Integrated Dell Remote Access Controller 9 Version 3.20.20.20 User's Guide

DELL EMC

Notes, cautions, and warnings

NOTE: A NOTE indicates important information that helps you make better use of your product.

CAUTION: A CAUTION indicates either potential damage to hardware or loss of data and tells you how to avoid the problem.

WARNING: A WARNING indicates a potential for property damage, personal injury, or death.

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1

Overview

The Integrated Dell Remote Access Controller (iDRAC) is designed to make you more productive as a system administrator and improve the overall availability of Dell EMC servers. iDRAC alerts you to system issues, helps you to perform remote management, and reduces the need for physical access to the system.

iDRAC with Lifecycle Controller technology is part of a larger data center solution that increases availability of business critical applications and workloads. The technology allows you to deploy, monitor, manage, configure, update, and troubleshoot Dell EMC systems from any location without using any agents or an operating system.

Several products work with the iDRAC and Lifecycle Controller to simplify and streamline IT operations. Following are some of the tools:

- Dell management plug-in for VMware vCenter
- Dell Repository Manager
- Dell management packs for Microsoft System Center Operations Manager (SCOM) and Microsoft System Center Configuration Manager (SCCM)
- BMC Bladelogic
- Dell OpenManage Essentials/OpenManage Enterprise
- Dell OpenManage Power Center

iDRAC is available in the following variants:

- iDRAC Basic — Available by default for 200-500 series servers
- iDRAC Express — Available by default on all 600 and higher series of rack or tower servers, and all blade servers
- iDRAC Enterprise — Available on all server models

Topics:

- Benefits of using iDRAC with Lifecycle Controller
- Key features
- New in this release
- How to use this guide
- Supported web browsers
- iDRAC licenses
- Licensed features in iDRAC9
- Interfaces and protocols to access iDRAC
- iDRAC port information
- Other documents you may need
- Contacting Dell
- Accessing documents from Dell support site

Benefits of using iDRAC with Lifecycle Controller

The benefits include:

- Increased Availability — Early notification of potential or actual failures that help prevent a server failure or reduce recovery time after failure.

- Improved Productivity and Lower Total Cost of Ownership (TCO) — Extending the reach of administrators to larger numbers of distant servers can make IT staff more productive while driving down operational costs such as travel.
- Secure Environment — By providing secure access to remote servers, administrators can perform critical management functions while maintaining server and network security.
- Enhanced Embedded Management through Lifecycle Controller – Lifecycle Controller provides deployment and simplified serviceability through Lifecycle Controller GUI for local deployment and Remote Services (WSMan) interfaces for remote deployment integrated with Dell OpenManage Essentials and partner consoles.

For more information about Lifecycle Controller GUI, see Lifecycle Controller User's Guide and for remote services, see Lifecycle Controller Remote Services Quick Start Guide available at www.dell.com/idracmanuals.

Key features

The key features of iDRAC include:

NOTE: Some of the features are available only with iDRAC Enterprise license. For information on the features available for a license, see iDRAC licenses .

Inventory and Monitoring

- View managed server health.
- Inventory and monitor network adapters and storage subsystem (PERC and direct attached storage) without any operating system agents.
- View and export system inventory.
- View sensor information such as temperature, voltage, and intrusion.
- Monitor CPU state, processor automatic throttling, and predictive failure.
- View memory information.
- Monitor and control power usage.
- Support for SNMPv3 gets and alerts.
- For blade servers: launch Management Module web interface, view OpenManage Enterprise (OME) Modular information, and WWN/MAC addresses.
- View network interfaces available on host operating systems.
- iDRAC9 provides improved monitoring and management functionality with Quick Sync 2. You need OpenManage Mobile app configured in your Android or iOS mobile device.

Deployment

- Manage vFlash SD card partitions.
- Configure front panel display settings.
- Manage iDRAC network settings.
- Configure and use virtual console and virtual media.
- Deploy operating systems using remote file share, virtual media, and VMCLI.
- Enable auto-discovery.
- Perform server configuration using the export or import XML or JSON profile feature through RACADM, WSMan and Redfish. For more information, see Lifecycle Controller Remote Services Quick Start Guide available at www.dell.com/idracmanuals.
- Configure persistence policy for virtual addresses, initiator, and storage targets.
- Remotely configure storage devices attached to the system at run-time.
- Perform the following operations for storage devices:
  - Physical disks: Assign or unassign physical disk as a global hot spare.
  - Virtual disks:
    - Create virtual disks.

    - Edit virtual disks cache policies.
    - Check virtual disk consistency.
    - Initialize virtual disks.
    - Encrypt virtual disks.
    - Assign or unassign dedicated hot spare.
    - Delete virtual disks.
  - Controllers:
    - Configure controller properties.
    - Import or auto-import foreign configuration.
    - Clear foreign configuration.
    - Reset controller configuration.
    - Create or change security keys.
  - PCIe SSD devices:
    - Inventory and remotely monitor the health of PCIe SSD devices in the server.
    - Prepare the PCIe SSD to be removed.
    - Securely erase the data.
  - Set the backplane mode (unified or split mode).
  - Blink or unblink component LEDs.
  - Apply the device settings immediately, at next system reboot, at a scheduled time, or as a pending operation to be applied as a batch as part of the single job.

Update

- Manage iDRAC licenses.
- Update BIOS and device firmware for devices supported by Lifecycle Controller.
- Update or rollback iDRAC firmware and Lifecycle Controller firmware using a single firmware image.
- Manage staged updates.
- Back up and restore server profile.
- Access iDRAC interface over direct USB connection.
- Configure iDRAC using Server Configuration Profiles on USB device.

Maintenance and Troubleshooting

- Perform power-related operations and monitor power consumption.
- Optimize system performance and power consumption by modifying the thermal settings.
- No dependency on OpenManage Server Administrator for generation of alerts.
- Log event data: Lifecycle and RAC logs.
- Set email alerts, IPMI alerts, remote system logs, WS Eventing logs, Redfish event, and SNMP traps (v1, v2c, and v3) for events and improved email alert notification.
- Capture last system crash image.
- View boot and crash capture videos.
- Out-of-band monitor and alert the performance index of CPU, memory, and I/O modules.
- Configure warning threshold for inlet temperature and power consumption.
- Use iDRAC Service Module to:
  - View operating system information.
  - Replicate Lifecycle Controller logs to operating system logs.
  - Automatic system recovery options.
  - Enable or disable status of Full Power Cycle for all System components except the PSU.
  - Remotely hard-reset iDRAC

  - Enable in-band iDRAC SNMP alerts
  - Access iDRAC using host OS (experimental feature)
  - Populate Windows Management Instrumentation (WMI) information.
  - Integrate with SupportAssist collection. This is applicable only if iDRAC Service Module Version 2.0 or later is installed.
  - Prepare to remove NVMe PCIe SSD.
- Generate SupportAssist collection in the following ways:
  - Automatic — Using iDRAC Service Module that automatically invokes the OS Collector tool.

Dell Best Practices regarding iDRAC

- iDRACs are intended to be on a separate management network; they are not designed nor intended to be placed on or connected to the internet. Doing so could expose the connected system to security and other risks for which Dell is not responsible.
- Along with locating iDRACs on a separate management subnet, users should isolate the management subnet/vLAN with technologies such as firewalls, and limit access to the subnet/vLAN to authorized server administrators.

Secure Connectivity

Securing access to critical network resources is a priority. iDRAC implements a range of security features that includes:

- Custom signing certificate for Secure Socket Layer (SSL) certificate.
- Signed firmware updates.
- User authentication through Microsoft Active Directory, generic Lightweight Directory Access Protocol (LDAP) Directory Service, or locally administered user IDs and passwords.
- Two-factor authentication using the Smart–Card logon feature. The two-factor authentication is based on the physical smart card and the smart card PIN.
- Single Sign-On and Public Key Authentication.
- Role-based authorization, to configure specific privileges for each user.
- SNMPv3 authentication for user accounts stored locally in the iDRAC. It is recommended to use this, but it is disabled by default.
- User ID and password configuration.
- Default login password modification.
- Set user passwords and BIOS passwords using one-way hash format for improved security.
- FIPS 140-2 Level 1 capability.
- Support for TLS 1.2, 1.1, and 1.0. To enhance security, default setting is TLS 1.1 and higher.
- SMCLP and web interfaces that support 128 bit and 40-bit encryption (for countries where 128 bit is not acceptable), using the TLS 1.2 standard.

  NOTE: To ensure a secure connection, Dell recommends using TLS 1.1 and higher.
- Session time-out configuration (in seconds).
- Configurable IP ports (for HTTP, HTTPS, SSH, Telnet, Virtual Console, and Virtual Media).

  NOTE: Telnet does not support SSL encryption and is disabled by default.
- Secure Shell (SSH) that uses an encrypted transport layer for higher security.
- Login failure limits per IP address, with login blocking from that IP address when the limit is exceeded.
- Limited IP address range for clients connecting to iDRAC.
- Dedicated Gigabit Ethernet adapter available on rack and tower servers (additional hardware may be required).

New in this release

This release includes all the features from the previous releases. Following are the new features added in this release:

- Support for MX platform.
- Added support for Open ID Connect.
- Added support for virtual media file sharing through http and https.

- Up to four SSH sessions.
- Added Health rollup—Overall health status displayed in iDRAC web-interface dashboard.
- Added support for viewing configuring and monitoring chassis storage that is assigned to the compute node.

How to use this guide

The contents of this user's guide enable you to perform various tasks using:

- iDRAC web interface — Only the task-related information is provided here. For information about the fields and options, see the *iDRAC Online Help* that you can access from the web interface.
- RACADM — The RACADM command or the object that you must use is provided here. For more information, see the iDRAC RACADM CLI Guide available at www.dell.com/idracmanuals.
- iDRAC Settings Utility — Only the task-related information is provided here. For information about the fields and options, see the *iDRAC Settings Utility Online Help* that you can access when you click **Help** in the iDRAC Settings GUI (press <F2> during boot, and then click **iDRAC Settings** on the **System Setup Main Menu** page).
- Redfish — Only the task-related information is provided here. For information about the fields and options, see the iDRAC Redfish API Guide available at www.dell.com/idracmanuals.

Supported web browsers

iDRAC is supported on the following browsers:

- Internet Explorer/Edge
- Mozilla Firefox
- Google Chrome
- Safari

For the list of supported versions, see the iDRAC Release Notes available at www.dell.com/idracmanuals.

Supported OS and Hypervisors

iDRAC is supported on the following OS, Hypervisors:

- Microsoft Windows Server and Windows PE
- VMware ESXI
- VMware vSphere
- Citrix XenServer
- RedHat Enterprise Linux
- SuSe Linux Enterprise Server
- Canonical Ubuntu

NOTE: For the list of supported versions, see the iDRAC Release Notes available at www.dell.com/idracmanuals.

iDRAC licenses

iDRAC features are available based on the type of the license. Depending on the system model, iDRAC Basic or iDRAC Express license is installed by default. iDRAC Enterprise license is available as an upgrade and can be purchased anytime. Only licensed features are available in the interfaces that enable you to configure or use iDRAC. For more information, see Licensed features in iDRAC9.

Types of licenses

iDRAC Basic or iDRAC Express are the standard licenses available by default on your system. iDRAC Enterprise license includes all the licensed features and can be purchased at any time. The types of Enterprise license offered are:

- 30-day evaluation—Evaluation licenses are duration-based and the timer runs when power is applied to the system. This license cannot be extended.
- Perpetual—The license is bound to the Service Tag and is permanent.

Following table lists the default license available in the 14th generation servers:

Table 1. Default License

iDRAC Basic License	iDRAC Express License
• PowerEdge R4XX • PowerEdge R5XX • PowerEdge T4XX	• PowerEdge C41XX • PowerEdge FC6XX • PowerEdge R6XX • PowerEdge R64XX • PowerEdge R7XX • PowerEdge R74XX • PowerEdge R74XX • PowerEdge R8XX • PowerEdge R9XX • PowerEdge R9XX • PowerEdge T6XX • Dell Precision Rack R7920

NOTE: The default license available with PowerEdge C64XX systems is Basic Plus. The Basic Plus license was custom made for C64XX systems.

NOTE: The default license available with PowerEdge MXXXX systems is Express for Blades.

Methods for acquiring licenses

Use any of the following methods to acquire the licenses:

- License Self-Service portal — The Dell Digital Locker allows you to view and manage your products, software, and licensing information in one location. A link to the Self-Service Portal is available in DRAC web interface, go to **Configuration** > **Licenses**.
- Email — License is attached to an email that is sent after requesting it from the technical support center.
- Point-of-sale — License is acquired while placing the order for a system.

NOTE: To manage licenses or to purchase new licenses, go to the License Self-Service Portal

License operations

Before you perform the license management tasks, ensure that you acquire the licenses. For more information, see the Methods for acquiring licenses.

NOTE: If you have purchased a system with all the licenses pre-installed, then license management is not required.

You can perform the following licensing operations using iDRAC, RACADM, WSMan, Redfish and Lifecycle Controller-Remote Services for one-to-one license management, and Dell License Manager for one-to-many license management:

- View — View the current license information.
- Import — After acquiring the license, store the license in a local storage and import it into iDRAC using one of the supported interfaces. The license is imported if it passes the validation checks.

  NOTE: Although you can export the factory-installed license, you cannot import it. To import the license, download the equivalent license from the Digital Locker or retrieve it from the email you received when you purchased the license.

  NOTE: After importing the license, you need to re-login to the iDRAC. This is applicable only for iDRAC web interface.
- Export — Exports the installed license. For more information, see the *iDRAC Online Help*.
- Delete — Deletes the license. For more information, see the *iDRAC Online Help*.
- Learn More — Learn more about an installed license, or the licenses available for a component installed in the server.

  NOTE: For the Learn More option to display the correct page, ensure that *.dell.com is added to the list of Trusted Sites in the Security Settings. For more information, see the Internet Explorer help documentation.

For one-to-many license deployment, you can use Dell License Manager. For more information, see Dell License Manager User's Guide available at www.dell.com/esmmanuals.

License component state or condition and available operations

The following table provides the list of license operations available based on the license state or condition:

Table 2. License operations based on state and condition

License/Component state or condition	Import	Export	Delete	Learn More
Non-administrator login	No	No	No	Yes
Active license	Yes	Yes	Yes	Yes
Expired license	No	Yes	Yes	Yes
License installed but component missing	No	Yes	Yes	Yes

Managing licenses using iDRAC web interface

To manage the licenses using the iDRAC web interface, go to **Configuration** > **Licenses**.

The **Licensing** page displays the licenses that are associated to devices, or the licenses that are installed but the device is not present in the system. For more information on importing, exporting, or deleting a license, see the *iDRAC Online Help*.

Managing licenses using RACADM

To manage licenses using RACADM, use the **license** subcommand. For more information, see the iDRAC RACADM CLI Guide available at www.dell.com/idracmanuals

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Licensed features in iDRAC9

The following table lists iDRAC9 features that are enabled based on the license purchased:

Table 3. Licensed features in iDRAC9

Feature	iDRAC9 Basic	iDRAC9 Express	iDRAC9 Express for Blades	iDRAC9 Enterprise
Interfaces / Standards				
iDRAC RESTful API and Redfish	Yes	Yes	Yes	Yes
IPMI 2.0	Yes	Yes	Yes	Yes
DCMI 1.5	Yes	Yes	Yes	Yes
Web-based GUI	Yes	Yes	Yes	Yes
RACADM command line (local/ remote)	Yes	Yes	Yes	Yes
SMASH-CLP (SSH-only)	Yes	Yes	Yes	Yes
Telnet	Yes	Yes	Yes	Yes
SSH	Yes	Yes	Yes	Yes
Serial Redirection	Yes	Yes	Yes	Yes
WSMan	Yes	Yes	Yes	Yes
Network Time Protocol	No	Yes	Yes	Yes
Connectivity				
Shared NIC (LOM)	Yes	Yes	N/A	Yes[1]
Dedicated NIC[2]	Yes	Yes	Yes	Yes[2]
VLAN tagging	Yes	Yes	Yes	Yes
IPv4	Yes	Yes	Yes	Yes
IPv6	Yes	Yes	Yes	Yes
DHCP	Yes	Yes	Yes	Yes
DHCP with zero touch	No	No	No	Yes
Dynamic DNS	Yes	Yes	Yes	Yes
OS pass-through	Yes	Yes	Yes	Yes
iDRAC Direct -Front panel USB	Yes	Yes	Yes	Yes
Connection View	Yes	Yes	Yes	Yes
NFS v4	Yes	Yes	Yes	Yes
SMB2 with NTLMv1 and NTLMv2	Yes	Yes	Yes	Yes
Security				
Role-based authority	Yes	Yes	Yes	Yes

Feature	iDRAC9 Basic	iDRAC9 Express	iDRAC9 Express for Blades	iDRAC9 Enterprise
Local users	Yes	Yes	Yes	Yes
SSL encryption	Yes	Yes	Yes	Yes
IP blocking	No	Yes	Yes	Yes
Directory services (AD, LDAP)	No	No	No	Yes
Two-factor authentication (smart card)	No	No	No	Yes
Single sign-On	No	No	No	Yes
PK authentication (for SSH)	No	Yes	Yes	Yes
FIPS 140-2	Yes	Yes	Yes	Yes
Secure UEFI boot - certificate management	Yes	Yes	Yes	Yes
Lock down mode	No	No	No	Yes
Customizable Security Policy Banner - login page	Yes	Yes	Yes	Yes
iDRAC Quick Sync 2 - optional auth for read operations	Yes	Yes	Yes	Yes
iDRAC Quick Sync 2 - add mobile device number to LCL	Yes	Yes	Yes	Yes
Remote Presence				
Power control	Yes	Yes	Yes	Yes
Boot control	Yes	Yes	Yes	Yes
Serial-over-LAN	Yes	Yes	Yes	Yes
Virtual Media	No	No	Yes	Yes
Virtual Folders	No	No	No	Yes
Remote File Share	No	No	No	Yes
HTML5 access to Virtual Console	No	No	Yes	Yes
Virtual Console	No	No	Yes	Yes
VNC connection to OS	No	No	No	Yes
Quality/bandwidth control	No	No	No	Yes
Virtual Console collaboration (up to six simultaneous users)	No	No	No	Yes
Virtual Console chat	No	No	No	Yes [2,3]
Virtual Flash partitions	No	No	No	Yes
Group Manager	No	No	No	Yes
HTTP / HTTPS support along with NFS/CIFS	Yes	Yes	Yes	Yes

Feature	iDRAC9 Basic	iDRAC9 Express	iDRAC9 Express for Blades	iDRAC9 Enterprise
Power and Thermal				
Real-time power meter	Yes	Yes	Yes	Yes
Power thresholds and alerts	Yes	Yes	Yes	Yes
Real-time power graphing	No	Yes	Yes	Yes
Historical power counters	No	Yes	Yes	Yes
Power capping	No	No	No	Yes
Power Center integration	No	No	No	Yes
Temperature monitoring	Yes	Yes	Yes	Yes
Temperature graphing	No	Yes	Yes	Yes
Health Monitoring				
Full agent-free monitoring	Yes	Yes	Yes	Yes
Predictive failure monitoring	Yes	Yes	Yes	Yes
SNMPv1, v2, and v3 (traps and gets)	Yes	Yes	Yes	Yes
Email Alerting	No	Yes	Yes	Yes
Configurable thresholds	Yes	Yes	Yes	Yes
Fan monitoring	Yes	Yes	Yes	Yes
Power Supply monitoring	Yes	Yes	Yes	Yes
Memory monitoring	Yes	Yes	Yes	Yes
CPU monitoring	Yes	Yes	Yes	Yes
RAID monitoring	Yes	Yes	Yes	Yes
NIC monitoring	Yes	Yes	Yes	Yes
HD monitoring (enclosure)	Yes	Yes	Yes	Yes
Out of Band Performance Monitoring	No	No	No	Yes
Alerts for excessive SSD wear	Yes	Yes	Yes	Yes
Customizable settings for Exhaust Temperature	Yes	Yes	Yes	Yes

Feature	iDRAC9 Basic	iDRAC9 Express	iDRAC9 Express for Blades	iDRAC9 Enterprise
Update				
Remote agent-free update	Yes	Yes	Yes	Yes
Embedded update tools	Yes	Yes	Yes	Yes
Sync with repository (scheduled updates)	No	No	No	Yes
Auto-update	No	No	No	Yes
Improved PSU firmware updates	Yes	Yes	Yes	Yes
Deployment and Configuration				
Local configuration via F10	Yes	Yes	Yes	Yes
Embedded OS deployment tools	Yes	Yes	Yes	Yes
Embedded configuration tools	Yes	Yes	Yes	Yes
Auto-Discovery	No	Yes	Yes	Yes
Remote OS deployment	No	Yes	Yes	Yes
Embedded driver pack	Yes	Yes	Yes	Yes
Full configuration inventory	Yes	Yes	Yes	Yes
Inventory export	Yes	Yes	Yes	Yes
Remote configuration	Yes	Yes	Yes	Yes
Zero-touch configuration	No	No	No	Yes
System Retire/Repurpose	Yes	Yes	Yes	Yes
Server Configuration Profile in GUI	Yes	Yes	Yes	Yes
Diagnostics, Service, and Logging				
Embedded diagnostic tools	Yes	Yes	Yes	Yes
Part Replacement	No	Yes	Yes	Yes
NOTE: After performing part replacement on RAID hardware, once the process is complete for replacing firmware and configuration, Lifecycle Logs reports double part replacement entries which is expected behavior.				
Server Configuration Backup	No	No	No	Yes
Easy Restore (system configuration)	Yes	Yes	Yes	Yes

Feature	iDRAC9 Basic	iDRAC9 Express	iDRAC9 Express for Blades	iDRAC9 Enterprise
Server Configuration Restore	Yes	Yes	Yes	Yes
Easy Restore Auto Timeout	Yes	Yes	Yes	Yes
LED Health status indicators	Yes [5]	Yes [5]	N/A	Yes [5]
LCD screen (iDRAC9 requires optional)	Yes [5]	Yes [5]	N/A	Yes [5]
Quick Sync (require NFC bezel, 13G only)	N/A	N/A	N/A	N/A
iDRAC Quick Sync 2 (BLE/Wi-Fi hardware)	Yes	Yes	Yes	Yes
iDRAC Direct (front USB management port)	Yes	Yes	Yes	Yes
iDRAC Service Module (iSM) embedded	Yes	Yes	Yes	Yes
iSM to in-band alert forwarding to consoles	Yes	Yes	Yes	Yes
SupportAssist Collection (embedded)	Yes	Yes	Yes	Yes
Crash screen capture	No	Yes	Yes	Yes
Crash video capture[4]	No	No	No	Yes
Boot capture	No	No	No	Yes
Manual reset for iDRAC (LCD ID button)	Yes	Yes	Yes	Yes
Remote reset for iDRAC (requires iSM)	Yes	Yes	Yes	Yes
Virtual NMI	Yes	Yes	Yes	Yes
OS watchdog[4]	Yes	Yes	Yes	Yes
System Event Log	Yes	Yes	Yes	Yes
Lifecycle Log	Yes	Yes	Yes	Yes
Enhanced Logging in Lifecycle Controller Log	Yes	Yes	Yes	Yes
Work notes	Yes	Yes	Yes	Yes
Remote Syslog	No	No	No	Yes

Feature	iDRAC9 Basic	iDRAC9 Express	iDRAC9 Express for Blades	iDRAC9 Enterprise
License management	Yes	Yes	Yes	Yes

[1] Requires vFlash SD card media.

[2] 500 series and lower rack and tower servers require a hardware card to enable this feature; this hardware is offered at additional cost.

[3] Remote agent-free update feature is available only using IPMI.

[4] Available only using IPMI.

[5] Requires OMSA agent on target server.

Interfaces and protocols to access iDRAC

The following table lists the interfaces to access iDRAC.

NOTE: Using more than one interface at the same time may generate unexpected results.

Table 4. Interfaces and protocols to access iDRAC

Interface or Protocol	Description
iDRAC Settings Utility (F2)	Use the iDRAC Settings utility to perform pre-OS operations. It has a subset of the features that are available in iDRAC web interface along with other features. To access iDRAC Settings utility, press <F2> during boot and then click **iDRAC Settings** on the **System Setup Main Menu** page.
Lifecycle Controller (F10)	Use Lifecycle Controller to perform iDRAC configurations. To access Lifecycle Controller, press <F10> during boot and go to **System Setup** > **Advanced Hardware Configuration** > **iDRAC Settings**. For more information, see *Lifecycle Controller User's Guide* available at **dell.com/idracmanuals**.
iDRAC Web Interface	Use the iDRAC web interface to manage iDRAC and monitor the managed system. The browser connects to the web server through the HTTPS port. Data streams are encrypted using 128-bit SSL to provide privacy and integrity. Any connection to the HTTP port is redirected to HTTPS. Administrators can upload their own SSL certificate through an SSL CSR generation process to secure the web server. The default HTTP and HTTPS ports can be changed. The user access is based on user privileges.
OpenManage Enterprise (OME) Modular Web Interface	In addition to monitoring and managing the chassis, use the OME-Modular web interface to: • View the status of a managed system • Update iDRAC firmware • Configure iDRAC network settings • Log in to iDRAC web interface • Start, stop, or reset the managed system • Update BIOS, PERC, and supported network adapters For more information, see the OME - Modular for PowerEdge MX7000 Chassis User's Guide available at www.dell.com/openmanagemanuals.
Server LCD Panel/ Chassis LCD Panel	Use the LCD on the server front panel to: • View alerts, iDRAC IP or MAC address, user programmable strings. • Set DHCP • Configure iDRAC static IP settings.

Interface or Protocol	Description
	For blade servers, the LCD is on the chassis front panel and is shared between all the blades. To reset iDRAC without rebooting the server, press and hold the System Identification button for 16 seconds. **NOTE: LCD panel is only available with rack or tower systems that support front bezel. For blade servers, the LCD is on the chassis front panel and is shared between all the blades.**
RACADM	Use this command-line utility to perform iDRAC and server management. You can use RACADM locally and remotely. • Local RACADM command-line interface runs on the managed systems that have Server Administrator installed. Local RACADM communicates with iDRAC through its in-band IPMI host interface. Since it is installed on the local managed system, users are required to log in to the operating system to run this utility. A user must have a full administrator privilege or be a root user to use this utility. • Remote RACADM is a client utility that runs on a management station. It uses the out-of-band network interface to run RACADM commands on the managed system and uses the HTTPs channel. The **–r** option runs the RACADM command over a network. • Firmware RACADM is accessible by logging in to iDRAC using SSH or telnet. You can run the firmware RACADM commands without specifying the iDRAC IP, user name, or password. • You do not have to specify the iDRAC IP, user name, or password to run the firmware RACADM commands. After you enter the RACADM prompt, you can directly run the commands without the racadm prefix.
iDRAC RESTful API and Redfish	The Redfish Scalable Platforms Management API is a standard defined by the Distributed Management Task Force (DMTF). Redfish is a next-generation systems management interface standard, which enables scalable, secure, and open server management. It is a new interface that uses RESTful interface semantics to access data that is defined in model format to perform out-of-band systems management. It is suitable for a wide range of servers ranging from stand-alone servers to rack mount and bladed environments and for large scale cloud environments. Redfish provides the following benefits over existing server management methods: • Increased simplicity and usability • High data security • Programmable interface that can be easily scripted • Follows widely-used standards For more information, see the iDRAC Redfish API Guide available at www.dell.com/idracmanuals.
WSMan	The LC-Remote Service is based on the WSMan protocol to do one-to-many systems management tasks. You must use WSMan client such as WinRM client (Windows) or the OpenWSMan client (Linux) to use the LC-Remote Services functionality. You can also use Power Shell and Python to script to the WSMan interface. Web Services for Management (WSMan) are a Simple Object Access Protocol (SOAP)–based protocol used for systems management. iDRAC uses WSMan to convey Distributed Management Task Force (DMTF) Common Information Model (CIM)–based management information. The CIM information defines the semantics and information types that can be modified in a managed system. The data available through WSMan is provided by iDRAC instrumentation interface mapped to the DMTF profiles and extension profiles. For more information, see the following: • Lifecycle Controller Remote Services Quick Start Guide available at www.dell.com/idracmanuals . • Lifecycle Controller page on Dell EMC knowledge base site — www.dell.com/support/article/sln311809/ • MOFs and Profiles — www.dell.com/support/article/sln311039/ • DTMF website — **dmtf.org/standards/profiles/**
SSH	Use SSH to run RACADM and SMCLP commands. It provides the same capabilities as the Telnet console using an encrypted transport layer for higher security. The SSH service is enabled by default on iDRAC. The

Interface or Protocol	Description
	SSH service can be disabled in iDRAC. iDRAC only supports SSH version 2 with the RSA host key algorithm. A unique 1024-bit RSA host key is generated when you power-up iDRAC for the first time.
Telnet	Use Telnet to access iDRAC where you can run RACADM and SMCLP commands. For details about RACADM, see iDRAC RACADM CLI Guide available at www.dell.com/idracmanuals. For details about SMCLP, see Using SMCLP. **NOTE: Telnet is not a secure protocol and is disabled by default. Telnet transmits all data, including passwords in plain text. When transmitting sensitive information, use the SSH interface.**
VMCLI	Use the Virtual Media Command Line Interface (VMCLI) to access a remote media through the management station and deploy operating systems on multiple managed systems.
IPMITool	Use the IPMITool to access the remote system's basic management features through iDRAC. The interface includes local IPMI, IPMI over LAN, IPMI over Serial, and Serial over LAN. For more information on IPMITool, see the *Dell OpenManage Baseboard Management Controller Utilities User's Guide* at **dell.com/idracmanuals**. **NOTE: IPMI version 1.5 is not supported.**
SMCLP	Use Server Management Workgroup Server Management-Command Line Protocol (SMCLP) to perform systems management tasks. This is available through SSH or Telnet. For more information about SMCLP, see Using SMCLP.
NTLM	iDRAC allows NTLM to provide authentication, integrity, and confidentiality to the users. NT LAN Manager (**NTLM**) is a suite of Microsoft security protocols and it works in a Windows network.
SMB	iDRAC9 supports the Server Message Block (SMB) Protocol. This is a network file sharing protocol and the default minimum SMB version supported is 2.0, SMBv1 is no longer supported.
NFS	iDRAC9 supports **Network File System** (**NFS**). This is a distributed filesystem protocol that enables users to **mount** remote directories on the servers.

iDRAC port information

The following table lists the ports that are required to remotely access iDRAC through firewall. These are the default ports iDRAC listens to for connections. Optionally, you can modify most of the ports. To modify ports, see Configuring services.

Table 5. Ports iDRAC listens for connections

Port number	Type	Function	Configurable port	Maximum Encryption Level
22	TCP	SSH	Yes	256-bit SSL
23	TCP	TELNET	Yes	None
80	TCP	HTTP	Yes	None
161	UDP	SNMP Agent	Yes	None
443	TCP	HTTPS	Yes	256-bit SSL
623	UDP	RMCP/RMCP+	No	128-bit SSL
5900	TCP	Virtual console keyboard and mouse redirection, Virtual Media, Virtual folders, and Remote File Share	Yes	128-bit SSL
5901	TCP	VNC	Yes	128-bit SSL

Port number	Type	Function	Configurable port	Maximum Encryption Level

NOTE: Port 5901 opens when VNC feature is enabled.

The following table lists the ports that iDRAC uses as a client:

Table 6. Ports iDRAC uses as client

Port number	Type	Function	Configurable port	Maximum Encryption Level
25	TCP	SMTP	Yes	None
53	UDP	DNS	No	None
68	UDP	DHCP-assigned IP address	No	None
69	TFTP	TFTP	No	None
123	UDP	Network Time Protocol (NTP)	No	None
162	UDP	SNMP trap	Yes	None
445	TCP	Common Internet File System (CIFS)	No	None
636	TCP	LDAP Over SSL (LDAPS)	No	256-bit SSL
2049	TCP	Network File System (NFS)	No	None
3269	TCP	LDAPS for global catalog (GC)	No	256-bit SSL
5353	UDP	mDNS	No	None

NOTE: When Group Manager is enabled, iDRAC uses mDNS to communicate through port 5353. However, when it is disabled, port 5353 is blocked by iDRAC's internal firewall and appears as open|filtered port in the port scans.

514	UDP	Remote syslog	Yes	None

Other documents you may need

Some of the iDRAC interfaces have the integrated *Online Help* document that can be accessed by clicking on the help (?) icon. The *Online Help* provides detailed information about the fields available on the web interface and the descriptions for the same. In addition, following documents are available on the Dell Support website at **dell.com/support** that provide additional information about the setup and operation of iDRAC in your system.

- The iDRAC Redfish API Guide provides information about Redfish API.
- The iDRAC RACADM CLI Guide provides information about the RACADM sub-commands, supported interfaces, and iDRAC property database groups and object definitions.
- The Systems Management Overview Guide provides brief information about the various software available to perform systems management tasks.
- The *Dell Remote Access Configuration Tool User's Guide* provides information on how to use the tool to discover iDRAC IP addresses in your network and perform one-to-many firmware updates and active directory configurations for the discovered IP addresses.
- The *Dell Systems Software Support Matrix* provides information about the various Dell systems, the operating systems supported by these systems, and the Dell OpenManage components that can be installed on these systems.
- The *iDRAC Service Module User's Guide* provides information to install the iDRAC Service Module.
- The *Dell OpenManage Server Administrator Installation Guide* contains instructions to help you install Dell OpenManage Server Administrator.
- The *Dell OpenManage Management Station Software Installation Guide* contains instructions to help you install Dell OpenManage management station software that includes Baseboard Management Utility, DRAC Tools, and Active Directory Snap-In.

- The *Dell OpenManage Baseboard Management Controller Management Utilities User's Guide* has information about the IPMI interface.
- The *Release Notes* provides last-minute updates to the system or documentation or advanced technical reference material intended for experienced users or technicians.

The following system documents are available to provide more information:

- The safety instructions that came with your system provide important safety and regulatory information. For additional regulatory information, see the Regulatory Compliance home page at **dell.com/regulatory_compliance**. Warranty information may be included within this document or as a separate document.
- The *Rack Installation Instructions* included with your rack solution describe how to install your system into a rack.
- The Getting Started Guide provides an overview of system features, setting up your system, and technical specifications.
- The Installation and Service Manual provides information about system features and describes how to troubleshoot the system and install or replace system components.

Contacting Dell

NOTE: If you do not have an active Internet connection, you can find contact information on your purchase invoice, packing slip, bill, or Dell product catalog.

Dell provides several online and telephone-based support and service options. Availability varies by country and product, and some services may not be available in your area. To contact Dell for sales, technical support, or customer service issues, visit www.dell.com/contactdell.

Accessing documents from Dell support site

You can access the required documents in one of the following ways:

- Using the following links:
  - For all Enterprise Systems Management and OpenManage Connections documents — **www.dell.com/esmmanuals**
  - For OpenManage documents — **www.dell.com/openmanagemanuals**
  - For iDRAC and Lifecycle Controller documents — **www.dell.com/idracmanuals**
  - For Serviceability Tools documents — **www.dell.com/serviceabilitytoolsDell.com/ServiceabilityTools**
  - For Client Command Suite Systems Management documents — **www.dell.com/omconnectionsclient**

Accessing documents using the product search

1. Go to www.dell.com/support.
2. In the **Enter a Service Tag, Serial Number...** search box, type the product name. For example, `PowerEdge` or `Integrated Dell Remote Access Controller`.

   A list of matching products is displayed.
3. Select your product and click the search icon or press enter.
4. Click **Manuals & documents**.

Accessing documents using product selector

You can also access documents by selecting your product.

1. Go to www.dell.com/support.
2. Click **Browse all products**.
3. Click the desired product category, such as Servers, Software, Storage, and so on.
4. Click the desired product and then click the desired version if applicable.

NOTE: For some products, you may need to navigate through the subcategories.

5 Click **Manuals & documents**.

2

Logging in to iDRAC

You can log in to iDRAC as an iDRAC user, a Microsoft Active Directory user, or a Lightweight Directory Access Protocol (LDAP) user. You can also log in using OpenID Connect and Single Sign-On or Smart Card.

To improve security, each system is shipped with a unique password for iDRAC, which is available on the system information tag. This unique password improves security of iDRAC and your server. The default user name is *root*.

While ordering the system, you can choose to retain the legacy password—calvin—as the default password. If you choose to retain the legacy password, the password is not available on the system information tag.

In this version, DHCP is enabled by default and iDRAC IP address is assigned dynamically.

NOTE:

- You must have login to iDRAC privilege to log in to iDRAC.
- iDRAC GUI does not support browser buttons such as **Back**, **Forward**, or **Refresh**.

NOTE: For information about recommended characters for user names and passwords, see Recommended characters in user names and passwords.

To change the default password, see Changing the default login password.

Customizable security banner

You can customize the security notice that is displayed on the login page. You can use RACADM, Redfish, or WSMan to customize the notice. Depending on the language you use, the notice can be either 1024 or 512 UTF-8 characters long.

OpenID Connect

You can log in to iDRAC using credentials of other web consoles such as Dell EMC OpenManage Enterprise (OME) - Modular. When this feature is enabled, the console starts managing the user permissions on the iDRAC. iDRAC provides the user session with all the permissions that are specified by the console.

NOTE: When lockdown mode is enabled, OpenID Connect login options are not displayed in iDRAC login page.

Topics:

- Logging into iDRAC using OpenID Connect
- Logging in to iDRAC as local user, Active Directory user, or LDAP user
- Logging in to iDRAC as a local user using a smart card
- Logging in to iDRAC using Single Sign-On
- Accessing iDRAC using remote RACADM
- Accessing iDRAC using local RACADM
- Accessing iDRAC using firmware RACADM
- Viewing system health
- Logging in to iDRAC using public key authentication
- Multiple iDRAC sessions

- Accessing iDRAC using SMCLP
- Secure default password
- Changing the default login password
- Enabling or disabling default password warning message
- IP Blocking
- Enabling or disabling OS to iDRAC Pass-through using web interface
- Enabling or disabling alerts using RACADM

Logging into iDRAC using OpenID Connect

To log in to iDRAC using the OpenID Connect:

1 In a supported web browser, type `https://[iDRAC-IP-address]` and press Enter.

The Log in page is displayed.

2 Select **OME Modular** from the **Log In with:** menu.

The console login page is displayed.

3 Enter the console **User name** and **Password**.

4 Click **Log in**.

You are logged in to iDRAC with the console user privileges.

NOTE: When lockdown mode is enabled, OpenID Connect login option is not displayed in iDRAC login page.

