	add_primary_mdm, add_secondary_mdm, add_tb
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 address

Parameter	Description
Name	USE_MDM_IP
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	CMD_ONLY_IN_CLUSTER
Message	Command can only be used 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 mode

Parameter	Description
Name	CMD_ONLY_IN_SINGLE
Message	Command can only be used 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 when cluster degraded

Parameter	Description
Name	CMD_ERROR_CLUSTER_DEGRADED
Message	Command cannot be used when a cluster is degraded
Commands	switch_mdm_ownership
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	There are too many devices for SDS
Commands	add_sds, add_sds_device
Description	Too many devices specified (add_sds), or the SDS already has the maximum number of allowed devices
Action	None

SDS device not found

Parameter	Description
Name	TGT_DEVICE_NOT_FOUND
Message	Could not find the SDS device
Commands	SDS device related commands
Description	SDS device was not found
Action	Check the command parameters. Use query_sds to view the device details.

License too long

Parameter	Description
Name	LICENSE_TOO_LONG
Message	The license key is too long. Please check your key and enter it again.
Commands	set_license
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	set_license
Description	The specified license key is invalid or does not match this version. Please contact Customer Support.
Action	Validate the specified license key with the one received from EMC

Unknown license version

Parameter	Description
Name	LICENSE_UNKNOWN_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 has not been 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	The current system configuration exceeds the license entitlements
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	CAPACITY_LICENSE_EXCEEDED
Message	The operation could not be completed. The license capacity has been 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_TIME_EXCEEDED
Message	The license has 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	INSTALL_ID_MISMATCH
Message	The license installation ID does not match the ID of 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	LICENSE_UNSUPPORTED_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 address equals primary IP address

Parameter	Description
Name	SEC_IP_EQUAL_PRI_IP
Message	The secondary IP is the same as the primary IP address. Please enter a different secondary IP address.
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	TGT_DEV_BEING_REMOVED
Message	The 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	The 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	TGT_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	The device ID is invalid. Please use a valid 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_FDs
Message	There are 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	FD_NAME_IN_USE
Message	Protection Domain name already in use. Please try a different name.
Commands	<code>add_protection_domain</code> , <code>rename_protection_domain</code>
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	FD_NOT_FOUND
Message	Could not find Protection Domain
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	FD_HAS_TGTS
Message	Protection Domain has SDSs
Commands	<code>remove_protection_domain</code>
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_TGTS_IN_STORAGE_POOL
Message	Less than three devices from different SDSs are defined in this Storage Pool. Add devices to the Storage Pool from additional SDSs.
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	Removal of the object is in progress. Please wait.
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	ENCRYPTION_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	ENCRYPTION_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 network test results

Parameter	Description
Name	NET_TEST_NOT_FOUND
Message	Could not find network test results
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	NET_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.

SDS device already active

Parameter	Description
Name	TGT_DEV_ALREADY_ACTIVE
Message	The SDS device is already active
Commands	activate_sds_device
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	TGT_DEV_WRONG_TEST_MODE
Message	The SDS device is in incorrect test mode
Commands	activate_sds_device
Description	At least one specified device will automatically be activated when its test is completed
Action	Use <code>query_sds</code> to view the device status

SDS device wrong test state

Parameter	Description
Name	TGT_DEV_WRONG_TEST_STATE
Message	The SDS device test is not complete
Commands	activate_sds_device
Description	At least one specified device test is not yet complete. This device cannot be activated.
Action	Use <code>query_sds</code> to view the devices' status

SDS device test in progress

Parameter	Description
Name	TGT_DEV_TEST_IN_PROGRESS
Message	The SDS device test is 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_ERROR_BUSY
Message	The 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 query_all 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 creation failed

Parameter	Description
Name	VOL_CREATE_FAIL
Message	Could not create the volume
Commands	add_volume
Description	The volume creation failed
Action	Use query_all to validate the system state, and retry the command

Invalid password

Parameter	Description
Name	INVALID_PASSWORD
Message	Invalid password. Please try again.
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	You do not have permission to perform this operation. Please contact your system administrator for assistance.
Commands	Most commands
Description	The specified user does not have permissions to issue this command
Action	Contact the system administrator

Too many Storage Pools in Protection Domain

Parameter	Description
Name	TOO_MANY_STORAGE_POOLS_IN_PROTECTION_DOMAIN
Message	There are too many Storage Pools in Protection Domain
Commands	add_storage_pool
Description	Addition of another Storage Pool will exceed the system limit of allowed Storage Pools in a Protection Domain
Action	Use query_protection_domain 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	add_storage_pool
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	Could not find Storage Pool
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	The 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.

Protection Domain has Storage Pools

Parameter	Description
Name	FD_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	INI_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	There are too many volumes in the VTree
Commands	snapshot_volume
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	There are too many snapshots in the VTree
Commands	snapshot_volume
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	NOTHING_TO_DO
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	There are too many devices in Storage Pool
Commands	<code>add_sds</code> , <code>add_sds_device</code>
Description	Adding a device to the specified Storage Pool will exceed the allowed system limit of SDS devices per Storage Pool
Action	Use <code>query_sds</code> to find the association of devices to Storage Pools

Volume not found for consistency group

Parameter	Description
Name	VOL_NOT_FOUND_FOR_SNAP_GROUP
Message	No volumes were found for the given consistency group
Commands	<code>remove_consistency_group</code>
Description	No volume found for the specified consistency group
Action	Use <code>query_all_volumes</code> to view the existing consistency groups, and review command parameters accordingly

Too many IP addresses

Parameter	Description
Name	TOO_MANY_IPS
Message	There are 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 address

Parameter	Description
Name	LAST_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 address 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

Volume size too large

Parameter	Description
Name	VOL_SIZE_TOO_LARGE
Message	The volume size too large
Commands	<code>add_volume</code> , <code>modify_volume_capacity</code>
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_SNAP
Message	The capacity of the Storage Pool is too small to create new snapshots
Commands	<code>snapshot_volume</code>
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 address belongs to other SDS

Parameter	Description
Name	IP_BELONGS_TO_OTHER_TGT
Message	The specified IP address belongs to another SDS. Please use the correct IP address.
Commands	<code>add_sds</code> , <code>add_sds_ip</code>
Description	The specified IP address is already assigned to another SDS
Action	Check command parameters

Invalid port

Parameter	Description
Name	INVALID_PORT
Message	The specified SDS port is not in the valid range. Please try again with a valid port number.
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.
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.
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.
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\lia\logs

LIA invalid password

Parameter	Description
Name	LIA_INVALID_PASSWORD
Message	Token authentication was not successful
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 current configuration
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 send back to the user.
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
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
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	<code>modify_sds_ip</code> , <code>remove_sds_ip</code>
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. Please enter a valid percentage value.
Commands	<code>set_capacity_alert_threshold</code>
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	<code>remove_storage_pool</code> <code>remove_protection_domain</code>
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	add_sds_ip
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	modify_sds_ip
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 system ID number that you provided does not match the actual system ID.
Commands	query_poll, query_properties, query_object
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 the given name already exists in the SDS.
Commands	add_sds_device
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 specified volume size is illegal. Volume size must be in 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 0—100.
Commands	<code>set_thick_volume_percentage</code>
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 system 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	<code>add_secondary_mdm</code> , <code>add_tb</code>
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	<code>map_volume_to_sdc</code>
Description	You attempted to map more than the maximum allowed number of volumes (8192) to one or more SDCs.
Action	Avoid mapping more than the maximum allowed volumes to a single SDC.