Logging in to iDRAC as local user, Active Directory user, or LDAP user

Before you log in to iDRAC using the web interface, ensure that you have configured a supported web browser and the user account is created with the required privileges.

NOTE: The user name is not case-sensitive for an Active Directory user. The password is case-sensitive for all users.

NOTE: In addition to Active Directory, openLDAP, openDS, Novell eDir, and Fedora-based directory services are supported.

NOTE: LDAP authentication with OpenDS is supported. The DH key must be larger than 768 bits.

To log in to iDRAC as local user, Active Directory user, or LDAP user:

1 Open a supported web browser.

2 In the **Address** field, type `https://[iDRAC-IP-address]` and press Enter.

NOTE: If the default HTTPS port number (port 443) changes, enter: `https://[iDRAC-IP-address]:[port-number]` where `[iDRAC-IP-address]` is the iDRAC IPv4 or IPv6 address and `[port-number]` is the HTTPS port number.

The **Login** page is displayed.

3 For a local user:

- In the **Username** and **Password** fields, enter your iDRAC user name and password.
- From the **Domain** drop-down menu, select **This iDRAC**.

4 For an Active Directory user, in the **User name** and **Password** fields, enter the Active Directory user name and password. If you have specified the domain name as a part of the username, select **This iDRAC** from the drop-down menu. The format of the user name can be: <domain>\<username>, <domain>/<username>, or <user>@<domain>.

For example, dell.com\john_doe, or JOHN_DOE@DELL.COM.

If the domain is not specified in the user name, select the Active Directory domain from the **Domain** drop-down menu.

5 For an LDAP user, in the **Username** and **Password** fields, enter your LDAP user name and password. Domain name is not required for LDAP login. By default, **This iDRAC** is selected in the drop-down menu.

6 Click **Submit**. You are logged in to iDRAC with the required user privileges.

If you log in with Configure Users privileges and the default account credentials, and if the default password warning feature is enabled, the **Default Password Warning** page is displayed allowing you to easily change the password.

Logging in to iDRAC as a local user using a smart card

Before you log in as a local user using Smart Card, make sure to:

- Upload user smart card certificate and the trusted Certificate Authority (CA) certificate to iDRAC.
- Enable smart card logon.

The iDRAC web interface displays the smart card logon page for users who are configured to use the smart card.

NOTE: Depending on the browser settings, you are prompted to download and install the smart card reader ActiveX plug-in when using this feature for the first time.

To log in to iDRAC as a local user using a smart card:

1 Access the iDRAC web interface using the link `https://[IP address]`.

The **iDRAC Login** page is displayed prompting you to insert the smart card.

NOTE: If the default HTTPS port number (port 443) changes, type: `https://[IP address]:[port number]` where, `[IP address]` is the IP address for the iDRAC and `[port number]` is the HTTPS port number.

2 Insert the smart card into the reader and click **Login**.

A prompt is displayed for the smart card's PIN. A password is not required.

3 Enter the Smart Card PIN for local smart card users.

You are logged in to the iDRAC.

NOTE: If you are a local user for whom Enable CRL check for Smart Card Logon is enabled, iDRAC attempts to download the certificate revocation list (CRL) and checks the CRL for the user's certificate. The login fails if the certificate is listed as revoked in the CRL or if the CRL cannot be downloaded for some reason.

Logging in to iDRAC as an Active Directory user using a smart card

Before you log in as an Active Directory user using smart card, ensure that you:

- Upload a Trusted Certificate Authority (CA) certificate (CA-signed Active Directory certificate) to iDRAC.
- Configure the DNS server.
- Enable Active Directory login.
- Enable smart card login.

To log in to iDRAC as an Active Directory user using smart card:

1 Log in to iDRAC using the link `https://[IP address]`.

The **iDRAC Login** page is displayed prompting you to insert the smart card.

NOTE: If the default HTTPS port number (port 443) is changed, type: `https://[IP address]:[port number]` where, `[IP address]` is the iDRAC IP address and `[port number]` is the HTTPS port number.

2 Insert the smart card and click **Login**.

A prompt is displayed for the smart card's **PIN**.

3 Enter the PIN and click **Submit**.

You are logged in to iDRAC with your Active Directory credentials.

NOTE:

If the smart card user is present in Active Directory, an Active Directory password is not required.

Logging in to iDRAC using Single Sign-On

When Single Sign-On (SSO) is enabled, you can log in to iDRAC without entering your domain user authentication credentials, such as user name and password.

Logging in to iDRAC SSO using iDRAC web interface

Before logging in to iDRAC using Single Sign-On, ensure that:

- You have logged in to your system using a valid Active Directory user account.
- Single Sign-On option is enabled during Active Directory configuration.

To log in to iDRAC using web interface:

1. Log in to your management station using a valid Active Directory account.
2. In a web browser, type `https://[FQDN address]`.

   NOTE: If the default HTTPS port number (port 443) has been changed, type: `https://[FQDN address]:[port number]` where `[FQDN address]` is the iDRAC FQDN (iDRACdnsname.domain. name) and `[port number]` is the HTTPS port number.

   NOTE: If you use IP address instead of FQDN, SSO fails.

   iDRAC logs you in with appropriate Microsoft Active Directory privileges, using your credentials that were cached in the operating system when you logged in using a valid Active Directory account.

Accessing iDRAC using remote RACADM

You can use remote RACADM to access iDRAC using RACADM utility.

For more information, see the iDRAC RACADM CLI Guide available at www.dell.com/idracmanuals.

If the management station has not stored the iDRAC's SSL certificate in its default certificate storage, a warning message is displayed when you run the RACADM command. However, the command is executed successfully.

NOTE: The iDRAC certificate is the certificate iDRAC sends to the RACADM client to establish the secure session. This certificate is either issued by a CA or self-signed. In either case, if the management station does not recognize the CA or signing authority, a warning is displayed.

Validating CA certificate to use remote RACADM on Linux

Before running remote RACADM commands, validate the CA certificate that is used for secure communications.

To validate the certificate for using remote RACADM:

1. Convert the certificate in DER format to PEM format (using openssl command-line tool):

   ```
   openssl x509 -inform pem -in [yourdownloadedderformatcert.crt] -outform pem -out
   [outcertfileinpemformat.pem] -text
   ```

2. Find the location of the default CA certificate bundle on the management station. For example, for RHEL5 64 bit, it is **/etc/pki/tls/cert.pem**.
3. Append the PEM formatted CA certificate to the management station CA certificate.

   For example, use the `cat command: cat testcacert.pem >> cert.pem`

4 Generate and upload the server certificate to iDRAC.

Accessing iDRAC using local RACADM

For information to access iDRAC using local RACADM, see the iDRAC RACADM CLI Guide available at www.dell.com/idracmanuals.

Accessing iDRAC using firmware RACADM

You can use SSH or Telnet interfaces to access iDRAC and run firmware RACADM commands. For more information, see the iDRAC RACADM CLI Guide available at www.dell.com/idracmanuals.

Viewing system health

Before you perform a task or trigger an event, you can use RACADM to check if the system is in a suitable state. To view the remote service status from RACADM, use the **getremoteservicesstatus** command.

Table 7. Possible values for system status

Host System	Lifecycle Controller (LC)	Real Time Status	Overall Status
• Powered Off • In POST • Out of POST • Collecting System Inventory • Automated Task Execution • Lifecycle Controller Unified Server Configurator • Server has halted at F1/F2 error prompt because of a POST error • Server has halted at F1/F2/F11 prompt because there are no bootable devices available • Server has entered F2 setup menu • Server has entered F11 Boot Manager menu	• Ready • Not Initialized • Reloading data • Disabled • In Recovery • In Use	• Ready • Not Ready	• Ready • Not Ready

1 Read/Write: Read Only
2 User Privilege: Login User
3 License Required: iDRAC Express or iDRAC Enterprise
4 Dependency: None

Logging in to iDRAC using public key authentication

You can log in to the iDRAC over SSH without entering a password. You can also send a single RACADM command as a command line argument to the SSH application. The command line options behave like remote RACADM since the session ends after the command is completed.

For example:

Logging in:

```
ssh username@<domain>
```

or

```
ssh username@<IP_address>
```

where `IP_address` is the IP address of the iDRAC.

Sending RACADM commands:

```
ssh username@<domain> racadm getversion
```

```
ssh username@<domain> racadm getsel
```

Multiple iDRAC sessions

The following table provides the number of iDRAC sessions that are possible using the various interfaces.

Table 8. Multiple iDRAC sessions

Interface	Number of Sessions
iDRAC Web Interface	6
Remote RACADM	4
Firmware RACADM/SMCLP	SSH - 4 Telnet - 2 Serial - 1

Accessing iDRAC using SMCLP

SMCLP is the default command line prompt when you log in to iDRAC using Telnet or SSH. For more information, see Using SMCLP.

Secure default password

All supported systems are shipped with a unique default password for iDRAC, unless you choose to set *calvin* as the password while ordering the system. The unique password helps improve the security of iDRAC and your server. To further enhance security, it is recommended that you change the default password.

The unique password for your system is available on the system information tag. To locate the tag, see the documentation for your server at www.dell.com/support.

NOTE: For PowerEdge C6420, M640, and FC640, the default password is *calvin*.

NOTE: Resetting iDRAC to the factory default settings reverts the default password to the one that the server was shipped with.

If you have forgotten the password and do not have access to the system information tag, there are a few methods to reset the password locally or remotely.

Resetting default iDRAC password locally

If you have physical access to the system, you can reset the password using the following:

- iDRAC Setting utility (System Setup)

- Local RACADM
- OpenManage Mobile
- Server management USB port
- USB-NIC

Resetting default password using the iDRAC Settings utility

You can access the iDRAC settings utility using the System Setup of your server. Using the iDRAC reset to defaults all feature, you can reset the iDRAC login credentials to default.

WARNING: Resetting iDRAC to default all, resets the iDRAC to the factory defaults.

To reset iDRAC using iDRAC Settings utility:

1. Reboot the server and press <F2>.
2. In the **System Setup** page, click **iDRAC Settings**.
3. Click **Reset iDRAC configurations to defaults all**.
4. Click **Yes** to confirm, and then click **Back**.
5. Click **Finish**.

The server restarts after all iDRAC settings are set to default settings.

Resetting default password using local RACADM

1. Log in to the host OS installed on the system.
2. Access the local RACADM interface.
3. Follow the instructions in Changing the default login password using RACADM.

Resetting default password using OpenManage Mobile

You can use the OpenManage Mobile (OMM) to log in and change the default password. To log in to iDRAC using OMM, scan the QR code on the system information tag. For more information about using OMM, see the OMM documentation at OME - Modular for PowerEdge MX7000 Chassis User's Guide available at www.dell.com/openmanagemanuals.

NOTE: Scanning the QR code logs you into iDRAC only if the default credentials are at default values. If you have changed them from the default values, enter the updated credentials.

Resetting default password using the server management USB port

NOTE: These steps require that the USB management port is enabled and configured.

Using Server Configuration Profile file

Create a Server Configuration Profile (SCP) file with a new password for the default account, place it on a memory key, and use the server management USB port on the server to upload the SCP file. For more information on creating the file, see Using USB port for server management.

Accessing iDRAC using a laptop

Connect a laptop to the server management USB port and access iDRAC to change the password. For more information, see Accessing iDRAC interface over direct USB connection.

Changing default password using USB-NIC

If you have access to a keyboard, mouse, and a display device, connect to the server using the USB-NIC to access the iDRAC interface and change the default password.

1 Connect the devices to the system.
2 Use a supported browser to access the iDRAC interface using the iDRAC IP.
3 Follow the instructions in Changing the default login password using web interface.

Resetting default iDRAC password remotely

If you do not have physical access to the system, you can reset the default password remotely.

Remote — Provisioned system

If you have an operating system installed on the system, use a remote desktop client to log in to the server. After you log into the server, use any of the local interfaces such as RACADM or web interface to change the password.

Remote — Non-provisioned system

If there is no operating system installed on the server and if you have a PXE setup available, use PXE and then use RACADM to reset the password.

Changing the default login password

The warning message that allows you to change the default password is displayed if:

- You log in to iDRAC with Configure User privilege.
- The default password warning feature is enabled.
- The default iDRAC user name and password are provided on the system information tag.

A warning message is also displayed when you log in to iDRAC using SSH, Telnet, remote RACADM, or the Web interface. For Web interface, SSH, and Telnet, a single warning message is displayed for each session. For remote RACADM, the warning message is displayed for each command.

NOTE: For information on recommended characters for user names and passwords, see Recommended characters in user names and passwords.

Changing the default login password using web interface

When you log in to the iDRAC web interface, if the **Default Password Warning** page is displayed, you can change the password. To do this:

1 Select the **Change Default Password** option.
2 In the **New Password** field, enter the new password.

NOTE: For information on recommended characters for user names and passwords, see Recommended characters in user names and passwords.

3 In the **Confirm Password** field, enter the password again.

4 Click **Continue**.
The new password is configured and you are logged in to iDRAC.

NOTE: Continue is enabled only if the passwords entered in the New Password and Confirm Password fields match.

For information about the other fields, see the *iDRAC Online Help*.

Changing the default login password using RACADM

To change the password, run the following RACADM command:

```
racadm set iDRAC.Users.<index>.Password <Password>
```

where, `<index>` is a value from 1 to 16 (indicates the user account) and `<password>` is the new user defined password.

NOTE: The index for the default account is 2.

For more information, see the iDRAC RACADM CLI Guide available at www.dell.com/idracmanuals.

NOTE: For information on recommended characters for user names and passwords, see Recommended characters in user names and passwords.

Changing the default login password using iDRAC settings utility

To change the default login password using iDRAC settings utility:

1 In the iDRAC Settings utility, go to **User Configuration**.
The **iDRAC Settings User Configuration** page is displayed.
2 In the **Change Password** field, enter the new password.

NOTE: For information on recommended characters for user names and passwords, see Recommended characters in user names and passwords.

3 Click **Back**, click **Finish**, and then click **Yes**.
The details are saved.

Enabling or disabling default password warning message

You can enable or disable the display of the default password warning message. To do this, you must have Configure Users privilege.

IP Blocking

You can use IP blocking to dynamically determine when excessive login failures occur from an IP address and block or prevent the IP address from logging into the iDRAC9 for a preselected time span. IP blocking includes:

- The number of allowable login failures.
- The timeframe in seconds when these failures must occur.
- The amount of time, in seconds, when the IP address is prevented from establishing a session after the total allowable number of failures is exceeded.

As consecutive login failures accumulate from a specific IP address, they are tracked by an internal counter. When the user logs in successfully, the failure history is cleared and the internal counter is reset.

NOTE: When consecutive login attempts are refused from the client IP address, some SSH clients may display the following message:

```
ssh exchange identification: Connection closed by remote host
```

.

Table 9. Login Retry Restriction Properties

Property	Definition
`iDRAC.IPBlocking.BlockEnable`	Enables the IP blocking feature. When consecutive failures `iDRAC.IPBlocking.FailCount` from a single IP address are encountered within a specific amount of time `iDRAC.IPBlocking.FailWindow` all further attempts to establish a session from that address are rejected for a certain timespan `iDRAC.IPBlocking.PenaltyTime`
`iDRAC.IPBlocking.FailCount`	Sets the number of login failures from an IP address before the login attempts are rejected.
`iDRAC.IPBlocking.FailWindow`	The time, in seconds during which the failed attempts are counted. When the failures occur beyond this time period, the counter gets reset.
`iDRAC.IPBlocking.PenaltyTime`	Defines the timespan in seconds when all login attempts from an IP address with excessive failures are rejected.

Enabling or disabling OS to iDRAC Pass-through using web interface

To enable OS to iDRAC Pass-through using Web interface:

1. Go to **iDRAC Settings** > **Connectivity** > **Network** > **OS to iDRAC Pass-through**.
   The **OS to iDRAC Pass-through** page is displayed.
2. Change the State to **Enabled**.
3. Select any of the following options for Pass-through Mode:
   - **LOM** — The OS to iDRAC pass-through link between the iDRAC and the host operating system is established through the LOM or NDC.
   - **USB NIC** — The OS to iDRAC pass-through link between the iDRAC and the host operating system is established through the internal USB bus.

   NOTE: If you set the pass-through mode to LOM, ensure that:
   - OS and iDRAC are on the same subnet
   - NIC selection in Network Settings is set to a LOM
4. If you select **LOM** as the pass-through configuration, and if the server is connected using dedicated mode, enter the IPv4 address of the operating system.

   NOTE: If the server is connected in shared LOM mode, then the OS IP Address field is disabled.

NOTE: If the VLAN is enabled on the iDRAC, the LOM-Passthrough will only function in shared LOM mode with VLAN tagging configured on the host.

5 If you select **USB NIC** as the pass-through configuration, enter the IP address of the USB NIC.

The default value is 169.254.1.1. It is recommended to use the default IP address. However, if this IP address conflicts with an IP address of other interfaces of the host system or the local network, you must change it.

Do not enter 169.254.0.3 and 169.254.0.4 IPs. These IPs are reserved for the USB NIC port on the front panel when a A/A cable is used.

6 Click **Apply**.

7 Click **Test Network Configuration** to check if the IP is accessible and the link is established between the iDRAC and the host operating system.

Enabling or disabling alerts using RACADM

Use the following command:

```
racadm set iDRAC.IPMILan.AlertEnable <n>
```

n=0 — Disabled

n=1 — Enabled

3

Setting up managed system

If you need to run local RACADM or enable Last Crash Screen capture, install the following from the *Dell Systems Management Tools and Documentation* DVD:

- Local RACADM
- Server Administrator

For more information about Server Administrator, see OpenManage Server Administrator User's Guide available at www.dell.com/openmanagemanuals.

Topics:

- Setting up iDRAC IP address
- Modifying local administrator account settings
- Setting up managed system location
- Optimizing system performance and power consumption
- Setting up management station
- Configuring supported web browsers
- Updating device firmware
- Viewing and managing staged updates
- Rolling back device firmware
- Backing up server profile
- Importing server profile
- Monitoring iDRAC using other Systems Management tools
- Support Server Configuration Profile — Import and Export
- Secure Boot Configuration from BIOS Settings or F2
- BIOS recovery

Setting up iDRAC IP address

You must configure the initial network settings based on your network infrastructure to enable the communication to and from iDRAC. You can set up the IP address using one of the following interfaces:

- iDRAC Settings utility
- Lifecycle Controller (see Lifecycle Controller User's Guide)
- Dell Deployment Toolkit (see OpenManage Deployment Toolkit User's Guide)
- Chassis or Server LCD panel (see the system's Installation and Service Manual)

In case of rack and tower servers, you can set up the IP address or use the default iDRAC IP address 192.168.0.120 to configure initial network settings, including setting up DHCP or the static IP for iDRAC.

In case of blade servers, the iDRAC network interface is disabled by default.

After you configure iDRAC IP address:

- Ensure that you change the default user name and password.

- Access iDRAC through any of the following interfaces:
  - iDRAC Web interface using a supported browser (Internet Explorer, Firefox, Chrome, or Safari)
  - Secure Shell (SSH) — Requires a client such as PuTTY on Windows. SSH is available by default in most of the Linux systems and hence does not require a client.
  - Telnet (must be enabled, since it is disabled by default)
  - IPMITool (uses IPMI command) or shell prompt (requires Dell customized installer in Windows or Linux, available from *Systems Management Documentation and Tools* DVD or www.dell.com/support)

Setting up iDRAC IP using iDRAC settings utility

To set up the iDRAC IP address:

1 Turn on the managed system.
2 Press <F2> during Power-on Self-test (POST).
3 In the **System Setup Main Menu** page, click **iDRAC Settings**.
  The **iDRAC Settings** page is displayed.
4 Click **Network**.
  The **Network** page is displayed.
5 Specify the following settings:
  - Network Settings
  - Common Settings
  - IPv4 Settings
  - IPv6 Settings
  - IPMI Settings
  - VLAN Settings
6 Click **Back**, click **Finish**, and then click **Yes**.
  The network information is saved and the system reboots.

Configuring the network settings

To configure the network settings:

NOTE: For information about the options, see the *iDRAC Settings Utility Online Help*.

1 Under **Enable NIC**, select **Enabled**.
2 From the **NIC Selection** drop-down menu, select the port from which you want to access the system remotely, following are the options:

  NOTE: You can select either the dedicated network interface card or from a list of LOMs available in the Quad port or Dual port mezzanine cards.

  - **Chassis (Dedicated)**: Enables the remote access device to use the dedicated network interface available on the Remote Access Controller (RAC). This interface is not shared with the host operating system and routes the management traffic to a separate physical network, enabling it to be separated from the application traffic.

    This option implies that iDRAC's dedicated network port routes its traffic separately from the server's LOM or NIC ports. The Dedicated option allows iDRAC to be assigned an IP address from the same subnet or different subnet in comparison to the IP addresses assigned to the Host LOM or NICs to manage the network traffic.
  - **For Quad port cards—LOM1-LOM16**
  - **For Dual port cards—LOM1, LOM2, LOM5, LOM6, LOM9, LOM10, LOM13, LOM14.**
3 From the **Failover Network** drop-down menu, select one of the remaining LOMs. If a network fails, the traffic is routed through the failover network.

For example, to route the iDRAC network traffic through LOM2 when LOM1 is down, select **LOM1** for **NIC Selection** and **LOM2** for **Failover Network**.

NOTE: If you have selected Dedicated in NIC Selection drop-down menu, the option is grayed-out.

4 Under **Auto Negotiation**, select **On** if iDRAC must automatically set the duplex mode and network speed.

This option is available only for dedicated mode. If enabled, iDRAC sets the network speed to 10, 100, or 1000 Mbps based on the network speed.

5 Under **Network Speed**, select either 10 Mbps or 100 Mbps.

NOTE: You cannot manually set the Network Speed to 1000 Mbps. This option is available only if Auto Negotiation option is enabled.

6 Under **Duplex Mode**, select **Half Duplex** or **Full Duplex** option.

NOTE: If you enable Auto Negotiation, this option is grayed-out.

NOTE: If network teaming is configured for the host OS using the same network adapter as NIC Selection, then the Failover Network should also be configured. NIC Selection and Failover Network should use the ports that are configured as a part of the network team. If more than two ports are used as part of the network team, then the Failover Network selection should be "All".

Common settings

If network infrastructure has DNS server, register iDRAC on the DNS. These are the initial settings requirements for advanced features such as Directory services—Active Directory or LDAP, Single Sign On, and smart card.

To register iDRAC:

1 Enable **Register DRAC on DNS**.

2 Enter the **DNS DRAC Name**.

3 Select **Auto Config Domain Name** to automatically acquire domain name from DHCP. Else, provide the **DNS Domain Name**.

Configuring the IPv4 settings

To configure the IPv4 settings:

1 Select **Enabled** option under **Enable IPv4**.

NOTE: In the 14th generation of the PowerEdge servers, DHCP is enabled by default.

2 Select **Enabled** option under **Enable DHCP**, so that DHCP can automatically assign the IP address, gateway, and subnet mask to iDRAC. Else, select **Disabled** and enter the values for:

- Static IP Address
- Static Gateway
- Static Subnet Mask

3 Optionally, enable **Use DHCP to obtain DNS server address**, so that the DHCP server can assign the **Static Preferred DNS Server** and **Static Alternate DNS Server**. Else, enter the IP addresses for **Static Preferred DNS Server** and **Static Alternate DNS Server**.

Configuring the IPv6 settings

Based on the infrastructure setup, you can use IPv6 address protocol.

To configure the IPv6 settings:

1 Select **Enabled** option under **Enable IPv6**.

2 For the DHCPv6 server to automatically assign the IP address, gateway, and subnet mask to iDRAC, select **Enabled** option under **Enable Auto-configuration**.

NOTE: You can configure both static IP and DHCP IP at the same time.

3 In the **Static IP Address 1** box, enter the static IPv6 address.

4 In the **Static Prefix Length** box, enter a value between 0 and 128.

5 In the **Static Gateway** box, enter the gateway address.

NOTE: If you configure static IP, the current IP address 1 displays static IP and the IP address 2 displays dynamic IP. If you clear the static IP settings, the current IP address 1 displays dynamic IP.

6 If you are using DHCP, enable **DHCPv6 to obtain DNS Server addresses** to obtain Primary and Secondary DNS server addresses from DHCPv6 server. You can configure the following if required:

- In the **Static Preferred DNS Server** box, enter the static DNS server IPv6 address.
- In the **Static Alternate DNS Server** box, enter the static alternate DNS server.

Configuring the IPMI settings

To enable the IPMI Settings:

1 Under **Enable IPMI Over LAN**, select **Enabled**.

2 Under **Channel Privilege Limit**, select **Administrator**, **Operator**, or **User**.

3 In the **Encryption Key** box, enter the encryption key in the format 0 to 40 hexadecimal characters (without any blanks characters.) The default value is all zeros.

VLAN settings

You can configure iDRAC into the VLAN infrastructure. To configure VLAN settings, perform the following steps:

1 Under **Enable VLAN ID**, select **Enabled**.

2 In the **VLAN ID** box, enter a valid number from 1 to 4094.

3 In the **Priority** box, enter a number from 0 to 7 to set the priority of the VLAN ID.

NOTE: After enabling VLAN, the iDRAC IP is not accessible for some time.

Setting up iDRAC IP using the OME-Modular web interface

To set up the iDRAC IP address using the OME-Modular Web interface see the "Configuring compute network settings" section in the OME - Modular for PowerEdge MX7000 Chassis User's Guide available at www.dell.com/openmanagemanuals.

Enabling provisioning server

The provisioning server feature allows newly installed servers to automatically discover the remote management console that hosts the provisioning server. The provisioning server provides custom administrative user credentials to iDRAC so that the unprovisioned server can be discovered and managed from the management console. For more information about provisioning server, see the Lifecycle Controller Remote Services Quick Start Guide available at www.dell.com/idracmanuals.

Provisioning server works with a static IP address. DHCP, DNS server, or the default DNS host name discovers the provisioning server. If DNS is specified, the provisioning server IP is retrieved from DNS and the DHCP settings are not required. If the provisioning server is specified, discovery is skipped so neither DHCP nor DNS is required.

You can enable the Provisioning Server feature using iDRAC Settings Utility or using Lifecycle Controller. For information on using Lifecycle Controller, see Lifecycle Controller User's Guide available at www.dell.com/idracmanuals.

If the Provisioning Server feature is not enabled on the factory-shipped system, the default administrator account (the default iDRAC user name and password are provided on the system badge) is enabled. Before enabling Provisioning Server, make sure to disable this administrator account. If the Provisioning Server feature in Lifecycle Controller is enabled, all the iDRAC user accounts are disabled until the provisioning server is discovered.

To enable provisioning server using iDRAC Settings utility:

1 Turn on the managed system.
2 During POST, press F2, and go to **iDRAC Settings** > **Remote Enablement**.
The **iDRAC Settings Remote Enablement** page is displayed.
3 Enable auto-discovery, enter the provisioning server IP address, and click **Back**.

NOTE: Specifying the provisioning server IP is optional. If it is not set, it is discovered using DHCP or DNS settings (step 7).

4 Click **Network**.
The **iDRAC Settings Network** page is displayed.
5 Enable NIC.
6 Enable IPv4.

NOTE: IPv6 is not supported for auto-discovery.

7 Enable DHCP and get the domain name, DNS server address, and DNS domain name from DHCP.

NOTE: Step 7 is optional if the provisioning server IP address (step 3) is provided.

Configuring servers and server components using Auto Config

The Auto Config feature configures and provisions all the components in a server in a single operation. These components include BIOS, iDRAC, and PERC. Auto Config automatically imports a Server Configuration Profile (SCP) XML or JSON file containing all configurable parameters. The DHCP server that assigns the IP address also provides the details for accessing the SCP file.

SCP files are created by configuring a gold configuration server. This configuration is then exported to a shared NFS, CIFS, HTTP or HTTPS network location that is accessible by the DHCP server and the iDRAC of the server being configured. The SCP file name can be based on the Service Tag or model number of the target server or can be given as a generic name. The DHCP server uses a DHCP server option to specify the SCP file name (optionally), SCP file location, and the user credentials to access the file location.

When the iDRAC obtains an IP address from the DHCP server that is configured for Auto Config, iDRAC uses the SCP to configure the server's devices. Auto Config is invoked only after the iDRAC gets its IP address from the DHCP server. If it does not get a response or an IP address from the DHCP server, then Auto Config is not invoked.

HTTP and HTTPS file sharing options are supported for iDRAC firmware 3.00.00.00 or later. Details of the HTTP or HTTPS address need to be provided. In case the proxy is enabled on the server, the user needs to provide further proxy settings to allow HTTP or HTTPS to transfer information. The `-s` option flag is updated as:

Table 10. Different Share Types and pass in values

-s (ShareType)	pass in
NFS	0 or `nfs`
CIFS	2 or `cifs`
HTTP	5 or `http`
HTTPS	6 or `https`

NOTE: HTTPS certificates are not supported with Auto Config. Auto Config ignores certificate warnings.

Following list describes the required and optional parameters to pass in for the string value:

`-f (Filename)`: name of exported Server Configuration Profile file. This is required for iDRAC firmware versions prior to 2.20.20.20.

`-n (Sharename)`: name of network share. This is required for NFS or CIFS.

`-s (ShareType)`: pass in either 0 for NFS, 2 for CIFS, 5 for HTTP and 6 for HTTPS. This is a mandatory field for iDRAC firmware versions 3.00.00.00.

`-i (IPAddress)`: IP address of the network share. This is a mandatory field.

`-u (Username)`: username that has access to network share. This is a mandatory field for CIFS.

`-p (Password)`: user password that has access to network share. This is a mandatory field for CIFS.

`-d (ShutdownType)`: either 0 for graceful or 1 for forced (default setting: 0). This is an optional field.

`-t (Timetowait)`: time to wait for the host to shutdown (default setting: 300). This is an optional field.

`-e (EndHostPowerState)`: either 0 for OFF or 1 for ON (default setting 1). This is an optional field.

The additional option flags are supported in iDRAC firmware 3.00.00.00 or later to enable the configuration of HTTP proxy parameters and set the retry timeout for accessing the Profile file:

`–pd (ProxyDefault)`: Use default proxy setting. This is an optional field.

`–pt (ProxyType)`: The user can pass in `http` or `socks` (default setting http). This is an optional field.

`–ph (ProxyHost)`: IP address of the proxy host. This is an optional field.

`–pu (ProxyUserName)`: username that has access to the proxy server. This is required for proxy support.

`–pp (ProxyPassword)`: user password that has access to the proxy server. This is required for proxy support.

`–po (ProxyPort)`: port for the proxy server (default setting is 80). This is an optional field.

`–to (Timeout)`: specifies the retry timeout in minutes for obtaining config file (default is 60 minutes).

For iDRAC firmware 3.00.00.00 or later, JSON format Profile files are supported. The following file names will be used if the Filename parameter is not present:

- <service tag>-config.xml, Example: CDVH7R1-config.xml
- <model number>-config.xml, Example: R640-config.xml
- config.xml
- <service tag>-config.json, Example:CDVH7R1-config.json
- <model number>-config.json, Example: R630-config.json
- config.json

NOTE: More information about HTTP can be found in the *14G Support for HTTP and HTTPS across IDRAC9 with Lifecycle Controller Interfaces* white paper at www.dell.com/support.

NOTE:

- Auto Config can only be enabled when **DHCPv4** and the **Enable IPV4** options are enabled.
- Auto Config and Auto Discovery features are mutually exclusive. Disable Auto Discovery for Auto Config to work.
- The Auto Config is disabled after a server has carried out an Auto Config operation.

If all the Dell PowerEdge servers in the DHCP server pool are of the same model type and number, then a single SCP file (**config.xml**) is required. The **config.xml** file name is used as the default SCP file name. In addition to **.xml** file, **.json** files can also be used with 14G systems. The file can be **config.json**.

The user can configure individual servers requiring different configuration files mapped using individual server Service Tags or server models. In an environment that has different servers with specific requirements, different SCP file names can be used to distinguish each server or server type. For example, if there are two server models to configure — PowerEdge R740s and PowerEdge R540s, use two SCP files, **R740-config.xml** and **R540-config.xml**.

NOTE: iDRAC server configuration agent automatically generates the configuration filename using the server Service Tag, model number, or the default filename — config.xml.

NOTE: If none of these files are on the network share, then the server configuration profile import job is marked as failed for file not found.

Auto Config sequence

1. Create or modify the SCP file that configures the attributes of Dell servers.
2. Place the SCP file in a share location that is accessible by the DHCP server and all the Dell servers that are assigned IP address from the DHCP server.
3. Specify the SCP file location in vendor-option 43 field of DHCP server.
4. The iDRAC while acquiring IP address advertises vendor class identifier. (Option 60)
5. The DHCP server matches the vendor class to the vendor option in the **dhcpd.conf** file and sends the SCP file location and, if specified the SCP file name to the iDRAC.
6. The iDRAC processes the SCP file and configures all the attributes listed in the file.

DHCP options

DHCPv4 allows many globally defined parameters to be passed to the DHCP clients. Each parameter is known as a DHCP option. Each option is identified with an option tag, which is a 1-byte value. Option tags 0 and 255 are reserved for padding and end of options, respectively. All other values are available for defining options.

The DHCP Option 43 is used to send information from the DHCP server to the DHCP client. The option is defined as a text string. This text string is set to contain the values of the SCP filename, share location and the credentials to access the location. For example,

```
option myname code 43 = text;
subnet 192.168.0.0 netmask 255.255.255.0 {
# default gateway
        option routers 192.168.0.1;
    option subnet-mask 255.255.255.0;
    option nis-domain  "domain.org";
    option domain-name "domain.org";
    option domain-name-servers 192.168.1.1;
    option time-offset -18000; #Eastern Standard Time
    option vendor-class-identifier "iDRAC";
    set vendor-string = option vendor-class-identifier;
    option myname "-f system_config.xml -i 192.168.0.130 -u user -p password -n cifs -s 2 -d 0 -
t 500";
```

where, -i is the location of the Remote File Share and –f is the file name in the string along with the credentials to the Remote File Share.

The DHCP Option 60 identifies and associates a DHCP client with a particular vendor. Any DHCP server configured to take action based on a client's vendor ID should have Option 60 and Option 43 configured. With Dell PowerEdge servers, the iDRAC identifies itself with vendor ID: *iDRAC*. Therefore, you must add a new 'Vendor Class' and create a 'scope option' under it for 'code 60,' and then enable the new scope option for the DHCP server.

Configuring option 43 on Windows

To configure option 43 on Windows:

1 On the DHCP server, go to **Start** > **Administration Tools** > **DHCP** to open the DHCP server administration tool.
2 Find the server and expand all items under it.
3 Right-click on **Scope Options** and select **Configure Options**.
The **Scope Options** dialog box is displayed.
4 Scroll down and select **043 Vendor Specific Info**.
5 In the **Data Entry** field, click anywhere in the area under **ASCII** and enter the IP address of the server that has the share location, which contains the SCP file.
The value appears as you type it under the **ASCII**, but it also appears in binary to the left.
6 Click **OK** to save the configuration.

Configuring option 60 on Windows

To configure option 60 on Windows:

1 On the DHCP server, go to **Start** > **Administration Tools** > **DHCP** to open the DHCP server administration tool.
2 Find the server and expand the items under it.
3 Right-click on **IPv4** and choose **Define Vendor Classes**.
4 Click **Add**.
A dialog box with the following fields is displayed:
- **Display name:**
- **Description:**
- **ID: Binary: ASCII:**

5 In the **Display name:** field, type `iDRAC`.
6 In the **Description:** field, type `Vendor Class`.
7 Click in the **ASCII:** section and type `iDRAC`.
8 Click **OK** and then **Close**.
9 On the DHCP window, right-click **IPv4** and select **Set Predefined Options**.
10 From the **Option class** drop-down menu, select **iDRAC** (created in step 4) and click **Add**.
11 In the **Option Type** dialog box, enter the following information:
- **Name** — `iDRAC`
- **Data Type** — String
- **Code** — 060
- **Description** — Dell vendor class identifier

12 Click **OK** to return to the **DHCP** window.
13 Expand all items under the server name, right-click **Scope Options** and select **Configure Options**.
14 Click the **Advanced** tab.
15 From the **Vendor class** drop-down menu, select **iDRAC**. The `060 iDRAC` is displayed in the **Available Options** column.
16 Select **060 iDRAC** option.
17 Enter the string value that must be sent to the iDRAC (along with a standard DHCP provided IP address). The string value helps in importing the correct SCP file.
For the option's **DATA entry, String Value** setting, use a text parameter that has the following letter options and values:
- `Filename (-f)` — Indicates the name of the exported Server Configuration Profile(SCP) file.
- `Sharename (-n)` — Indicates the name of the network share.
- `ShareType (-s)` —

Alongside supporting NFS and CIFS-based file sharing, iDRAC firmware 3.00.00.00 or later also supports accessing profile files by using HTTP and HTTPS. The **-s option** flag is updated as follows:

-s (ShareType): type nfs or 0 for NFS; cifs or 2 for CIFS; http or 5 for HTTP; or https or 6 for HTTPS (mandatory).

- `IPAddress (-i)` — Indicates the IP address of the file share.

NOTE: `Sharename (-n)`, `ShareType (-s)`, and `IPAddress (-i)` are required attributes that must be passed. -n is not required for HTTP or HTTPs.

- `Username (-u)` — Indicates the user name required to access the network share. This information is required only for CIFS.
- `Password (-p)` — Indicates the password required to access the network share. This information is required only for CIFS.
- `ShutdownType (-d)` — Indicates the mode of shutdown. 0 indicates Graceful shutdown and 1 indicates Forced shutdown.

NOTE: The default setting is 0.

- `Timetowait (-t)` — Indicates the time the host system waits before shutting down. The default setting is 300.
- `EndHostPowerState (-e)` — Indicates the power state of the host. 0 indicates OFF and 1 indicates ON. The default setting is 1.

NOTE: `ShutdownType (-d)`, `Timetowait (-t)`, and `EndHostPowerState (-e)` are optional attributes.

NFS: -f system_config.xml -i 192.168.1.101 -n /nfs_share -s 0 -d 1

CIFS: -f system_config.xml -i 192.168.1.101 -n cifs_share -s 2 -u <*USERNAME*> -p <*PASSWORD*> -d 1 -t 400

HTTP: -f system_config.json -i 192.168.1.101 -s 5

HTTP: -f http_share/system_config.xml -i 192.168.1.101 -s http

HTTP: -f system_config.xml -i 192.168.1.101 -s http -n http_share

HTTPS: -f system_config.json -i 192.168.1.101 -s https

Configuring option 43 and option 60 on Linux

Update the **/etc/dhcpd.conf** file. The steps to configure the options are similar to the steps for Windows:

1 Set aside a block or pool of addresses that this DHCP server can allocate.

2 Set the option 43 and use the name vendor class identifier for option 60.

```
option myname code 43 = text;
subnet 192.168.0.0 netmask 255.255.0.0  {
#default gateway
    option routers            192.168.0.1;
    option subnet-mask        255.255.255.0;
    option nis-domain        "domain.org";
    option domain-name        "domain.org";
    option domain-name-servers    192.168.1.1;
    option time-offset        -18000;    # Eastern Standard Time
    option vendor-class-identifier "iDRAC";
    set vendor-string = option vendor-class-identifier;
    option myname "-f system_config.xml -i 192.168.0.130 -u user -p password -n cifs -s 2 -d
0 -t 500";
    range dynamic-bootp 192.168.0.128 192.168.0.254;
    default-lease-time 21600;
    max-lease-time 43200;
        }
}
```

The following are the required and optional parameters that must be passed in the vendor class identifier string:

- Filename (–f) — Indicates the name of the exported Server Configuration Profile file.

NOTE: For more information on file naming rules, see Configuring servers and server components using Auto Config.

- Sharename (-n) — Indicates the name of the network share.
- ShareType (-s) — Indicates the share type. 0 indicates NFS, 2 indicates CIFS, 5 indicates HTTP, and 6 indicates HTTPS.

NOTE: Example for Linux NFS, CIFS, HTTP, HTTPS share:

- **NFS**: `-f system_config.xml -i 192.168.0.130 -n /nfs -s 0 -d 0 -t 500`

  Ensure that you use NFS2 or NFS3 for NFS network share.
- **CIFS**: `-f system_config.xml -i 192.168.0.130 -n sambashare/config_files -s 2 -u user -p password -d 1 -t 400`
- **HTTP**: `-f system_config.xml -i 192.168.1.101 -s http -n http_share`
- **HTTPS**: `-f system_config.json -i 192.168.1.101 -s https`

- IPAddress (-i) — Indicates the IP address of the file share.

NOTE: Sharename (-n), ShareType (-s), and IPAddress (-i) are required attributes that must be passed. -n is not required for HTTP or HTTPS.

- Username (-u) — Indicates the user name required to access the network share. This information is required only for CIFS.
- Password (-p) — Indicates the password required to access the network share. This information is required only for CIFS.
- ShutdownType (-d) — Indicates the mode of shutdown. 0 indicates Graceful shutdown and 1 indicates Forced shutdown.

NOTE: The default setting is 0.

- Timetowait (-t) — Indicates the time the host system waits before shutting down. The default setting is 300.
- EndHostPowerState (-e) — Indicates the power state of the host. 0 indicates OFF and 1 indicates ON. The default setting is 1.

NOTE: ShutdownType (-d), Timetowait (-t), and EndHostPowerState (-e) are optional attributes.

The following is an example of a static DHCP reservation from a dhcpd.conf file:

```
host my_host {
host my_host {
hardware ethernet b8:2a:72:fb:e6:56;
fixed-address 192.168.0.211;
option host-name "my_host";
option myname " -f r630_raid.xml -i 192.168.0.1 -n /nfs -s 0 -d 0 -t 300";
}
```

NOTE: After editing the dhcpd.conf file, make sure to restart the dhcpd service to apply the changes.

Prerequisites before enabling Auto Config

Before enabling the Auto config feature, make sure that following are already set:

- Supported network share (NFS, CIFS, HTTP and HTTPS) is available on the same subnet as the iDRAC and DHCP server. Test the network share to ensure that it can be accessed and that the firewall and user permissions are set correctly.
- Server configuration profile is exported to the network share. Also, make sure that the necessary changes in the SCP file are complete so that proper settings can be applied when the Auto Config process is initiated.
- DHCP server is set and the DHCP configuration is updated as required for iDRAC to call the server and initiate the Auto Config feature.

Enabling Auto Config using iDRAC web interface

Make sure that DHCPv4 and the Enable IPv4 options are enabled and Auto-discovery is disabled.

To enable Auto Config:

1 In the iDRAC web interface, go to **iDRAC Settings** > **Connectivity** > **Network** > **Auto Config**.

The **Network** page is displayed.

2 In the **Auto Config** section, select one of the following options from the **Enable DHCP Provisioning** drop-down menu:

- **Enable Once** — Configures the component only once using the SCP file referenced by the DHCP server. After this, Auto Config is disabled.
- **Enable once after reset** — After the iDRAC is reset, configures the components only once using the SCP file referenced by the DHCP server. After this, Auto Config is disabled.
- **Disable** — Disables the Auto Config feature.

3 Click **Apply** to apply the setting.

The network page automatically refreshes.

Enabling Auto Config using RACADM

To enable Auto Config feature using RACADM, use the `iDRAC.NIC.AutoConfig` object.

For more information, see the iDRAC RACADM CLI Guide available at www.dell.com/idracmanuals.

For more information on the Auto Config feature, see the *Zero-Touch, bare-metal server provisioning using the Dell EMC iDRAC with Lifecycle Controller Auto Config feature* white paper available at the www.dell.com/support.

Using hash passwords for improved security

On PowerEdge servers with iDRAC version 3.00.00.00, you can set user passwords and BIOS passwords using a one-way hash format. The user authentication mechanism is not affected (except for SNMPv3 and IPMI) and you can provide the password in plain text format.

With the new password hash feature:

- You can generate your own SHA256 hashes to set iDRAC user passwords and BIOS passwords. This allows you to have the SHA256 values in the server configuration profile, RACADM, and WSMan. When you provide the SHA256 password values, you cannot authenticate through SNMPv3 and IPMI.

  NOTE: Remote RACADM or WSMan or Redfish cannot be used for Hash password Configuration / Replacement for IDRAC. You can use SCP for Hash Password Configuration / Replacement on Remote RACADM or WSMan or Redfish.
- You can set up a template server including all the iDRAC user accounts and BIOS passwords using the current plain text mechanism. After the server is set up, you can export the server configuration profile with the password hash values. The export includes the hash values required for SNMPv3 and IPMI authentication. After importing this profile, you must use the the latest Dell IPMI tool, if you use an older tool, the IPMI authentication fails for the users who have the hashed password values set.
- The other interfaces such as IDRAC GUI will show the user accounts enabled.

You can generate the hash password with and without Salt using SHA256.

You must have Server Control privileges to include and export hash passwords.

If access to all accounts is lost, use iDRAC Settings Utility or local RACADM and perform reset iDRAC to default task.

If the password of the iDRAC user account is set with the SHA256 password hash only and not the other hashes (SHA1v3Key or MD5v3Key or IPMIKey), then authentication through SNMP v3 and IPMI is not available.

Hash password using RACADM

To set hash passwords, use the following objects with the **set** command:

- iDRAC.Users.SHA256Password
- iDRAC.Users.SHA256PasswordSalt

Use the following command to include the hash password in the exported server configuration profile:

```
racadm get -f <file name> -l <NFS / CIFS / HTTP / HTTPS share> -u <username> -p <password>  -t
<filetype> --includePH
```

You must set the Salt attribute when the associated hash is set.

NOTE: The attributes are not applicable to the INI configuration file.

Hash password in server configuration profile

The new hash passwords can be optionally exported in the server configuration profile.

When importing server configuration profile, you can uncomment the existing password attribute or the new password hash attribute(s). If both are uncommented an error is generated and the password is not set. A commented attribute is not applied during an import.

Generating hash password without SNMPv3 and IPMI authentication

Hash password can be generated without SNMPv3 and IPMI authentication with or without salt. Both require SHA256.

To generate hash password with salt:

1 For the iDRAC user accounts, you must salt the password using SHA256.

When you salt the password, a 16-bytes binary string is appended. The Salt is required to be 16 bytes long, if provided. Once appended, it becomes a 32 character string. The format is "password"+"salt", for example:

Password = SOMEPASSWORD

Salt = ALITTLEBITOFSALT—16 characters are appended

2 Open a Linux command prompt, and run the following command:

```
Generate Hash-> echo-n SOMEPASSWORDALITTLEBITOFSALT|sha256sum  -><HASH>
```

```
Generate Hex Representation of Salt -> echo -n ALITTLEBITOFSALT | xxd -p   -> <HEX-SALT>
```

```
set iDRAC.Users.4.SHA256Password <HASH>
```

```
set iDRAC.Users.4.SHA256PasswordSalt <HEX-SALT>
```

3 Provide hash value and salt in the imported server configuration profile, the RACADM commands, Redfish, or WSMan.

NOTE: If you wish to clear a previously salted password, then ensure that the password-salt is explicitly set to an empty string i.e.

```
set iDRAC.Users.4.SHA256Password
ca74e5fe75654735d3b8d04a7bdf5dcdd06f1c6c2a215171a24e5a9dcb28e7a2
```

```
set iDRAC.Users.4.SHA256PasswordSalt
```

4 After setting the password, the normal plain text password authentication works except that SNMP v3 and IPMI authentication fails for the iDRAC user accounts that had passwords updated with hash.

Modifying local administrator account settings

After setting the iDRAC IP address, you can modify the local administrator account settings (that is, user 2) using the iDRAC Settings utility. To do this:

1 In the iDRAC Settings utility, go to **User Configuration**.

The **iDRAC Settings User Configuration** page is displayed.

2 Specify the details for **User Name**, **LAN User Privilege**, **Serial Port User Privilege**, and **Change Password**.

For information about the options, see the *iDRAC Settings Utility Online Help*.

3 Click **Back**, click **Finish**, and then click **Yes**.

The local administrator account settings are configured.

Setting up managed system location

You can specify the location details of the managed system in the data center using the iDRAC Web interface or iDRAC Settings utility.

Setting up managed system location using web interface

To specify the system location details:

1. In the iDRAC web interface, go to **System** > **Details** > **System Details**.
   The **System Details** page is displayed.
2. Under **System Location**, enter the location details of the managed system in the data center.
   For information about the options, see the *iDRAC Online Help*.
3. Click **Apply**. The system location details are saved in iDRAC.

Setting up managed system location using RACADM

To specify the system location details, use the `System.Location` group objects.

For more information, see the iDRAC RACADM CLI Guide available at www.dell.com/idracmanuals.

Setting up managed system location using iDRAC settings utility

To specify the system location details:

1. In the iDRAC Settings utility, go to **System Location**.
   The **iDRAC Settings System Location** page is displayed.
2. Enter the location details of the managed system in the data center. For information about the options, see the *iDRAC Settings Utility Online Help*.
3. Click **Back**, click **Finish**, and then click **Yes**.
   The details are saved.

Optimizing system performance and power consumption

The power required to cool a server can contribute a significant amount to the overall system power. Thermal control is the active management of system cooling through fan speed and system power management to make sure that the system is reliable while minimizing system power consumption, airflow, and system acoustic output. You can adjust the thermal control settings and optimize against the system performance and performance-per-Watt requirements.

Using the iDRAC Web interface, RACADM, or the iDRAC Settings Utility, you can change the following thermal settings:

- Optimize for performance
- Optimize for minimum power
- Set the maximum air exhaust temperature
- Increase airflow through a fan offset, if required

- Increase airflow through increasing minimum fan speed

Modifying thermal settings using iDRAC web interface

To modify the thermal settings:

1 In the iDRAC Web interface, go to **Configuration** > **System Settings** > **Hardware Settings** > **Fans configuration**.
The **Fan Setup** page is displayed.

2 Specify the following:

- **Thermal Profile** — Select the thermal profile:
  - **Default Thermal Profile Settings** — Implies that the thermal algorithm uses the same system profile settings that is defined under **System BIOS** > **System BIOS Settings** > **System Profile Settings** page.

  By default, this is set to **Default Thermal Profile Settings**. You can also select a custom algorithm, which is independent of the BIOS profile. The options available are:
  - **Maximum Performance (Performance Optimized)** :
    - Reduced probability of memory or CPU throttling.
    - Increased probability of turbo mode activation.
    - Generally, higher fan speeds at idle and stress loads.
  - **Minimum Power (Performance per Watt Optimized)**:
    - Optimized for lowest system power consumption based on optimum fan power state.
    - Generally, lower fan speeds at idle and stress loads.

  NOTE: Selecting Maximum Performance or Minimum Power, overrides thermal settings associated to System Profile setting under System BIOS > System BIOS Settings.System Profile Settings page.
- **Maximum Exhaust Temperature Limit** — From the drop-down menu, select the maximum exhaust air temperature. The values are displayed based on the system.
  The default value is **Default, 70°C (158 °F)**.

  This option allows the system fans speeds to change such that the exhaust temperature does not exceed the selected exhaust temperature limit. This cannot always be guaranteed under all system operating conditions due to dependency on system load and system cooling capability.
- **Fan Speed Offset** — Selecting this option allows additional cooling to the server. In case hardware is added (example, new PCIe cards), it may require additional cooling. A fan speed offset causes fan speeds to increase (by the offset % value) over baseline fan speeds calculated by the Thermal Control algorithm. Possible values are:
  - **Low Fan Speed** — Drives fan speeds to a moderate fan speed.
  - **Medium Fan Speed** — Drives fan speeds close to medium.
  - **High Fan Speed** — Drives fan speeds close to full speed.
  - **Max Fan Speed** — Drives fan speeds to full speed.
  - **Off** — Fan speed offset is set to off. This is the default value. When set to off, the percentage does not display. The default fan speed is applied with no offset. Conversely, the maximum setting will result in all fans running at maximum speed.

  The fan speed offset is dynamic and based on the system. The fan speed increase for each offset is displayed next to each option.

  The fan speed offset increases all fan speeds by the same percentage. Fan speeds may increase beyond the offset speeds based on individual component cooling needs. The overall system power consumption is expected to increase.

  Fan speed offset allows you to increase the system fan speed with four incremental steps. These steps are equally divided between the typical baseline speed and the maximum speed of the server system fans. Some hardware configurations results in higher baseline fan speeds, which results in offsets other than the maximum offset to achieve maximum speed.

  The most common usage scenario is non-standard PCIe adapter cooling. However, the feature can be used to increase system cooling for other purposes.

- **Minimum Fan Speed in PWM (% of Max)** — Select this option to fine tune the fan speed. Using this option, you can set a higher baseline system fan speed or increase the system fan speed if other custom fan speed options are not resulting in the required higher fan speeds.
  - **Default** — Sets minimum fan speed to default value as determined by the system cooling algorithm.
  - **Custom** — Enter the percentage value.

  The allowable range for minimum fan speed PWM is dynamic based on the system configuration. The first value is the idle speed and the second value is the configuration max (which may or may not be 100% based on system configuration).

  System fans can run higher than this speed as per thermal requirements of the system but not lower than the defined minimum speed. For example, setting Minimum Fan Speed at 35% limits the fan speed to never go lower than 35% PWM.

NOTE: 0% PWM does not indicate fan is off. It is the lowest fan speed that the fan can achieve.

The settings are persistent, which means that once they are set and applied, they do not automatically change to the default setting during system reboot, power cycling, iDRAC, or BIOS updates. The custom cooling options may not be supported on all servers. If the options are not supported, they are not displayed or you cannot provide a custom value.

3 Click **Apply** to apply the settings.

The following message is displayed:

```
It is recommended to reboot the system when a thermal profile change has been made. This is to ensure all power and thermal settings are activated.
```

Click **Reboot Later** or **Reboot Now**.

NOTE: You must reboot the system for the settings to take effect.

Modifying thermal settings using RACADM

To modify the thermal settings, use the objects in the **system.thermalsettings** group with the **set** sub command as provided in the following table.

Table 11. Thermal Settings

Object	Description	Usage	Example

`AirExhaustTemp`	Allows you to set the maximum air exhaust temperature limit.	Set to any of the following values (based on the system):
		• 0 — Indicates 40°C
		• 1 — Indicates 45°C
		• 2 — Indicates 50°C
		• 3 — Indicates 55°C
		• 4 — Indicates 60°C
		• 255 — Indicates 70°C (default)
			To check the existing setting on the system:
			`racadm get system.thermalsettings.AirExhaustTemp`
			The output is:
			`AirExhaustTemp=70`
			This output indicates that the system is set to limit the air exhaust temperature to 70°C.
			To set the exhaust temperature limit to 60°C:
			`racadm set system.thermalsettings.AirExhaustTemp 4`

Object	Description	Usage	Example

			The output is:
			`Object value modified successfully.`
			
			If a system does not support a particular air exhaust temperature limit, then when you run the following command:
			
			`racadm set system.thermalsettings.AirExhaustTemp 0`
			
			The following error message is displayed:
			
			`ERROR: RAC947: Invalid object value specified.`
			
			Make sure to specify the value depending on the type of object.
			
			For more information, see RACADM help.
			
			To set the limit to the default value:
			
			`racadm set system.thermalsettings.AirExhaustTemp 255`

`FanSpeedHighOffsetVal`	• Getting this variable reads the fan speed offset value in %PWM for High Fan Speed Offset setting.
	• This value depends on the system.
	• Use `FanSpeedOffset` object to set this value using index value 1.
		Values from 0-100	`racadm get system.thermalsettings FanSpeedHighOffsetVal`
			
			A numerical value, for example 66, is returned. This value indicates that when you use the following command, it applies a fan speed offset of High (66% PWM) over the baseline fan speed
			`racadm set system.thermalsettings FanSpeedOffset 1`

`FanSpeedLowOffsetVal`	• Getting this variable reads the fan speed offset value in %PWM for Low Fan Speed Offset setting.
	• This value depends on the system.
	• Use `FanSpeedOffset` object to set this value using index value 0.
		Values from 0-100	`racadm get system.thermalsettings FanSpeedLowOffsetVal`
			
			This returns a value such as “23”. This means that when you use the following command, it applies a fan speed offset of Low (23% PWM) over baseline fan speed
			`racadm set system.thermalsettings FanSpeedOffset 0`

`FanSpeedMaxOffsetVal`	• Getting this variable reads the fan speed offset value in	Values from 0-100	`racadm get system.thermalsettings FanSpeedMaxOffsetVal`

Object	Description	Usage	Example
	%PWM for Max Fan Speed Offset setting. • This value depends on the system. • Use `FanSpeedOffset` to set this value using index value 3		This returns a value such as "100". This means that when you use the following command, it applies a fan speed offset of Max (meaning full speed, 100% PWM). Usually, this offset results in fan speed increasing to full speed. `racadm set system.thermalsettings FanSpeedOffset 3`

`FanSpeedMediumOffsetVal`	• Getting this variable reads the fan speed offset value in %PWM for Medium Fan Speed Offset setting.
	• This value depends on the system.
	• Use `FanSpeedOffset` object to set this value using index value 2
		Values from 0-100	`racadm get system.thermalsettings FanSpeedMediumOffsetVal`
			This returns a value such as "47". This means that when you use the following command, it applies a fan speed offset of Medium (47% PWM) over baseline fan speed
			`racadm set system.thermalsettings FanSpeedOffset 2`

`FanSpeedOffset`	• Using this object with get command displays the existing Fan Speed Offset value.
	• Using this object with set command allows setting the required fan speed offset value.
	• The index value decides the offset that is applied and the `FanSpeedLowOffsetVal`, `FanSpeedMaxOffsetVal`, `FanSpeedHighOffsetVal`, and `FanSpeedMediumOffsetVal` objects (defined earlier) are the values at which the offsets are applied.
		Values are:
		• 0 — Low Fan Speed
		• 1 — High Fan Speed
		• 2 — Medium Fan Speed
		• 3 — Max Fan Speed
		• 255 — None
			To view the existing setting:
			`racadm get system.thermalsettings.FanSpeedOffset`
			To set the fan speed offset to High value (as defined in `FanSpeedHighOffsetVal`)
			`racadm set system.thermalsettings.FanSpeedOffset 1`

`MFSMaximumLimit`	Read Maximum limit for MFS	Values from 1 — 100	To display the highest value that can be set using `MinimumFanSpeed` option: `racadm get system.thermalsettings.MFSMaximumLimit`
`MFSMinimumLimit`	Read Minimum limit for MFS	Values from 0 to `MFSMaximumLimit` Default is 255 (means None)	To display the lowest value that can be set using `MinimumFanSpeed` option. `racadm get system.thermalsettings.MFSMinimumLimit`

Object	Description	Usage	Example
`MinimumFanSpeed`	• Allows configuring the Minimum Fan speed that is required for the system to operate. • It defines the baseline (floor) value for fan speed and system allows fans to go lower than this defined fan speed value. • This value is %PWM value for fan speed.	Values from `MFSMinimumLimit` to `MFSMaximumLimit` When get command reports 255, it means user configured offset is not applied.	To make sure that the system minimum speed does not decrease lower than 45% PWM (45 must be a value between `MFSMinimumLimit` to `MFSMaximumLimit`): `racadm set system.thermalsettings.MinimumFanSpeed 45`

`ThermalProfile`	• Allows you to specify the Thermal Base Algorithm.
	• Allows you to set the system profile as required for thermal behavior associated to the profile.
		Values:
		• 0 — Auto
		• 1 — Maximum performance
		• 2 — Minimum Power
			To view the existing thermal profile setting:
			
			`racadm get system.thermalsettings.ThermalProfile`
			
			To set the thermal profile to Maximum Performance:
			
			`racadm set system.thermalsettings.ThermalProfile 1`

`ThirdPartyPCIFanResponse`	• Thermal overrides for third-party PCI cards. • Allows you to disable or enable the default system fan response for detected third-party PCI cards. • You can confirm the presence of third-party PCI card by viewing the message ID PCI3018 in the Lifecycle Controller log.	Values: • 1 — Enabled • 0 — Disabled **NOTE: The default value is 1.**	To disable any default fan speed response set for a detected third-party PCI card: `racadm set system.thermalsettings.ThirdPartyPCIFanResponse 0`

Modifying thermal settings using iDRAC settings utility

To modify the thermal settings:

1 In the iDRAC Settings utility, go to **Thermal**.
The **iDRAC Settings Thermal** page is displayed.

2 Specify the following:
- Thermal Profile
- Maximum Exhaust Temperature Limit
- Fan Speed Offset
- Minimum Fan Speed

The settings are persistent, which means that once they are set and applied, they do not automatically change to the default setting during system reboot, power cycling, iDRAC, or BIOS updates. A few Dell servers may or may not support some or all of these custom user cooling options. If the options are not supported, they are not displayed or you cannot provide a custom value.

3 Click **Back**, click **Finish**, and then click **Yes**.
The thermal settings are configured.

Setting up management station

A management station is a computer used for accessing iDRAC interfaces to remotely monitor and manage the PowerEdge server(s).

To set up the management station:

1 Install a supported operating system. For more information, see the release notes.

2 Install and configure a supported Web browser. For more information, see the release notes.

3 Install the latest Java Runtime Environment (JRE) (required if Java plug-in type is used to access iDRAC using a Web browser).

NOTE: You need Java 8 or later to use this feature and to launch iDRAC Virtual Console over an IPv6 network.

4 From the *Dell Systems Management Tools and Documentation* DVD, install Remote RACADM and VMCLI from the SYSMGMT folder. Else, run **Setup** on the DVD to install Remote RACADM by default and other OpenManage software. For more information about RACADM, see iDRAC RACADM CLI Guide available at www.dell.com/idracmanuals.

5 Install the following based on the requirement:

- Telnet
- SSH client
- TFTP
- Dell OpenManage Essentials

Accessing iDRAC remotely

To remotely access iDRAC Web interface from a management station, make sure that the management station is in the same network as iDRAC. For example:

- Blade servers — The management station must be on the same network as OME Modular. .
- Rack and tower servers — Set the iDRAC NIC to Dedicated or LOM1 and make sure that the management station is on the same network as iDRAC.

To access the managed system's console from a management station, use Virtual Console through iDRAC Web interface.

Configuring supported web browsers

NOTE: For information about the supported browsers and their versions, see the *Release Notes* available at www.dell.com/idracmanuals.

Most features of iDRAC web interface can be accessed using these browsers with default settings. For certain feature to work, you must change a few settings. These settings include disabling pop-up blockers, enabling Java, ActiveX, or HTML5 plug-in support and so on.

If you are connecting to iDRAC web interface from a management station that connects to the Internet through a proxy server, configure the web browser to access the Internet from through this server.

NOTE: If you use Internet Explorer or Firefox to access the iDRAC web interface, you may need to configure certain settings as described in this section. You can use other supported browsers with their default settings.

NOTE: Blank proxy settings are treated equivalent to No proxy.

Configuring Internet Explorer

This section provides details about configuring Internet Explorer (IE) to ensure you can access and use all features of the iDRAC web interface. These settings include:

- Resetting security settings

- Adding iDRAC IP to trusted sites
- Configuring IE to enable Active Directory SSO
- Disabling IE Enhanced Security Configuration

Resetting Internet Explorer security settings

Ensure that Internet Explorer (IE) settings are set to Microsoft-recommended defaults and customize the settings as described in this section.

1 Open IE as an administrator or using an administrator account.
2 Click **Tools Internet Options Security Local Network** or **Local intranet**.
3 Click **Custom Level**, select **Medium-Low**, and click **Reset**. Click **OK** to confirm.

Adding iDRAC IP to the trusted-sites list

When you access iDRAC Web interface, you are prompted to add iDRAC IP address to the list of trusted domains if the IP address is missing from the list. When completed, click **Refresh** or relaunch the web browser to establish a connection to iDRAC web interface. If you are not prompted to add the IP, it is recommended that you add the IP manually to the trusted-sites list.

NOTE: When connecting to the iDRAC web interface with a certificate the browser does not trust, the browser's certificate error warning may display a second time after you acknowledge the first warning.

To add iDRAC IP address to the trusted-sites list:

1 Click **Tools** > **Internet Options** > **Security** > **Trusted sites** > **Sites**.
2 Enter the iDRAC IP address to the **Add this website to the zone**.
3 Click **Add**, click **OK**, and then click **Close**.
4 Click **OK** and then refresh your browser.

Configuring Internet Explorer to enable Active Directory SSO

To configure the browser settings for Internet Explorer:

1 In Internet Explorer, navigate to **Local Intranet** and click **Sites**.
2 Select the following options only:
   - Include all local (intranet) sites not listed on other zones.
   - Include all sites that bypass the proxy server.
3 Click **Advanced**.
4 Add all relative domain names that will be used for iDRAC instances that is part of the SSO configuration (for example, **myhost.example.com**.)
5 Click **Close** and click **OK** twice.

Disabling Internet Explorer Enhanced Security Configuration

To ensure that you can download log files and other local elements using the web interface, it is recommended to disable Internet Explorer Enhanced Security Configuration from Windows features. For information about disabling this feature on your version of Windows, see Microsoft's documentation.

Configuring Mozilla Firefox

This section provides details about configuring Firefox to ensure you can access and use all features of the iDRAC web interface. These settings include:

- Disabling whitelist feature
- Configuring Firefox to enable Active Directory SSO

Disabling whitelist feature in Firefox

Firefox has a "whitelist" security feature that requires user permission to install plug-ins for each distinct site that hosts a plug-in. If enabled, the whitelist feature requires you to install a Virtual Console viewer for each iDRAC you visit, even though the viewer versions are identical.

To disable the whitelist feature and avoid unnecessary plug-in installations, perform the following steps:

1 Open a Firefox Web browser window.

2 In the address field, enter `about:config` and press <Enter>.

3 In the **Preference Name** column, locate and double-click **xpinstall.whitelist.required**.

The values for **Preference Name**, **Status**, **Type**, and **Value** change to bold text. The **Status** value changes to user set and the **Value** changes to false.

4 In the **Preferences Name** column, locate **xpinstall.enabled**.

Make sure that **Value** is **true**. If not, double-click **xpinstall.enabled** to set **Value** to **true**.

Configuring Firefox to enable Active Directory SSO

To configure the browser settings for Firefox:

1 In Firefox address bar, enter `about:config`.

2 In **Filter**, enter `network.negotiate`.

3 Add the domain name to network.negotiate-auth.trusted-uris (using comma separated list.)

4 Add the domain name to network.negotiate-auth.delegation-uris (using comma separated list.)

Configuring web browsers to use virtual console

To use Virtual Console on your management station:

1 Make sure that a supported version of the browser (Internet Explorer (Windows), or Mozilla Firefox (Windows or Linux), Google Chrome, Safari) is installed.

For more information about the supported browser versions, see the *Release Notes* available at www.dell.com/idracmanuals.

2 To use Internet Explorer, set IE to **Run As Administrator**.

3 Configure the Web browser to use ActiveX, Java, or HTML5 plug-in.

ActiveX viewer is supported only with Internet Explorer. HTML5 or a Java viewer is supported on any browser.

NOTE: You need Java 8 or later to use this feature and to launch iDRAC Virtual Console over an IPv6 network.

4 Import the root certificates on the managed system to avoid the pop-ups that prompt you to verify the certificates.

5 Install the **compat-libstdc++-33-3.2.3-61** related package.

NOTE: On Windows, the compat-libstdc++-33-3.2.3-61 related package may be included in the .NET framework package or the operating system package.

6 If you are using MAC operating system, select the **Enable access for assistive devices** option in the **Universal Access** window. For more information, see the MAC operating system documentation.

Configuring Internet Explorer to use HTML5-based plug-in

The HTML5 virtual console and virtual media APIs are created by using HTML5 technology. The following are the advantages of HTML5 technology:

- Installation is not required on the client workstation.
- Compatibility is based on browser and is not based on the operating system or installed components.
- Compatible with most of the desktops and mobile platforms.
- Quick deployment and the client is downloaded as part of a web page.

You must configure Internet Explorer (IE) settings before you launch and run HTML5 based virtual console and virtual media applications. To configure the browser settings:

1 Disable pop-up blocker. To do this, click **Tools** > **Internet Options** > **Privacy** and clear the **Turn on Pop-up Blocker** check-box.

2 Start the HTML5 virtual console using any of the following methods:
   - In IE, click **Tools** > **Compatibility View Settings** and clear the **Display intranet sites in Compatibility View** check-box.
   - In IE using an IPv6 address, modify the IPv6 address as follows:
     `https://[fe80::d267:e5ff:fef4:2fe9]/ to https://fe80--d267-e5ff-fef4-2fe9.ipv6-literal.net/`
   - Direct HTML5 virtual console in IE using an IPv6 address, modify the IPv6 address as follows:
     `https://[fe80::d267:e5ff:fef4:2fe9]/console to https://fe80--d267-e5ff-fef4-2fe9.ipv6-literal.net/console`

3 To display the Title Bar information in IE, go to **Control Panel** > **Appearance and Personalization** > **Personalization** > **Window Classic**

Configuring the web browser to use Java plug-in

Install a Java Runtime Environment (JRE) if you are using Firefox or IE and want to use the Java Viewer.

NOTE: Install a 32-bit or 64-bit JRE version on a 64-bit operating system or a 32-bit JRE version on a 32-bit operating system.

To configure IE to use Java plug-in:

- Disable automatic prompting for file downloads in Internet Explorer.
- Disable *Enhanced Security Mode* in Internet Explorer.

Configuring IE to use ActiveX plug-in

You must configure the IE browser settings before you start and run ActiveX based Virtual Console and Virtual Media applications. The ActiveX applications are delivered as signed CAB files from the iDRAC server. If the plug-in type is set to Native-ActiveX type in Virtual console, when you try to start the Virtual Console, the CAB file is downloaded to the client system and ActiveX based Virtual Console is started. Internet Explorer requires some configurations to download, install, and run these ActiveX based applications.

On 64-bit operating systems, you can install both 32-bit or 64-bit versions of Internet Explorer. You may use either of 32-bit or 64-bit, however, you must install the corresponding plug-in. For example, if you install the plug-in in the 64-bit browser and then open the viewer in a 32-bit browser, you must install the plug-in again.

NOTE: You can use ActiveX plug-in only with Internet Explorer.

NOTE: To use ActiveX plug-in on systems with Internet Explorer 9, before configuring Internet Explorer, ensure that you disable the Enhanced Security Mode in Internet Explorer or in the server manager in Windows Server operating systems.

For ActiveX applications in Windows 7, Windows 2008, and Windows 10 configure the following Internet Explorer settings to use the ActiveX plug-in:

1 Clear the browser's cache.
2 Add iDRAC IP or host name to the **Local Internet site** list.
3 Reset the custom settings to **Medium-low** or change the settings to allow installation of signed ActiveX plug-ins.
4 Enable the browser to download encrypted content and to enable third-party browser extensions. To do this, go to **Tools** > **Internet Options** > **Advanced**, clear the **Do not save encrypted pages to disk** option, and select the **Enable third-party browser extensions** option.

NOTE: Restart Internet Explorer for the Enable third-party browser extension setting to take effect.

5 Go to **Tools** > **Internet Options** > **Security** and select the zone in which you want to run the application.
6 Click **Custom level**. In the **Security Settings** window, do the following:
   - Select **Enable** for **Automatic prompting for ActiveX controls**.
   - Select **Prompt** for **Download signed ActiveX controls**.
   - Select **Enable** or **Prompt** for **Run ActiveX controls and plugins**.
   - Select **Enable** or **Prompt** for **Script ActiveX controls marked safe for scripting**.
7 Click **OK** to close the **Security Settings** window.
8 Click **OK** to close the **Internet Options** window.

NOTE: On systems with Internet Explorer 11, ensure that you add the iDRAC IP by clicking Tools > Compatibility View settings.

NOTE:

- The varying versions of Internet Explorer share **Internet Options**. Therefore, after you add the server to the list of *trusted sites* for one browser the other browser uses the same setting.
- Before installing the ActiveX control, Internet Explorer may display a security warning. To complete the ActiveX control installation procedure, accept the ActiveX control when Internet Explorer prompts you with a security warning.
- If you get the error **Unknown Publisher** while launching Virtual Console, it may be caused because of the change to the code-signing certificate path. To resolve this error, you must download an addition key. Use a search engine to search for **Symantec SO16958** and, from the search results, follow the instructions on the Symantec website.

Additional settings for Windows Vista or newer Microsoft operating systems

The Internet Explorer browsers in Windows Vista or newer operating systems have an additional security feature called *Protected Mode*.

To launch and run ActiveX applications in Internet Explorer browsers with *Protected Mode*:

1 Run IE as an administrator.
2 Go to **Tools** > **Internet Options** > **Security** > **Trusted Sites**.
3 Make sure that the **Enable Protected Mode** option is not selected for Trusted Sites zone. Alternatively, you can add the iDRAC address to sites in the Intranet zone. By default, protected mode is turned off for sites in Intranet Zone and Trusted Sites zone.
4 Click **Sites**.
5 In the **Add this website to the zone** field, add the address of your iDRAC and click **Add**.
6 Click **Close** and then click **OK**.
7 Close and restart the browser for the settings to take effect.

Clearing browser cache

If you have issues when operating the Virtual Console, (out of range errors, synchronization issues, and so on) clear the browser's cache to remove or delete any old versions of the viewer that may be stored on the system and try again.

NOTE: You must have administrator privilege to clear the browser's cache.

Clearing earlier Java versions

To clear older versions of Java viewer in Windows or Linux, do the following:

1 At the command prompt, run `javaws-viewer` or `javaws-uninstall`.
The **Java Cache** viewer is displayed.
2 Delete the items titled *iDRAC Virtual Console Client*.

Importing CA certificates to management station

When you launch Virtual Console or Virtual Media, prompts are displayed to verify the certificates. If you have custom Web server certificates, you can avoid these prompts by importing the CA certificates to the Java or ActiveX trusted certificate store.

Importing CA certificate to Java trusted certificate store

To import the CA certificate to the Java trusted certificate store:

1 Launch the **Java Control Panel**.
2 Click **Security** tab and then click **Certificates**.
The **Certificates** dialog box is displayed.
3 From the Certificate type drop-down menu, select **Trusted Certificates**.
4 Click **Import**, browse, select the CA certificate (in Base64 encoded format), and click **Open**.
The selected certificate is imported to the Web start trusted certificate store.
5 Click **Close** and then click **OK**. The **Java Control Panel** window closes.

Importing CA certificate to ActiveX trusted certificate store

You must use the OpenSSL command line tool to create the certificate Hash using Secure Hash Algorithm (SHA). It is recommended to use OpenSSL tool 1.0.x and later since it uses SHA by default. The CA certificate must be in Base64 encoded PEM format. This is one-time process to import each CA certificate.

To import the CA certificate to the ActiveX trusted certificate store:

1 Open the OpenSSL command prompt.
2 Run a 8 byte hash on the CA certificate that is currently in-use on the management station using the command: `openssl x509 -in (name of CA cert) -noout -hash`
An output file is generated. For example, if the CA certificate file name is **cacert.pem**, the command is:

```
openssl x509 -in cacert.pem -noout -hash
```

The output similar to “431db322” is generated.
3 Rename the CA file to the output file name and include a “.0" extension. For example, 431db322.0.
4 Copy the renamed CA certificate to your home directory. For example, **C:\Documents and Settings\<user> directory**.

Viewing localized versions of web interface

iDRAC web interface is supported in the following languages:

- English (en-us)
- French (fr)
- German (de)
- Spanish (es)

- Japanese (ja)
- Simplified Chinese (zh-cn)

The ISO identifiers in parentheses denote the supported language variants. For some supported languages, resizing the browser window to 1024 pixels wide is required to view all features.

iDRAC Web interface is designed to work with localized keyboards for the supported language variants. Some features of iDRAC Web interface, such as Virtual Console, may require additional steps to access certain functions or letters. Other keyboards are not supported and may cause unexpected problems.

NOTE: See the browser documentation on how to configure or setup different languages and view localized versions of iDRAC Web interface.

Updating device firmware

Using iDRAC, you can update the iDRAC, BIOS, and all device firmware that is supported by using Lifecycle Controller update such as:

- Fibre Channel (FC) cards
- Diagnostics
- Operating System Driver Pack
- Network Interface Card (NIC)
- RAID Controller
- Power Supply Unit (PSU)
- NVMe PCIe devices
- SAS/SATA hard drives
- Backplane update for internal and external enclosures
- OS Collector

CAUTION: The PSU firmware update may take several minutes depending on the system configuration and PSU model. To avoid damaging the PSU, do not interrupt the update process or power on the system during PSU firmware update.

You must upload the required firmware to iDRAC. After the upload is complete, the current version of the firmware installed on the device and the version being applied is displayed. If the firmware being uploaded is not valid, an error message is displayed. Updates that do not require a reboot are applied immediately. Updates that require a system reboot are staged and committed to run on the next system reboot. Only one system reboot is required to perform all updates.

After the firmware is updated, the **System Inventory** page displays the updated firmware version and logs are recorded.