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	<code>remove_sds</code> , <code>remove_sds_device</code>
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	<code>sds_network_limits</code>
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
Commands	<code>enable_sds_rmcache</code> <code>disable_sds_rmcache</code> <code>set_sds_rmcache_size</code>
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	Only a single SDC may be mapped to this volume at a time
Commands	map_volume_to_ini
Description	The volume is already mapped and the 'allow multi map' flag is not set
Action	You are not allowed to map this volume more than once. If you want to enable multiple mapping, use the flag <code>allow_multi_map</code>

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 <code>test_only</code> 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	activate_sds_device activate_all_devices
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
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.

Volume already mapped to an SDC

Parameter	Description
Name	VOL_ALREADY_MAPPED_TO_AN_INI
Message	The volume is already mapped to a SDC
Commands	map_volume_to_sdc with the all_sdc option
Description	If the volume is already mapped to one or more SDCs, you cannot use the all_sdc 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	add_sds
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 add_sds command failed, the system will try to remove it automatically, without user intervention. Therefore, if you issue the same add_sds 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	modify_spare_policy
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

Invalid background device scanner bandwidth limit

Parameter	Description
Name	INVALID_SCANNER_BW_LIMIT
Message	The scanner bandwidth limit is invalid. Please use a value between 10KB - 1GB
Commands	enable_background_device_scanner
Description	The bandwidth value that you provided for the bandwidth limit parameter is invalid.
Action	Verify that correct input parameters (a value between 10KB–1GB) are used with the command

Zero padding with background device scanner data comparison mode

Parameter	Description
Name	ZEROPAD_AND_SCANNER
Message	Zero padding must be enabled in order to set scanner to Data Comparison mode
Commands	enable_background_device_scanner
Description	The background device scanner has two modes: device only, and data comparison mode. The Storage Pool must have zero padding enabled before you attempt to enable background device scanning in data comparison mode.
Action	Enable zero padding in the Storage Pool (you must do this before adding devices to the Storage Pool)

IP address already assigned to another SDS

Parameter	Description
Name	ADDRESS_BELONGS_TO_DIFFERENT_TGT
Message	The given address belongs to a different SDS. Please check the system configuration.
Commands	<code>add_sds</code> , <code>add_sds_ip</code>
Description	This message is returned if the specified IP address has already been assigned to another SDS in the system
Action	Check SDS network configuration and IP address assignments

Capacity too low for thin volumes

Parameter	Description
Name	CAPACITY_TOO_LOW_FOR_THIN_VOL
Message	Storage Pool reached critical capacity utilization. Unable to create new thin volumes.
Commands	<code>add_volume</code> , <code>modify_volume_capacity</code>
Description	Thin volumes cannot be allocated if the specified Storage Pool has reached the critical capacity level
Action	Add more devices to the Storage Pool

Too many Storage Pools in the system

Parameter	Description
Name	TOO_MANY_STORAGE_POOLS
Message	There are too many Storage Pools in the system
Commands	<code>add_storage_pool</code>
Description	Addition of another Storage Pool will exceed the system limit of allowed Storage Pools
Action	Remove unused Storage Pools. If the problem is not solved, install a new system.

Remote access to the MDM is blocked

Parameter	Description
Name	REMOTE_PERMISSION_DENIED
Message	Permission denied. Remote read-only limit state is enabled and is blocking this operation from a remote location. Run this command from the Primary MDM host.
Commands	All
Description	Remote read-only limit state is enabled and is blocking this operation from a remote location
Action	Run the command from the Primary MDM host

Cannot add a partitioned device

Parameter	Description
Name	TGT_ADD_DEV_IS_PARTITIONED
Message	Unable to add a device that was already partitioned
Commands	add_sds, add_sds_device
Description	The added device is partitioned and cannot be used by the system
Action	Remove partitions from the device, or add the partitioned device to the system

Cannot add a mounted device

Parameter	Description
Name	TGT_ADD_DEV_IS_MOUNTED
Message	Unable to add a device that was already mounted
Commands	add_sds, add_sds_device
Description	The added device is mounted and cannot be used by the system
Action	Unmount the device

Device header mismatch

Parameter	Description
Name	INVALID_DEVICE_HEADER_SIGNATURE
Message	Found an invalid device header signature
Commands	add_sds, add_sds_device
Description	The device was previously added to the system, or after SDS reboot the signature of the header does not match the expected signature
Action	Check the specific SDS devices configuration

APPENDIX D

ScaleIO on Xen

This section describes topics that relate to using ScaleIO on XEN. Topics include:

- ◆ [Adding a volume 415](#)
- ◆ [Removing a ScaleIO volume from Xen 416](#)
- ◆ [Modifying the size of a ScaleIO volume 417](#)

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 58](#).
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 165](#).

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 161](#).
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 E

Deployment in OpenStack Environments

This appendix contains information about ScaleIO deployment in an OpenStack cloud operating system environment. Topics include:

- ◆ [Overview.....](#) 419
- ◆ [Environment and system requirements.....](#) 421
- ◆ [Volume limitations](#) 422
- ◆ [Supported operations](#) 422
- ◆ [Installation.....](#) 422
- ◆ [QoS functionality](#) 426
- ◆ [Thin provisioning](#) 427
- ◆ [Multiple Protection Domains and Storage Pools](#) 427
- ◆ [Configuration script.....](#) 430

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.

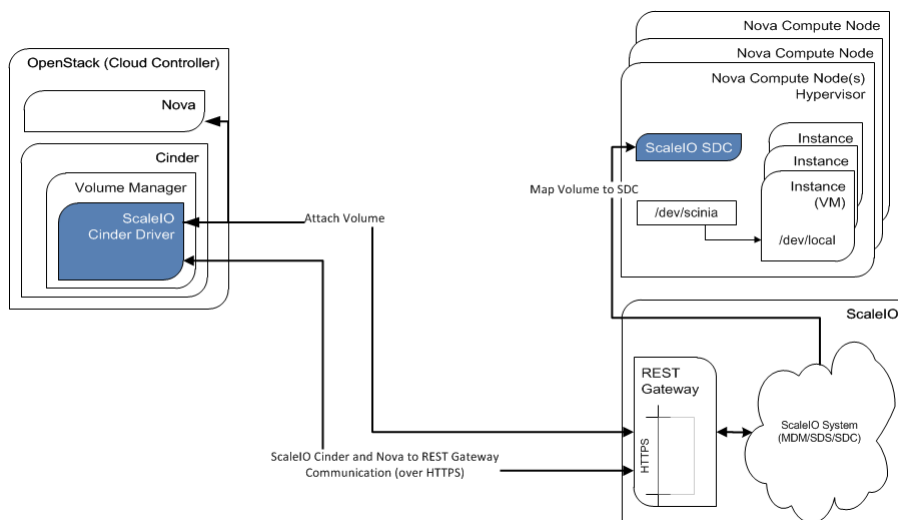
The ScaleIO elastic storage solution includes a Cinder driver, which interfaces between ScaleIO and OpenStack, and presents volumes to OpenStack as block devices which are available for block storage. It also includes an OpenStack Nova driver, for handling compute and instance volume related operations. 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.x or 7.x (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 the *ScaleIO Installation Guide*. 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 the `keytool` utility, see the *EMC ScaleIO Installation Guide*.
- ◆ 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.

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
- ◆ 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 the *ScaleIO Installation Guide*. You can install the required drivers manually or using a script. Topics in this section include:

- ◆ [Manual installation](#) 423
- ◆ [Installation script](#) 426

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. 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.LibvirtISERVolumeDriver, local=nova.virt.
libvirt.volume.LibvirtVolumeDriver, fake=nova.virt.libvirt.volum
e.LibvirtFakeVolumeDriver, rbd=nova.virt.libvirt.volume.LibvirtN
etVolumeDriver, sheepdog=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. In `/etc/nova/nova.conf`, add the bold text from the previous step to the `volume_drivers` key.
5. Copy the file `scaleio.filters` to the location `/etc/nova/rootwrap.d`
If the `rootwrap.d` folder doesn't exist, you must create it.

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` in `/etc/cinder/cinder.conf`, as follows:
 - a. `volume_driver=cinder.volume.drivers.emc.scaleio.ScaleIO
Driver`
 - b. `cinder_scaleio_config_file=/etc/cinder/cinder_scaleio.c
onfig`
 - c. Find the key `enabled_backends=lvm` and append the following key exactly one line after it:

`enabled_backends=ScaleIO`
 - d. Append the following ScaleIO configuration scope at the end of the `cinder.conf` file:

`[Scaleio]`

`volume_driver=cinder.volume.drivers.emc.scaleio.ScaleI
ODriver`

`cinder_scaleio_config_file=/etc/cinder/cinder_scaleio.
config`

`volume_backend_name=Scaleio`
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 MDM with which the REST Gateway will communicate
 - The password of the MDM with which the REST Gateway will communicate

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`), and either the Storage Pool name (`storage_pool_name`), or Storage Pool ID (`storage_pool_id`)

- For multiple Protection Domains and Storage Pools, follow the instructions in [“Multiple Protection Domains and Storage Pools” on page 427](#).
- `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.xx.xx
rest_server_username=admin
rest_server_password=<password>
protection_domain_name=pd1
storage_pool_name=default
storage_pools=pd1: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:

For RHEL 6.x:

```
/user/lib/python2.6/site-packages/cinder
/user/lib/python2.6/site-packages/nova
```

For RHEL 7.x:

```
/user/lib/python2.7/site-packages/cinder
/user/lib/python2.7/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 428](#)
- ◆ [“Dynamic mode example using the CLI” on page 428](#)

- ◆ [“Example notes” on page 429](#)
- ◆ [“Defaults and missing arguments” on page 429](#)

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:

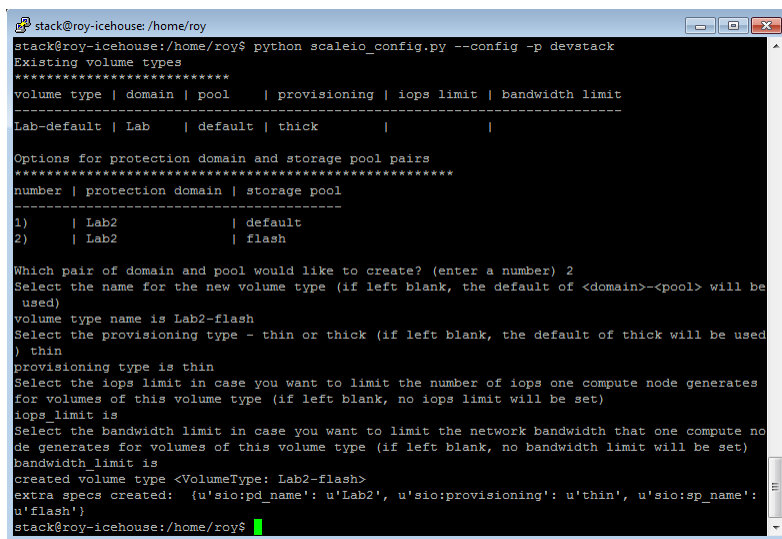
- `config`:
 - Creates the ScaleIO cinder configuration file (if it's missing) with the mandatory info of REST server IP address, username and password.
 - Displays the existing volume types and its Storage Pools and Protection Domains
 - Displays the optional pairs of Storage Pools and Protection Domains 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 30 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 F

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](#) 433
- ◆ [Type resources](#) 440
- ◆ [Responses](#) 517

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. It requires the MDM user name and password for the login request. The login returns a token in the response, that is used for later authentications for other requests. 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 ScaleIO Installation Manager to install ScaleIO, the Gateway has already been installed and configured with the MDM details.

To install the gateway manually, see the *ScaleIO Installation Guide*.

Before you start using this API:

1. If you installed the ScaleIO Gateway manually, ensure that the MDM connection properties are configured correctly in the ScaleIO Gateway configuration file. For more information, see [“Configuring connection properties in the ScaleIO Gateway” on page 434](#). If the Installation Manager was used to install ScaleIO, the ScaleIO Gateway is already configured, and no action is required.

Hint: You can also run this test from the link in the Installation Manager Maintenance Operation screen.

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.jsp**. In addition, there is a link from the IM-WEB maintenance page (`maintain.jsp`) to the REST test page (`rest.jsp`).

Note: iSCSI functionality is deprecated in this version of ScaleIO.

The remainder of this section covers the following topics:

- ◆ [Configuring connection properties in the ScaleIO Gateway](#) 434
- ◆ [Logs](#) 439

Configuring connection properties in the ScaleIO Gateway

This section describes how to configure MDM connection properties and passwords 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 Gateway using REST-API commands” on page 434](#)
- [“Configuring the Gateway by editing the user properties file” on page 436](#)
- [“Configuring the Gateway using a CLI tool” on page 437](#)
- [“Configuring the gatewayAdminPassword using Installation Manager CLI” on page 438](#)

Configuring the 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: In order to configure the ScaleIO Gateway, you must authenticate first. For more information, see [“General information” on page 440](#).

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>",
}
```

For example:

```
HTTPS://10.76.61.100:443/api/updateConfiguration
{
  "mdmAddresses": ["10.76.61.32", "10.76.61.33"],
  "mdmPort": "6611",
  "gatewayAdminPassword": "123",
}
```

Configuration is complete.