The supported firmware image file types are:

- **.exe** — Windows-based Dell Update Package (DUP)
- **.d9** — Contains both iDRAC and Lifecycle Controller firmware

For files with **.exe** extension, you must have the System Control privilege. The Remote Firmware Update licensed feature and Lifecycle Controller must be enabled.

For files with **.d9** extension, you must have the Configure privilege.

NOTE: After upgrading the iDRAC firmware, you may notice a difference in the time stamp displayed in the Lifecycle Controller log until the iDRAC time is reset using NTP. The Lifecycle log displays the BIOS time until the iDRAC time is reset.

You can perform firmware updates by using the following methods:

- Uploading a supported image type, one at a time, from a local system or network share.
- Connecting to an FTP, TFTP, HTTP or HTTPS site or a network repository that contains Windows DUPs and a corresponding catalog file.

You can create custom repositories by using the Dell Repository Manager. For more information, see *Dell Repository Manager Data Center User's Guide*. iDRAC can provide a difference report between the BIOS and firmware installed on the system and the updates available in the repository. All applicable updates contained in the repository are applied to the system. This feature is available with iDRAC Enterprise license.

- Scheduling recurring automated firmware updates by using the catalog file and custom repository.

There are multiple tools and interfaces that can be used to update the iDRAC firmware. The following table is applicable only to iDRAC firmware. The table lists the supported interfaces, image-file types, and whether Lifecycle Controller must be in enabled state for the firmware to be updated.

Table 12. Image file types and dependencies

	.D9 Image		iDRAC DUP	
Interface	**Supported**	**Requires LC enabled**	**Supported**	**Requires LC enabled**
BMCFW64.exe utility	Yes	No	No	N/A
Racadm FWUpdate (old)	Yes	No	No	N/A
Racadm Update (new)	Yes	Yes	Yes	Yes
iDRAC UI	Yes	Yes	Yes	Yes
WSMan	Yes	Yes	Yes	Yes
In-band OS DUP	No	N/A	Yes	No

The following table provides information on whether a system restart is required when firmware is updated for a particular component:

NOTE: When multiple firmware updates are applied through out-of-band methods, the updates are ordered in the most efficient possible manner to reduce unnecessary system restart.

Table 13. Firmware update — supported components

Component Name	Firmware Rollback Supported? (Yes or No)	Out-of-band — System Restart Required?	In-band — System Restart Required?	Lifecycle Controller GUI — Restart Required?
Diagnostics	No	No	No	No
OS Driver Pack	No	No	No	No
iDRAC with Lifecycle Controller	Yes	No	No*	Yes
BIOS	Yes	Yes	Yes	Yes
RAID Controller	Yes	Yes	Yes	Yes
BOSS	Yes	Yes	Yes	Yes
NVDIMM	No	Yes	Yes	Yes
Backplanes	Yes	Yes	Yes	Yes
Enclosures	Yes	Yes	No	Yes
NIC	Yes	Yes	Yes	Yes
Power Supply Unit	Yes	Yes	Yes	Yes
CPLD	No	Yes	Yes	Yes
FC Cards	Yes	Yes	Yes	Yes
NVMe PCIe SSD drives	Yes	No	No	No

Component Name	Firmware Rollback Supported? (Yes or No)	Out-of-band — System Restart Required?	In-band — System Restart Required?	Lifecycle Controller GUI — Restart Required?
SAS/SATA hard drives	No	Yes	Yes	No
OS Collector	No	No	No	No

* Indicates that though a system restart is not required, iDRAC must be restarted to apply the updates. iDRAC communication and monitoring may temporarily be interrupted.

When you check for updates, the version marked as **Available** does not always indicate that it is the latest version available. Before you install the update, ensure that the version you choose to install is newer than the version currently installed. If you want to control the version that iDRAC detects, create a custom repository using Dell Repository Manager (DRM) and configure iDRAC to use that repository to check for updates.

Updating firmware using iDRAC web interface

You can update the device firmware using firmware images available on the local system, from a repository on a network share (CIFS, NFS, HTTP or HTTPS), or from FTP.

Updating single device firmware

Before updating the firmware using single device update method, make sure that you have downloaded the firmware image to a location on the local system.

NOTE: Ensure that the file name for the single component DUP does not have any blank space.

To update single device firmware using iDRAC web interface:

1. Go to **Maintenance** > **System Update**.
   The **Firmware Update** page is displayed.
2. On the **Update** tab, select **Local** as the File Location.
3. Click **Browse**, select the firmware image file for the required component, and then click **Upload**.
4. After the upload is complete, the **Update Details** section displays each firmware file uploaded to iDRAC and its status.
   If the firmware image file is valid and was successfully uploaded, the **Contents** column displays a plus icon (+) icon next to the firmware image file name. Expand the name to view the **Device Name**, **Current**, and **Available firmware version** information.
5. Select the required firmware file and do one of the following:
   - For firmware images that do not require a host system reboot, click **Install**. For example, iDRAC firmware file.
   - For firmware images that require a host system reboot, click **Install and Reboot** or **Install Next Reboot**.
   - To cancel the firmware update, click **Cancel**.

   When you click **Install**, **Install and Reboot**, or **Install Next Reboot**, the message `Updating Job Queue` is displayed.
6. To display the **Job Queue** page, click **Job Queue**. Use this page to view and manage the staged firmware updates or click **OK** to refresh the current page and view the status of the firmware update.

   NOTE: If you navigate away from the page without saving the updates, an error message is displayed and all the uploaded content is lost.

Scheduling automatic firmware updates

You can create a periodic recurring schedule for iDRAC to check for new firmware updates. At the scheduled date and time, iDRAC connects to the specified destination, checks for new updates, and applies or stages all applicable updates. A log file is created on the remote server, which contains information about server access and staged firmware updates.

It is recommended that you create a repository using Dell Repository Manager (DRM) and configure iDRAC to use this repository to check for and perform firmware updates. Using an internal repository enables you to control the firmware and versions available to iDRAC and helps avoid any unintended firmware changes.

NOTE: For more information about DRM, see Dell.com/openmanagemanuals > Repository Manager.

iDRAC Enterprise license is required to schedule automatic updates.

You can schedule automatic firmware updates using the iDRAC web interface or RACADM.

NOTE: IPv6 address is not supported for scheduling automatic firmware updates.

Scheduling automatic firmware update using web interface

To schedule automatic firmware update using web Interface:

NOTE: Do not create the next scheduled occurrence of an automatic update job if a job is already Scheduled. It overwrites the current scheduled job.

1. In the iDRAC web interface, go to **Maintenance** > **System Update** > **Automatic Update**.
   The **Firmware Update** page is displayed.
2. Click the **Automatic Update** tab.
3. Select the **Enable Automatic Update** option.
4. Select any of the following options to specify if a system reboot is required after the updates are staged:
   - **Schedule Updates** — Stage the firmware updates but do not reboot the server.
   - **Schedule Updates and reboot Server** — Enables server reboot after the firmware updates are staged.
5. Select any of the following to specify the location of the firmware images:
   - **Network** — Use the catalog file from a network share (CIFS, NFS, HTTP or HTTPS, TFTP). Enter the network share location details.

     NOTE: While specifying the network share settings, it is recommended to avoid special characters for user name and password or percent encode the special characters.
   - **FTP** — Use the catalog file from the FTP site. Enter the FTP site details.
   - **HTTP** or **HTTPS** — Allows catalog file streaming and via HTTP and HTTPS file transfer.
6. Based on the selection in step 5, enter the network settings or the FTP settings.
   For information about the fields, see the *iDRAC Online Help*.
7. In the **Update Window Schedule** section, specify the start time for the firmware update and the frequency of the updates (daily, weekly, or monthly).
   For information about the fields, see the *iDRAC Online Help*.
8. Click **Schedule Update**.
   The next scheduled job is created in the job queue. Five minutes after the first instance of the recurring job starts, the job for the next time period is created.

Scheduling automatic firmware update using RACADM

To schedule automatic firmware update, use the following commands:

- To enable automatic firmware update:

  ```
  racadm set lifecycleController.lcattributes.AutoUpdate.Enable 1
  ```

- To view the status of automatic firmware update:

  ```
  racadm get lifecycleController.lcattributes.AutoUpdate
  ```

- To schedule the start time and frequency of the firmware update:

  ```
  racadm AutoUpdateScheduler create -u username -p password -l <location>  [-f catalogfilename -pu <proxyuser> -pp<proxypassword> -po <proxy port> -pt <proxytype>] -time < hh:mm> [-dom < 1 – 28,L,'*'> -wom <1-4,L,'*'> -dow <sun-sat,'*'>] -rp <1-366> -a <applyserverReboot (1-enabled | 0-disabled)>
  ```

  For example,

  – To automatically update firmware using a CIFS share:

  ```
  racadm AutoUpdateScheduler create -u admin -p pwd -l //1.2.3.4/CIFS-share –f cat.xml -time 14:30 -wom 1 -dow sun -rp 5 -a 1
  ```

  – To automatically update firmware using FTP:

  ```
  racadm AutoUpdateScheduler create -u admin -p pwd -l ftp.mytest.com -pu puser –pp puser –po 8080 –pt http –f cat.xml -time 14:30 -wom 1 -dow sun -rp 5 -a 1
  ```

- To view the current firmware update schedule:

  ```
  racadm AutoUpdateScheduler view
  ```

- To disable automatic firmware update:

  ```
  racadm set lifecycleController.lcattributes.AutoUpdate.Enable 0
  ```

- To clear the schedule details:

  ```
  racadm AutoUpdateScheduler clear
  ```

- Upload the update file from a remote HTTP share:

  ```
  racadm update –f <updatefile> -u admin -p mypass -l http://1.2.3.4/share
  ```

- Upload the update file from a remote HTTPS share:

  ```
  racadm update –f <updatefile> -u admin -p mypass -l https://1.2.3.4/share
  ```

Updating device firmware using RACADM

To update device firmware using RACADM, use the **update** subcommand. For more information, see the *iDRAC RACADM CLI Guide* available at www.dell.com/idracmanuals.

Examples:

- To generate a comparison report using an update repository:

  ```
  racadm update –f catalog.xml –l //192.168.1.1 –u test –p passwd --verifycatalog
  ```

- To perform all applicable updates from an update repository using **myfile.xml** as a catalog file and perform a graceful reboot:

  ```
  racadm update –f "myfile.xml" –b "graceful" –l //192.168.1.1 –u test –p passwd
  ```

- To perform all applicable updates from an FTP update repository using **Catalog.xml** as a catalog file:

  ```
  racadm update –f "Catalog.xml" –t FTP –e 192.168.1.20/Repository/Catalog
  ```

Updating firmware using OME-Modular web interface

You can update iDRAC firmware for blade servers using the OME-Modular Web interface.

To update iDRAC firmware using the OME-Modular Web interface see the OME Modular User's Guide available at dell.com/support/manuals.

Updating firmware using DUP

Before you update firmware using Dell Update Package (DUP), make sure to:

- Install and enable the IPMI and managed system drivers.
- Enable and start the Windows Management Instrumentation (WMI) service if your system is running Windows operating system,

  NOTE: While updating the iDRAC firmware using the DUP utility in Linux, if you see error messages such as `usb 5-2: device descriptor read/64, error -71` displayed on the console, ignore them.
- If the system has ESX hypervisor installed, then for the DUP file to run, make sure that the "usbarbitrator" service is stopped using command: `service usbarbitrator stop`

To update iDRAC using DUP:

1 Download the DUP based on the installed operating system and run it on the managed system.
2 Run the DUP.

The firmware is updated. A system restart is not required after firmware update is complete.

Updating firmware using remote RACADM

1 Download the firmware image to the TFTP or FTP server. For example, C:\downloads\firmimg.d9
2 Run the following RACADM command:

TFTP server:

- Using **fwupdate** command:

```
racadm -r <iDRAC IP address> -u <username> -p <password> fwupdate -g -u -a <path>
```

path the location on the TFTP server where **firmimg.d9** is stored.

- Using **update** command:

```
racadm -r <iDRAC IP address> -u <username> -p <password> update –f <filename>
```

FTP server:

- Using **fwupdate** command:

```
racadm -r <iDRAC IP address> -u <username> -p <password> fwupdate –f <ftpserver IP>
<ftpserver username> <ftpserver password> –d <path>
```

path the location on the FTP server where **firmimg.d9** is stored.

- Using **update** command:

```
racadm -r <iDRAC IP address> -u <username> -p <password> update –f <filename>
```

For more information, see the iDRAC RACADM CLI Guide available at www.dell.com/idracmanuals.

Updating firmware using Lifecycle Controller Remote Services

For information to update the firmware using Lifecycle Controller–Remote Services, see Lifecycle Controller Remote Services Quick Start Guide available at www.dell.com/idracmanuals.

Viewing and managing staged updates

You can view and delete the scheduled jobs including configuration and update jobs. This is a licensed feature. All jobs queued to run during the next reboot can be deleted.

Viewing and managing staged updates using iDRAC web interface

To view the list of scheduled jobs using iDRAC web interface, go to **Maintenance** > **Job Queue**. The **Job Queue** page displays the status of jobs in the Lifecycle Controller job queue. For information about the displayed fields, see the *iDRAC Online Help*.

To delete job(s), select the job(s) and click **Delete**. The page is refreshed and the selected job is removed from the Lifecycle Controller job queue. You can delete all the jobs queued to run during the next reboot. You cannot delete active jobs, that is, jobs with the status *Running* or *Downloading*.

You must have Server Control privilege to delete jobs.

Viewing and managing staged updates using RACADM

To view the staged updates using RACADM, use **jobqueue** sub-command. For more information, see the iDRAC RACADM CLI Guide available at www.dell.com/idracmanuals.

Rolling back device firmware

You can roll back the firmware for iDRAC or any device that Lifecycle Controller supports, even if the upgrade was previously performed using another interface. For example, if the firmware was upgraded using the Lifecycle Controller GUI, you can roll back the firmware using the iDRAC web interface. You can perform firmware rollback for multiple devices with one system reboot.

On Dell's 14th generation PowerEdge servers that have a single iDRAC and Lifecycle Controller firmware, rolling back the iDRAC firmware also rolls back the Lifecycle Controller firmware.

It is recommended to keep the firmware updated to ensure you have the latest features and security updates. You may need to rollback an update or install an earlier version if you encounter any issues after an update. To install an earlier version, use Lifecycle Controller to check for updates and select the version you want to install.

You can perform firmware rollback for the following components:

- iDRAC with Lifecycle Controller
- BIOS
- Network Interface Card (NIC)
- Power Supply Unit (PSU)
- RAID Controller
- Backplane

NOTE: You cannot perform firmware rollback for Diagnostics, Driver Packs, and CPLD.

Before rolling back the firmware, make sure that:

- You have Configure privilege to roll back iDRAC firmware.
- You have Server Control privilege and have enabled Lifecycle Controller to roll back firmware for any other device other than the iDRAC.
- Change the NIC mode to **Dedicated** if the mode is set as **Shared LOM**.

You can roll back the firmware to the previously installed version using any of the following methods:

- iDRAC web interface
- OME-Modular web interface

- iDRAC RACADM CLI
- Lifecycle Controller GUI
- Lifecycle Controller-Remote Services

Rollback firmware using iDRAC web interface

To roll back device firmware:

1 In the iDRAC Web interface, go to **Maintenance** > **System Update** > **Rollback**.

The **Rollback** page displays the devices for which you can rollback the firmware. You can view the device name, associated devices, currently installed firmware version, and the available firmware rollback version.

2 Select one or more devices for which you want to rollback the firmware.

3 Based on the selected devices, click **Install and Reboot** or **Install Next Reboot**. If only iDRAC is selected, then click **Install**.

When you click **Install and Reboot** or **Install Next Reboot**, the message "Updating Job Queue" is displayed.

4 Click **Job Queue**.

The **Job Queue** page is displayed, where you can view and manage the staged firmware updates.

NOTE:

- While in rollback mode, the rollback process continues in the background even if you navigate away from this page.

An error message appears if:

- You do not have Server Control privilege to rollback any firmware other than the iDRAC or Configure privilege to rollback iDRAC firmware.
- Firmware rollback is already in-progress in another session.
- Updates are staged to run or already in running state.

If Lifecycle Controller is disabled or in recovery state and you try to perform a firmware rollback for any device other than iDRAC, an appropriate warning message is displayed along with steps to enable Lifecycle Controller.

Rollback firmware using OME-Modular web interface

To roll back using the OME-Modular Web interface, see the OME - Modular for PowerEdge MX7000 Chassis User's Guide available at www.dell.com/openmanagemanuals.

Rollback firmware using RACADM

1 Check the rollback status and the FQDD using the `swinventory` command:

```
racadm swinventory
```

For the device for which you want to rollback the firmware, the `Rollback Version` must be `Available`. Also, note the FQDD.

2 Rollback the device firmware using:

```
racadm rollback <FQDD>
```

For more information, see iDRAC RACADM CLI Guide available at www.dell.com/idracmanuals.

Rollback firmware using Lifecycle Controller

For information, see Lifecycle Controller User's Guide available at www.dell.com/idracmanuals.

Rollback firmware using Lifecycle Controller-Remote Services

For information, see Lifecycle Controller Remote Services Quick Start Guide available at www.dell.com/idracmanuals.

Recovering iDRAC

iDRAC supports two operating system images to make sure a bootable iDRAC. In the event of an unforeseen catastrophic error and you lose both boot paths:

- iDRAC bootloader detects that there is no bootable image.
- System Health and Identify LED is flashed at ~1/2 second rate. (LED is located on the back of a rack and tower servers and on the front of a blade server.)
- Bootloader is now polling the SD card slot.
- Format an SD card with FAT using a Windows operating system, or EXT3 using a Linux operating system.
- Copy **firmimg.d9** to the SD card.
- Insert the SD card into the server.
- Bootloader detects the SD card, turns the flashing LED to solid amber, reads the firmimg.d9, reprograms iDRAC, and then reboots iDRAC.

Backing up server profile

You can back up the system configuration, including the installed firmware images on various components such as BIOS, RAID, NIC, iDRAC, Lifecycle Controller, and Network Daughter Cards (NDCs) and the configuration settings of those components. The backup operation also includes the hard disk configuration data, motherboard, and replaced parts. The backup creates a single file that you can save to a vFlash SD card or network share (CIFS, NFS, HTTP or HTTPS).

You can also enable and schedule periodic backups of the firmware and server configuration based on a certain day, week, or month.

You can reset iDRAC even when a server-profile backup or restore operation is in progress.

Backup feature is licensed and is available with the iDRAC Enterprise license.

Before performing a backup operation, make sure that:

- Collect System Inventory On Reboot (CSIOR) option is enabled. If you initiate a back operation while CSIOR is disabled, the following message is displayed:

  ```
  System Inventory with iDRAC may be stale,start CSIOR for updated inventory
  ```

- To perform backup on a vFlash SD card:
  - vFlash SD card is inserted, enabled, and initialized.
  - vFlash SD card has at least 100 MB free space to store the backup file.

The backup file contains encrypted user sensitive data, configuration information, and firmware images that you can use for import server profile operation.

Backup events are recorded in the Lifecycle Log.

NOTE: If you are exporting the server profile using NFS on Windows 10 operating system and face issues accessing the exported server profile, enable Client for NFS in Windows Features.

Backing up server profile using iDRAC web interface

To back up the server profile using iDRAC Web interface:

1 Go to **iDRAC Settings** > **Settings** > **Backup and Export Server Profile**.
The **Backup and Export Server Profile** page is displayed.
2 Select one of the following to save the backup file image:
- **Network Share** to save the backup file image on a CIFS or NFS share.
- **HTTP** or **HTTPS** to save the backup file image to a local file via HTTP/S file transfer.

NOTE: Once you mount the NFS share, within iDRAC the non-root user cannot write to the share. This is to make iDRAC more secure.

3 Enter the backup **File Name** , **Backup File Passphrase** (optional), **Confirm Passphrase** details.
4 If **Network** is selected as the file location, enter the network settings accordingly.

NOTE: While specifying the network share settings, it is recommended to avoid special characters for user name and password or percent encode the special characters.

For information about the fields, see the *iDRAC Online Help*.

Backing up server profile using RACADM

To back up the server profile using RACADM, use the **systemconfig backup** command.
For more information, see the iDRAC RACADM CLI Guide available at www.dell.com/idracmanuals.

Scheduling automatic backup server profile

You can enable and schedule periodic backups of the firmware and server configuration based on a certain day, week, or month.

Before scheduling automatic backup server profile operation, make sure that:

- Lifecycle Controller and Collect System Inventory On Reboot (CSIOR) option is enabled.
- Network Time Protocol (NTP) is enabled so that time drift does not affect the actual times of scheduled jobs running and when the next scheduled job is created.
- To perform backup on a vFlash SD card:
  - A Dell supported vFlash SD card is inserted, enabled, and initialized.
  - vFlash SD card has enough space to store the backup file.

NOTE: IPv6 address is not supported for scheduling automatic backup server profile.

Scheduling automatic backup server profile using web interface

To schedule automatic backup server profile:

1 In the iDRAC Web interface, go to **iDRAC Settings** > **Settings** > **Backup and Export Server Profile**.
The **Backup and Export Server Profile** page is displayed.
2 Select one of the following to save the backup file image:
- **Network** to save the backup file image on a CIFS or NFS share.

- **HTTP or HTTPS** to save the backup file image using HTTP/S file transfer.

3 Enter the backup **File Name**, **Backup File Passphrase (optional)** and **Confirm Passphrase**.

4 If **Network** is selected as the file location, enter the network settings.

NOTE: While specifying the network share settings, it is recommended to avoid special characters for user name and password or percent encode the special characters.

For information about the fields, see the *iDRAC Online Help*

5 Click **Backup Now**.

A recurring job is represented in the job queue with a start date and time of the next scheduled backup operation. Five minutes after the first instance of the recurring job starts, the job for the next time period is created. The backup server profile operation is performed at the scheduled date and time.

Scheduling automatic backup server profile using RACADM

To enable automatic backup use the command:

```
racadm set lifecyclecontroller.lcattributes.autobackup Enabled
```

To schedule a backup server profile operation:

```
racadm systemconfig backup -f <filename> <target> [-n <passphrase>] -time <hh:mm> -dom
<1-28,L,'*'> -dow<*,Sun-Sat> -wom <1-4, L,'*'> -rp  <1-366>-mb <Max Backups>
```

To view the current backup schedule:

```
racadm systemconfig getbackupscheduler
```

To disable automatic backup, use the command:

```
racadm set LifeCycleController.lcattributes.autobackup Disabled
```

To clear the backup schedule:

```
racadm systemconfig clearbackupscheduler
```

For more information, see the iDRAC RACADM CLI Guide available at www.dell.com/idracmanuals.

Importing server profile

You can use the backup image file to import or restore the configuration and firmware for the same server without rebooting the server.

Import feature is not licensed.

NOTE: For the restore operation, the system Service Tag and the Service Tag in the backup file must be identical. The restore operation applies to all system components that are same and present in the same location or slot as captured in the backup file. If components are different or not in the same location, they are not modified and restore failures is logged to the Lifecycle Log.

Before performing an import operation, make sure that Lifecycle Controller is enabled. If Lifecycle Controller is disabled, and if you initiate the import operation, the following message is displayed:

```
Lifecycle Controller is not enabled, cannot create Configuration job.
```

When the import is in-progress, if you initiate an import operation again, the following error message is displayed:

```
Restore is already running
```

Import events are recorded in the Lifecycle Log.

Easy Restore

After you replace the motherboard on your server, Easy Restore allows you to automatically restore the following data:

- System Service Tag
- Asset Tag
- Licenses data
- UEFI Diagnostics application
- System configuration settings—BIOS, iDRAC, and NIC

Easy Restore uses the Easy Restore flash memory to back up the data. When you replace the motherboard and power on the system, the BIOS queries the iDRAC and prompts you to restore the backed-up data. The first BIOS screen prompts you to restore the Service Tag, licenses, and UEFI diagnostic application. The second BIOS screen prompts you to restore system configuration settings. If you choose not to restore data on the first BIOS screen and if you do not set the Service Tag by another method, the first BIOS screen is displayed again. The second BIOS screen is displayed only once.

NOTE:

- System configurations settings are backed-up only when CSIOR is enabled. Ensure that Lifecycle Controller and CSIOR are enabled.
- System Erase does not clear the data from the Easy Restore flash memory.
- Easy Restore does not back up other data such as firmware images, vFlash data, or add-in cards data.

Importing server profile using iDRAC web interface

To import the server profile using iDRAC web interface:

1 Go to **iDRAC Settings** > **Settings** > **Import Server Profile**.

The **Import Server Profile** page is displayed.

2 Select one of the following to specify the location of the backup file:

- **Network Share** to save the backup file image on a CIFS or NFS share.
- **HTTP/ HTTPS** to save the backup file image to a local file via HTTP/S file transfer.

3 Enter the backup **File Name**, **Backup File Passphrase (optional)** and **Confirm Passphrase** details.

4 Enter the backup **File Name** and decryption passphrase (optional).

5 If **Network** is selected as the file location, enter the network settings.

NOTE: While specifying the network share settings, it is recommended to avoid special characters for user name and password or percent encode the special characters.

For information about the fields, see the *iDRAC Online Help*.

6 Select one of the following for **Virtual disks configuration and hard disk data**:

- **Preserve** - Preserves the RAID level, virtual disk, controller attributes, and hard disk data in the system and restores the system to a previously known state using the backup image file.
- **Delete and Replace** - Deletes and replaces the RAID level, virtual disk, controller attributes, and hard disk configuration information in the system with the data from the backup image file.

7 Click **Import**.

The import server profile operation is initiated.

Importing server profile using RACADM

To import the server profile using RACADM, use the **systemconfig restore** command.

For more information, see the iDRAC RACADM CLI Guide available at www.dell.com/idracmanuals.

Restore operation sequence

The restore operation sequence is:

1 Host system shuts down.
2 Backup file information is used to restore the Lifecycle Controller.
3 Host system turns on.
4 Firmware and configuration restore process for the devices is completed.
5 Host system shuts down.
6 iDRAC firmware and configuration restore process is completed.
7 iDRAC restarts.
8 Restored host system turns on to resume normal operation.

Monitoring iDRAC using other Systems Management tools

You can discover and monitor iDRAC using Dell Management Console or Dell OpenManage Essentials. You can also use Dell Remote Access Configuration Tool (DRACT) to discover iDRACs, update firmware, and set up Active Directory. For more information, see the respective user's guides.

Support Server Configuration Profile — Import and Export

Server Configuration Profile (SCP) allows you to import and export server configuration files.

User can import and export from local management station, and from a Network Share via CIFS, NFS, HTTP or HTTPS. Using SCP, you can select and import or export component level configurations for BIOS, NIC and RAID. You can import and export SCP to the local management station or to a CIFS, NFS, HTTP, or HTTPS network share. You can either import and export individual profiles of iDRAC, BIOS, NIC, and RAID, or all of them together as a single file.

User can specify preview import or export of the SCP where the job is running and configuration result is generated but none of the configuration has applied.

A job is created once the import or export is initiated through the GUI. The status of the jobs can be viewed on the Job Queue page.

NOTE: Only Host Name or IP Address are accepted for destination address.

NOTE: You can browse to a specific location to import the server configuration files. You need to select the correct server configuration file that you want to import. For example, import.xml.

NOTE: Depending on the exported file format (that you selected), the extension is added automatically. For example, `export_system_config.xml`.

NOTE: SCP applies the full configuration in a single job with minimal number of reboots. However, in a few system configurations some attributes change the operation mode of a device or may create subdevices with new attributes. When this occurs, SCP may be unable to apply all settings during a single job. Review the ConfigResult entries for the job to resolve any pending configuration settings.

Secure Boot Configuration from BIOS Settings or F2

UEFI Secure Boot is a technology that eliminates a major security void that may occur during a handoff between the UEFI firmware and UEFI operating system (OS). In UEFI Secure Boot, each component in the chain is validated and authorized against a specific certificate before it is allowed to load or run. Secure Boot removes the threat and provides software identity checking at every step of the boot—Platform firmware, Option Cards, and OS BootLoader.

The Unified Extensible Firmware Interface (UEFI) Forum—an industry body that develops standards for pre-boot software—defines Secure Boot in the UEFI specification. Computer system vendors, expansion card vendors, and operating system providers collaborate on this specification to promote interoperability. As a portion of the UEFI specification, Secure Boot represents an industry-wide standard for security in the pre-boot environment.

When enabled, UEFI Secure Boot prevents the unsigned UEFI device drivers from being loaded, displays an error message, and does not allow the device to function. You must disable Secure Boot to load the unsigned device drivers.

On the Dell 14th generation and later versions of PowerEdge servers, you can enable or disable the Secure Boot feature by using different interfaces (RACADM, WSMAN, REDFISH, and LC-UI).

Acceptable file formats

The Secure Boot policy contains only one key in PK, but multiple keys may reside in KEK. Ideally, either the platform manufacturer or platform owner maintains the private key corresponding to the public PK. Third parties (such as OS providers and device providers) maintain the private keys corresponding to the public keys in KEK. In this way, platform owners or third parties may add or remove entries in the db or dbx of a specific system.

The Secure Boot policy uses db and dbx to authorize pre-boot image file execution. For an image file to get executed, it must associate with a key or hash value in db, and not associate with a key or hash value in dbx. Any attempts to update the contents of db or dbx must be signed by a private PK or KEK. Any attempts to update the contents of PK or KEK must be signed by a private PK.

Table 14. Acceptable file formats

Policy Component	Acceptable File Formats	Acceptable File Extensions	Max records allowed
PK	X.509 Certificate (binary DER format only)	1 `.cer` 2 `.der` 3 .crt	One
KEK	X.509 Certificate (binary DER format only) Public Key Store	1 `.cer` 2 `.der` 3 `.crt` 4 `.pbk`	More than one
DB and DBX	X.509 Certificate (binary DER format only) EFI image (system BIOS will calculate and import image digest)	1 `.cer` 2 `.der` 3 `.crt` 4 `.efi`	More than one

The Secure Boot Settings feature can be accessed by clicking System Security under System BIOS Settings. To go to System BIOS Settings, press F2 when the company logo is displayed during POST.

- By default, Secure Boot is Disabled and the Secure Boot policy is set to Standard. To configure the Secure Boot Policy, you must enable Secure Boot.
- When the Secure Boot mode is set to Standard, it indicates that the system has default certificates and image digests or hash loaded from the factory. This caters to the security of standard firmware, drivers, option-roms, and boot loaders.
- To support a new driver or firmware on a server, the respective certificate must be enrolled into the DB of Secure Boot certificate store. Therefore, Secure Boot Policy must be configured to Custom.

When the Secure Boot Policy is configured as Custom, it inherits the standard certificates and image digests loaded in the system by default, which you can modify. Secure Boot Policy configured as Custom allows you to perform operations such as View, Export, Import, Delete, Delete All, Reset, and Reset All. Using these operations, you can configure the Secure Boot Policies.

Configuring the Secure Boot Policy to Custom enables the options to manage the certificate store by using various actions such as Export, Import, Delete, Delete All, Reset, and Rest All on PK, KEK, DB, and DBX. You can select the policy (PK / KEK / DB / DBX) on which you want to make the change and perform appropriate actions by clicking the respective link. Each section will have links to perform the Import, Export, Delete, and Reset operations. Links are enabled based on what is applicable, which depends on the configuration at the point of time. Delete All and Reset All are the operations that have impact on all the policies. Delete All deletes all the certificates and image digests in the Custom policy, and Rest All restores all the certificates and image digests from Standard or Default certificate store.

BIOS recovery

The BIOS recovery feature allows you to manually recover the BIOS from a stored image. The BIOS is checked when the system is powered-on and if a corrupt or compromised BIOS is detected, an error message is displayed. You can then initiate the process of BIOS recovery using RACADM. To perform a manual BIOS recovery, see the iDRAC RACADM Command Line Interface Reference Guide available at www.dell.com/idracmanuals.

4

Configuring iDRAC

iDRAC enables you to configure iDRAC properties, set up users, and set up alerts to perform remote management tasks.

Before you configure iDRAC, make sure that the iDRAC network settings and a supported browser is configured, and the required licenses are updated. For more information about the licensable feature in iDRAC, see iDRAC licenses .

You can configure iDRAC using:

- iDRAC Web Interface
- RACADM
- Remote Services (see *Lifecycle Controller Remote Services User's Guide*)
- IPMITool (see *Baseboard Management Controller Management Utilities User's Guide*)

To configure iDRAC:

1 Log in to iDRAC.
2 Modify the network settings if required.

NOTE: If you have configured iDRAC network settings, using iDRAC Settings utility during iDRAC IP address setup, then ignore this step.

3 Configure interfaces to access iDRAC.
4 Configure front panel display.
5 Configure System Location if required.
6 Configure time zone and Network Time Protocol (NTP) if required.
7 Establish any of the following alternate communication methods to iDRAC:
   - IPMI or RAC serial
   - IPMI serial over LAN
   - IPMI over LAN
   - SSH or Telnet client
8 Obtain the required certificates.
9 Add and configure iDRAC users with privileges.
10 Configure and enable e-mail alerts, SNMP traps, or IPMI alerts.
11 Set the power cap policy if required.
12 Enable the Last Crash Screen.
13 Configure virtual console and virtual media if required.
14 Configure vFlash SD card if required.
15 Set the first boot device if required.
16 Set the OS to iDRAC Pass-through if required.

Topics:

- Viewing iDRAC information
- Modifying network settings
- FIPS mode
- Configuring services
- Configuring TLS

- Using VNC client to manage remote server
- Configuring front panel display
- Configuring time zone and NTP
- Setting first boot device
- Enabling or disabling OS to iDRAC Pass-through
- Obtaining certificates
- Configuring multiple iDRACs using RACADM
- Disabling access to modify iDRAC configuration settings on host system

Viewing iDRAC information

You can view the basic properties of iDRAC.

Viewing iDRAC information using web interface

In the iDRAC Web interface, go to **iDRAC Settings** > **Overview** to view the following information related to iDRAC. For information about the properties, see *iDRAC Online Help*.

iDRAC Details

- Device Type
- Hardware Version
- Firmware Version
- Firmware Update
- RAC time
- IPMI version
- Number of Possible Sessions
- Number of Current Sessions
- IPMI Version

iDRAC Service Module

- Status

Connection View

- State
- Switch Connection ID
- Switch Port Connection ID

Current Network Settings

- iDRAC MAC Address
- Active NIC Interface
- DNS Domain Name

Current IPv4 Setting

- IPv4 Enabled
- DHCP
- Current IP Address
- Current Subnet Mask
- Current Gateway

- Use DHCP to Obtain DNS Server Address
- Current Preferred DNS Server
- Current Alternate DNS Server

Current IPv6 Settings

- IPv6 Enable
- Autoconfiguration
- Current IP Address
- Current IP Gateway
- Link Local Address
- Use DHCPv6 to obtain DNS
- Current Preferred DNS Server
- Current Alternate DNS Server

Viewing iDRAC information using RACADM

To view iDRAC information using RACADM, see `getsysinfo` or `get` sub-command details provided in the iDRAC RACADM CLI Guide available at www.dell.com/idracmanuals .

Modifying network settings

After configuring the iDRAC network settings using the iDRAC Settings utility, you can also modify the settings through the iDRAC Web interface, RACADM, Lifecycle Controller, Dell Deployment Toolkit, and Server Administrator (after booting to the operating system). For more information on the tools and privilege settings, see the respective user's guides.

To modify the network settings using iDRAC Web interface or RACADM, you must have **Configure** privileges.

NOTE: Changing the network settings may terminate the current network connections to iDRAC.

Modifying network settings using web interface

To modify the iDRAC network settings:

1 In the iDRAC Web interface, go to **iDRAC Settings** > **Connectivity** > **Network** > **Network Settings**.
The **Network** page is displayed.

2 Specify the network settings, common settings, IPv4, IPv6, IPMI, and/or VLAN settings as per your requirement and click **Apply**.
If you select **Auto Dedicated NIC** under **Network Settings**, when the iDRAC has its NIC Selection as shared LOM (1, 2, 3, or 4) and a link is detected on the iDRAC dedicated NIC, the iDRAC changes its NIC selection to use the dedicated NIC. If no link is detected on the dedicated NIC, then the iDRAC uses the shared LOM. The switch from shared to dedicated time-out is five seconds and from dedicated to shared is 30 seconds. You can configure this time-out value using RACADM or WSMan.

For information about the various fields, see the *iDRAC Online Help*.

Modifying network settings using local RACADM

To generate a list of available network properties, use the command

```
racadm get iDRAC.Nic
```

To use DHCP to obtain an IP address, use the following command to write the object **DHCPEnable** and enable this feature.

```
racadm set iDRAC.IPv4.DHCPEnable 1
```

The following example shows how the command may be used to configure the required LAN network properties:

```
racadm set iDRAC.Nic.Enable 1
racadm set iDRAC.IPv4.Address 192.168.0.120
racadm set iDRAC.IPv4.Netmask 255.255.255.0
racadm set iDRAC.IPv4.Gateway 192.168.0.120
racadm set iDRAC.IPv4.DHCPEnable 0
racadm set iDRAC.IPv4.DNSFromDHCP 0
racadm set iDRAC.IPv4.DNS1 192.168.0.5
racadm set iDRAC.IPv4.DNS2 192.168.0.6
racadm set iDRAC.Nic.DNSRegister 1
racadm set iDRAC.Nic.DNSRacName RAC-EK00002
racadm set iDRAC.Nic.DNSDomainFromDHCP 0
racadm set iDRAC.Nic.DNSDomainName MYDOMAIN
```

NOTE: If iDRAC.Nic.Enable is set to 0, the iDRAC LAN is disabled even if DHCP is enabled.

Configuring IP filtering

In addition to user authentication, use the following options to provide additional security while accessing iDRAC:

- IP filtering limits the IP address range of the clients accessing iDRAC. It compares the IP address of an incoming login to the specified range and allows iDRAC access only from a management station whose IP address is within the range. All other login requests are denied.
- When repeated login failures occur from a particular IP address, it prevents the address from logging in to iDRAC for a preselected time span. If you unsuccessfully log in up to two times, you are allowed to log in again only after 30 seconds. If you unsuccessfully log in more than two times, you are allowed to log in again only after 60 seconds.

As login failures accumulate from a specific IP address, they are registered by an internal counter. When the user successfully logs in, the failure history is cleared and the internal counter is reset.

NOTE: When login attempts are prevented from the client IP address, few SSH clients may display the message: `ssh exchange identification: Connection closed by remote host.`

NOTE: If you are using Dell Deployment Toolkit (DTK), see the OpenManage Deployment Toolkit User's Guide available at www.dell.com/openmanagemanuals for the privileges.

Configure IP filtering using iDRAC web interface

You must have Configure privilege to perform these steps.

To configure IP filtering:

1. In iDRAC Web interface, go to **iDRAC Settings** > **Connectivity** > **Network** > **Network Settings** > **Advanced Network Settings**.
   The **Network** page is displayed.
2. Click **Advanced Network Settings**.
   The **Network Security** page is displayed.
3. Specify the IP filtering settings using **IP Range Address** and **IP Range Subnet Mask**.
   For more information about the options, see *iDRAC Online Help*.
4. Click **Apply** to save the settings.
   Federal Information Processing Standards — FIPS is a set of standards used by the United States government agencies and contractors. FIPS Mode is intended to meet the requirements of FIPS 140-2 level 1. For more information about FIPS, refer to the FIPS User Guide for iDRAC .

   NOTE: Enabling FIPS Mode resets iDRAC to the default settings.

Configuring IP filtering using RACADM

You must have Configure privilege to perform these steps.

To configure IP filtering, use the following RACADM objects in the **iDRAC.IPBlocking** group:

- RangeEnable
- RangeAddr
- RangeMask

The **RangeMask** property is applied to both the incoming IP address and to the **RangeAddr** property. If the results are identical, the incoming login request is allowed to access iDRAC. Logging in from IP addresses outside this range results in an error.

The login proceeds if the following expression equals zero:

```
RangeMask & (<incoming-IP-address> ^ RangeAddr)
```

&	Bitwise AND of the quantities
^	Bitwise exclusive-OR

Examples for IP Filtering

The following RACADM commands block all IP addresses except 192.168.0.57:

```
racadm set iDRAC.IPBlocking.RangeEnable 1
racadm set iDRAC.IPBlocking.RangeAddr 192.168.0.57
racadm set iDRAC.IPBlocking.RangeMask 255.255.255.255
```

To restrict logins to a set of four adjacent IP addresses (for example, 192.168.0.212 through 192.168.0.215), select all but the lowest two bits in the mask:

```
racadm set iDRAC.IPBlocking.RangeEnable 1
racadm set iDRAC.IPBlocking.RangeAddr 192.168.0.212
racadm set iDRAC.IPBlocking.RangeMask 255.255.255.252
```

The last byte of the range mask is set to 252, the decimal equivalent of 11111100b.

For more information, see the iDRAC RACADM CLI Guide available at www.dell.com/idracmanuals.

FIPS mode

FIPS is a computer security standard that United States government agencies and contractors must use. Starting from version iDRAC 2.40.40.40, iDRAC supports enabling FIPS mode.

iDRAC will be officially certified to support FIPS mode in the future.

Difference between FIPS-mode supported and FIPS-validated

Software that has been validated by completing the Cryptographic Module Validation Program is referred to as FIPS-validated. Because of the time it takes to complete FIPS-validation, not all versions of iDRAC are validated. For information about the latest status of FIPS-validation for iDRAC, see the Cryptographic Module Validation Program page on the NIST website.

Enabling FIPS Mode

CAUTION: Enabling FIPS mode resets iDRAC to factory-default settings. If you want to restore the settings, back up the server configuration profile (SCP) before you enable FIPS mode, and restore the SCP after iDRAC restarts.

NOTE: If you reinstall or upgrade iDRAC firmware, FIPS mode gets disabled.

Enabling FIPS mode using web interface

1 On the iDRAC web interface, navigate to **iDRAC Settings** > **Connectivity** > **Network** > **Network Settings** > **Advanced Network Settings**.

2 In **FIPS Mode**, select **Enabled** and click **Apply**.

NOTE: Enabling FIPS Mode resets iDRAC to the default settings.

3 A message appears prompting you to confirm the change. Click **OK**.

iDRAC restarts in FIPS mode. Wait for at least 60 seconds before you reconnect to iDRAC.

4 Install a trusted certificate for iDRAC.

NOTE: The default SSL certificate is not allowed in FIPS mode.

NOTE: Some iDRAC interfaces, such as the standards-compliant implementations of IPMI and SNMP, do not support FIPS-compliance.

Enabling FIPS mode using RACADM

Use RACADM CLI to execute the following command:

```
racadm set iDRAC.Security.FIPSMode <Enable>
```

Disabling FIPS mode

To disable FIPS mode, you must reset iDRAC to the factory-default settings.

Configuring services

You can configure and enable the following services on iDRAC:

Local Configuration	Disable access to iDRAC configuration (from the host system) using Local RACADM and iDRAC Settings utility.
Web Server	Enable access to iDRAC web interface. If you disable the web interface, remote RACADM also gets disabled. Use local RACADM to re-enable the web server and remote RACADM.
SSH	Access iDRAC through firmware RACADM.
Telnet	Access iDRAC through firmware RACADM.
Remote RACADM	Remotely access iDRAC.
Redfish	Enables support for Redfish RESTful API.
SNMP Agent	Enables support for SNMP queries (GET, GETNEXT, and GETBULK operations) in iDRAC.
Automated System Recovery Agent	Enable Last System Crash Screen.
VNC Server	Enable VNC server with or without SSL encryption.

Configuring services using web interface

To configure the services using iDRAC Web interface:

1 In the iDRAC Web interface, go to **iDRAC Settings** > **Services**.
The **Services** page is displayed.

2 Specify the required information and click **Apply**.
For information about the various settings, see the *iDRAC Online Help*.

NOTE: Do not select the Prevent this page from creating additional dialogs check-box. Selecting this option prevents you from configuring services.

Configuring services using RACADM

To enable and configure services using RACADM, use the **set** command with the objects in the following object groups:

- iDRAC.LocalSecurity
- iDRAC.LocalSecurity
- iDRAC.SSH
- iDRAC.Webserver
- iDRAC.Telnet
- iDRAC.Racadm
- iDRAC.SNMP

For more information about these objects, see iDRAC RACADM CLI Guide available at www.dell.com/idracmanuals.

Enabling or disabling HTTPS redirection

If you do not want automatic redirection from HTTP to HTTPs due to certificate warning issue with default iDRAC certificate or as a temporary setting for debugging purpose, you can configure iDRAC such that redirection from http port (default is 80) to https port (default is 443) is disabled. By default, it is enabled. You have to log out and log in to iDRAC for this setting to take effect. When you disable this feature, a warning message is displayed.

You must have Configure iDRAC privilege to enable or disable HTTPS redirection.

An event is recorded in the Lifecycle Controller log file when this feature is enabled or disabled.

To disable the HTTP to HTTPS redirection:

```
racadm set iDRAC.Webserver.HttpsRedirection Disabled
```

To enable HTTP to HTTPS redirection:

```
racadm set iDRAC.Webserver.HttpsRedirection Enabled
```

To view the status of the HTTP to HTTPS redirection:

```
racadm get iDRAC.Webserver.HttpsRedirection
```

Configuring TLS

By default, iDRAC is configured to use TLS 1.1 and higher. You can configure iDRAC to use any of the following:

- TLS 1.0 and higher
- TLS 1.1 and higher
- TLS 1.2 only

NOTE: To ensure a secure connection, Dell recommends using TLS 1.1 and higher.

Configuring TLS using web interface

1 Go to **iDRAC Settings** > **Services**.
2 Click the **Services** tab and then click **Web Server**.
3 In the **TLS Protocol** drop-down, select the TLS version and click **Apply**.

Configuring TLS using RACADM

To check the version of TLS configured:

```
racadm get idrac.webserver.tlsprotocol
```

To set the version of TLS:

```
racadm set idrac.webserver.tlsprotocol <n>
```

<n>=0	TLS 1.0 and Higher
<n>=1	TLS 1.1 and Higher
<n>=2	TLS 1.2 Only

Using VNC client to manage remote server

You can use a standard open VNC client to manage the remote server using both desktop and mobile devices such as Dell Wyse PocketCloud. When servers in data centers stop functioning, the iDRAC or the operating system sends an alert to the console on the management station. The console sends an email or SMS to a mobile device with required information and launches VNC viewer application on the management station. This VNC viewer can connect to OS/Hypervisor on the server and provide access to keyboard, video and mouse of the host server to perform the necessary remediation. Before launching the VNC client, you must enable the VNC server and configure the VNC server settings in iDRAC such as password, VNC port number, SSL encryption, and the time out value. You can configure these settings using iDRAC Web interface or RACADM.

NOTE: VNC feature is licensed and is available in the iDRAC Enterprise license.

You can choose from many VNC applications or Desktop clients such as the ones from RealVNC or Dell Wyse PocketCloud.

2 VNC client sessions can be activated at the same time. Second one is in Read-Only mode.

If a VNC session is active, you can only launch the Virtual Media using Launch Virtual Console and not the Virtual Console Viewer.

If video encryption is disabled, the VNC client starts RFB handshake directly, and a SSL handshake is not required. During VNC client handshake (RFB or SSL), if another VNC session is active or if a Virtual Console session is open, the new VNC client session is rejected. After completion of the initial handshake, VNC server disables Virtual Console and allows only Virtual Media. After termination of the VNC session, VNC server restores the original state of Virtual Console (enabled or disabled).

NOTE:

- When iDRAC NIC is in shared mode and the host system is power cycled, the network connection is lost for a few seconds. During this time, if you perform any action in the active VNC client, the VNC session may close. You must wait for timeout (value configured for the VNC Server settings in the **Services** page in iDRAC Web interface) and then re-establish the VNC connection.
- If the VNC client window is minimized for more than 60 seconds, the client window closes. You must open a new VNC session. If you maximize the VNC client window within 60 seconds, you can continue to use it.

Configuring VNC server using iDRAC web interface

To configure the VNC server settings:

1 In the iDRAC Web interface, go to **Configuration** > **Virtual Console**.
The **Virtual Console** page is displayed.
2 In the **VNC Server** section, enable the VNC server, specify the password, port number, and enable or disable SSL encryption.
For information about the fields, see the *iDRAC Online Help*.
3 Click **Apply**.
The VNC server is configured.

Configuring VNC server using RACADM

To configure the VNC server, use the `set` command with the objects in `VNCserver`.

For more information, see the iDRAC RACADM CLI Guide available at www.dell.com/idracmanuals.

Setting up VNC viewer with SSL encryption

While configuring the VNC server settings in iDRAC, if the **SSL Encryption** option was enabled, then the SSL tunnel application must be used along with the VNC Viewer to establish the SSL encrypted connection with iDRAC VNC server.

NOTE: Most of the VNC clients do not have built-in SSL encryption support.

To configure the SSL tunnel application:

1 Configure SSL tunnel to accept connection on `<localhost>:<localport number>`. For example, 127.0.0.1:5930.
2 Configure SSL tunnel to connect to `<iDRAC IP address>:<VNC server port Number>`. For example, 192.168.0.120:5901.
3 Start the tunnel application.
To establish connection with the iDRAC VNC server over the SSL encrypted channel, connect the VNC viewer to the localhost (link local IP address) and the local port number (127.0.0.1:<local port number>).

Setting up VNC viewer without SSL encryption

In general, all Remote Frame Buffer (RFB) compliant VNC Viewers connect to the VNC server using the iDRAC IP address and port number that is configured for the VNC server. If the SSL encryption option is disabled when configuring the VNC server settings in iDRAC, then to connect to the VNC Viewer do the following:

In the **VNC Viewer** dialog box, enter the iDRAC IP address and the VNC port number in the **VNC Server** field.

The format is `<iDRAC IP address:VNC port number>`

For example, if the iDRAC IP address is 192.168.0.120 and VNC port number is 5901, then enter `192.168.0.120:5901`.

Configuring front panel display

You can configure the front panel LCD and LED display for the managed system.

For rack and tower servers, two types of front panels are available:

- LCD front panel and System ID LED
- LED front panel and System ID LED

For blade servers, only the System ID LED is available on the server front panel since the blade chassis has the LCD.

Configuring LCD setting

You can set and display a default string such as iDRAC name, IP, and so on or a user-defined string on the LCD front panel of the managed system.

Configuring LCD setting using web interface

To configure the server LCD front panel display:

1 In iDRAC Web interface, go to **Configurations** > **System Settings** > **Hardware Settings** > **Front Panel configuration**.

2 In **LCD Settings** section, from the **Set Home Message** drop-down menu, select any of the following:
   - Service Tag (default)
   - Asset Tag
   - DRAC MAC Address
   - DRAC IPv4 Address
   - DRAC IPv6 Address
   - System Power
   - Ambient Temperature
   - System Model
   - Host Name
   - User Defined
   - None

   If you select **User Defined**, enter the required message in the text box.

   If you select **None**, home message is not displayed on the server LCD front panel.

3 Enable Virtual Console indication (optional). If enabled, the Live Front Panel Feed section and the LCD panel on the server displays the `Virtual console session active` message when there is an active Virtual Console session.

4 Click **Apply**.
   The server LCD front panel displays the configured home message.

Configuring LCD setting using RACADM

To configure the server LCD front panel display, use the objects in the System.LCD group.
For more information, see the iDRAC RACADM CLI Guide available at www.dell.com/idracmanuals.

Configuring LCD setting using iDRAC settings utility

To configure the server LCD front panel display:

1 In the iDRAC Settings utility, go to **Front Panel Security**.
The **iDRAC Settings.Front Panel Security** page is displayed.
2 Enable or disable the power button.
3 Specify the following:
- Access to the front panel
- LCD message string
- System power units, ambient temperature units, and error display

4 Enable or disable the virtual console indication.
For information about the options, see the *iDRAC Settings Utility Online Help*.
5 Click **Back**, click **Finish**, and then click **Yes**.

Configuring system ID LED setting

To identify a server, enable or disable System ID LED blinking on the managed system.

Configuring system ID LED setting using web interface

To configure the System ID LED display:

1 In iDRAC Web interface, go to **Configuration** > **System Settings** > **Hardware Settings** > **Front Panel configuration**. The **System ID LED Settings** page is displayed.
2 In **System ID LED Settings** section, select any of the following options to enable or disable LED blinking:
- Blink Off
- Blink On
- Blink On 1 Day Timeout
- Blink On 1 Week Timeout
- Blink On 1 Month Timeout

3 Click **Apply**.
The LED blinking on the front panel is configured.

Configuring system ID LED setting using RACADM

To configure system ID LED, use the **setled** command.
For more information, see the iDRAC RACADM CLI Guide available at www.dell.com/idracmanuals.

Configuring time zone and NTP

You can configure the time zone on iDRAC and synchronize the iDRAC time using Network Time Protocol (NTP) instead of BIOS or host system times.

You must have Configure privilege to configure time zone or NTP settings.

Configuring time zone and NTP using iDRAC web interface

To configure time zone and NTP using iDRAC web interface:

1 Go to **iDRAC Settings** > **Settings** > **Time zone and NTP Settings**.
The **Time zone and NTP** page is displayed.
2 To configure the time zone, from the **Time Zone** drop-down menu, select the required time zone, and then click **Apply**.
3 To configure NTP, enable NTP, enter the NTP server addresses, and then click **Apply**.
For information about the fields, see *iDRAC Online Help*.

Configuring time zone and NTP using RACADM

To configure time zone and NTP, use the **set** command with the objects in the **iDRAC.Time** and **iDRAC.NTPConfigGroup** group.
For more information, see the iDRAC RACADM CLI Guide available at www.dell.com/idracmanuals.

Setting first boot device

You can set the first boot device for the next boot only or for all subsequent reboots. If you set the device to be used for all subsequent boots, it remains as the first boot device in the BIOS boot order until it is changed again either from the iDRAC web interface or from the BIOS boot sequence.

You can set the first boot device to one of the following:

- Normal Boot
- PXE
- BIOS Setup
- Local Floppy/Primary Removable Media
- Local CD/DVD
- Hard Drive
- Virtual Floppy
- Virtual CD/DVD/ISO
- Local SD Card
- Lifecycle Controller
- BIOS Boot Manager
- UEFI Device Path
- UEFI HTTP

NOTE:

- BIOS Setup (F2), Lifecycle Controller (F10), and BIOS Boot Manager (F11) cannot be set as permanent boot device.
- The first boot device setting in iDRAC Web Interface overrides the System BIOS boot settings.

Setting first boot device using web interface

To set the first boot device using iDRAC Web interface:

1 Go to **Configuration** > **System Settings** > **Hardware Settings** > **First Boot Device**.

The **First Boot Device** page is displayed.

2 Select the required first boot device from the drop-down list, and click **Apply**.

The system boots from the selected device for subsequent reboots.

3 To boot from the selected device only once on the next boot, select **Boot Once**. Thereafter, the system boots from the first boot device in the BIOS boot order.

For more information about the options, see the *iDRAC Online Help*.

Setting first boot device using RACADM

- To set the first boot device, use the **iDRAC.ServerBoot.FirstBootDevice** object.
- To enable boot once for a device, use the **iDRAC.ServerBoot.BootOnce** object.

For more information about these objects, see the iDRAC RACADM CLI Guide available at www.dell.com/idracmanuals.

Setting first boot device using virtual console

You can select the device to boot from as the server is being viewed in the Virtual Console viewer before the server runs through its boot-up sequence. Boot-once is supported by all devices listed in Setting first boot device.

To set the first boot device using Virtual Console:

1 Launch Virtual Console.

2 In the Virtual Console Viewer, from the **Next Boot** menu, set the required device as the first boot device.

Enabling last crash screen

To troubleshoot the cause of a crash on the managed system, you can capture the system crash image using iDRAC.

NOTE: For information about Server Administrator, see the OpenManage Installation Guide available at www.dell.com/openmanagemanuals.

1 From the *Dell Systems Management Tools and Documentation* DVD or from the Dell Support website, install Server Administrator or iDRAC Service Module (iSM) on the managed system.

2 In the **Windows** startup and recovery window, make sure that the automatic reboot option is not selected.

For more information, see Windows documentation.

3 Use Server Administrator to enable the **Auto Recovery** timer, set the Auto Recovery action to **Reset**, **Power Off**, or **Power Cycle**, and set the timer in seconds (a value between 60 - 480).

4 Enable the **Auto Shutdown and Recovery** (ASR) option using one of the following:

- Server Administrator — See the OpenManage Server Administrator Storage Management User's Guide.
- Local RACADM — Use the command `racadm config -g cfgRacTuning -o cfgRacTuneAsrEnable 1`

5 Enable **Automated System Recovery Agent**. To do this, go to **iDRAC Settings** > **Services** > **Automated System Recovery Agent**, select **Enabled**, and click **Apply**.

Enabling or disabling OS to iDRAC Pass-through

In servers that have Network Daughter Card (NDC) or embedded LAN On Motherboard (LOM) devices, you can enable the OS to iDRAC Pass-through feature. This feature provides a high-speed bi-directional in-band communication between iDRAC and the host operating system through a shared LOM, a dedicated NIC, or through the USB NIC. This feature is available for iDRAC Enterprise license.

NOTE: iDRAC Service Module (iSM) provides more features for managing iDRAC through the operating system. For more information, see the iDRAC Service Module User's Guide available at www.dell.com/esmmanuals.

When enabled through dedicated NIC, you can launch the browser in the host operating system and then access the iDRAC Web interface. The dedicated NIC for the blade servers is through the Chassis Management Controller.

Switching between dedicated NIC or shared LOM does not require a reboot or reset of the host operating system or iDRAC.

You can enable this channel using:

- iDRAC web interface
- RACADM or WSMan (post operating system environment)
- iDRAC Settings utility (pre-operating system environment)

If the network configuration is changed through iDRAC Web interface, you must wait for at least 10 seconds before enabling OS to iDRAC Pass-through.

If you are configuring the server using a Server Configuration Profile through RACADM, WSMan or Redfish and if the network settings are changed in this file, then you must wait for 15 seconds to either enable OS to iDRAC Pass-through feature or set the OS Host IP address.

Before enabling OS to iDRAC Pass-through, make sure that:

- iDRAC is configured to use dedicated NIC or shared mode (that is, NIC selection is assigned to one of the LOMs).
- Host operating system and iDRAC are in the same subnet and same VLAN.
- Host operating system IP address is configured.
- A card that supports OS to iDRAC Pass-through capability is installed.
- You have the Configure privilege.

When you enable this feature:

- In shared mode, the host operating system's IP address is used.
- In dedicated mode, you must provide a valid IP address of the host operating system. If more than one LOM is active, enter the first LOM's IP address.

If the OS to iDRAC Pass-through feature does not work after it is enabled, ensure that you check the following:

- The iDRAC dedicated NIC cable is connected properly.
- At least one LOM is active.

NOTE: Use the default IP address. Ensure that the IP address of the USB NIC interface is not in the same network subnet as the iDRAC or host OS IP addresses. If this IP address conflicts with an IP address of other interfaces of the host system or the local network, you must change it.

NOTE: Do not use 169.254.0.3 and 169.254.0.4 IP addresses. These IP addresses are reserved for the USB NIC port on the front panel when an A/A cable is used.

NOTE: iDRAC may not be accessible from the host server using LOM-Passthrough when NIC teaming is enabled. Then, iDRAC can be accessed from the host server OS using the iDRAC USB NIC or through the external network, via the iDRAC dedicated NIC.

Supported cards for OS to iDRAC Pass-through

The following table provides a list of cards that support the OS to iDRAC Pass-through feature using LOM.

Table 15. OS to iDRAC Pass-through using LOM — supported cards

Category	Manufacturer	Type
NDC	Broadcom	• 5720 QP rNDC 1G BASE-T
	Intel	• x520/i350 QP rNDC 1G BASE-T

In-built LOM cards also support the OS to iDRAC pass-through feature.

Supported operating systems for USB NIC

The operating systems supported for USB NIC are:

- Server 2012 R2 Foundation Edition
- Server 2012 R2 Essentials Edition
- Server 2012 R2 Standard Edition
- Server 2012 R2 Datacenter Edition
- Server 2012 for Embedded Systems (Base and R2 w/ SP1)
- Server 2016 Essentials Edition
- Server 2016 Standard Edition
- Server 2016 Datacenter Edition
- RHEL 7.3
- RHEL 6.9
- SLES 12 SP2
- ESXi 6.0 U3
- vSphere 2016
- XenServer 7.1

For Linux operating systems, configure the USB NIC as DHCP on the host operating system before enabling USB NIC.

For vSphere, you must install the VIB file before enabling USB NIC.

NOTE: To configure USB NIC as DHCP in Linux operating system or XenServer, refer to the operating system or hypervisor documentation.

Installing VIB file

For vSphere operating systems, before enabling the USB NIC, you must install the VIB file.

To install the VIB file:

1. Using Win-SCP, copy the VIB file to **/tmp/** folder of the ESX-i host operating system.
2. Go to the ESXi prompt and run the following command:

   ```
   esxcli software vib install -v /tmp/ iDRAC_USB_NIC-1.0.0-799733X03.vib --no-sig-check
   ```

   The output is:

   ```
   Message: The update completed successfully, but the system needs to be rebooted for the
   changes to be effective.
   Reboot Required: true
   VIBs Installed: Dell_bootbank_iDRAC_USB_NIC_1.0.0-799733X03
   ```

```
VIBs Removed:
VIBs Skipped:
```

3 Reboot the server.

4 At the ESXi prompt, run the command: `esxcfg-vmknic -l`.

The output displays the usb0 entry.

Enabling or disabling OS to iDRAC Pass-through using web interface

To enable OS to iDRAC Pass-through using Web interface:

1 Go to **iDRAC Settings** > **Connectivity** > **Network** > **OS to iDRAC Pass-through**.

The **OS to iDRAC Pass-through** page is displayed.

2 Change the State to **Enabled**.

3 Select any of the following options for Pass-through Mode:

- **LOM** — The OS to iDRAC pass-through link between the iDRAC and the host operating system is established through the LOM or NDC.
- **USB NIC** — The OS to iDRAC pass-through link between the iDRAC and the host operating system is established through the internal USB bus.

NOTE: If you set the pass-through mode to LOM, ensure that:

- OS and iDRAC are on the same subnet
- NIC selection in Network Settings is set to a LOM

4 If you select **LOM** as the pass-through configuration, and if the server is connected using dedicated mode, enter the IPv4 address of the operating system.

NOTE: If the server is connected in shared LOM mode, then the OS IP Address field is disabled.

NOTE: If the VLAN is enabled on the iDRAC, the LOM-Passthrough will only function in shared LOM mode with VLAN tagging configured on the host.

5 If you select **USB NIC** as the pass-through configuration, enter the IP address of the USB NIC.

The default value is 169.254.1.1. It is recommended to use the default IP address. However, if this IP address conflicts with an IP address of other interfaces of the host system or the local network, you must change it.

Do not enter 169.254.0.3 and 169.254.0.4 IPs. These IPs are reserved for the USB NIC port on the front panel when a A/A cable is used.

6 Click **Apply**.

7 Click **Test Network Configuration** to check if the IP is accessible and the link is established between the iDRAC and the host operating system.

Enabling or disabling OS to iDRAC Pass-through using RACADM

To enable or disable OS to iDRAC Pass-through using RACADM, use the objects in the **iDRAC.OS-BMC** group.

For more information, see the iDRAC RACADM CLI Guide available at www.dell.com/idracmanuals.

Enabling or disabling OS to iDRAC Pass-through using iDRAC settings utility

To enable or disable OS to iDRAC Pass-through using iDRAC Settings Utility:

1 In the iDRAC Settings utility, go to **Communications Permissions**.

The **iDRAC Settings.Communications Permissions** page is displayed.

2 Select any of the following options to enable OS to iDRAC pass-through:

- **LOM** — The OS to iDRAC pass-through link between the iDRAC and the host operating system is established through the LOM or NDC.
- **USB NIC** — The OS to iDRAC pass-through link between the iDRAC and the host operating system is established through the internal USB bus.

> **NOTE: If you set the pass-through mode to LOM, ensure that:**
>
> - OS and iDRAC are on the same subnet
> - NIC selection in Network Settings is set to a LOM

To disable this feature, select **Disabled**.

> **NOTE: The LOM option can be selected only of the card supports OS to iDRAC pass-through capability. Else, this option is grayed-out.**

3 If you select **LOM** as the pass-through configuration, and if the server is connected using dedicated mode, enter the IPv4 address of the operating system.

> **NOTE: If the server is connected in shared LOM mode, then the OS IP Address field is disabled.**

4 If you select **USB NIC** as the pass-through configuration, enter the IP address of the USB NIC.

The default value is 169.254.1.1. However, if this IP address conflicts with an IP address of other interfaces of the host system or the local network, you must change it. Do not enter 169.254.0.3 and 169.254.0.4 IPs. These IPs are reserved for the USB NIC port on the front panel when a A/A cable is used

5 Click **Back**, click **Finish**, and then click **Yes**.

The details are saved.

Obtaining certificates

The following table lists the types of certificates based on the login type.

Table 16. Types of certificate based on login type

Login Type	Certificate Type	How to Obtain
Single Sign-on using Active Directory	Trusted CA certificate	Generate a CSR and get it signed from a Certificate Authority SHA-2 certificates are also supported.
Smart Card login as a local or Active Directory user	• User certificate • Trusted CA certificate	• User Certificate — Export the smart card user certificate as Base64-encoded file using the card management software provided by the smart card vendor. • Trusted CA certificate — This certificate is issued by a CA.

Login Type	Certificate Type	How to Obtain
		SHA-2 certificates are also supported.
Active Directory user login	Trusted CA certificate	This certificate is issued by a CA. SHA-2 certificates are also supported.
Local User login	SSL Certificate	Generate a CSR and get it signed from a trusted CA **NOTE: iDRAC ships with a default self-signed SSL server certificate. The iDRAC Web server, Virtual Media, and Virtual Console use this certificate.** SHA-2 certificates are also supported.

SSL server certificates

iDRAC includes a web server that is configured to use the industry-standard SSL security protocol to transfer encrypted data over a network. An SSL encryption option is provided to disable weak ciphers. Built upon asymmetric encryption technology, SSL is widely accepted for providing authenticated and encrypted communication between clients and servers to prevent eavesdropping across a network.

An SSL-enabled system can perform the following tasks:

- Authenticate itself to an SSL-enabled client
- Allow the two systems to establish an encrypted connection

NOTE: If SSL encryption is set to 256-bit or higher and 168–bit or higher, the cryptography settings for your virtual machine environment (JVM, IcedTea) may require installing the Unlimited Strength Java Cryptography Extension Policy Files to permit usage of iDRAC plugins such as vConsole with this level of encryption. For information about installing the policy files, see the documentation for Java.

iDRAC Web server has a Dell self-signed unique SSL digital certificate by default. You can replace the default SSL certificate with a certificate signed by a well-known Certificate Authority (CA). A Certificate Authority is a business entity that is recognized in the Information Technology industry for meeting high standards of reliable screening, identification, and other important security criteria. Examples of CAs include Thawte and VeriSign. To initiate the process of obtaining a CA-signed certificate, use either iDRAC Web interface or RACADM interface to generate a Certificate Signing Request (CSR) with your company's information. Then, submit the generated CSR to a CA such as VeriSign or Thawte. The CA can be a root CA or an intermediate CA. After you receive the CA-signed SSL certificate, upload this to iDRAC.

For each iDRAC to be trusted by the management station, that iDRAC's SSL certificate must be placed in the management station's certificate store. Once the SSL certificate is installed on the management stations, supported browsers can access iDRAC without certificate warnings.

You can also upload a custom signing certificate to sign the SSL certificate, rather than relying on the default signing certificate for this function. By importing one custom signing certificate into all management stations, all the iDRACs using the custom signing certificate are trusted. If a custom signing certificate is uploaded when a custom SSL certificate is already in-use, then the custom SSL certificate is disabled and a one-time auto-generated SSL certificate, signed with the custom signing certificate, is used. You can download the custom signing certificate (without the private key). You can also delete an existing custom signing certificate. After deleting the custom signing certificate, iDRAC resets and auto-generates a new self-signed SSL certificate. If a self-signed certificate is regenerated, then the trust must be re-established between that iDRAC and the management workstation. Auto-generated SSL certificates are self-signed and have an expiration date of seven years and one day and a start date of one day in the past (for different time zone settings on management stations and the iDRAC).

The iDRAC Web server SSL certificate supports the asterisk character (*) as part of the left-most component of the Common Name when generating a Certificate Signing Request (CSR). For example, *.qa.com, or *.company.qa.com. This is called a wildcard certificate. If a wildcard CSR is generated outside of iDRAC, you can have a signed single wildcard SSL certificate that you can upload for multiple iDRACs and all the iDRACs are trusted by the supported browsers. While connecting to iDRAC Web interface using a supported browser that supports a wildcard certificate, the iDRAC is trusted by the browser. While launching viewers, the iDRACs are trusted by the viewer clients.

Generating a new certificate signing request

A CSR is a digital request to a Certificate Authority (CA) for a SSL server certificate. SSL server certificates allow clients of the server to trust the identity of the server and to negotiate an encrypted session with the server.

After the CA receives a CSR, they review and verify the information the CSR contains. If the applicant meets the CA's security standards, the CA issues a digitally-signed SSL server certificate that uniquely identifies the applicant's server when it establishes SSL connections with browsers running on management stations.

After the CA approves the CSR and issues the SSL server certificate, it can be uploaded to iDRAC. The information used to generate the CSR, stored on the iDRAC firmware, must match the information contained in the SSL server certificate, that is, the certificate must have been generated using the CSR created by iDRAC.

Generating CSR using web interface

To generate a new CSR:

NOTE: Each new CSR overwrites any previous CSR data stored in the firmware. The information in the CSR must match the information in the SSL server certificate. Else, iDRAC does not accept the certificate.

1. In the iDRAC Web interface, go to **iDRAC Settings** > **Connectivity** > **SSL** > **SSL certificate**, select **Generate Certificate Signing Request (CSR)** and click **Next**.
   The **Generate a New Certificate Signing Request** page is displayed.
2. Enter a value for each CSR attribute.
   For more information, see *iDRAC Online Help*.
3. Click **Generate**.
   A new CSR is generated. Save it to the management station.

Generating CSR using RACADM

To generate a CSR using RACADM, use the **set** command with the objects in the **iDRAC.Security** group, and then use the **sslcsrgen** command to generate the CSR.

For more information, see the iDRAC RACADM CLI Guide available at www.dell.com/idracmanuals.

Uploading server certificate

After generating a CSR, you can upload the signed SSL server certificate to the iDRAC firmware. iDRAC must be reset to apply the certificate. iDRAC accepts only X509, Base 64 encoded Web server certificates. SHA-2 certificates are also supported.

CAUTION: During reset, iDRAC is not available for a few minutes.

Uploading server certificate using web interface

To upload the SSL server certificate:

1 In the iDRAC Web interface, go to **iDRAC Settings** > **Connectivity** > **SSL** > **SSL certificate**, select **Upload Server Certificate** and click **Next**.

The **Certificate Upload** page is displayed.

2 Under **File Path**, click **Browse** and select the certificate on the management station.

3 Click **Apply**.

The SSL server certificate is uploaded to iDRAC.

4 A pop-up message is displayed asking you to reset iDRAC immediately or at a later time. Click **Reset iDRAC** or **Reset iDRAC Later** as required.

iDRAC resets and the new certificate is applied. The iDRAC is not available for a few minutes during the reset.

NOTE: You must reset iDRAC to apply the new certificate. Until iDRAC is reset, the existing certificate is active.

Uploading server certificate using RACADM

To upload the SSL server certificate, use the **sslcertupload** command. For more information, see the iDRAC RACADM CLI Guide available at www.dell.com/idracmanuals.

If the CSR is generated outside of iDRAC with a private key available, then to upload the certificate to iDRAC:

1 Send the CSR to a well-known root CA. CA signs the CSR and the CSR becomes a valid certificate.

2 Upload the private key using the remote racadm `sslkeyupload` command.

3 Upload the signed certificate to iDRAC using the remote racadm `sslcertupload` command.

The new certificate is uploaded iDRAC. A message is displayed asking you to reset iDRAC.

4 Run the racadm **racreset** command to reset iDRAC.

iDRAC resets and the new certificate is applied. The iDRAC is not available for a few minutes during the reset.

NOTE: You must reset iDRAC to apply the new certificate. Until iDRAC is reset, the existing certificate is active.

Viewing server certificate

You can view the SSL server certificate that is currently being used in iDRAC.

Viewing server certificate using web interface

In the iDRAC Web interface, go to **iDRAC Settings** > **Connectivity** > **SSL** > **SSL Certificate**. The **SSL** page displays the SSL server certificate that is currently in use at the top of the page.

Viewing server certificate using RACADM

To view the SSL server certificate, use the **sslcertview** command.

For more information, see the iDRAC RACADM CLI Guide available at www.dell.com/idracmanuals.

Uploading custom signing certificate

You can upload a custom signing certificate to sign the SSL certificate. SHA-2 certificates are also supported.

Uploading custom signing certificate using web interface

To upload the custom signing certificate using iDRAC web interface:

1 Go to **iDRAC Settings** > **Connectivity** > **SSL**.
The **SSL** page is displayed.
2 Under **Custom SSL Certificate Signing Certificate**, click **Upload Signing Certificate**.
The **Upload Custom SSL Certificate Signing Certificate** page is displayed.
3 Click **Choose File** and select the custom SSL certificate signing certificate file.
Only Public-Key Cryptography Standards #12 (PKCS #12) compliant certificate is supported.
4 If the certificate is password protected, in the **PKCS#12 Password** field, enter the password.
5 Click **Apply**.
The certificate is uploaded to iDRAC.
6 A pop-up message is displayed asking you to reset iDRAC immediately or at a later time. Click **Reset iDRAC** or **Reset iDRAC Later** as required.
After iDRAC resets, the new certificate is applied. The iDRAC is not available for a few minutes during the reset.

NOTE: You must reset iDRAC to apply the new certificate. Until iDRAC is reset, the existing certificate is active.

Uploading custom SSL certificate signing certificate using RACADM

To upload the custom SSL certificate signing certificate using RACADM, use the **sslcertupload** command, and then use the **racreset** command to reset iDRAC.

For more information, see the iDRAC RACADM CLI Guide available at www.dell.com/idracmanuals.

Downloading custom SSL certificate signing certificate

You can download the custom signing certificate using iDRAC Web interface or RACADM.

Downloading custom signing certificate

To download the custom signing certificate using iDRAC Web interface:

1 Go to **iDRAC Settings** > **Connectivity** > **SSL**.
The **SSL** page is displayed.
2 Under **Custom SSL Certificate Signing Certificate**, select **Download Custom SSL Certificate Signing Certificate** and click **Next**.
A pop-up message is displayed that allows you to save the custom signing certificate to a location of your choice.

Downloading custom SSL certificate signing certificate using RACADM

To download the custom SSL certificate signing certificate, use the **sslcertdownload** subcommand. For more information, see the iDRAC RACADM CLI Guide available at www.dell.com/idracmanuals.

Deleting custom SSL certificate signing certificate

You can also delete an existing custom signing certificate using iDRAC Web interface or RACADM.

Deleting custom signing certificate using iDRAC web interface

To delete the custom signing certificate using iDRAC web interface:

1 Go to **iDRAC Settings** > **Connectivity** > **SSL**.

The **SSL** page is displayed.

2 Under **Custom SSL Certificate Signing Certificate**, select **Delete Custom SSL Certificate Signing Certificate** and click **Next**.

3 A pop-up message is displayed asking you to reset iDRAC immediately or at a later time. Click **Reset iDRAC** or **Reset iDRAC Later** as required.

After iDRAC resets, a new self-signed certificate is generated.

Deleting custom SSL certificate signing certificate using RACADM

To delete the custom SSL certificate signing certificate using RACADM, use the **sslcertdelete** subcommand. Then, use the **racreset** command to reset iDRAC.

For more information, see the iDRAC RACADM CLI Guide available at www.dell.com/idracmanuals.

Configuring multiple iDRACs using RACADM

You can configure one or more iDRACs with identical properties using RACADM. When you query a specific iDRAC using its group ID and object ID, RACADM creates a configuration file from the retrieved information. Import the file to other iDRACs to identically configure them.

NOTE:

- The configuration file contains information that is applicable for the particular server. The information is organized under various object groups.
- Some configuration files contain unique iDRAC information, such as the static IP address, that you must modify before you import the file into other iDRACs.

You can also use the System Configuration Profile (SCP) to configure multiple iDRACs using RACADM. SCP file contains the component configuration information. You can use this file to apply the configuration for BIOS, iDRAC, RAID, and NIC by importing the file into a target system. For more information, see *XML Configuration Workflow* white paper available at www.dell.com/manuals.

To configure multiple iDRACs using the configuration file:

1 Query the target iDRAC that contains the required configuration using the following command:.

```
racadm get -f <file_name>.xml -t xml -c iDRAC.Embedded.1
```

The command requests the iDRAC configuration and generates the configuration file.