Using REST API to add 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 436](#)).

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, as described in [“Configuring the Gateway by editing the user properties file” on page 436](#).

Configuring the Gateway by editing the user properties file

If the ScaleIO Gateway was installed manually *after* ScaleIO was installed, you can configure the following Installation Manager properties, by editing the `gatewayUser.properties` file:

- ◆ Enable Gateway (default: true)

To disable, set **`features.enable_gateway=false`**

You can completely disable the use of the default port, 443, by setting both this property and the `features.enable_IM` to false.

- ◆ Change MDM port (default=6611)

To change the port, set **`mdm.port=<MDM_PORT>`**

- ◆ Change MDM IP addresses

To change the MDM IP addresses, set

```
mdm.ip.addresses=<MDM_MANAGEMENT_IP_ADDRESS1>;  
<MDM_MANAGEMENT_IP_ADDRESS1>
```

Note: The `gateway-admin.password` property cannot be set manually, because it is saved in the file in hashed format. You should configure it in one of two ways:

Use a REST API command, as explained in [“General information” on page 440](#).

Use the Installation Manager CLI command `im generate_password`. This

command must be issued locally where the Gateway is installed. For more information, see [“Configuring the gatewayAdminPassword using Installation Manager CLI” on page 438.](#)

To edit the properties, perform the following:

1. Use a text editor to open the `gatewayUser.properties` file, located in the following directory on the Installation Manager/Gateway server:

Gateway installed on	Location of <code>gatewayUser.properties</code> file
Windows, 32-bit	C:\Program Files (x86)\EMC\ScaleIO\Gateway\webapps\ROOT\WEB-INF\classes\
Windows, 64-bit	C:\Program Files\EMC\ScaleIO\Gateway\webapps\ROOT\WEB-INF\classes\
Linux	/opt/emc/scaleio/gateway/webapps/ROOT/WEB-INF/classes

2. Edit the file with the desired changes.
3. Save and close the file.
4. Restart the **scaleio-gateway** service:
 - **Windows**
Restart the **EMC ScaleIO Gateway** service
 - **Linux**
Type the command **`service scaleio-gateway restart`**

Configuration is complete.

Configuring the Gateway using a CLI tool

This section provides an example of gateway configuration using the CURL CLI tool.

Note: This action requires a token (key), that is received in an authentication response. For more information, see [“General information” on page 440.](#)

1. Send a login request:

```
curl -k -v --basic --user admin:<gateway admin password>  
https://<host address>/api/login
```

The output of this command should be used in the following step instead of **<key>**.

2. Send the following command:

```
curl -k -v --basic --user admin:<key received at login> -X
POST -H "Content-Type: application/json" -d
'{"mdmAddresses":["<address a>", "<address b>"],
"mdmPort":"6611", "gatewayAdminPassword":"<gateway admin
new password>"}' https://<host
address>/api/updateConfiguration
```

Example

```
curl -k -v --basic --user
admin:YWRtaW46MTQyNzczMTA3MzExNjplNzZMDY5NjhlNjMyZDdjZDU
4MTk3MTZkNWYwNzI4Mg -X POST -H "Content-Type:
application/json" -d '{"mdmAddresses":["10.76.60.1",
"10.76.60.2"], "mdmPort":"6611",
"gatewayAdminPassword":"NewPassword"}'
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 using Installation Manager CLI

Download and launch the CLI. For more information, see *“Installing with the CLI”* in the *ScaleIO Installation Guide*.

To configure the gatewayAdminPassword, run the following command in the Installation Manager’s CLI:

```
im generate_password --im_password <ADMIN_PASSWORD>
--config_file "<CONFIG_FILE_FULL_PATH>"
```

Note: This command must be issued locally where the Gateway is installed.

For example:

```
im generate_password --im_password admin --config_file  
"C:\ProgramFiles\EMC\ScaleIO\Gatewaywebapps\ROOT\WEB-INF\classes\gatewayUser.properties"
```

For more information on this command, see *“Installation Manager CLI commands”* in the *ScaleIO Installation Guide*.

Logs

Logs for REST activity are saved in the following locations on the ScaleIO Gateway:

Windows:

```
C:\Program  
Files\EMC\ScaleIO\Gateway\logs\api_operations.log
```

Linux:

```
/opt/emc/scaleio/gateway/logs/api_operations.log
```

Type resources

This section describes information about type resources for the following:

- ◆ General information 440
- ◆ System 450
- ◆ Protection Domain 463
- ◆ SDS 472
- ◆ Storage Pool 481
- ◆ Device 490
- ◆ Volume 497
- ◆ VTree 503
- ◆ ScsiInitiator 506
- ◆ SDC 509
- ◆ User 512
- ◆ Fault Set 513

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.

- `snmpSamplingFrequency`—MDM sampling frequency in seconds. If sampling frequency is set to 0, the SNMP trap sender will be disabled, and no sampling to the MDM will be performed.
- `snmpResendFrequency`—Resend frequency of SNMP traps, in minutes. If resend frequency is set to 0, all traps will be sent in every sampling.

- `snmpTrapsReceiverIp`—SNMP trap receivers' IP addresses (supports up to two comma-separated or semi-colon-separated IP addresses)
- `snmpPort`—The port number used for SNMP traps

For example:

```
{
  "mdmAddresses": ["10.76.60.150", "10.76.60.11"],
  "mdmPort": "6611",
  "gatewayAdminPassword": "Password1",
  "systemId": "7f5d8fc72a3d7f3d" ,
  "snmpSamplingFrequency": "30",
  "snmpResendFrequency": "0",
  "snmpTrapsReceiverIps": ["10.76.60.190", "10.76.60.191"],
  "snmpPort": "162"
}
```

◆ 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
- `mdmUsername`—MDM user name
- `systemId`—ID of the system, configured by `mdmAddresses` (see detailed explanation above, for *Change configuration of ScaleIO Gateway (POST)*)
- `snmpSamplingFrequency`—MDM sampling frequency in second
- `snmpResendFrequency`—Resend frequency of SNMP traps, in minutes
- `snmpTrapsReceiverIp`—SNMP trap receivers' IP addresses
- `snmpPort`—The port number used for SNMP traps
- `remoteSyslog`—The remote syslog servers configuration in the MDM
- `featuresEnableIM`—Indication whether the IM is enabled or not
- `featuresEnableSnmp`—Indication whether SNMP is enabled or not

For example:

```
{
  "featuresEnableIM": "true",
  "mdmUsername": "user",
  "snmpResendFrequency": "0",
  "snmpSamplingFrequency": "30",
  "snmpPort": "162",
  "mdmPort": "6611",
  "remoteSyslog": [
    {
      "hostName": "10.76.60.100",
      "port": 1468,
      "facility": 16
    },
    {
      "hostName": "10.76.60.101",
      "port": 1468,
      "facility": 16
    }
  ],
  "mdmAddresses": [
    "10.76.60.150",
    "10.76.60.135"
  ],
  "systemId": "7f5d8fc72a3d7f3d",
  "featuresEnableSnmp": "false",
  "snmpTrapsReceiverIps": [
    "10.76.60.192"
  ]
}
```

◆ 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	This property indicates that the license is a non-production license.
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		
correctedReadErrorCount		
BackgroundScanCompareCount		
BackgroundScannedInMB		

BWC

Properties	Type
totalWeightInKb	
numOccured	
numSeconds	

Operations (page 1 of 6)

Operation (N/A)	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
	/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

Operations (page 2 of 6)

Operation (N/A)	URI	Method	Parameters	Notes	Return
	/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, <u>primaryMdmActorIpList</u> – list of IP addresses Optional: <u>mdmManagements</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.	
	/api/instances/System/action/addSecondaryMdm	POST	Optional: <u>secondaryMdmActorIpList</u> , <u>secondaryMdmActorPort</u>		

Operations (page 3 of 6)

Operation (N/A)	URI	Method	Parameters	Notes	Return
	/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		
	/api/instances/System:::{id}/action/setLicense	POST	Required: <u>key</u>	See example after this table.	

Operations (page 4 of 6)

Operation (N/A)	URI	Method	Parameters	Notes	Return
	/api/instances/System::<{id}/action/removeConsistencyGroupSnapshots	POST	Required: <u>snapGroupIpd</u>		numberOfVolumes – number of volumes that were removed because of this operation
	/api/instances/System::<{id}/action/snapshotVolumes	POST	Required: <u>snapshotDefs</u> – a list of combination of “volumeId” volume ID and “snapshotName” (optional field) snapshot name. For example: { “snapshotDefs”: [{ “volumeId”: “2dd9132300000000”, “snapshotName”: “snap1” }], {“volumeId”: “1234” }}}		volumeIdList snapshotGroupIpd for example: { “volumeIdList”: [“2dd9132400000001”], “snapshotGroupId”: “d2e53daf000000001” }

Operations (page 5 of 6)

Operation (N/A)	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 (N/A)	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> <u>hostIp</u>		
	/api/instances/System:: <id>/action/stopRemoteSyslog</id>	POST	Required: <u>hostIp</u>		
	/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		
correctedReadErrorCount		
BackgroundScanCompareCount		
BackgroundScannedInMB		

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: https://localhost:443/api/types/ProtectionDomain/instances/action/querySelectedStatistics with: { "properties": ["capacityInUseInKb"], "allIds": "" } 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</id>	POST			
	/api/types/ProtectionDomain/instances	POST	According to “Required\Optional for POST” column in Protection Domain object.		id
	/api/instances/ProtectionDomain:: <id>/action/setProtectionDomainName</id>	POST	Required: <u>name</u>		

Operations (page 3 of 3)

Operation	URI	Method	Parameters	Notes	Return
	/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>rmcacheSizeInMB</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
onVmWare		-
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		

SdsIp

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		

Object (page 2 of 3)

Properties	Type	Note
rmcacheCurrNumOf4kbEntries		
rmcacheCurrNumOf8kbEntries		
rmcacheCurrNumOf16kbEntries		
rmcacheCurrNumOf32kbEntries		
rmcacheCurrNumOf64kbEntries		
rmcacheCurrNumOf128kbEntries		
rmcacheSkipCountLargelo		
rmcacheSkipCountUnaligned4kblo		
rmcacheSkipCountCacheAllBusy		
capacityLimitInKb		
maxCapacityInKb		
capacityInUseInKb		
thickCapacityInUseInKb		
thinCapacityInUseInKb		
snapCapacityInUseInKb		
snapCapacityInUseOccupiedInKb		
unreachableUnusedCapacityInKb		
protectedVacInKb		
degradedHealthyVacInKb		
degradedFailedVacInKb		
failedVacInKb		
inUseVacInKb		
activeMovingInFwdRebuildJobs		
pendingMovingInFwdRebuildJobs		
activeMovingOutFwdRebuildJobs		
pendingMovingOutFwdRebuildJobs		
activeMovingInBckRebuildJobs		
pendingMovingInBckRebuildJobs		
activeMovingOutBckRebuildJobs		
pendingMovingOutBckJobs		
activeMovingInRebalanceJobs		
pendingMovingRebalanceJobs		
activeMovingRebalanceJobs		activeMovingOutRebalanceJobs

Object (page 3 of 3)

Properties	Type	Note
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	
correctedReadErrorCount		
BackgroundScanCompareCount		
BackgroundScannedInMB		

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

Operations (page 2 of 5)

Operation	URI	Method	Parameters	Notes	Return
	/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
	/api/types/Sds/instances/action/queryBySelectedIds	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: Optional: <u>deviceInfoList</u> – list of: "devicePath", "storagePoolId" and "deviceName" (optional) <u>forceClean</u> – TRUE or FALSE <u>deviceTestTimeSecs</u> - The maximal test run-time in seconds or 128 MB data. Default limit is 10 seconds. Not relevant for noTest. <u>deviceTestMode</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.		id
	/api/instances/Sds::{id}/action/setSdsName	POST	Required: <u>name</u>		
	/api/instances/Sds::{id}/action/setSdsPort	POST	Required: <u>sdsPort</u>		

Operations (page 4 of 5)

Operation	URI	Method	Parameters	Notes	Return
	/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/addSdslp	POST	Required: <u>ip</u> <u>role</u>		
Remove an IP address from a SDS	/api/instances/Sds::{id}/action/removeSdslp	POST	Required: <u>ip</u>		
Set new role to existing IP address	/api/instances/Sds::{id}/action/setSdslpRole	POST	Required: <u>sdslpToSet</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			
	/api/instances/Sds::{id}/action/setRmcacheFrozen	POST	Required: <u>rmcacheFrozen</u> - TRUE or FALSE		

Operations (page 5 of 5)

Operation	URI	Method	Parameters	Notes	Return
	/api/instances/Sds::{id}/action/querySdsNetworkLatencyMeters	POST			NetBwc list
	/api/instances/Sds::{id}/action/setNumOfloBuffers	POST	Required: numOfloBuffers		
	/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
setSizeBwc	MosBwcQueryWindowSize
sendLatencyBwc	MosBwcQueryWindowLatency
sdsId	
sdsIp	

MosBwcQueryWindowSize

Properties	Type
numOccured	
totalWeightInKB	
numSeconds	

MosBwcQueryWindowLatency

Properties	Type
numOccured	
totalWeightInMicroseconds	
numSeconds	

Storage Pool**Object (page 1 of 2)**