NOTE: Redirecting the iDRAC configuration to a file using `get -f` is only supported with the local and remote RACADM interfaces.

NOTE: The generated configuration file does not contain user passwords.

The **get** command displays all configuration properties in a group (specified by group name and index) and all configuration properties for a user.

2 Modify the configuration file using a text editor, if required.

NOTE: It is recommended that you edit this file with a simple text editor. The RACADM utility uses an ASCII text parser. Any formatting confuses the parser, which may corrupt the RACADM database.

3 On the target iDRAC, use the following command to modify the settings:

```
racadm set -f <file_name>.xml -t xml
```

This loads the information into the other iDRAC. You can use **set** command to synchronize the user and password database with Server Administrator.

4 Reset the target iDRAC using the command: `racadm racreset`

Disabling access to modify iDRAC configuration settings on host system

You can disable access to modify the iDRAC configuration settings through Local RACADM or iDRAC Settings utility. However, you can view these configuration settings. To do this:

1 In iDRAC Web interface, go to **iDRAC Settings** > **Services** > **Local Configurations**.

2 Select one or both of the following:

- **Disable the iDRAC Local Configuration using iDRAC Settings** — Disables access to modify the configuration settings in iDRAC Settings utility.
- **Disable the iDRAC Local Configuration using RACADM** — Disables access to modify the configuration settings in Local RACADM.

3 Click **Apply**.

NOTE: If access is disabled, you cannot use Server Administrator or IPMITool to perform iDRAC configurations. However, you can use IPMI Over LAN.

5

Viewing iDRAC and managed system information

You can view iDRAC and managed system's health and properties, hardware and firmware inventory, sensor health, storage devices, network devices, and view and terminate user sessions. For blade servers, you can also view the Remote-Assigned Address information.

Topics:

- Viewing managed system health and properties
- Viewing system inventory
- Viewing sensor information
- Monitoring performance index of CPU, memory, and input output modules
- Checking the system for Fresh Air compliance
- Viewing historical temperature data
- Viewing network interfaces available on host OS
- Viewing network interfaces available on host OS using RACADM
- Viewing Remote-Assigned Address mezzanine card fabric connections
- Viewing or terminating iDRAC sessions

Viewing managed system health and properties

When you log in to the iDRAC web interface, the **System Summary** page allows you to view the managed system's health, basic iDRAC information, preview the virtual console, add and view work notes, and quickly launch tasks such as power on or off, power cycle, view logs, update and rollback firmware, switch on or switch off the front panel LED, and reset iDRAC.

To access the **System Summary** page, go to **System** > **Overview** > **Summary**. The **System Summary** page is displayed. For more information, see the *iDRAC Online Help*.

You can also view the basic system summary information using the iDRAC Settings utility. To do this, in iDRAC Settings utility, go to **System Summary**. The **iDRAC Settings System Summary** page is displayed. For more information, see the *iDRAC Settings Utility Online Help*.

Viewing system inventory

You can view information about the hardware and firmware components installed on the managed system. To do this, in iDRAC web interface, go to **System** > **Inventories**. For information about the displayed properties, see the *iDRAC Online Help*.

The Hardware Inventory section displays the information for the following components available on the managed system:

- iDRAC
- RAID controller
- Batteries
- CPUs
- DIMMs
- HDDs
- Backplanes
- Network Interface Cards (integrated and embedded)
- Video card
- SD card

- Power Supply Units (PSUs)
- Fans
- Fibre Channel HBAs
- USB
- NVMe PCIe SSD devices

The Firmware Inventory section displays the firmware version for the following components:

- BIOS
- Lifecycle Controller
- iDRAC
- OS driver pack
- 32-bit diagnostics
- System CPLD
- PERC controllers
- Batteries
- Physical disks
- Power supply
- NIC
- Fibre Channel
- Backplane
- Enclosure
- PCIe SSDs

NOTE: Software inventory displays only the last 4 bytes of the firmware version. For example, if the firmware version is FLVDL06, the firmware inventory displays DL06.

When you replace any hardware component or update the firmware versions, make sure to enable and run the **Collect System Inventory on Reboot** (CSIOR) option to collect the system inventory on reboot. After a few minutes, log in to iDRAC, and navigate to the **System Inventory** page to view the details. It may take up to 5 minutes for the information to be available depending on the hardware installed on the server.

NOTE: CSIOR option is enabled by default.

NOTE: Configuration changes and firmware updates that are made within the operating system may not reflect properly in the inventory until you perform a server restart.

Click **Export** to export the hardware inventory in an XML format and save it to a location of your choice.

Viewing sensor information

The following sensors help to monitor the health of the managed system:

- **Batteries** — Provides information about the batteries on the system board CMOS and storage RAID On Motherboard (ROMB).

  NOTE: The Storage ROMB battery settings are available only if the system has a ROMB with a battery.
- **Fan** (available only for rack and tower servers) — Provides information about the system fans — fan redundancy and fans list that display fan speed and threshold values.
- **CPU** — Indicates the health and state of the CPUs in the managed system. It also reports processor automatic throttling and predictive failure.
- **Memory** — Indicates the health and state of the Dual In-line Memory Modules (DIMMs) present in the managed system.
- **Intrusion** — Provides information about the chassis.
- **Power Supplies** (available only for rack and tower servers) — Provides information about the power supplies and the power supply redundancy status.

NOTE: If there is only one power supply in the system, the power supply redundancy is set to Disabled.

- **Removable Flash Media** — Provides information about the Internal SD Modules; vFlash and Internal Dual SD Module (IDSDM).
  - When IDSDM redundancy is enabled, the following IDSDM sensor status is displayed — IDSDM Redundancy Status, IDSDM SD1, IDSDM SD2. When redundancy is disabled, only IDSDM SD1 is displayed.
  - If IDSDM redundancy is initially disabled when the system is powered on or after an iDRAC reset, the IDSDM SD1 sensor status is displayed only after a card is inserted.
  - If IDSDM redundancy is enabled with two SD cards present in the IDSDM, and the status of one SD card is online while the status of the other card is offline. A system reboot is required to restore redundancy between the two SD cards in the IDSDM. After the redundancy is restored, the status of both the SD cards in the IDSDM is online.
  - During the rebuilding operation to restore redundancy between two SD cards present in the IDSDM, the IDSDM status is not displayed since the IDSDM sensors are powered off.

    NOTE: If the host system is rebooted during IDSDM rebuild operation, the iDRAC does not display the IDSDM information. To resolve this, rebuild IDSDM again or reset the iDRAC.
  - System Event Logs (SEL) for a write-protected or corrupt SD card in the IDSDM module are not repeated until they are cleared by replacing the SD card with a writable or good SD card, respectively.
- **Temperature** — Provides information about the system board inlet temperature and exhaust temperature (only applies to rack servers). The temperature probe indicates whether the status of the probe is within the preset warning and critical threshold value.
- **Voltage** — Indicates the status and reading of the voltage sensors on various system components.

The following table provides information about viewing the sensor information using iDRAC web interface and RACADM. For information about the properties that are displayed on the web interface, see the *iDRAC Online Help*.

NOTE: The Hardware Overview page displays data only for sensors present on your system.

Table 17. Sensor information using web interface and RACADM

View sensor information For	Using web interface	Using RACADM
Batteries	**Dashboard** > **System Health** > **Batteries**	Use the **getsensorinfo** command. For power supplies, you can also use the **System.Power.Supply** command with the **get** subcommand. For more information, see the iDRAC RACADM CLI Guide available at www.dell.com/idracmanuals.
Fan	**Dashboard** > > **System Health** > **Fans**	
CPU	**Dashboard** > **System Health** > **CPU**	
Memory	**Dashboard** > **System Health** > **Memory**	
Intrusion	**Dashboard** > **System Health** > **Intrusion**	
Power Supplies	> **Hardware** > **Power Supplies**	
Removable Flash Media	**Dashboard** > **System Health** > **Removable Flash Media**	
Temperature	**Dashboard** > **System Health** > **Power/ Thermal** > **Temperatures**	
Voltage	**Dashboard** > **System Health** > **Power/ Thermal** > **Voltages**	

Monitoring performance index of CPU, memory, and input output modules

In Dell's 14th generation Dell PowerEdge servers, Intel ME supports Compute Usage Per Second (CUPS) functionality. The CUPS functionality provides real-time monitoring of CPU, memory, and I/O utilization and system-level utilization index for the system. Intel ME allows out-of-band (OOB) performance monitoring and does not consume CPU resources. The Intel ME has a system CUPS sensor that provides computation, memory, and I/O resource utilization values as a CUPS Index. iDRAC monitors this CUPS index for the overall system utilization and also monitors the instantaneous utilization index of the CPU, Memory, and I/O.

NOTE: This feature is not supported on PowerEdge R930 servers.

The CPU and chipset have dedicated Resource monitoring Counters (RMC). The data from these RMCs is queried to obtain utilization information of system resources. The data from RMCs is aggregated by the node manager to measure the cumulative utilization of each of these system resources that is read from iDRAC using existing intercommunication mechanisms to provide data through out-of-band management interfaces.

The Intel sensor representation of performance parameters and index values is for complete physical system. Therefore, the performance data representation on the interfaces is for the complete physical system, even if the system is virtualized and has multiple virtual hosts.

To display the performance parameters, the supported sensors must be present in the server.

The four system utilization parameters are:

- **CPU Utilization** — Data from RMCs for each CPU core is aggregated to provide cumulative utilization of all the cores in the system. This utilization is based on time spent in active and inactive states. A sample of RMC is taken every six seconds.
- **Memory Utilization** — RMCs measure memory traffic occurring at each memory channel or memory controller instance. Data from these RMCs is aggregated to measure the cumulative memory traffic across all the memory channels on the system. This is a measure of memory bandwidth consumption and not amount of memory utilization. iDRAC aggregates it for one minute, so it may or may not match the memory utilization that other OS tools, such as **top** in Linux, show. Memory bandwidth utilization that the iDRAC shows is an indication of whether workload is memory intensive or not.
- **I/O Utilization** — There is one RMC per root port in the PCI Express Root Complex to measure PCI Express traffic emanating from or directed to that root port and the lower segment. Data from these RMCs is aggregated for measuring PCI express traffic for all PCI Express segments emanating from the package. This is measure of I/O bandwidth utilization for the system.
- **System Level CUPS Index** — The CUPS index is calculated by aggregating CPU, Memory, and I/O index considering a predefined load factor of each system resource. The load factor depends on the nature of the workload on the system. CUPS Index represents the measurement of the compute headroom available on the server. If the system has a large CUPS Index, then there is limited headroom to place more workload on that system. As the resource consumption decreases, the system's CUPS index decreases. A low CUPS index indicates that there is a large compute headroom and the server can receive new workloads and the server is in a lower power state to reduce power consumption. Workload monitoring can then be applied throughout the data center to provide a high-level and holistic view of the data center's workload, providing a dynamic data center solution.

NOTE: The CPU, memory, and I/O utilization indexes are aggregated over one minute. Therefore, if there are any instantaneous spikes in these indexes, they may be suppressed. They are indication of workload patterns not the amount of resource utilization.

The IPMI, SEL, and SNMP traps are generated if the thresholds of the utilization indexes are reached and the sensor events are enabled. The sensor event flags are disabled by default. It can be enabled using the standard IPMI interface.

The required privileges are:

- Login privilege is required to monitor performance data.
- Configure privilege is required for setting warning thresholds and reset historical peaks.
- Login privilege and Enterprise license are required to read historical statics data.

Monitoring performance index of CPU, memory, and input output modules using web interface

To monitor the performance index of CPU, memory, and I/O modules, in the iDRAC web interface, go to **System** > **Performance**.

- **System Performance** section — Displays the current reading and the warning reading for CPU, Memory and I/O utilization index, and system level CUPS index in a graphical view.
- **System Performance Historical Data** section:
  - Provides the statistics for CPU, memory, IO utilization, and the system level CUPS index. If the host system is powered off, then the graph displays the power off line below 0 percent.
  - You can reset the peak utilization for a particular sensor. Click **Reset Historical Peak**. You must have Configure privilege to reset the peak value.
- **Performance Metrics** section:
  - Displays status and present reading
  - Displays or specifies the warning threshold utilization limit. You must have server configure privilege to set the threshold values.

For information about the displayed properties, see the *iDRAC Online Help*.

Monitoring performance index for of CPU, memory, and input output modules using RACADM

Use the **SystemPerfStatistics** sub command to monitor performance index for CPU, memory, and I/O modules. For more information, see the iDRAC RACADM CLI Guide available at www.dell.com/idracmanuals.

Checking the system for Fresh Air compliance

Fresh Air cooling directly uses outside air to cool systems in the data center. Fresh Air compliant systems can operate above its normal ambient operating range (temperatures up to 113 °F (45 °C)).

NOTE: Some servers or certain configurations of a server may not be Fresh Air compliant. See the specific server manual for details related to Fresh Air compliance or contact Dell for more details.

To check the system for Fresh Air compliance:

1. In the iDRAC Web interface, go to **System** > **Overview** > **Cooling** > **Temperature overview**.
   The **Temperature overview** page is displayed.
2. See the **Fresh Air** section that indicates whether the server is fresh air compliant or not.

Viewing historical temperature data

You can monitor the percentage of time the system has operated at ambient temperature that is greater than the normally supported fresh air temperature threshold. The system board temperature sensor reading is collected over a period of time to monitor the temperature. The data collection starts when the system is first powered on after it is shipped from the factory. The data is collected and displayed for the duration when the system is powered on. You can track and store the monitored temperature for the last seven years.

NOTE: You can track the temperature history even for systems that are not Fresh-Air compliant. However, the threshold limits and fresh air related warnings generated are based on fresh air supported limits. The limits are 42ºC for warning and 47ºC for critical. These values correspond to 40ºC and 45ºC fresh air limits with 2ºC margin for accuracy.

Two fixed temperature bands are tracked that are associated to fresh air limits:

- Warning band — Consists of the duration a system has operated above the temperature sensor warning threshold (42ºC). The system can operate in the warning band for 10% of the time for 12 months.
- Critical band — Consists of the duration a system has operated above the temperature sensor critical threshold (47ºC). The system can operate in the critical band for 1% of the time for 12 months which also increments time in the warning band.

The collected data is represented in a graphical format to track the 10% and 1% levels. The logged temperature data can be cleared only before shipping from the factory.

An event is generated if the system continues to operate above the normally supported temperature threshold for a specified operational time. If the average temperature over the specified operational time is greater than or equal to the warning level (> = 8%) or the critical level (> = 0.8%), an event is logged in the Lifecycle Log and the corresponding SNMP trap is generated. The events are:

- Warning event when the temperature was greater than the warning threshold for duration of 8% or more in the last 12 months.
- Critical event when the temperature was greater than the warning threshold for duration of 10% or more in the last 12 months.
- Warning event when the temperature was greater than the critical threshold for duration of 0.8% or more in the last 12 months.
- Critical event when the temperature was greater than the critical threshold for duration of 1% or more in the last 12 months.

You can also configure iDRAC to generate additional events. For more information, see the Setting alert recurrence event section.

Viewing historical temperature data using iDRAC web interface

To view historical temperature data:

1 In the iDRAC Web interface, go to **System** > **Overview** > **Cooling** > **Temperature overview**.

The **Temperature overview** page is displayed.

2 See the **System Board Temperature Historical Data** section that provides a graphical display of the stored temperature (average and peak values) for the last day, last 30 days, and last year.

For more information, see the *iDRAC Online Help*.

NOTE: After an iDRAC firmware update or iDRAC reset, some temperature data may not be displayed in the graph.

Viewing historical temperature data using RACADM

To view historical data using RACADM, use the **inlettemphistory** command.

For more information, see the iDRAC RACADM CLI Guide available at www.dell.com/idracmanuals.

Configuring warning threshold for inlet temperature

You can modify the minimum and maximum warning threshold values for the system board inlet temperature sensor. If reset to default action is performed, the temperature thresholds are set to the default values. You must have Configure user privilege to set the warning threshold values for the inlet temperature sensor.

Configuring warning threshold for inlet temperature using web interface

To configure warning threshold for inlet temperature:

1 In the iDRAC Web interface, go to **System** > **Overview** > **Cooling** > **Temperature overview**.

The **Temperature overview** page is displayed.

2 In the **Temperature Probes** section, for the **System Board Inlet Temp**, enter the minimum and maximum values for the **Warning Threshold** in Centigrade or Fahrenheit. If you enter the value in centigrade, the system automatically calculates and displays the Fahrenheit value. Similarly, if you enter Fahrenheit, the value for Centigrade is displayed.

3 Click **Apply**.

The values are configured.

NOTE: Changes to default thresholds are not reflected in the historical data chart since the chart limits are for fresh air limit values only. Warnings for exceeding the custom thresholds are different from warning associated to exceeding fresh air thresholds.

Viewing network interfaces available on host OS

You can view information about all the network interfaces that are available on the host operating system such as the IP addresses that are assigned to the server. The iDRAC Service Module provides this information to iDRAC. The OS IP address information includes the IPv4 and IPv6 addresses, MAC address, Subnet mask or prefix length, the FQDD of the network device, network interface name, network interface description, network interface status, network interface type (Ethernet, tunnel, loopback, and so on.), Gateway address, DNS server address, and DHCP server address.

NOTE: This feature is available with iDRAC Express and iDRAC Enterprise licenses.

To view the OS information, make sure that:

- You have Login privilege.
- iDRAC Service Module is installed and running on the host operating system.
- OS Information option is enabled in the **iDRAC Settings** > **Overview** > **iDRAC Service Module** page.

iDRAC can display the IPv4 and IPv6 addresses for all the interfaces configured on the Host OS.

Depending on how the Host OS detects the DHCP server, the corresponding IPv4 or IPv6 DHCP server address may not be displayed.

Viewing network interfaces available on host OS using web interface

To view the network interfaces available on the host OS using Web interface:

1 Go to **System** > **Host OS** > **Network Interfaces**.

The **Network Interfaces** page displays all the network interfaces that are available on the host operating system.

2 To view the list of network interfaces associated with a network device, from the **Network Device FQDD** drop-down menu, select a network device and click **Apply**.

The OS IP details are displayed in the **Host OS Network Interfaces** section.

3 From the **Device FQDD** column, click on the network device link.

The corresponding device page is displayed from the **Hardware** > **Network Devices** section, where you can view the device details. For information about the properties, see the *iDRAC Online Help*.

4 Click the + icon to display more details.

Similarly, you can view the host OS network interface information associated with a network device from the **Hardware** > **Network Devices** page. Click **View Host OS Network Interfaces**.

NOTE: For the ESXi host OS in the iDRAC Service Module v2.3.0 or later, the Description column in the Additional Details list is displayed in the following format:

```
<List-of-Uplinks-Configured-on-the-vSwitch>/<Port-Group>/<Interface-name>
```

Viewing network interfaces available on host OS using RACADM

Use the **gethostnetworkinterfaces** command to view the network interfaces available on the host operating systems using RACADM. For more information, see the iDRAC RACADM CLI Guide available at www.dell.com/idracmanuals.

Viewing Remote-Assigned Address mezzanine card fabric connections

In blade servers, Remote-Assigned Address allows the use of persistent and MAC addresses (WWN/MAC) for each managed server port connection.

You can view the following information for each installed embedded Ethernet and optional mezzanine card port:

- Fabrics to which the cards are connected.
- Type of fabric.
- Server-assigned, remotely assigned MAC addresses.

To view the Remote-Assigned Address information in iDRAC, configure and enable the Remote-Assigned Address feature in OME Modular. For more information, see the OME - Modular for PowerEdge MX7000 Chassis User's Guide available at www.dell.com/openmanagemanuals. Any existing Virtual Console or Virtual Media session terminates if the Remote-Assigned Address setting is enabled or disabled.

NOTE: To avoid errors that may lead to an inability to turn on the managed system, you *must* have the correct type of mezzanine card installed for each port and fabric connection.

The Remote-Assigned Address feature replaces the server–assigned MAC addresses and is implemented for iDRAC along with blade LOMs, mezzanine cards and I/O modules. The iDRAC Remote-Assigned Address feature supports preservation of slot specific MAC address for iDRACs in a chassis. When Remote-Assigned Address setting is enabled or disabled, any existing virtual consol or virtual media sessions get terminated.

If OME Modular enables remote–assigned MAC addresses, iDRAC displays the **MAC address** on any of the following pages:

- **System** > **Details** > **iDRAC Details**.
- **System** > **Server** > **WWN/MAC**.
- **iDRAC Settings** > **Overview** > **Current Network Settings**.

Viewing or terminating iDRAC sessions

You can view the number of users currently logged in to iDRAC and terminate the user sessions.

Terminating iDRAC sessions using web interface

The users who do not have administrative privileges must have Configure iDRAC privilege to terminate iDRAC sessions using iDRAC Web interface.

To view and terminate the iDRAC sessions:

1. In the iDRAC Web interface, go to **iDRAC Settings** > **users** > **Sessions**.

   The **Sessions** page displays the session ID, username, IP address, and session type. For more information about these properties, see the *iDRAC Online Help*.
2. To terminate the session, under the **Terminate** column, click the Trashcan icon for a session.

Terminating iDRAC sessions using RACADM

You must have administrator privileges to terminate iDRAC sessions using RACADM.
To view the current user sessions, use the **getssninfo** command.

To terminate a user session, use the **closessn** command.

For more information, see the iDRAC RACADM CLI Guide available at www.dell.com/idracmanuals.

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Setting up iDRAC communication

You can communicate with iDRAC using any of the following modes:

- iDRAC Web Interface
- Serial connection using DB9 cable (RAC serial or IPMI serial) — For rack and tower servers only
- IPMI Serial Over LAN
- IPMI Over LAN
- Remote RACADM
- Local RACADM
- Remote Services

NOTE: To ensure that Local RACADM import or export commands work properly, ensure that the USB mass-storage host is enabled in the operating system. For information about enabling USB storage host, see the documentation for your operating system.

The following table provides an overview of the supported protocols, supported commands, and pre-requisites:

Table 18. Communication modes — summary

Mode of Communication	Supported Protocol	Supported Commands	Pre-requisite
iDRAC Web Interface	Internet Protocol (https)	N/A	Web Server
Serial using Null modem DB9 cable	Serial Protocol	RACADM	Part of iDRAC firmware
		SMCLP	RAC Serial or IPMI Serial is enabled
		IPMI	
IPMI Serial Over LAN	Intelligent Platform Management Bus protocol	IPMI	IPMITool is installed and IPMI Serial Over LAN is enabled
	SSH		
	Telnet		
IPMI over LAN	Intelligent Platform Management Bus protocol	IPMI	IPMITool is installed and IPMI Settings is enabled
SMCLP	SSH	SMCLP	SSH or Telnet on iDRAC is enabled
	Telnet		
Remote RACADM	https	Remote RACADM	Remote RACADM is installed and enabled
Firmware RACADM	SSH	Firmware RACADM	Firmware RACADM is installed and enabled
	Telnet		
Local RACADM	IPMI	Local RACADM	Local RACADM is installed

Mode of Communication	Supported Protocol	Supported Commands	Pre-requisite
Remote Services [1]	WSMan	WinRM (Windows) OpenWSMan (Linux)	WinRM is installed (Windows) or OpenWSMan is installed (Linux)
	Redfish	Various browser plug-ins, CURL (Windows and Linux), Python request and JSON modules	Plug-ins, CURL, Python modules are installed

[1] For more information, see the Lifecycle Controller User's Guide available at www.dell.com/idracmanuals.

Topics:

- Communicating with iDRAC through serial connection using DB9 cable
- Switching between RAC serial and serial console while using DB9 cable
- Communicating with iDRAC using IPMI SOL
- Communicating with iDRAC using IPMI over LAN
- Enabling or disabling remote RACADM
- Disabling local RACADM
- Enabling IPMI on managed system
- Configuring Linux for serial console during boot in RHEL 6
- Supported SSH cryptography schemes

Communicating with iDRAC through serial connection using DB9 cable

You can use any of the following communication methods to perform systems management tasks through serial connection to rack and tower servers:

- RAC Serial
- IPMI Serial — Direct Connect Basic mode and Direct Connect Terminal mode

NOTE: In case of blade servers, the serial connection is established through the chassis. For more information, see the OME - Modular for PowerEdge MX7000 Chassis User's Guide available at www.dell.com/openmanagemanuals.

To establish the serial connection:

1. Configure the BIOS to enable serial connection.
2. Connect the Null Modem DB9 cable from the management station's serial port to the managed system's external serial connector.

   NOTE: Server power cycle is required from vConsole or GUI for any change in Baud-rate.
3. Make sure that the management station's terminal emulation software is configured for serial connection using any of the following:
   - Linux Minicom in an Xterm
   - Hilgraeve's HyperTerminal Private Edition (version 6.3)

   Based on where the managed system is in its boot process, you can see either the POST screen or the operating system screen. This is based on the configuration: SAC for Windows and Linux text mode screens for Linux.
4. Enable RAC serial or IPMI serial connections in iDRAC.

Configuring BIOS for serial connection

To configure BIOS for Serial Connection:

NOTE: This is applicable only for iDRAC on rack and tower servers.

1 Turn on or restart the system.
2 Press F2.
3 Go to **System BIOS Settings** > **Serial Communication**.
4 Select **External Serial Connector** to **Remote Access device**.
5 Click **Back**, click **Finish**, and then click **Yes**.
6 Press Esc to exit **System Setup**.

Enabling RAC serial connection

After configuring serial connection in BIOS, enable RAC serial in iDRAC.

NOTE: This is applicable only for iDRAC on rack and tower servers.

Enabling RAC serial connection using web interface

To enable RAC serial connection:

1 In the iDRAC Web interface, go to **iDRAC Settings** > **Network** > **Serial**.
The **Serial** page is displayed.
2 Under **RAC Serial**, select **Enabled** and specify the values for the attributes.
3 Click **Apply**.
The RAC serial settings are configured.

Enabling RAC serial connection using RACADM

To enable RAC serial connection using RACADM, use the **set** command with the object in the **iDRAC.Serial** group.

Enabling IPMI serial connection basic and terminal modes

To enable IPMI serial routing of BIOS to iDRAC, configure IPMI Serial in any of the following modes in iDRAC:

NOTE: This is applicable only for iDRAC on rack and tower servers.

- IPMI basic mode — Supports a binary interface for program access, such as the IPMI shell (ipmish) that is included with the Baseboard Management Utility (BMU). For example, to print the System Event Log using ipmish via IPMI Basic mode, run the following command:
  ```
  ipmish -com 1 -baud 57600 -flow cts -u <username> -p <password> sel get
  ```
  NOTE: The default iDRAC user name and password are provided on the system badge.
- IPMI terminal mode — Supports ASCII commands that are sent from a serial terminal. This mode supports limited number of commands (including power control) and raw IPMI commands that are typed as hexadecimal ASCII characters. It allows you to view the operating system boot sequences up to BIOS, when you login to iDRAC through SSH or Telnet. You need to logout from the IPMI terminal using **[sys pwd -x]**, below are the example for IPMI Terminal mode commands.
  - [sys tmode]
  - [sys pwd -u root calvin]
  - [sys health query -v]
  - [18 00 01]
  - [sys pwd -x]

Enabling serial connection using web interface

Make sure to disable the RAC serial interface to enable IPMI Serial.

To configure IPMI Serial settings:

1. In the iDRAC Web interface, go to **iDRAC Settings** > **Connectivity** > **Serial**.
2. Under **IPMI Serial**, specify the values for the attributes. For information about the options, see the *iDRAC Online Help*.
3. Click **Apply**.

Enabling serial connection IPMI mode using RACADM

To configure the IPMI mode, disable the RAC serial interface and then enable the IPMI mode.

```
racadm set iDRAC.Serial.Enable 0
racadm set iDRAC.IPMISerial.ConnectionMode <n>
```

n=0 — Terminal Mode

n=1 — Basic Mode

Enabling serial connection IPMI serial settings using RACADM

1. Change the IPMI serial-connection mode to the appropriate setting using the command.

   ```
   racadm set iDRAC.Serial.Enable 0
   ```

2. Set the IPMI Serial baud rate using the command.

   ```
   racadm set iDRAC.IPMISerial.BaudRate <baud_rate>
   ```

Parameter	Allowed values (in bps)
`<baud_rate>`	9600, 19200, 57600, and 115200.

3. Enable the IPMI serial hardware flow control using the command.

   ```
   racadm set iDRAC.IPMISerial.FlowContro 1
   ```

4. Set the IPMI serial channel minimum privilege level using the command.

   ```
   racadm set iDRAC.IPMISerial.ChanPrivLimit <level>
   ```

Parameter	Privilege level
`<level>` = 2	User
`<level>` = 3	Operator
`<level>` = 4	Administrator

5. Ensure that the serial MUX (external serial connector) is set correctly to the remote access device in the BIOS Setup program to configure BIOS for serial connection.

For more information about these properties, see the IPMI 2.0 specification.

Additional settings for ipmi serial terminal mode

This section provides additional configuration settings for IPMI serial terminal mode.

Configuring additional settings for IPMI serial terminal mode using web interface

To set the Terminal Mode settings:

1 In the iDRAC Web interface, go to **iDRAC Settings** > **Connectivity** > **Serial**.
The **Serial** page is displayed.
2 Enable IPMI serial.
3 Click **Terminal Mode Settings.**
The **Terminal Mode Settings** page is displayed.
4 Specify the following values:
- Line editing
- Delete control
- Echo Control
- Handshaking control
- New line sequence
- Input new line sequences

For information about the options, see the *iDRAC Online Help*.
5 Click **Apply**.
The terminal mode settings are configured.
6 Make sure that the serial MUX (external serial connector) is set correctly to the remote access device in the BIOS Setup program to configure BIOS for serial connection.

Configuring additional settings for IPMI serial terminal mode using RACADM

To configure the Terminal Mode settings, use the **set** command with the objects in the **idrac.ipmiserial** group.
For more information, see the iDRAC RACADM CLI Guide available at www.dell.com/idracmanuals.

Switching between RAC serial and serial console while using DB9 cable

iDRAC supports Escape key sequences that allow switching between RAC Serial Interface communication and Serial Console on rack and tower servers.

Switching from serial console to RAC serial

To switch to RAC Serial Interface communication mode when in Serial Console Mode, press Esc+Shift, 9.

The key sequence directs you to the `iDRAC Login` prompt (if the iDRAC is set to RAC Serial mode) or to the Serial Connection mode where terminal commands can be issued if iDRAC is set to IPMI Serial Direct Connect Terminal Mode.

Switching from RAC serial to serial console

To switch to Serial Console Mode when in RAC Serial Interface Communication Mode, press Esc+Shift, Q.

When in terminal mode, to switch the connection to the Serial Console mode, press Esc+Shift, Q.

To go back to the terminal mode use, when connected in Serial Console mode, press Esc+Shift, 9.

Communicating with iDRAC using IPMI SOL

IPMI Serial Over LAN (SOL) allows a managed system's text-based console serial data to be redirected over iDRAC's dedicated or shared out-of-band ethernet management network. Using SOL you can:

- Remotely access operating systems with no time-out.
- Diagnose host systems on Emergency Management Services (EMS) or Special Administrator Console (SAC) for Windows or Linux shell.
- View the progress of a servers during POST and reconfigure the BIOS setup program.

To setup the SOL communication mode:

1 Configure BIOS for serial connection.
2 Configure iDRAC to Use SOL.
3 Enable a supported protocol (SSH, Telnet, IPMItool).

Configuring BIOS for serial connection

NOTE: This is applicable only for iDRAC on rack and tower servers.

1 Turn on or restart the system.
2 Press F2.
3 Go to **System BIOS Settings** > **Serial Communication**.
4 Specify the following values:
   - Serial Communication — On With Console Redirection
   - Serial Port Address — COM2.

     NOTE: You can set the serial communication field to On with serial redirection via com1 if serial device2 in the serial port address field is also set to com1.
   - External serial connector — Serial device 2
   - Failsafe Baud Rate — 115200
   - Remote Terminal Type — VT100/VT220
   - Redirection After Boot — Enabled
5 Click **Back** and then click **Finish**.
6 Click **Yes** to save the changes.
7 Press <Esc> to exit **System Setup**.

NOTE: BIOS sends the screen serial data in 25 x 80 format. The SSH window that is used to invoke the `console com2` command must be set to 25 x 80. Then, the redirected screen appears correctly.

NOTE: If the boot loader or operating system provides serial redirection such as GRUB or Linux, then the BIOS Redirection After Boot setting must be disabled. This is to avoid potential race condition of multiple components accessing the serial port.

Configuring iDRAC to use SOL

You can specify the SOL settings in iDRAC using Web interface, RACADM, or iDRAC Settings utility.

Configuring iDRAC to use SOL using iDRAC web interface

To configure IPMI Serial over LAN (SOL):

1 In the iDRAC Web interface, go to **iDRAC Settings** > **Connectivity** > **Serial Over LAN**.
The **Serial over LAN** page is displayed.
2 Enable SOL, specify the values, and click **Apply**.
The IPMI SOL settings are configured.
3 To set the character accumulate interval and the character send threshold, select **Advanced Settings.**
The **Serial Over LAN Advanced Settings** page is displayed.
4 Specify the values for the attributes and click **Apply**.
The IPMI SOL advanced settings are configured. These values help to improve the performance.

For information about the options, see the *iDRAC Online Help*.

Configuring iDRAC to use SOL using RACADM

To configure IPMI Serial over LAN (SOL):

1 Enable IPMI Serial over LAN using the command.
```
racadm set iDRAC.IPMISol.Enable 1
```
2 Update the IPMI SOL minimum privilege level using the command.
```
racadm set iDRAC.IPMISol.MinPrivilege <level>
```

Parameter	Privilege level
<level> = 2	User
<level> = 3	Operator
<level> = 4	Administrator

NOTE: To activate IPMI SOL, you must have the minimum privilege defined in IMPI SOL. For more information, see the IPMI 2.0 specification.

3 Update the IPMI SOL baud rate using the command.
```
racadm set iDRAC.IPMISol.BaudRate <baud_rate>
```

NOTE: To redirect the serial console over LAN, make sure that the SOL baud rate is identical to the managed system's baud rate.

Parameter	Allowed values (in bps)
<baud_rate>	9600, 19200, 57600, and 115200.

4 Enable SOL for each user using the command.
```
racadm set iDRAC.Users.<id>.SolEnable 2
```

Parameter	Description
<id>	Unique ID of the user

NOTE: To redirect the serial console over LAN, ensure that the SOL baud rate is identical to the baud rate of the managed system.

Enabling supported protocol

The supported protocols are IPMI, SSH, and Telnet.

Enabling supported protocol using web interface

To enable SSH or Telnet, go to **iDRAC Settings** > **Services** and select **Enabled** for SSH or Telnet, respectively.

To enable IPMI, go to **iDRAC Settings** > **Connectivity** and select **IPMI Settings**. Make sure that the **Encryption Key** value is all zeroes or press the backspace key to clear and change the value to NULL characters.

Enabling supported protocol using RACADM

To enable the SSH or Telnet, use the following commands.

- Telnet

  ```
  racadm set iDRAC.Telnet.Enable 1
  ```
- SSH

  ```
  racadm set iDRAC.SSH.Enable 1
  ```

  To change the SSH port

  ```
  racadm set iDRAC.SSH.Port <port number>
  ```

You can use tools such as:

- IPMItool for using IPMI protocol
- Putty/OpenSSH for using SSH or Telnet protocol

SOL using IPMI protocol

The IPMI-based SOL utility and IPMItool use RMCP+ delivered using UDP datagrams to port 623. The RMCP+ provides improved authentication, data integrity checks, encryption, and the ability to carry multiple types of payloads while using IPMI 2.0. For more information, see **http://ipmitool.sourceforge.net/manpage.html**.

The RMCP+ uses a 40-character hexadecimal string (characters 0-9, a-f, and A-F) encryption key for authentication. The default value is a string of 40 zeros.

An RMCP+ connection to iDRAC must be encrypted using the encryption key (Key Generator Key). You can configure the encryption key using the iDRAC web interface or iDRAC Settings utility.

To start SOL session using IPMItool from a management station:

NOTE: If required, you can change the default SOL time-out at iDRAC Settings > Services.

1 Install IPMITool from the *Dell Systems Management Tools and Documentation* DVD.
For installation instructions, see the *Software Quick Installation Guide*.

2 At the command prompt (Windows or Linux), run the following command to start SOL from iDRAC:

```
ipmitool -H <iDRAC-ip-address> -I lanplus -U <login name> -P <login password> sol activate
```

This command connected the management station to the managed system's serial port.

3 To quit a SOL session from IPMItool, press ~ and then . (period).

NOTE: If a SOL session does not terminate, reset iDRAC and allow up to two minutes to complete booting.

NOTE: IPMI SOL session may terminate while copying large input text from a client running Windows OS to a host running Linux OS. To avoid the session from getting terminated abruptly, convert any large text to a UNIX-based line ending.

NOTE: If a SOL session created using RACADM tool exists, starting another SOL session using IPMI tool will not show any notification or error about the existing sessions.

SOL using SSH or Telnet protocol

Secure Shell (SSH) and Telnet are network protocols used to perform command line communications to iDRAC. You can parse remote RACADM and SMCLP commands through either of these interfaces.

SSH has improved security over Telnet. iDRAC only supports SSH version 2 with password authentication, and is enabled by default. iDRAC supports up to four SSH sessions and two Telnet sessions at a time. It is recommended to use SSH as Telnet is not a secure protocol. You must use Telnet only if you cannot install an SSH client or if your network infrastructure is secure.

NOTE: For MX platforms, one SSH session will be used for iDRAC communication. If all the sessions are in use, then iDRAC will not launch until one session is free.

Use open-source programs such as PuTTY or OpenSSH that support SSH and Telnet network protocols on a management station to connect to iDRAC.

NOTE: Run `OpenSSH` from a VT100 or ANSI terminal emulator on Windows. Running `OpenSSH` at the Windows command prompt does not result in full functionality (that is, some keys do not respond and no graphics are displayed).

Before using SSH or Telnet to communicate with iDRAC, make sure to:

1 Configure BIOS to enable Serial Console.
2 Configure SOL in iDRAC.
3 Enable SSH or Telnet using iDRAC Web interface or RACADM.

Telnet (port 23)/ SSH (port 22) client <--> WAN connection <--> iDRAC

The IPMI-based SOL that uses SSH or Telnet protocol eliminates the need for an additional utility because the serial to network translation happens within iDRAC. The SSH or Telnet console that you use must be able to interpret and respond to the data arriving from the serial port of the managed system. The serial port usually attaches to a shell that emulates an ANSI- or VT100/VT220–terminal. The serial console is automatically redirected to the SSH or Telnet console.

Using SOL from PuTTY on Windows

NOTE: If required, you can change the default SSH or Telnet time-out at iDRAC Settings > Services.

To start IPMI SOL from PuTTY on a Windows management station:

1 Run the following command to connect to iDRAC

```
putty.exe [-ssh | -telnet] <login name>@<iDRAC-ip-address> <port number>
```

NOTE: The port number is optional. It is required only when the port number is reassigned.

2 Run the command `console com2` or `connect` to start SOL and boot the managed system.

A SOL session from the management station to the managed system using the SSH or Telnet protocol is opened. To access the iDRAC command-line console, follow the ESC key sequence. Putty and SOL connection behavior:

- While accessing the managed system through putty during POST, if the Function keys and keypad option on putty is set to:
  - VT100+ — F2 passes, but F12 cannot pass.
  - ESC[n~ — F12 passes, but F2 cannot pass.

- In Windows, if the Emergency Management System (EMS) console is opened immediately after a host reboot, the Special Admin Console (SAC) terminal may get corrupted. Quit the SOL session, close the terminal, open another terminal, and start the SOL session using the same command.

Using SOL from OpenSSH or Telnet on Linux

To start SOL from OpenSSH or Telnet on a Linux management station:

NOTE: If required, you can change the default SSH or Telnet session time-out at iDRAC Settings > Services.

1 Start a shell.

2 Connect to iDRAC using the following command:

- For SSH: ssh *<iDRAC-ip-address>* -l *<login name>*
- For Telnet: telnet *<iDRAC-ip-address>*

NOTE: If you have changed the port number for the Telnet service from the default (port 23), add the port number to the end of the Telnet command.

3 Enter one of the following commands at the command prompt to start SOL:

- `connect`
- `console com2`

This connects iDRAC to the managed system's SOL port. Once a SOL session is established, iDRAC command line console is not available. Follow the escape sequence correctly to open the iDRAC command line console. The escape sequence is also printed on the screen as soon as a SOL session is connected. When the managed system is off, it takes sometime to establish the SOL session.

NOTE: You can use console com1 or console com2 to start SOL. Reboot the server to establish the connection.

The `console -h com2` command displays the contents of the serial history buffer before waiting for input from the keyboard or new characters from the serial port.

The default (and maximum) size of the history buffer is 8192 characters. You can set this number to a smaller value using the command:

```
racadm set iDRAC.Serial.HistorySize <number>
```

4 Quit the SOL session to close an active SOL session.

Using Telnet virtual console

Some Telnet clients on the Microsoft operating systems may not display the BIOS setup screen correctly when BIOS Virtual Console is set for VT100/VT220 emulation. If this issue occurs, change the BIOS console to ANSI mode to update the display. To perform this procedure in the BIOS setup menu, select **Virtual Console** > **Remote Terminal Type** > **ANSI**.

When you configure the client VT100 emulation window, set the window or application that is displaying the redirected Virtual Console to 25 rows x 80 columns to make sure correct text display. Else, some text screens may be garbled.

To use Telnet virtual console:

1 Enable **Telnet** in **Windows Component Services.**

2 Connect to the iDRAC using the command

```
telnet <IP address>:<port number>
```

Parameter	Description
`<IP address>`	IP address for the iDRAC
`<port number>`	Telnet port number (if you are using a new port)

Configuring backspace key for your Telnet session

Depending on the Telnet client, using the Backspace key may produce unexpected results. For example, the session may echo `^h`. However, most Microsoft and Linux Telnet clients can be configured to use the Backspace key.

To configure a Linux Telnet session to use the <Backspace> key, open a command prompt and type `stty erase ^h`. At the prompt, type `telnet`.

To configure Microsoft Telnet clients to use the Backspace key:

1 Open a command prompt window (if required).
2 If you are not running a Telnet session, type `telnet`. If you are running a Telnet session, press Ctrl+].
3 At the prompt, type `set bsasdel`.
The message `Backspace will be sent as delete` is displayed.

Disconnecting SOL session in iDRAC command line console

The commands to disconnect a SOL session are based on the utility. You can exit the utility only when a SOL session is completely terminated.

To disconnect a SOL session, terminate the SOL session from the iDRAC command line console.

- To quit SOL redirection, press Enter, Esc, T.
  The SOL session closes.
- To quit a SOL session from Telnet on Linux, press and hold Ctrl+].
  A Telnet prompt is displayed. Type `quit` to exit Telnet.

If a SOL session is not terminated completely in the utility, other SOL sessions may not be available. To resolve this, terminate the command line console in the Web interface under **iDRAC Settings** > **Connectivity** > **Serial Over LAN**.

Communicating with iDRAC using IPMI over LAN

You must configure IPMI over LAN for iDRAC to enable or disable IPMI commands over LAN channels to any external systems. If IPMI over LAN is not configured, then external systems cannot communicate with the iDRAC server using IPMI commands.

NOTE: IPMI also supports IPv6 address protocol for Linux-based operating systems.

Configuring IPMI over LAN using web interface

To configure IPMI over LAN:

1 In the iDRAC Web interface, go to **iDRAC Settings** > **Connectivity**.
The **Network** page is displayed.
2 Under **IPMI Settings**, specify the values for the attributes and click **Apply**.
For information about the options, see the *iDRAC Online Help*.

The IPMI over LAN settings are configured.

Configuring IPMI over LAN using iDRAC settings utility

To configure IPMI over LAN:

1 In the **iDRAC Settings Utility**, go to **Network**.
The **iDRAC Settings Network** page is displayed.
2 For **IPMI Settings**, specify the values.
For information about the options, see the *iDRAC Settings Utility Online Help*.
3 Click **Back**, click **Finish**, and then click **Yes**.
The IPMI over LAN settings are configured.

Configuring IPMI over LAN using RACADM

1 Enable IPMI over LAN.

```
racadm set iDRAC.IPMILan.Enable 1
```

NOTE: This setting determines the IPMI commands that are executed using IPMI over LAN interface. For more information, see the IPMI 2.0 specifications at intel.com.

2 Update the IPMI channel privileges.

```
racadm set iDRAC.IPMILan.PrivLimit <level>
```

Parameter	Privilege level
<level> = 2	User
<level> = 3	Operator
<level> = 4	Administrator

3 Set the IPMI LAN channel encryption key ,if required.

```
racadm set iDRAC.IPMILan.EncryptionKey <key>
```

Parameter	Description
<key>	20-character encryption key in a valid hexadecimal format.

NOTE: The iDRAC IPMI supports the RMCP+ protocol. For more information, see the IPMI 2.0 specifications at intel.com.

Enabling or disabling remote RACADM

You can enable or disable remote RACADM using the iDRAC Web interface or RACADM. You can run up to five remote RACADM sessions in parallel.

NOTE: Remote RACADM is enabled by default.

Enabling or disabling remote RACADM using web interface

1 In iDRAC Web interface, go to **iDRAC Settings** > **Services**.
2 Under **Remote RACADM**, select the desired option and click **Apply**.
The remote RACADM is enabled or disabled based on the selection.

Enabling or disabling remote RACADM using RACADM

NOTE: It is recommended to run these commands using local RACADM or firmware RACADM.

- To disable remote RACADM:

```
racadm set iDRAC.Racadm.Enable 0
```

- To enable remote RACADM:

```
racadm set iDRAC.Racadm.Enable 1
```

Disabling local RACADM

The local RACADM is enabled by default. To disable, see Disabling access to modify iDRAC configuration settings on host system.

Enabling IPMI on managed system

On a managed system, use the Dell Open Manage Server Administrator to enable or disable IPMI. For more information, see the OpenManage Server Administrator User's Guide available at www.dell.com/openmanagemanuals.

NOTE: From iDRAC v2.30.30.30 or later, IPMI supports IPv6 address protocol for Linux-based operating systems.

Configuring Linux for serial console during boot in RHEL 6

The following steps are specific to the Linux GRand Unified Bootloader (GRUB). Similar changes are required if a different boot loader is used.

NOTE: When you configure the client VT100 emulation window, set the window or application that is displaying the redirected Virtual Console to 25 rows x 80 columns to make sure the correct text displays. Else, some text screens may be garbled.

Edit the **/etc/grub.conf** file as follows:

1 Locate the General Setting sections in the file and add the following:

```
serial --unit=1 --speed=57600 terminal --timeout=10 serial
```

2 Append two options to the kernel line:

```
kernel ............. console=ttyS1,115200n8r console=tty1
```

3 Disable GRUB's graphical interface and use the text-based interface. Else, the GRUB screen is not displayed in RAC Virtual Console. To disable the graphical interface, comment-out the line starting with `splashimage`.

The following example provides a sample **/etc/grub.conf** file that shows the changes described in this procedure.

```
# grub.conf generated by anaconda
# Note that you do not have to rerun grub after making changes to this file
# NOTICE: You do not have a /boot partition. This means that all
# kernel and initrd paths are relative to /, e.g.
# root (hd0,0)
# kernel /boot/vmlinuz-version ro root=/dev/sdal
# initrd /boot/initrd-version.img
#boot=/dev/sda
default=0
timeout=10
#splashimage=(hd0,2)/grub/splash.xpm.gz

serial --unit=1 --speed=57600
terminal --timeout=10 serial
```

```
title Red Hat Linux Advanced Server (2.4.9-e.3smp) root (hd0,0)
kernel /boot/vmlinuz-2.4.9-e.3smp ro root=/dev/sda1 hda=ide-scsi console=ttyS0
console=ttyS1,115200n8r
initrd /boot/initrd-2.4.9-e.3smp.img
title Red Hat Linux Advanced Server-up (2.4.9-e.3) root (hd0,00)
kernel /boot/vmlinuz-2.4.9-e.3 ro root=/dev/sda1 s
initrd /boot/initrd-2.4.9-e.3.im
```

4 To enable multiple GRUB options to start Virtual Console sessions through the RAC serial connection, add the following line to all options:

```
console=ttyS1,115200n8r console=tty1
```

The example shows `console=ttyS1,57600` added to the first option.

NOTE: If the boot loader or operating system provides serial redirection such as GRUB or Linux, then the BIOS Redirection After Boot setting must be disabled. This is to avoid potential race condition of multiple components accessing the serial port.

Enabling login to the virtual console after boot

In the file **/etc/inittab**, add a new line to configure `agetty` on the COM2 serial port:

```
co:2345:respawn:/sbin/agetty -h -L 57600 ttyS1 ansi
```

The following example shows a sample file with the new line.

```
#inittab This file describes how the INIT process should set up
#the system in a certain run-level.
#Author:Miquel van Smoorenburg
#Modified for RHS Linux by Marc Ewing and Donnie Barnes
#Default runlevel. The runlevels used by RHS are:
#0 - halt (Do NOT set initdefault to this)
#1 - Single user mode
#2 - Multiuser, without NFS (The same as 3, if you do not have #networking)
#3 - Full multiuser mode
#4 - unused
#5 - X11
#6 - reboot (Do NOT set initdefault to this)
id:3:initdefault:
#System initialization.
si::sysinit:/etc/rc.d/rc.sysinit
l0:0:wait:/etc/rc.d/rc 0
l1:1:wait:/etc/rc.d/rc 1
l2:2:wait:/etc/rc.d/rc 2
l3:3:wait:/etc/rc.d/rc 3
l4:4:wait:/etc/rc.d/rc 4
l5:5:wait:/etc/rc.d/rc 5
l6:6:wait:/etc/rc.d/rc 6
#Things to run in every runlevel.
ud::once:/sbin/update
ud::once:/sbin/update
#Trap CTRL-ALT-DELETE
ca::ctrlaltdel:/sbin/shutdown -t3 -r now
#When our UPS tells us power has failed, assume we have a few
#minutes of power left. Schedule a shutdown for 2 minutes from now.
#This does, of course, assume you have power installed and your
#UPS is connected and working correctly.
pf::powerfail:/sbin/shutdown -f -h +2 "Power Failure; System Shutting Down"
#If power was restored before the shutdown kicked in, cancel it.
pr:12345:powerokwait:/sbin/shutdown -c "Power Restored; Shutdown Cancelled"
```

```
#Run gettys in standard runlevels
co:2345:respawn:/sbin/agetty -h -L 57600 ttyS1 ansi
1:2345:respawn:/sbin/mingetty tty1
2:2345:respawn:/sbin/mingetty tty2
```

```
3:2345:respawn:/sbin/mingetty tty3
4:2345:respawn:/sbin/mingetty tty4
5:2345:respawn:/sbin/mingetty tty5
6:2345:respawn:/sbin/mingetty tty6

#Run xdm in runlevel 5
#xdm is now a separate service
x:5:respawn:/etc/X11/prefdm -nodaemon
```

In the file **/etc/securetty** add a new line with the name of the serial tty for COM2:

```
ttyS1
```

The following example shows a sample file with the new line.

NOTE: Use the Break Key Sequence (~B) to execute the Linux Magic SysRq key commands on serial console using IPMI Tool.

```
vc/1
vc/2
vc/3
vc/4
vc/5
vc/6
vc/7
vc/8
vc/9
vc/10
vc/11
tty1
tty2
tty3
tty4
tty5
tty6
tty7
tty8
tty9
tty10
tty11
ttyS1
```

Supported SSH cryptography schemes

To communicate with iDRAC using SSH protocol, it supports multiple cryptography schemes listed in the following table.

Table 19. SSH cryptography schemes

Scheme Type	Algorithms
Asymmetric Cryptography	
Public key	ssh-rsa
	ecdsa-sha2-nistp256
Symmetric Cryptography	
Key Exchange	curve25519-sha256@libssh.org
	ecdh-sha2-nistp256
	ecdh-sha2-nistp384

Scheme Type	Algorithms
	ecdh-sha2-nistp521
	diffie-hellman-group-exchange-sha256
	diffie-hellman-group14-sha1
Encryption	chacha20-poly1305@openssh.com
	aes128-ctr
	aes192-ctr
	aes256-ctr
	aes128-gcm@openssh.com
	aes256-gcm@openssh.com
MAC	hmac-sha1
	hmac-ripemd160
	umac-64@openssh.com
Compression	None

NOTE: If you enable OpenSSH 7.0 or later, DSA public key support is disabled. To ensure better security for iDRAC, Dell recommends not enabling DSA public key support.

Using public key authentication for SSH

iDRAC supports the Public Key Authentication (PKA) over SSH. This is a licensed feature. When the PKA over SSH is set up and used correctly, you must enter the user name while logging into iDRAC. This is useful for setting up automated scripts that perform various functions. The uploaded keys must be in RFC 4716 or OpenSSH format. Else, you must convert the keys into that format.

In any scenario, a pair of private and public key must be generated on the management station. The public key is uploaded to iDRAC local user and private key is used by the SSH client to establish the trust relationship between the management station and iDRAC.

You can generate the public or private key pair using:

- *PuTTY Key Generator* application for clients running Windows
- *ssh-keygen* CLI for clients running Linux.

CAUTION: This privilege is normally reserved for users who are members of the Administrator user group on iDRAC. However, users in the 'Custom' user group can be assigned this privilege. A user with this privilege can modify any user's configuration. This includes creation or deletion of any user, SSH Key management for users, and so on. For these reasons, assign this privilege carefully.

CAUTION: The capability to upload, view, and/ or delete SSH keys is based on the 'Configure Users' user privilege. This privilege allows user(s) to configure another user's SSH key. You should grant this privilege carefully.

Generating public keys for Windows

To use the *PuTTY Key Generator* application to create the basic key:

1 Start the application and select RSA for the key type.
2 Enter the number of bits for the key. The number of bits must be between 2048 and 4096 bits.
3 Click **Generate** and move the mouse in the window as directed.
The keys are generated.
4 You can modify the key comment field.
5 Enter a passphrase to secure the key.
6 Save the public and private key.

Generating public keys for Linux

To use the *ssh-keygen* application to create the basic key, open a terminal window and at the shell prompt, enter `ssh-keygen -t rsa -b 2048 -C testing`
where:

- `-t` is *rsa*.
- `-b` specifies the bit encryption size between 2048 and 4096.
- `-C` allows modifying the public key comment and is optional.

NOTE: The options are case-sensitive.

Follow the instructions. After the command executes, upload the public file.

CAUTION: Keys generated from the Linux management station using ssh-keygen are in non-4716 format. Convert the keys into the 4716 format using `ssh-keygen -e -f /root/.ssh/id_rsa.pub > std_rsa.pub`. Do not change the permissions of the key file. The conversion must be done using default permissions.

NOTE: iDRAC does not support ssh-agent forward of keys.

Uploading SSH keys

You can upload up to four public keys *per user* to use over an SSH interface. Before adding the public keys, make sure that you view the keys if they are set up, so that a key is not accidentally overwritten.

When adding new public keys, make sure that the existing keys are not at the index where the new key is added. iDRAC does not perform checks to make sure previous key(s) are deleted before a new key(s) are added. When a new key is added, it is usable if the SSH interface is enabled.

Uploading SSH keys using web interface

To upload the SSH keys:

1 In the iDRAC Web interface, go to **iDRAC Settings** > **Users** > **Local Users**.
The **Local Users** page is displayed.
2 In the **User ID** column, click a user ID number.
The **Users Main Menu** page is displayed.
3 Under **SSH Key Configurations**, select **Upload SSH Key(s)** and click **Next**.
The **Upload SSH Key(s)** page is displayed.

4 Upload the SSH keys in one of the following ways:
   - Upload the key file.
   - Copy the contents of the key file into the text box

   For more information, see iDRAC Online Help.
5 Click **Apply**.

Uploading SSH keys using RACADM

To upload the SSH keys, run the following command:

NOTE: You cannot upload and copy a key at the same time.

- For local RACADM: `racadm sshpkauth -i <2 to 16> -k <1 to 4> -f <filename>`
- From remote RACADM using Telnet or SSH: `racadm sshpkauth -i <2 to 16> -k <1 to 4> -t <key-text>`

For example, to upload a valid key to iDRAC User ID 2 in the first key space using a file, run the following command:

```
$ racadm sshpkauth -i 2 -k 1 -f pkkey.key
```

NOTE: The `-f` option is not supported on telnet/ssh/serial RACADM.

Viewing SSH keys

You can view the keys that are uploaded to iDRAC.

Viewing SSH keys using web interface

To view the SSH keys:

1 In Web interface, go to **iDRAC Settings** > **Users**.
   The **Local Users** page is displayed.
2 In the **User ID** column, click a user ID number.
   The **Users Main Menu** page is displayed.
3 Under **SSH Key Configurations**, select **View/Remove SSH Key(s)** and click **Next**.
   The **View/Remove SSH Key(s)** page is displayed with the key details.

Deleting SSH keys

Before deleting the public keys, make sure that you view the keys if they are set up, so that a key is not accidentally deleted.

Deleting SSH keys using web interface

To delete the SSH key(s):

1 In Web interface, go to **iDRAC Settings** > **Users**.
   The **Local Users** page is displayed.
2 In the **ID** column, select a user ID number, click **Edit**.
   The **Edit User** page is displayed.
3 Under **SSH Key Configurations**, select a SSH Key and click **Edit**.
   The **SSH Key** page displays the **Edit From** details.
4 Select **Remove** for the key(s) you want to delete, and click **Apply**.
   The selected key(s) is deleted.

Deleting SSH keys using RACADM

To delete the SSH key(s), run the following commands:

- Specific key — `racadm sshpkauth -i <2 to 16> -d -k <1 to 4>`
- All keys — `racadm sshpkauth -i <2 to 16> -d -k all`

7

Configuring user accounts and privileges

You can setup user accounts with specific privileges (*role-based authority*) to manage your system using iDRAC and maintain system security. By default iDRAC is configured with a local administrator account. The default iDRAC user name and password are provided with the system badge. As an administrator, you can setup user accounts to allow other users to access iDRAC. For more information see the documentation for the server.

You can setup local users or use directory services such as Microsoft Active Directory or LDAP to setup user accounts. Using a directory service provides a central location for managing authorized user accounts.

iDRAC supports role-based access to users with a set of associated privileges. The roles are administrator, operator, read only, or none. The role defines the maximum privileges available.

Topics:

- iDRAC user roles and privileges
- Recommended characters in user names and passwords
- Configuring local users
- Configuring Active Directory users
- Configuring generic LDAP users

iDRAC user roles and privileges

The iDRAC role and privilege names have changed from earlier generation of servers. The role names are:

Table 20. iDRAC roles

Current Generation	Prior Generation	Privileges
Administrator	Administrator	Login, Configure, Configure Users, Logs, System Control, Access Virtual Console, Access Virtual Media, System Operations, Debug
Operator	Power User	Login, Configure, System Control, Access Virtual Console, Access Virtual Media, System Operations, Debug
Read Only	Guest User	Login
None	None	None

The following table describes the user privileges:

Table 21. iDRAC user privileges

Current Generation	Prior Generation	Description
Login	Login to iDRAC	Enables the user to log in to iDRAC.
Configure	Configure iDRAC	Enables the user to configure iDRAC. With this privilege, a user can also configure power management, virtual console, virtual media, licenses, system settings, storage devices, BIOS settings, SCP and so on.

NOTE: The administrator role overrides all the privileges from the other components such as BIOS setup password.

Configure Users	Configure Users	Enables the user to allow specific users to access the system.
Logs	Clear Logs	Enables the user to clear only the System Event Log (SEL).
System Control	Control and configure system	Allows power cycling the host system.
Access Virtual Console	Access Virtual Console Redirection (for blade servers)	Enables the user to run Virtual Console.
	Access Virtual Console (for rack and tower servers)	
Access Virtual Media	Access Virtual Media	Enables the user to run and use Virtual Media.
System Operations	Test Alerts	Allows user initiated and generated events, and information is sent as an asynchronous notification and logged.
Debug	Execute Diagnostic Commands	Enables the user to run diagnostic commands.

Recommended characters in user names and passwords

This section provides details about the recommended characters while creating and using user names and passwords.

NOTE: The password must include one uppercase and one lower case letter, one number and a special character.

Use the following characters while creating user names and passwords:

Table 22. Recommended characters for user names

Characters	Length
0-9	1–16
A-Z	
a-z	
- ! # $ % & ( ) * / ; ? @ [\ ] ^ _ ` { | } ~ + < = >	

Table 23. Recommended characters for passwords

Characters	Length
0-9	1–20
A-Z	
a-z	
' - ! " # $ % & ( ) * , . / : ; ? @ [\ ] ^ _ ` { | } ~ + < = >	

NOTE: You may be able to create user names and passwords that include other characters. However, to ensure compatibility with all interfaces, Dell recommends using only the characters listed here.

NOTE: The characters allowed in user names and passwords for network shares are determined by the network-share type. iDRAC supports valid characters for network share credentials as defined by the share type, except <, >, and , (comma).

NOTE: To improve security, it is recommended to use complex passwords that have eight or more characters and include lowercase alphabets, uppercase alphabets, numbers, and special characters. It is also recommended to regularly change the passwords, if possible.

Configuring local users

You can configure up to 16 local users in iDRAC with specific access permissions. Before you create an iDRAC user, verify if any current users exist. You can set user names, passwords, and roles with the privileges for these users. The user names and passwords can be changed using any of the iDRAC secured interfaces (that is, web interface, RACADM or WSMan). You can also enable or disable SNMPv3 authentication for each user.

Configuring local users using iDRAC web interface

To add and configure local iDRAC users:

NOTE: You must have Configure Users permission to create an iDRAC user.

1 In the iDRAC Web interface, go to **iDRAC Settings** > **User**.
The **Local Users** page is displayed.

2 In the User **ID** column, select a user ID number and click **Edit**.

NOTE: User 1 is reserved for the IPMI anonymous user and you cannot change this configuration.

The **User Configuration** page is displayed.

3 Add **User Account Settings** and **Advanced Settings** details to configure the user account.

NOTE: Enable the user ID and specify the user name, password, and user role (access privileges) for the user. You can also enable LAN privilege level, Serial port privilege level, serial over LAN status, SNMPv3 authentication, authentication type and the privacy type for the user. For more information about the options, see the *iDRAC Online Help*.

4 Click **Save**. The user is created with the required privileges.

Configuring local users using RACADM

NOTE: You must be logged in as user root to execute RACADM commands on a remote Linux system.

You can configure single or multiple iDRAC users using RACADM.

To configure multiple iDRAC users with identical configuration settings, follow these procedures:

- Use the RACADM examples in this section as a guide to create a batch file of RACADM commands and then execute the batch file on each managed system.
- Create the iDRAC configuration file and execute the **racadm set** command on each managed system using the same configuration file.

If you are configuring a new iDRAC or if you have used the **racadm racresetcfg** command, then check for the default iDRAC user name and password on the system badge. The **racadm racresetcfg** command resets the iDRAC to the default values.

NOTE: Users can be enabled and disabled over time. As a result, a user may have a different index number on each iDRAC.

To verify if a user exists, type the following command once for each index (1–16):

```
racadm get iDRAC.Users.<index>.UserName
```

Several parameters and object IDs are displayed with their current values. The key field is `iDRAC.Users.UserName=`. If a user name is displayed after =, that index number is taken.

NOTE: You can utilize

```
racadm get -f <myfile.cfg>
```

and view or edit the

```
myfile.cfg
```

file, which includes all iDRAC configuration parameters.

To enable SNMP v3 authentication for a user, use **SNMPv3AuthenticationType**, **SNMPv3Enable**, **SNMPv3PrivacyType** objects. For more information, see the iDRAC RACADM CLI Guide available at www.dell.com/idracmanuals.

If you use the Server Configuration Profile file to configure users, use the **AuthenticationProtocol**, **ProtocolEnable**, and **PrivacyProtocol** attributes to enable SNMPv3 authentication.

Adding iDRAC user using RACADM

1 Set the index and user name.

```
racadm set idrac.users.<index>.username <user_name>
```

Parameter	Description
`<index>`	Unique index of the user
`<user_name>`	User name

2 Set the password.

```
racadm set idrac.users.<index>.password <password>
```

3 Set the user privileges.

For more information, see the iDRAC RACADM CLI Guide available at www.dell.com/idracmanuals.

4 Enable the user.

```
racadm set.idrac.users.<index>.enable 1
```

To verify, use the following command:

```
racadm get idrac.users.<index>
```

For more information, see the iDRAC RACADM CLI Guide available at www.dell.com/idracmanuals.

Enabling iDRAC user with permissions

To enable a user with specific administrative permissions (role-based authority):

1 Locate an available user index.

```
racadm get iDRAC.Users <index>
```

2 Type the following commands with the new user name and password.

```
racadm set iDRAC.Users.<index>.Privilege <user privilege bit mask value>
```

NOTE: The default privilege value is 0, which indicates the user has no privileges enabled. For a list of valid bit-mask values for specific user privileges, see the iDRAC RACADM CLI Guide available at www.dell.com/idracmanuals.

Configuring Active Directory users

If your company uses the Microsoft Active Directory software, you can configure the software to provide access to iDRAC, allowing you to add and control iDRAC user privileges to your existing users in your directory service. This is a licensed feature.

NOTE: Using Active Directory to recognize iDRAC users is supported on the Microsoft Windows 2000, Windows Server 2003, and Windows Server 2008 operating systems.

You can configure user authentication through Active Directory to log in to the iDRAC. You can also provide role-based authority, which enables an administrator to configure specific privileges for each user.

Prerequisites for using Active Directory authentication for iDRAC

To use the Active Directory authentication feature of iDRAC, make sure that you have:

- Deployed an Active Directory infrastructure. See the Microsoft website for more information.
- Integrated PKI into the Active Directory infrastructure. iDRAC uses the standard Public Key Infrastructure (PKI) mechanism to authenticate securely into the Active Directory. See the Microsoft website for more information.
- Enabled the Secure Socket Layer (SSL) on all domain controllers that iDRAC connects to for authenticating to all the domain controllers.

Enabling SSL on domain controller

When iDRAC authenticates users with an Active Directory domain controller, it starts an SSL session with the domain controller. At this time, the domain controller must publish a certificate signed by the Certificate Authority (CA)—the root certificate of which is also uploaded into iDRAC. For iDRAC to authenticate to *any* domain controller—whether it is the root or the child domain controller—that domain controller must have an SSL-enabled certificate signed by the domain's CA.

If you are using Microsoft Enterprise Root CA to *automatically* assign all your domain controllers to an SSL certificate, you must:

1 Install the SSL certificate on each domain controller.

2 Export the Domain Controller Root CA Certificate to iDRAC.

3 Import iDRAC Firmware SSL Certificate.

Installing SSL certificate for each domain controller

To install the SSL certificate for each controller:

1 Click **Start** > **Administrative Tools** > **Domain Security Policy**.
2 Expand the **Public Key Policies** folder, right-click **Automatic Certificate Request Settings** and click **Automatic Certificate Request**. The **Automatic Certificate Request Setup Wizard** is displayed.
3 Click **Next** and select **Domain Controller**.
4 Click **Next** and click **Finish**. The SSL certificate is installed.

Exporting domain controller root CA certificate to iDRAC

NOTE: If your system is running Windows 2000 or if you are using standalone CA, the following steps may vary.

To export the domain controller root CA certificate to iDRAC:

1 Locate the domain controller that is running the Microsoft Enterprise CA service.
2 Click **Start** > **Run**.
3 Enter `mmc` and click **OK**.
4 In the **Console 1** (MMC) window, click **File (**or **Console** on Windows 2000 systems**)** and select **Add/Remove Snap-in**.
5 In the **Add/Remove Snap-In** window, click **Add**.
6 In the **Standalone Snap-In** window, select **Certificates** and click **Add**.
7 Select **Computer** and click **Next**.
8 Select **Local Computer**, click **Finish**, and click **OK**.
9 In the **Console 1** window, go to **Certificates Personal Certificates** folder.
10 Locate and right-click the root CA certificate, select **All Tasks**, and click **Export...**.
11 In the **Certificate Export Wizard**, click **Next**, and select **No do not export the private key**.
12 Click **Next** and select **Base-64 encoded X.509 (.cer)** as the format.
13 Click **Next** and save the certificate to a directory on your system.
14 Upload the certificate you saved in step 13 to iDRAC.

Importing iDRAC firmware SSL certificate

iDRAC SSL certificate is the identical certificate used for iDRAC Web server. All iDRAC controllers are shipped with a default self-signed certificate.

If the Active Directory Server is set to authenticate the client during an SSL session initialization phase, you need to upload iDRAC Server certificate to the Active Directory Domain controller. This additional step is not required if the Active Directory does not perform a client authentication during an SSL session's initialization phase.

NOTE: If your system is running Windows 2000, the following steps may vary.

NOTE: If iDRAC firmware SSL certificate is CA-signed and the certificate of that CA is already in the domain controller's Trusted Root Certificate Authority list, do not perform the steps in this section.

To import iDRAC firmware SSL certificate to all domain controller trusted certificate lists:

1 Download iDRAC SSL certificate using the following RACADM command:
```
racadm sslcertdownload -t 1 -f <RAC SSL certificate>
```
2 On the domain controller, open an **MMC Console** window and select **Certificates** > **Trusted Root Certification Authorities**.
3 Right-click **Certificates**, select **All Tasks** and click **Import**.

4 Click **Next** and browse to the SSL certificate file.

5 Install iDRAC SSL Certificate in each domain controller's **Trusted Root Certification Authority**.

If you have installed your own certificate, make sure that the CA signing your certificate is in the **Trusted Root Certification Authority** list. If the Authority is not in the list, you must install it on all your domain controllers.

6 Click **Next** and select whether you want Windows to automatically select the certificate store based on the type of certificate, or browse to a store of your choice.

7 Click **Finish** and click **OK**. The iDRAC firmware SSL certificate is imported to all domain controller trusted certificate lists.

Supported Active Directory authentication mechanisms

You can use Active Directory to define iDRAC user access using two methods:

- *Standard schema* solution, which uses Microsoft's default Active Directory group objects only.
- *Extended schema* solution, which has customized Active Directory objects. All the access control objects are maintained in Active Directory. It provides maximum flexibility to configure user access on different iDRACs with varying privilege levels.

Standard schema Active Directory overview

As shown in the following figure, using standard schema for Active Directory integration requires configuration on both Active Directory and iDRAC.

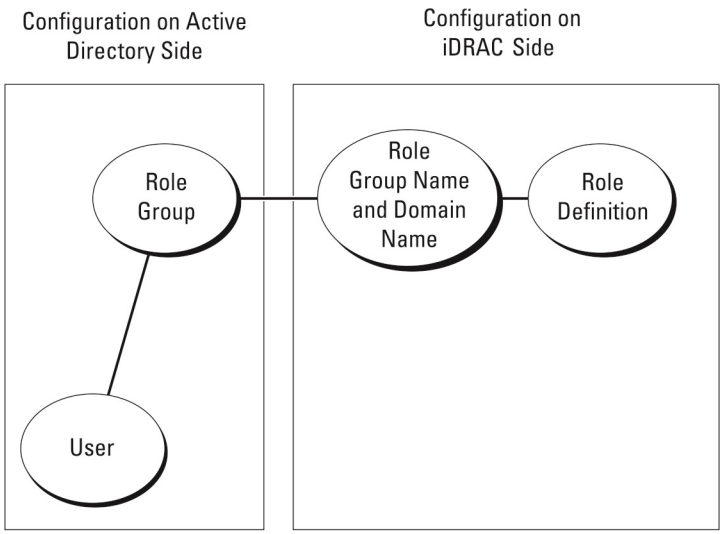

Figure 1. Configuration of iDRAC with active directory standard schema

In Active Directory, a standard group object is used as a role group. A user who has iDRAC access is a member of the role group. To give this user access to a specific iDRAC, the role group name and its domain name need to be configured on the specific iDRAC. The role and the privilege level are defined on each iDRAC and not in the Active Directory. You can configure up to five role groups in each iDRAC. Table reference no shows the default role group privileges.

Table 24. Default role group privileges

Role Groups	Default Privilege Level	Permissions Granted	Bit Mask
Role Group 1	None	Log in to iDRAC, Configure iDRAC, Configure Users, Clear	0x000001ff

Role Groups	Default Privilege Level	Permissions Granted	Bit Mask
		Logs, Execute Server Control Commands, Access Virtual Console, Access Virtual Media, Test Alerts, Execute Diagnostic Commands	
Role Group 2	None	Log in to iDRAC, Configure iDRAC, Execute Server Control Commands, Access Virtual Console, Access Virtual Media, Test Alerts, Execute Diagnostic Commands	0x000000f9
Role Group 3	None	Log in to iDRAC	0x00000001
Role Group 4	None	No assigned permissions	0x00000000
Role Group 5	None	No assigned permissions	0x00000000

NOTE: The Bit Mask values are used only when setting Standard Schema with the RACADM.

Single domain versus multiple domain scenarios

If all the login users and role groups, including the nested groups, are in the same domain, then only the domain controllers' addresses must be configured on iDRAC. In this single domain scenario, any group type is supported.

If all the login users and role groups, or any of the nested groups, are from multiple domains, then Global Catalog server addresses must be configured on iDRAC. In this multiple domain scenario, all the role groups and nested groups, if any, must be a Universal Group type.

Configuring Standard schema Active Directory

Before configuring the standard schema Active Directory, ensure that:

- You have the iDRAC enterprise license.
- The configuration is performed on a server that is used as the Domain Controller.
- The dat, time and time zone on the server are correct.
- The iDRAC network settings are configured, or in iDRAC web interface go to **iDRAC Settings > Connectivity > Network > Common Settings** to configure the network settings.

To configure iDRAC for an Active Directory login access:

1 On an Active Directory server (domain controller), open the Active Directory Users and Computers Snap-in.
2 Create the iDRAC groups and users.
3 Configure the group name, domain name, and the role privileges on iDRAC using the iDRAC web interface or RACADM.

Configuring Active Directory with Standard schema using iDRAC web interface

NOTE: For information about the various fields, see the *iDRAC Online Help*.

1 In the iDRAC web interface, go to **iDRAC Settings** > **Users** > **Directory Services**.

The **Directory Service** page is displayed.

2 Select the **Microsoft Active Directory** option and then click **Edit**.

The **Active Directory Configuration and Management** page is displayed.

3 Click **Configure Active Directory**.

The **Active Directory Configuration and Management Step 1 of 4** page is displayed.

4 Optionally, enable certificate validation and upload the CA-signed digital certificate used during initiation of SSL connections when communicating with the Active Directory (AD) server. For this, the Domain Controllers and Global Catalog FQDN must be specified. This is done in the next steps. And hence the DNS should be configured properly in the network settings.

5 Click **Next**.

The **Active Directory Configuration and Management Step 2 of 4** page is displayed.

6 Enable Active Directory and specify the location information about Active Directory servers and user accounts. Also, specify the time iDRAC must wait for responses from Active Directory during iDRAC login.

NOTE: If certificate validation is enabled, specify the Domain Controller Server addresses and the Global Catalog FQDN. Make sure that DNS is configured correctly under iDRAC Settings > Network.

7 Click **Next**. The **Active Directory Configuration and Management Step 3 of 4** page is displayed.

8 Select **Standard Schema** and click Next.

The **Active Directory Configuration and Management Step 4a of 4** page is displayed.

9 Enter the location of Active Directory global catalog server(s) and specify privilege groups used to authorize users.

10 Click a **Role Group** to configure the control authorization policy for users under the standard schema mode.

The **Active Directory Configuration and Management Step 4b of 4** page is displayed.

11 Specify the privileges and click **Apply**.

The settings are applied and the **Active Directory Configuration and Management Step 4a of 4** page is displayed.

12 Click **Finish**. The Active Directory settings for standard schema are configured.

Configuring Active Directory with Standard schema using RACADM

1 Use the following commands:

```
racadm set iDRAC.ActiveDirectory.Enable 1
racadm set iDRAC.ActiveDirectory.Schema 2
racadm set iDRAC.ADGroup.Name <common name of the role group>
racadm set iDRAC.ADGroup.Domain <fully qualified domain name>
racadm set iDRAC.ADGroup.Privilege <Bit-mask value for specific RoleGroup permissions>
racadm set iDRAC.ActiveDirectory.DomainController1 <fully qualified domain name or IP
address of the domain controller>
racadm set iDRAC.ActiveDirectory.DomainController2 <fully qualified domain name or IP
address of the domain controller>
racadm set iDRAC.ActiveDirectory.DomainController3 <fully qualified domain name or IP
address of the domain controller>
racadm set iDRAC.ActiveDirectory.GlobalCatalog1 <fully qualified domain name or IP address
of the domain controller>
racadm set iDRAC.ActiveDirectory.GlobalCatalog2 <fully qualified domain name or IP address
of the domain controller>
racadm set iDRAC.ActiveDirectory.GlobalCatalog3 <fully qualified domain name or IP address
of the domain controller>
```

- Enter the Fully Qualified Domain Name (FQDN) of the domain controller, not the FQDN of the domain. For example, enter `servername.dell.com` instead of `dell.com`.
- For bit-mask values for specific Role Group permissions, see Default role group privileges.
- You must provide at least one of the three domain controller addresses. iDRAC attempts to connect to each of the configured addresses one-by-one until it makes a successful connection. With Standard Schema, these are the addresses of the domain controllers where the user accounts and the role groups are located.
- The Global Catalog server is only required for standard schema when the user accounts and role groups are in different domains. In multiple domain case, only the Universal Group can be used.
- If certificate validation is enabled, the FQDN or IP address that you specify in this field must match the Subject or Subject Alternative Name field of your domain controller certificate.