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		-

Object (page 2 of 2)

Properties	Type	Required\Optional for POST
protectionDomainId		Required
zeroPaddingEnabled		Optional; must be enabled before devices are added to the Storage Pool, if replication via RecoverPoint will be used.
useRmcache		Optional
rmcacheWriteHandlingMode	Passthrough or Cached (default)	Optional
backgroundScannerMode	Disabled or DeviceOnly or DataComparison	
backgroundScannerBWLimitKBps		

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		
correctedReadErrorCount		
BackgroundScanCompareCount		
BackgroundScannedInMB		

Operations (page 1 of 5)

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 5)

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			

Operations (page 3 of 5)

Operation	URI	Method	Parameters	Notes	Return
	/api/types/StoragePool/instances	POST	According to “Required\Optional for POST” column in Storage Pool object. Zero padding must be enabled if replication via RecoverPoint will be used. Zero padding must be configured before devices are added.		id
	/api/instances/StoragePool:: <id>/action/setStoragePoolName</id>	POST	Required: <u>name</u>		
	/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	Zero padding must be enabled if replication via RecoverPoint will be used. Zero padding must be configured before devices are added.	
	/api/instances/StoragePool:: <id>/action/setUseRmcache</id>	POST	Required: <u>useRmcache</u>		

Operations (page 4 of 5)

Operation	URI	Method	Parameters	Notes	Return
	/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 (default)		
	/api/instances/StoragePool:: <id>/action/setRebuildEnabled</id>	POST	Required: <u>rebuildEnabled</u>		
	/api/instances/StoragePool:: <id>/action/setRebalanceEnabled</id>	POST	Required: <u>rebalanceEnabled</u>		
	/api/instances/StoragePool:: <id>/action/setRebuildRebalanceParallelism</id>	POST	Required: <u>limit</u>		

Operations (page 5 of 5)

Operation	URI	Method	Parameters	Notes	Return
	/api/instances/StoragePool:: <id>/action/enableBackgroundDeviceScanner</id>	POST	Required: scannerMode - "DeviceOnly" or "DataComparison" Optional: bandwidthLimitInKbpsPerDevice	DeviceOnly - Perform read operations. Fix from peer on errors. DataComparison - Read and compare data content with peer.	
	/api/instances/StoragePool:: <id>/action/disableBackgroundDeviceScanner</id>	POST			
	/api/instances/StoragePool:: <id>/action/resetBackgroundDeviceScannerErrorCounters</id>	POST	Optional: dataCompareErrorCounter - TRUE or FALSE correctedReadErrorCounter - TRUE or FALSE	Default is FALSE for both counters	

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		Required
sdsId		Required

Parent

Name	Type	Note
StoragePool	Storage Pool	
SDS	SDS	

Relationships

Name	Type	Note
Statistics		

Statistics

Note: If the background device scanner is enabled, read statistics are dramatically affected.

Object (page 1 of 2)

Properties	Type	Note
correctedReadErrorCount		
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

Object (page 2 of 2)

Properties	Type	Note
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	
BackgroundScanCompareCount		
BackgroundScannedInMB		

Operations (page 1 of 4)

Operation	URI	Method	Parameters	Notes	Return
	/api/types/Device/instances	GET		If zero padding is required (for example, when using replication via RecoverPoint), you must enable it before adding any devices to the Storage Pool.	List of all Device objects
Get delta for Device	/api/types/Device/instances?systemId={systemId}&sessionTag={sessionTag}&lastVersion={lastVersion}	GET			Delta
	/api/instances/Device:::{id}	GET			Device object
	/api/instances/Device:::{id}/relationships/Statistics	GET			List of Statistics for the Device
	/api/types/Device/instances/action/querySelectedStatistics	POST	Required: ids - list of object IDs or allIds - with empty value properties - list of properties to fetch (to see available properties, see Statistics)	If allIds appears, ids 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: name AND sdsId or sdsName		id

Operations (page 2 of 4)

Operation	URI	Method	Parameters	Notes	Return
	/api/types/Device/instances/action/queryBySelectedIds	POST	Required: <u>ids</u>		Matching ids
Remove a device	/api/instances/Device:: <id>/action/removeDevice</id>	POST	Required: <u>force</u> - TRUE or FALSE.		
	/api/instances/Device:: <id>/action/abortRemoveDevice</id>	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
devicesIsPartial	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		Required
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.		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 an SDC	/api/instances/Volume:: <id>/action/addMappedSdc</id>	POST	Required: <u>sdcId</u> – SDC ID or <u>guid</u> – SDC GUID Optional: <u>allowMultipleMappings</u> - "TRUE" or "FALSE"	After execution of this request, the volumes will be accessible to mapped SDCs	

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 guid – SDC GUID 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> or guid – SDC GUID 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

Note: iSCSI functionality is deprecated in this version of ScaleIO.

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/queryIdByKey	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		
onVmWare		
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={system id}&sessionTag={session tag}&lastVersion={last version}	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/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 FaultSet	List of id and the selected properties
	/api/types/FaultSet/instances/action/queryIdByKey	POST	Required: <u>name</u> AND <u>protectionDomainId</u> or <u>protectionDomainName</u>		id
	/api/types/FaultSet/instances/action/queryBySelectedIds	POST	Required: <u>ids</u>		List of FaultSet objects matching the ids
	/api/instances/FaultSet::{id}/action/removeFaultSet	POST			
	/api/types/FaultSet/instances	POST	According to “Required\Optional for POST” column in Fault Set object.		id
	/api/types/FaultSet::{id}/instances/action/clearFaultSet	POST			
	/api/types/FaultSet::{id}/instances/action/setFaultSetName	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 - ScaleIO Gateway is disabled. Enable the gateway by editing the file <code><gateway installation directory>/webapps/ROOT/WEB-INF/classes/gatewayUser.properties</code> . The parameter <code>features.enable_gateway</code> must be set to true , and then you must restart the scaleio-gateway service.
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.

Return codes (page 2 of 2)

Status Code	Name	ScaleIO usage
422	Unprocessable Entity	Semantically invalid content on a POST, which could be a range error, inconsistent properties, or something similar
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 G

SNMP Trap Support

This section describes ScaleIO support for SNMP. Topics include:

- ◆ [General.....](#) 519
- ◆ [Supported alerts and event numbering conventions.....](#) 520
- ◆ [Configuring the SNMP properties.....](#) 523
- ◆ [ScaleIO.mib file.....](#) 527

General

SNMP traps are implemented as part of the ScaleIO Gateway, using SNMP v2. UDP transport is used for SNMP, and the default port for trap communication is 162. The SNMP feature is disabled, by default. If you want to use the SNMP feature, enable it by editing the `gatewayUser.properties` file. For more information, see [“Configuring the SNMP properties” on page 523](#).

The SNMP trap sender includes a proprietary/custom MIB called `scaleio.mib`. This MIB file is located on the ScaleIO gateway server, in the folder `/gateway/webapps/ROOT/WEB-INF/classes`. A copy of the MIB is included in [“ScaleIO.mib file” on page 527](#). 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. A repeating trap will be sent the first time that it occurs, and will only be sent again if the resend interval has passed since it was last sent. The resend frequency parameter is also 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 ScaleIO gateway and the SNMP trap receivers must be configured. Traps can be sent to up to two SNMP trap receivers.

The **scaleio-gateway** service must be restarted after configuration.

Supported alerts and event numbering conventions

The following alerts can be sent as SNMP traps by the ScaleIO system. All events are numbered in the following format:

⟨CLASS⟩.⟨TYPE⟩.⟨ISSUE⟩

CLASS/TYPE:

- ◆ 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.

The following table describes each alert, and the actions to be taken for each one:

Table 27 SNMP alerts and required actions (page 1 of 3)

Area	Alert	Classification	Number	Severity	Cause	Action
System	License Expired	System.License.License_Expired	1.2.1	5 (Critical)	The system's license has expired. Configuration actions cannot be performed	To resume operational mode, contact EMC Support for license renewal. If you have already renewed your license, install it.
	License is About to Expire	System.License.License_Is_About_To_Expire	1.2.2	2 (Warning)	System license will expire in 2 days	Contact EMC Support for license renewal. If you have already renewed your license, install it.
MDM	MDM Not Clustered	MDM.MDM_Cluster.MDM_Not_Clustered	2.1.1	5 (Critical)	The MDM cluster is in SINGLE mode.	Validate that the MDM standby script is running on all servers running MDMs. Validate the MDM process is running on all servers on which it was installed.
	MDM Not Clustered	MDM.MDM_Cluster.MDM_Not_Clustered_Manually	2.1.2	2 (Warning)	MDM cluster was manually set to SINGLE mode.	Confirm that this is an expected operation. Working in <i>single</i> mode is not recommended. Prepare the cluster modules (if needed), and return to CLUSTER mode.
	SNMP server cannot connect to MDM	MDM.MDM_Cluster.SNMP_Server_Cannot_Connect_To_MDM	2.1.3	5 (Critical)	SNMP server cannot connect with the MDM cluster	Validate that the MDM is running and available by using the GUI or CLI. Validate that the SNMP server is properly configured. Validate network connectivity.
Protection Domain	Protection Domain Inactive	MDM.Protection_Domain.Protection_Inactive	2.2.1	2 (Warning)	Protection Domain was inactivated by a user command.	Confirm that this is an expected operation. This is usually done for maintenance. When maintenance is complete, reactivate the Protection Domain.

Table 27 SNMP alerts and required actions (page 2 of 3)

Area	Alert	Classification	Number	Severity	Cause	Action
Storage Pool	Storage Pool has Failed Capacity	MDM.Storage_Pool.Storage_Pool_has_Failed_Capacity	2.4.1	5 (Critical)	For the given Storage Pool, for some blocks, both primary and secondary copies are inaccessible.	Check and fix the state of all devices in the Storage Pool and all the server's holding devices in the Storage Pool.
	Storage Pool has Degraded Capacity	MDM.Storage_Pool.Storage_Pool_has_Degraded_Capacity	2.4.2	2 (Warning)	For the given Storage Pool, for some blocks, one of the 2 copies are inaccessible.	For the given Storage Pool, check if a server is offline or if there is another server hardware-related issue. Check if a storage device is down.
	Capacity Utilization Above Critical Threshold	MDM.Storage_Pool.Capacity_Utilization_Above_Critical_Threshold	2.4.3	5 (Critical)	Due to thinly provisioned volumes or snapshot usage, the capacity utilization of the Storage Pool is reaching a critical threshold.	Remove snapshots, if possible, or add physical storage.
	Capacity Utilization Above High Threshold	MDM.Storage_Pool.Capacity_Utilization_Above_High_Threshold	2.4.4	2 (Warning)	Due to thinly provisioned volumes or snapshot usage, the capacity utilization of the Storage Pool is reaching a high threshold.	Remove snapshots, if possible, or add physical storage.
	Failure Recovery Capacity Below Threshold	System.Capacity.Failure_Recovery_Capacity_Below_Threshold	2.4.5	2 (Warning)	The capacity available for recovery in a degraded storage event is lower than the predefined threshold.	Replace failed hardware or add more physical storage.
	Background Scanner Compare Error	MDM.Storage_Pool.Background_Scanner_Compare_Error	2.4.6	5 (Warning)	Comparison between copies failed. Error was corrected.	No action required. Note: devices might be faulty.

Table 27 SNMP alerts and required actions (page 3 of 3)

Area	Alert	Classification	Number	Severity	Cause	Action
SDS	SDS Disconnected	SDS.SDS.SDS_Disconnected	3.1.1	2 (Warning)	The SDS has disconnected from the MDM	Make sure that this is an expected event. Validate and correct the SDS process and connectivity state.
Device	Device Failed	SDS.Device.Device_Failed	3.2.1	2 (Warning)	SDS device couldn't be opened, read from or written to	Validate the device state. Check the cause of the error, and determine if it is a human error or a system malfunction. Check hardware if needed.
	Fixed Read Error	SDS.Device.Fixed_Read_Error	3.2.2	2 (Warning) if counter > 0	Read from SDS device failed. Data was corrected from the other copy.	No action required. Note: device might be faulty.
	Fixed Read Error	SDS.Device.Fixed_Read_Error	3.2.3	5 (Critical) if counter >= 5	Read from SDS device failed. Data was corrected from the other copy.	SDS device read failed more than 5 times. Replace the physical device.

Configuring the SNMP properties

This section describes how to configure SNMP trap properties, by editing the `gatewayUser.properties` file:

- ◆ Enable the SNMP feature

To enable, set `features.enable_snmp=true`

- ◆ Change the MDM user name

To change the MDM user name, edit the property `mdm.username`.

For security reasons, it is recommended to use the credentials of a read-only user.

- ◆ Change the MDM user password

To change the password for the MDM user name, edit the property `mdm.password`.

- ◆ Change MDM password encoding

There are two ways of changing the MDM password encoding:

- Manually, which involves generating an encoded password using a Base64 tool, and then editing the `mdm.password.encoding` and the `mdm.password` properties in the `gatewayUser.properties` file
- Using the ScaleIO Installation Manager CLI (IM CLI)

Manually enabling MDM password encoding

1. Using a Base64 tool, such as <https://www.base64decode.org/>, generate a password.
2. Copy the generated password and paste it into the property `mdm.password` in the `gatewayUser.properties` file.

Note: Default file location:

Windows:

`C:\Program Files\EMC\ScaleIO\Gateway\webapps\ROOT\WEB-INF\classes\gatewayUser.properties`

Linux:

`/opt/emc/scaleio/gateway/webapps/ROOT/WEB-INF/classes/gatewayUser.properties`

3. In the same file, edit the property `mdm.password.encoding` (**true**=enabled, **false** or left empty=not enabled). When `mdm.password.encoding=true`, Base64 encoding is used for storing the password.

Using the ScaleIO IM CLI to enable MDM password encoding

If you use the ScaleIO IM CLI to generate the password, as described below, there is no need to edit the `mdm.password.encoding` property, because it will be changed to `true` automatically. The password will be generated and saved automatically for the `mdm.password` property.

You do not need to log in to the IM CLI in order to generate an MDM password.

For information about installing and using the ScaleIO IM CLI, see the *ScaleIO Installation Guide*.

Using the IM CLI, type the following command:

```
im generate_mdm_password --mdm_password <PASSWORD>  
--config_file <PATH_TO_GATEWAYUSER.PROPERTIES_FILE>
```

For example:

- In Windows:

```
im generate_mdm_password --mdm_password test  
--config_file "C:\Program Files\EMC\ScaleIO\Gateway\  
webapps\ROOT\WEB-INF\classes\gatewayUser.properties"
```

- In Linux:

```
im generate_mdm_password --mdm_password test  
--config_file /opt/emc/scaleio/gateway/webapps/ROOT/  
WEB-INF/classes/gatewayUser.properties
```

Returned message:

```
Password generated successfully!
```

Example yield:

```
mdm.password=dGVzdA==  
mdm.password.encoding=true
```

- ◆ Change the sampling frequency

To change the sampling frequency, edit the property `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).

- ◆ Change the resend frequency

To change the resend frequency, edit the property `snmp.resend_frequency` (resend frequency of SNMP traps, in minutes. If resend frequency is set to 0, all traps will be sent in every sampling).

- ◆ Change the trap receiver IP address

To change the trap receiver IP address, edit the property `snmp.traps_receiver_ip` (SNMP trap receivers' IP addresses—supports up to two comma-separated or semi-colon-separated IP addresses).

◆ Change the SNMP Port

To change the SNMP port, edit the property `snmp.port` (the port number used for SNMP traps (default=162)).

Note: The SNMP configuration can also be updated using the REST API `updateConfiguration` command. For more information, see [“General information” on page 440](#).

To edit the properties, perform the following:

1. Use a text editor to open the `gatewayUser.properties` file, located in the following directory on the Installation Manager/Gateway server:

Gateway installed on	Location of <code>gatewayUser.properties</code> file
Windows, 32-bit	C:\Program Files (x86)\EMC\ScaleIO\Gateway\webapps\ROOT\WEB-INF\classes\
Windows, 64-bit	C:\Program Files\EMC\ScaleIO\Gateway\webapps\ROOT\WEB-INF\classes\
Linux	/opt/emc/scaleio/gateway/webapps/ROOT/WEB-INF/classes

2. Edit the file with the desired changes.
 3. Save and close the file.
 4. Restart the **scaleio-gateway** service:
 - **Windows**
Restart the **EMC ScaleIO Gateway** service
 - **Linux**
Type the command **`service scaleio-gateway restart`**
- Configuration is complete.

ScaleIO.mib file

The following text is the content of the `scaleio.mib` file.

Note: The object source identifier in the trap
MDM.MDM_Cluster.SNMP_Server_Cannot_Connect_To_MDM is "NA".

SCALEIO-MIB DEFINITIONS ::= BEGIN

IMPORTS

MODULE-IDENTITY, OBJECT-TYPE, NOTIFICATION-TYPE, Integer32 FROM SNMPv2-SMI
DisplayString FROM RFC1213-MIB;

scaleio MODULE-IDENTITY

LAST-UPDATED "201411060000Z"

ORGANIZATION "EMC Corporation"

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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 Integer32

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,  
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** Data is rebuilt on servers that 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 (by default, 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

DRL Dirty Region Logging: 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.

F

Failed Capacity The capacity is inaccessible due to a failure, and data integrity is at risk

Fault Sets A logical entity that ensures that SDS data is backed up on SDSs that 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 an object in the system. In some CLI commands, an ID can be used to specify a system component.

IP 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.

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 unique set of SDSs grouped together for reliability and tenancy separation.

R

RAM Cache RAM that is reserved for caching storage devices in Storage Pool.

Rebalance When ScaleIO detects lopsided use of storage capacity, or when new nodes are added, it redistributes data across the nodes, in order to improve performance.

Restricted MDM Mode A mode set in which commands can only be performed from an MDM machine.

Restricted SDC Mode Only approved SDCs can access the MDM. When this mode is enabled, volumes can only be added to *approved* SDCs.

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.

S

SDC ScaleIO Data Client, 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. User volumes will always use the storage of a single Storage Pool.
T	
Thick Capacity	Capacity allocated for thick volumes.
Thick Provisioned Volume	Volume that 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 rebalance processes. Throttling can be controlled per Protection Domain or per Storage Pool (by configuring rebuild and rebalance policies).
Tie-Breaker	The Tie-Breaker is used to determine which of the MDM nodes will take control over the ScaleIO system. As the number of MDMs is even, the Tie-Breaker ensures that there will always be one primary MDM achieving cluster quorum.
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 consists of multiple blocks spread evenly on a storage pool devices.

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.