- To disable the certificate validation during SSL handshake, use the following command:

  ```
  racadm set iDRAC.ActiveDirectory.CertValidationEnable 0
  ```

  In this case, no Certificate Authority (CA) certificate needs to be uploaded.
- To enforce the certificate validation during SSL handshake (optional), use the following command:

  ```
  racadm set iDRAC.ActiveDirectory.CertValidationEnable 1
  ```

  In this case, you must upload the CA certificate using the following command:

  ```
  racadm sslcertupload -t 0x2 -f <ADS root CA certificate>
  ```

  NOTE: If certificate validation is enabled, specify the Domain Controller Server addresses and the Global Catalog FQDN. Ensure that DNS is configured correctly under Overview > iDRAC Settings > Network.

  Using the following RACADM command may be optional.

  ```
  racadm sslcertdownload -t 1 -f <RAC SSL certificate>
  ```

2 If DHCP is enabled on iDRAC and you want to use the DNS provided by the DHCP server, enter the following command:

```
racadm set iDRAC.IPv4.DNSFromDHCP 1
```

3 If DHCP is disabled on iDRAC or you want manually enter the DNS IP address, enter the following RACADM command:

```
racadm set iDRAC.IPv4.DNSFromDHCP 0
racadm set iDRAC.IPv4.DNSFromDHCP.DNS1 <primary DNS IP address>
racadm set iDRAC.IPv4.DNSFromDHCP.DNS2 <secondary DNS IP address>
```

4 If you want to configure a list of user domains so that you only need to enter the user name when logging in to the web interface, use the following command:

```
racadm set iDRAC.UserDomain.<index>.Name <fully qualified domain name or IP Address of the
domain controller>
```

You can configure up to 40 user domains with index numbers between 1 and 40.

Extended schema Active Directory overview

Using the extended schema solution requires the Active Directory schema extension.

Best practices for extended schema

The extended schema uses Dell association objects to join iDRAC and permission. This allows you to use iDRAC based on the overall permissions granted. The default Access Control List (ACL) of Dell Association objects allows Self and Domain Administrators to manage the permissions and scope of iDRAC objects.

By default, the Dell Association objects do not inherit all permissions from the parent Active Directory objects. If you enable inheritance for the Dell Association object, the inherited permissions for that association object are granted to the selected users and groups. This may result in unintended privileges being provided to the iDRAC.

To use the Extended Schema securely, Dell recommends not enabling inheritance on Dell Association objects within the extended schema implementation.

Active directory schema extensions

The Active Directory data is a distributed database of *attributes* and *classes*. The Active Directory schema includes the rules that determine the type of data that can be added or included in the database. The user class is one example of a *class* that is stored in the database. Some example user class attributes can include the user's first name, last name, phone number, and so on. You can extend the Active Directory database by adding your own unique *attributes* and *classes* for specific requirements. Dell has extended the schema to include the necessary changes to support remote management authentication and authorization using Active Directory.

Each *attribute* or *class* that is added to an existing Active Directory Schema must be defined with a unique ID. To maintain unique IDs across the industry, Microsoft maintains a database of Active Directory Object Identifiers (OIDs) so that when companies add extensions to the schema, they can be guaranteed to be unique and not to conflict with each other. To extend the schema in Microsoft's Active Directory, Dell received unique OIDs, unique name extensions, and uniquely linked attribute IDs for the attributes and classes that are added into the directory service:

- Extension is: `dell`
- Base OID is: `1.2.840.113556.1.8000.1280`
- RAC LinkID range is: `12070 to 12079`

Overview of iDRAC schema extensions

Dell has extended the schema to include an *Association*, *Device*, and *Privilege* property. The *Association* property is used to link together the users or groups with a specific set of privileges to one or more iDRAC devices. This model provides an administrator maximum flexibility over the different combinations of users, iDRAC privileges, and iDRAC devices on the network without much complexity.

For each physical iDRAC device on the network that you want to integrate with Active Directory for authentication and authorization, create at least one association object and one iDRAC device object. You can create multiple association objects, and each association object can be linked to as many users, groups of users, or iDRAC device objects as required. The users and iDRAC user groups can be members of any domain in the enterprise.

However, each association object can be linked (or, may link users, groups of users, or iDRAC device objects) to only one privilege object. This example allows an administrator to control each user's privileges on specific iDRAC devices.

iDRAC device object is the link to iDRAC firmware for querying Active Directory for authentication and authorization. When iDRAC is added to the network, the administrator must configure iDRAC and its device object with its Active Directory name so that users can perform authentication and authorization with Active Directory. Additionally, the administrator must add iDRAC to at least one association object for users to authenticate.

The following figure shows that the association object provides the connection that is needed for the authentication and authorization.

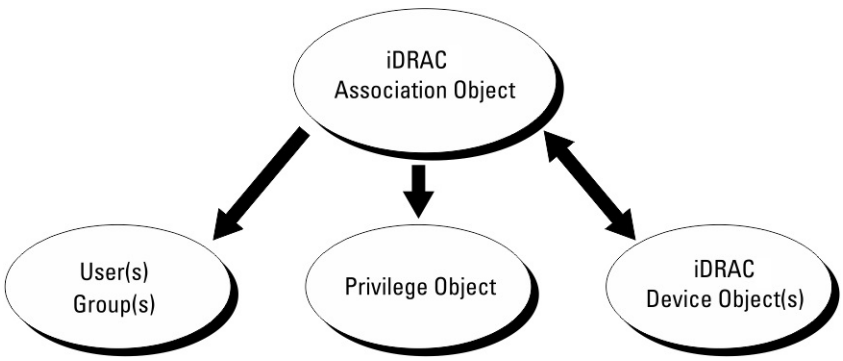

Figure 2. Typical setup for active directory objects

You can create as many or as few association objects as required. However, you must create at least one Association Object, and you must have one iDRAC Device Object for each iDRAC device on the network that you want to integrate with Active Directory for Authentication and Authorization with iDRAC.

The Association Object allows for as many or as few users and/or groups as well as iDRAC Device Objects. However, the Association Object only includes one Privilege Object per Association Object. The Association Object connects the Users who have Privileges on iDRAC devices.

The Dell extension to the ADUC MMC Snap-in only allows associating the Privilege Object and iDRAC Objects from the same domain with the Association Object. The Dell extension does not allow a group or an iDRAC object from other domains to be added as a product member of the Association Object.

When adding Universal Groups from separate domains, create an Association Object with Universal Scope. The Default Association objects created by the Dell Schema Extender Utility are Domain Local Groups and they do not work with Universal Groups from other domains.

Users, user groups, or nested user groups from any domain can be added into the Association Object. Extended Schema solutions support any user group type and any user group nesting across multiple domains allowed by Microsoft Active Directory.

Accumulating privileges using Extended Schema

The Extended Schema Authentication mechanism supports Privilege Accumulation from different privilege objects associated with the same user through different Association Objects. In other words, Extended Schema Authentication accumulates privileges to allow the user the super set of all assigned privileges corresponding to the different privilege objects associated with the same user.

The following figure provides an example of accumulating privileges using Extended Schema.

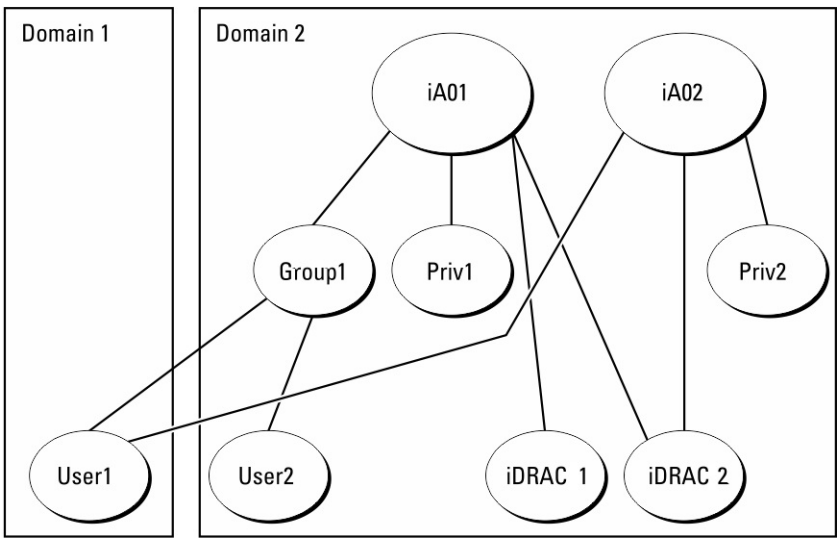

Figure 3. Privilege accumulation for a user

The figure shows two Association Objects—A01 and A02. User1 is associated to iDRAC2 through both association objects.

Extended Schema Authentication accumulates privileges to allow the user the maximum set of privileges possible considering the assigned privileges of the different privilege objects associated to the same user.

In this example, User1 has both Priv1 and Priv2 privileges on iDRAC2. User1 has Priv1 privileges on iDRAC1 only. User2 has Priv1 privileges on both iDRAC1 and iDRAC2. In addition, this figure shows that User1 can be in a different domain and can be a member of a group.

Configuring Extended schema Active Directory

To configure Active Directory to access iDRAC:

1 Extend the Active Directory schema.
2 Extend the Active Directory Users and Computers Snap-in.
3 Add iDRAC users and their privileges to Active Directory.
4 Configure iDRAC Active Directory properties using iDRAC Web interface or RACADM.

Extending Active Directory schema

Extending your Active Directory schema adds a Dell organizational unit, schema classes and attributes, and example privileges and association objects to the Active Directory schema. Before you extend the schema, make sure that you have the Schema Admin privileges on the Schema Master FSMO-Role-Owner of the domain forest.

NOTE: The schema extension for this product is different from the previous generations. The earlier schema does not work with this product.

NOTE: Extending the new schema has no impact on previous versions of the product.

You can extend your schema using one of the following methods:

- Dell Schema Extender utility
- LDIF script file

If you use the LDIF script file, the Dell organizational unit is not added to the schema.

The LDIF files and Dell Schema Extender are on your *Dell Systems Management Tools and Documentation* DVD in the following respective directories:

- DVDdrive :\SYSMGMT\ManagementStation\support\OMActiveDirectory_Tools\Remote_Management_Advanced\LDIF_Files
- <DVDdrive>: \SYSMGMT\ManagementStation\support\OMActiveDirectory_Tools\Remote_Management_Advanced\Schema Extender

To use the LDIF files, see the instructions in the readme included in the **LDIF_Files** directory.

You can copy and run the Schema Extender or LDIF files from any location.

Using Dell Schema Extender

CAUTION: The Dell Schema Extender uses the SchemaExtenderOem.ini file. To make sure that the Dell Schema Extender utility functions properly, do not modify the name of this file.

1. In the **Welcome** screen, click **Next.**
2. Read and understand the warning and click **Next**.
3. Select **Use Current Log In Credentials** or enter a user name and password with schema administrator rights.
4. Click **Next** to run the Dell Schema Extender.
5. Click **Finish**.

   The schema is extended. To verify the schema extension, use the MMC and the Active Directory Schema Snap-in to verify that the Classes and attributes exist. See the Microsoft documentation for details about using the MMC and the Active Directory Schema Snap-in.

Classes and attributes

Table 25. Class definitions for classes added to the active directory schema

Class Name	Assigned Object Identification Number (OID)
delliDRACDevice	1.2.840.113556.1.8000.1280.1.7.1.1
delliDRACAssociation	1.2.840.113556.1.8000.1280.1.7.1.2
dellRAC4Privileges	1.2.840.113556.1.8000.1280.1.1.1.3

Class Name	Assigned Object Identification Number (OID)
dellPrivileges	1.2.840.113556.1.8000.1280.1.1.1.4
dellProduct	1.2.840.113556.1.8000.1280.1.1.1.5

Table 26. DelliDRACdevice class

OID	1.2.840.113556.1.8000.1280.1.7.1.1
Description	Represents the Dell iDRAC device. iDRAC must be configured as delliDRACDevice in Active Directory. This configuration enables iDRAC to send Lightweight Directory Access Protocol (LDAP) queries to Active Directory.
Class Type	Structural Class
SuperClasses	dellProduct
Attributes	dellSchemaVersion
	dellRacType

Table 27. delliDRACAssociationObject class

OID	1.2.840.113556.1.8000.1280.1.7.1.2
Description	Represents the Dell Association Object. The Association Object provides the connection between the users and the devices.
Class Type	Structural Class
SuperClasses	Group
Attributes	dellProductMembers
	dellPrivilegeMember

Table 28. dellRAC4Privileges class

OID	1.2.840.113556.1.8000.1280.1.1.1.3
Description	Defines the privileges (Authorization Rights) for iDRAC
Class Type	Auxiliary Class
SuperClasses	None
Attributes	dellIsLoginUser
	dellIsCardConfigAdmin
	dellIsUserConfigAdmin
	dellIsLogClearAdmin
	dellIsServerResetUser

OID	1.2.840.113556.1.8000.1280.1.1.1.3
	dellIsConsoleRedirectUser
	dellIsVirtualMediaUser
	dellIsTestAlertUser
	dellIsDebugCommandAdmin

Table 29. dellPrivileges class

OID	1.2.840.113556.1.8000.1280.1.1.1.4
Description	Used as a container Class for the Dell Privileges (Authorization Rights).
Class Type	Structural Class
SuperClasses	User
Attributes	dellRAC4Privileges

Table 30. dellProduct class

OID	1.2.840.113556.1.8000.1280.1.1.1.5
Description	The main class from which all Dell products are derived.
Class Type	Structural Class
SuperClasses	Computer
Attributes	dellAssociationMembers

Table 31. List of attributes added to the active directory schema

Attribute Name/Description	Assigned OID/Syntax Object Identifier	Single Valued
dellPrivilegeMember List of dellPrivilege Objects that belong to this Attribute.	1.2.840.113556.1.8000.1280.1.1.2.1 Distinguished Name (LDAPTYPE_DN 1.3.6.1.4.1.1466.115.121.1.12)	FALSE
dellProductMembers List of dellRacDevice and DelliDRACDevice Objects that belong to this role. This attribute is the forward link to the dellAssociationMembers backward link. Link ID: 12070	1.2.840.113556.1.8000.1280.1.1.2.2 Distinguished Name (LDAPTYPE_DN 1.3.6.1.4.1.1466.115.121.1.12)	FALSE
dellIsLoginUser TRUE if the user has Login rights on the device.	1.2.840.113556.1.8000.1280.1.1.2.3 Boolean (LDAPTYPE_BOOLEAN 1.3.6.1.4.1.1466.115.121.1.7)	TRUE

Attribute Name/Description	Assigned OID/Syntax Object Identifier	Single Valued
dellIsCardConfigAdmin TRUE if the user has Card Configuration rights on the device.	1.2.840.113556.1.8000.1280.1.1.2.4 Boolean (LDAPTYPE_BOOLEAN 1.3.6.1.4.1.1466.115.121.1.7)	TRUE
dellIsUserConfigAdmin TRUE if the user has User Configuration rights on the device.	1.2.840.113556.1.8000.1280.1.1.2.5 Boolean (LDAPTYPE_BOOLEAN 1.3.6.1.4.1.1466.115.121.1.7)	TRUE
dellIsLogClearAdmin TRUE if the user has Log Clearing rights on the device.	1.2.840.113556.1.8000.1280.1.1.2.6 Boolean (LDAPTYPE_BOOLEAN 1.3.6.1.4.1.1466.115.121.1.7)	TRUE
dellIsServerResetUser TRUE if the user has Server Reset rights on the device.	1.2.840.113556.1.8000.1280.1.1.2.7 Boolean (LDAPTYPE_BOOLEAN 1.3.6.1.4.1.1466.115.121.1.7)	TRUE
dellIsConsoleRedirectUser TRUE if the user has Virtual Console rights on the device.	1.2.840.113556.1.8000.1280.1.1.2.8 Boolean (LDAPTYPE_BOOLEAN 1.3.6.1.4.1.1466.115.121.1.7)	TRUE
dellIsVirtualMediaUser TRUE if the user has Virtual Media rights on the device.	1.2.840.113556.1.8000.1280.1.1.2.9 Boolean (LDAPTYPE_BOOLEAN 1.3.6.1.4.1.1466.115.121.1.7)	TRUE
dellIsTestAlertUser TRUE if the user has Test Alert User rights on the device.	1.2.840.113556.1.8000.1280.1.1.2.10 Boolean (LDAPTYPE_BOOLEAN 1.3.6.1.4.1.1466.115.121.1.7)	TRUE
dellIsDebugCommandAdmin TRUE if the user has Debug Command Admin rights on the device.	1.2.840.113556.1.8000.1280.1.1.2.11 Boolean (LDAPTYPE_BOOLEAN 1.3.6.1.4.1.1466.115.121.1.7)	TRUE
dellSchemaVersion The Current Schema Version is used to update the schema.	1.2.840.113556.1.8000.1280.1.1.2.12 Case Ignore String (LDAPTYPE_CASEIGNORESTRING 1.2.840.113556.1.4.905)	TRUE
dellRacType This attribute is the Current RAC Type for the delliDRACDevice object and the backward link to the dellAssociationObjectMembers forward link.	1.2.840.113556.1.8000.1280.1.1.2.13 Case Ignore String (LDAPTYPE_CASEIGNORESTRING 1.2.840.113556.1.4.905)	TRUE
dellAssociationMembers List of dellAssociationObjectMembers that belong to this Product. This attribute is the backward link to the dellProductMembers linked attribute.	1.2.840.113556.1.8000.1280.1.1.2.14 Distinguished Name (LDAPTYPE_DN 1.3.6.1.4.1.1466.115.121.1.12)	FALSE

Attribute Name/Description	Assigned OID/Syntax Object Identifier	Single Valued
Link ID: 12071		

Installing Dell extension to the Active Directory users and computers snap-in

When you extend the schema in Active Directory, you must also extend the Active Directory Users and Computers Snap-in so the administrator can manage iDRAC devices, users and user groups, iDRAC associations, and iDRAC privileges.

When you install your systems management software using the *Dell Systems Management Tools and Documentation* DVD, you can extend the Snap-in by selecting the **Active Directory Users and Computers Snap-in** option during the installation procedure. See the Dell OpenManage Software Quick Installation Guide for additional instructions about installing systems management software. For 64-bit Windows Operating Systems, the Snap-in installer is located under:

<DVDdrive>:\SYSMGMT\ManagementStation\support\OMActiveDirectory_SnapIn64

For more information about the Active Directory Users and Computers Snap-in, see Microsoft documentation.

Adding iDRAC users and privileges to Active Directory

Using the Dell-extended Active Directory Users and Computers Snap-in, you can add iDRAC users and privileges by creating device, association, and privilege objects. To add each object, perform the following:

- Create an iDRAC device Object
- Create a Privilege Object
- Create an Association Object
- Add objects to an Association Object

Creating iDRAC device object

To create iDRAC device object:

1. In the MMC **Console Root** window, right-click a container.
2. Select **New** > **Dell Remote Management Object Advanced**.
   The **New Object** window is displayed.
3. Enter a name for the new object. The name must be identical to iDRAC name that you enter while configuring Active Directory properties using iDRAC Web interface.
4. Select iDRAC **Device Object** and click OK.

Creating privilege object

To create a privilege object:

NOTE: You must create a privilege object in the same domain as the related association object.

1. In the **Console Root** (MMC) window, right-click a container.
2. Select **New** > **Dell Remote Management Object Advanced**.
   The **New Object** window is displayed.
3. Enter a name for the new object.
4. Select **Privilege Object** and click OK.
5. Right-click the privilege object that you created, and select **Properties**.
6. Click the **Remote Management Privileges** tab and assign the privileges for the user or group.

Creating association object

To create association object:

NOTE: iDRAC association object is derived from the group and its scope is set to Domain Local.

1 In the **Console Root** (MMC) window, right-click a container.
2 Select **New** > **Dell Remote Management Object Advanced**.
This **New Object** window is displayed.
3 Enter a name for the new object and select **Association Object**.
4 Select the scope for the **Association Object** and click OK.
5 Provide access privileges to the authenticated users for accessing the created association objects.

Providing user access privileges for association objects

To provide access privileges to the authenticated users for accessing the created association objects:

1 Go to **Administrative Tools** > **ADSI Edit**. The **ADSI Edit** window is displayed.
2 In the right-pane, navigate to the created association object, right-click and select **Properties**.
3 In the **Security** tab, click **Add**.
4 Type `Authenticated Users`, click **Check Names**, and click **OK**. The authenticated users is added to the list of **Groups and user names**.
5 Click **OK**.

Adding objects to association object

Using the **Association Object Properties** window, you can associate users or user groups, privilege objects, and iDRAC devices or iDRAC device groups.

You can add groups of users and iDRAC devices.

Adding users or user groups

To add users or user groups:

1 Right-click the **Association Object** and select **Properties**.
2 Select the **Users** tab and click **Add**.
3 Enter the user or user group name and click **OK**.

Adding privileges

To add privileges:

Click the **Privilege Object** tab to add the privilege object to the association that defines the user's or user group's privileges when authenticating to an iDRAC device. Only one privilege object can be added to an Association Object.

1 Select the **Privileges Object** tab and click **Add**.
2 Enter the privilege object name and click **OK**.
3 Click the **Privilege Object** tab to add the privilege object to the association that defines the user's or user group's privileges when authenticating to an iDRAC device. Only one privilege object can be added to an Association Object.

Adding iDRAC devices or iDRAC device groups

To add iDRAC devices or iDRAC device groups:

1 Select the **Products** tab and click **Add**.
2 Enter iDRAC devices or iDRAC device group name and click **OK**.
3 In the **Properties** window, click **Apply** and click **OK**.
4 Click the **Products** tab to add one iDRAC device connected to the network that is available for the defined users or user groups. You can add multiple iDRAC devices to an Association Object.

Configuring Active Directory with Extended schema using iDRAC web interface

To configure Active Directory with extended schema using Web interface:

NOTE: For information about the various fields, see the *iDRAC Online Help*.

1 In the iDRAC Web interface, go to **iDRAC Settings** > **Users** > **Directory Services** > **Microsoft Active Directory**. Click **Edit**
The **Active Directory Configuration and Management Step 1 of 4** page is displayed.
2 Optionally, enable certificate validation and upload the CA-signed digital certificate used during initiation of SSL connections when communicating with the Active Directory (AD) server.
3 Click **Next**.
The **Active Directory Configuration and Management Step 2 of 4** page is displayed.
4 Specify the location information about Active Directory (AD) servers and user accounts. Also, specify the time iDRAC must wait for responses from AD during login process.

NOTE:
- If certificate validation is enabled, specify the Domain Controller Server addresses and the FQDN. Make sure that DNS is configured correctly under **iDRAC Settings** > **Network**
- If the user and iDRAC objects are in different domains, then do not select the **User Domain from Login** option. Instead select **Specify a Domain** option and enter the domain name where the iDRAC object is available.

5 Click **Next**. The **Active Directory Configuration and Management Step 3 of 4** page is displayed.
6 Select **Extended Schema** and click **Next**.
The **Active Directory Configuration and Management Step 4 of 4** page is displayed.
7 Enter the name and location of the iDRAC device object in Active Directory (AD) and click **Finish**.
The Active Directory settings for extended schema mode is configured.

Configuring Active Directory with Extended schema using RACADM

To configure Active Directory with Extended Schema using the RACADM:

1 Use the following commands:

```
racadm set iDRAC.ActiveDirectory.Enable 1
racadm set iDRAC.ActiveDirectory.Schema 2
racadm set iDRAC.ActiveDirectory.RacName <RAC common name>
racadm set iDRAC.ActiveDirectory.RacDomain <fully qualified rac domain name>
racadm set iDRAC.ActiveDirectory.DomainController1 <fully qualified domain name or IP
address of the domain controller>
racadm set iDRAC.ActiveDirectory.DomainController2 <fully qualified domain name or IP
address of the domain controller>
racadm set iDRAC.ActiveDirectory.DomainController3 <fully qualified domain name or IP
address of the domain controller>
```

- Enter the Fully Qualified Domain Name (FQDN) of the domain controller, not the FQDN of the domain. For example, enter `servername.dell.com` instead of `dell.com`.
- You must provide at least one of the three addresses. iDRAC attempts to connect to each of the configured addresses one-by-one until it makes a successful connection. With Extended Schema, these are the FQDN or IP addresses of the domain controllers where this iDRAC device is located.
- To disable the certificate validation during SSL handshake, use the following command:

  ```
  racadm set iDRAC.ActiveDirectory.CertValidationEnable 0
  ```

  In this case, you do not have to upload a CA certificate.
- To enforce the certificate validation during SSL handshake (optional):

  ```
  racadm set iDRAC.ActiveDirectory.CertValidationEnable 1
  ```

  In this case, you must upload a CA certificate using the following command:

  ```
  racadm sslcertupload -t 0x2 -f <ADS root CA certificate>
  ```

  NOTE: If certificate validation is enabled, specify the Domain Controller Server addresses and the FQDN. Ensure that DNS is configured correctly under iDRAC Settings > Network.

  Using the following RACADM command may be optional:

  ```
  racadm sslcertdownload -t 1 -f <RAC SSL certificate>
  ```

2 If DHCP is enabled on iDRAC and you want to use the DNS provided by the DHCP server, enter the following command:

```
racadm set iDRAC.IPv4.DNSFromDHCP 1
```

3 If DHCP is disabled in iDRAC or you want to manually input your DNS IP address, enter the following command:

```
racadm set iDRAC.IPv4.DNSFromDHCP 0
racadm set iDRAC.IPv4.DNSFromDHCP.DNS1 <primary DNS IP address>
racadm set iDRAC.IPv4.DNSFromDHCP.DNS2 <secondary DNS IP address>
```

4 If you want to configure a list of user domains so that you only need to enter the user name during log in to iDRAC web interface, use the following command:

```
racadm set iDRAC.UserDomain.<index>.Name <fully qualified domain name or IP Address of the domain controller>
```

You can configure up to 40 user domains with index numbers between 1 and 40.

Testing Active Directory settings

You can test the Active Directory settings to verify whether your configuration is correct, or to diagnose the problem with a failed Active Directory log in.

Testing Active Directory settings using iDRAC web interface

To test the Active Directory settings:

1 In iDRAC Web Interface, go to **iDRAC Settings** > **Users** > **Directory Services** > **Microsoft Active Directory**, click **Test**.

The **Test Active Directory Settings** page is displayed.

2 Click **Test**.

3 Enter a test user's name (for example, **username@domain.com**) and password and click **Start Test**. A detailed test results and the test log displays.

If there is a failure in any step, examine the details in the test log to identify the problem and a possible solution.

NOTE: When testing Active Directory settings with Enable Certificate Validation checked, iDRAC requires that the Active Directory server be identified by the FQDN and not an IP address. If the Active Directory server is identified by an IP address, certificate validation fails because iDRAC is not able to communicate with the Active Directory server.

Testing Active Directory settings using RACADM

To test the Active Directory settings, use the **testfeature** command.

For more information, see the iDRAC RACADM CLI Guide available at www.dell.com/idracmanuals.

Configuring generic LDAP users

iDRAC provides a generic solution to support Lightweight Directory Access Protocol (LDAP)-based authentication. This feature does not require any schema extension on your directory services.

To make iDRAC LDAP implementation generic, the commonality between different directory services is utilized to group users and then map the user-group relationship. The directory service specific action is the schema. For example, they may have different attribute names for the group, user, and the link between the user and the group. These actions can be configured in iDRAC.

NOTE: The Smart Card based Two Factor Authentication (TFA) and the Single Sign-On (SSO) logins are not supported for generic LDAP Directory Service.

Configuring generic LDAP directory service using iDRAC web-based interface

To configure the generic LDAP directory service using Web interface:

NOTE: For information about the various fields, see the *iDRAC Online Help*.

1 In the iDRAC Web interface, go to **iDRAC Settings** > **Users** > **Directory Services** > **Generic LDAP Directory Service**, click **Edit**.
The **Generic LDAP Configuration and Management Step 1 of 3** page displays the current generic LDAP settings.

2 Optionally, enable certificate validation and upload the digital certificate used during initiation of SSL connections when communicating with a generic LDAP server.

NOTE: In this release, non-SSL port based LDAP bind is not supported. Only LDAP over SSL is supported.

3 Click **Next**.
The **Generic LDAP Configuration and Management Step 2 of 3** page is displayed.

4 Enable generic LDAP authentication and specify the location information about generic LDAP servers and user accounts.

NOTE: If certificate validation is enabled, specify the LDAP Server's FQDN and make sure that DNS is configured correctly under iDRAC Settings > **Network.**

NOTE: In this release, nested group is not supported. The firmware searches for the direct member of the group to match the user DN. Also, only single domain is supported. Cross domain is not supported.

5 Click **Next**.
The **Generic LDAP Configuration and Management Step 3a of 3** page is displayed.

6 Click **Role Group**.
The **Generic LDAP Configuration and Management Step 3b of 3** page is displayed.

7 Specify the group distinguished name, the privileges associated with the group, and click **Apply**.

NOTE: If you are using Novell eDirectory and if you have used these characters—#(hash), "(double quotes), ;(semi colon), > (greater than), , (comma), or <(lesser than)—for the Group DN name, they must be escaped.

The role group settings are saved. The **Generic LDAP Configuration and Management Step 3a of 3** page displays the role group settings.

8 If you want to configure additional role groups, repeat steps 7 and 8.

9 Click **Finish**. The generic LDAP directory service is configured.

Configuring generic LDAP directory service using RACADM

To configure the LDAP directory service, use the objects in the **iDRAC.LDAP** and **iDRAC.LDAPRole** groups.

For more information, see the iDRAC RACADM CLI Guide available at www.dell.com/idracmanuals.

Testing LDAP directory service settings

You can test the LDAP directory service settings to verify whether your configuration is correct, or to diagnose the problem with a failed LDAP log in.

Testing LDAP directory service settings using iDRAC web interface

To test the LDAP directory service settings:

1 In iDRAC Web Interface, go to **iDRAC Settings** > **Users** > **Directory Services** > **Generic LDAP Directory Service**.

The **Generic LDAP Configuration and Management** page displays the current generic LDAP settings.

2 Click **Test**.

3 Enter the user name and password of a directory user that is chosen to test the LDAP settings. The format depends on the *Attribute of User Login* is used and the user name entered must match the value of the chosen attribute.

NOTE: When testing LDAP settings with Enable Certificate Validation checked, iDRAC requires that the LDAP server be identified by the FQDN and not an IP address. If the LDAP server is identified by an IP address, certificate validation fails because iDRAC is not able to communicate with the LDAP server.

NOTE: When generic LDAP is enabled, iDRAC first tries to login the user as a directory user. If it fails, local user lookup is enabled.

The test results and the test log are displayed.

Testing LDAP directory service settings using RACADM

To test the LDAP directory service settings, use the `testfeature` command. For more information, see the iDRAC RACADM CLI Guide available at www.dell.com/idracmanuals.

8

System Lockdown mode

System Lockdown mode helps in preventing unintended changes after a system is provisioned. This feature can help in protecting the system from unintentional or malicious changes. Lockdown mode is applicable to both configuration and firmware updates. When the system is locked down, any attempt to change the system configuration is blocked. If any attempts are made to change the critical system settings, an error message is displayed.

NOTE: After the System Lockdown mode is enabled, you cannot change any configuration settings. System Settings fields are disabled.

Lockdown mode can be enabled or disabled using the following interfaces:

- iDRAC web interface
- RACADM
- WSMan
- SCP (System Configuration Profile)
- Redfish
- Using F2 during POST and selecting iDRAC Settings

NOTE: To enable Lockdown mode, you must have iDRAC Enterprise license and System Control privileges.

Following are a few of the tasks that can be performed even if the system is in Lockdown mode:

- Power cap setting
- System power operations (power on/off, reset)
- Power priority
- Identify operations (Chassis or PERC)
- Part replacement
- Running diagnostics
- Modular operations (VLan configuration, Remote-Assigned Address)
- Group Manager passcode

The following table lists the functional and non-functional features, interfaces, and utilities that are affected by Lockdown mode:

NOTE: Changing the boot order using iDRAC is not supported when lockdown mode is enabled. However, boot-control option is available in vConsole menu, which has no effect when iDRAC is in lock down mode.

Table 32. Items affected by Lockdown mode

Disabled	Remain functional
• OMSA/OMSS • IPMI • DRAC/LC • DTK-Syscfg • Redfish • OpenManage Essentials • BIOS (F2 settings become read-only)	• All Vendor tools that have direct access to the device • PERC – PERC CLI – DTK-RAIDCFG – F2/Ctrl+R • NVMe – DTK-RAIDCFG

Disabled	Remain functional
	– F2/Ctrl+R • BOSS-S1 – Marvell CLI – F2/Ctrl+R • Part replacement, Easy Restore, and system board replacement • Power capping • System power operations (power on, off, reset) • Identify devices (chassis and PERC) • ISM/OMSA settings (OS BMC enable, watchdog ping, OS name, OS version) • Modular operations (VLAN configuration, Remote-Assigned Addressing) • Group Manager passcode

NOTE: When lockdown mode is enabled, OpenID Connect login option is not displayed in iDRAC login page.

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Configuring iDRAC for Single Sign-On or smart card login

This section provides information to configure iDRAC for Smart Card login (for local users and Active Directory users), and Single Sign-On (SSO) login (for Active Directory users.) SSO and smart card login are licensed features.

iDRAC supports Kerberos based Active Directory authentication to support Smart Card and SSO logins. For information on Kerberos, see the Microsoft website.

Topics:

- Prerequisites for Active Directory Single Sign-On or smart card login
- Configuring iDRAC SSO login for Active Directory users
- Configuring iDRAC smart card login for local users
- Configuring iDRAC smart card login for Active Directory users
- Enabling or disabling smart card login

Prerequisites for Active Directory Single Sign-On or smart card login

The prerequisites to Active Directory based SSO or Smart Card logins are:

- Synchronize iDRAC time with the Active Directory domain controller time. If not, kerberos authentication on iDRAC fails. You can use the Time zone and NTP feature to synchronize the time. To do this, see Configuring time zone and NTP.
- Register iDRAC as a computer in the Active Directory root domain.
- Generate a keytab file using the ktpass tool.
- To enable Single Sign-On for Extended schema, make sure that the **Trust this user for delegation to any service (Kerberos only)** option is selected on the **Delegation** tab for the keytab user. This tab is available only after creating the keytab file using ktpass utility.
- Configure the browser to enable SSO login.
- Create the Active Directory objects and provide the required privileges.
- For SSO, configure the reverse lookup zone on the DNS servers for the subnet where iDRAC resides.

  NOTE: If the host name does not match the reverse DNS lookup, Kerberos authentication fails.
- Configure the browser to support SSO login. For more information, see Single Sign-On.

  NOTE: Google Chrome and Safari do not support Active Directory for SSO login.

Registering iDRAC as a computer in Active Directory root domain

To register iDRAC in Active Directory root domain:

1 Click **iDRAC Settings** > **Connectivity** > **Network**.

The **Network** page is displayed.

2 You can select **IPv4 Settings** or **IPv6 Settings** based on the IP settings.

3 Provide a valid **Preferred/Alternate DNS Server** IP address. This value is a valid DNS server IP address that is part of the root domain.

4 Select **Register iDRAC on DNS**.

5 Provide a valid **DNS Domain Name**.

6 Verify that network DNS configuration matches with the Active Directory DNS information.

For more information about the options, see the *iDRAC Online Help*.

Generating Kerberos keytab file

To support the SSO and smart card login authentication, iDRAC supports the configuration to enable itself as a kerberized service on a Windows Kerberos network. The Kerberos configuration on iDRAC involves the same steps as configuring a non–Windows Server Kerberos service as a security principal in Windows Server Active Directory.

The *ktpass* tool (available from Microsoft as part of the server installation CD/DVD) is used to create the Service Principal Name (SPN) bindings to a user account and export the trust information into a MIT–style Kerberos *keytab* file, which enables a trust relation between an external user or system and the Key Distribution Centre (KDC). The keytab file contains a cryptographic key, which is used to encrypt the information between the server and the KDC. The ktpass tool allows UNIX–based services that support Kerberos authentication to use the interoperability features provided by a Windows Server Kerberos KDC service. For more information on the **ktpass** utility, see the Microsoft website at: **technet.microsoft.com/en-us/library/cc779157(WS.10).aspx**

Before generating a keytab file, you must create an Active Directory user account for use with the **-mapuser** option of the `ktpass` command. Also, you must have the same name as iDRAC DNS name to which you upload the generated keytab file.

To generate a keytab file using the ktpass tool:

1 Run the *ktpass* utility on the domain controller (Active Directory server) where you want to map iDRAC to a user account in Active Directory.

2 Use the following ktpass command to create the Kerberos keytab file:

```
C:\> ktpass.exe -princ HTTP/idrac7name.domainname.com@DOMAINNAME.COM -mapuser DOMAINNAME
\username -mapOp set -crypto AES256-SHA1 -ptype KRB5_NT_PRINCIPAL -pass [password] -out c:
\krbkeytab
```

The encryption type is AES256-SHA1. The principal type is KRB5_NT_PRINCIPAL. The properties of the user account to which the Service Principal Name is mapped to must have **Use AES 256 encryption types for this account** property enabled.

NOTE: Use lowercase letters for the iDRACname and Service Principal Name. Use uppercase letters for the domain name as shown in the example.

3 Run the following command:

```
C:\>setspn -a HTTP/iDRACname.domainname.com username
```

A keytab file is generated.

NOTE: If you find any issues with iDRAC user for which the keytab file is created, create a new user and a new keytab file. If the same keytab file which was initially created is again executed, it does not configure correctly.

Creating Active Directory objects and providing privileges

Perform the following steps for Active Directory Extended schema based SSO login:

1 Create the device object, privilege object, and association object in the Active Directory server.

2 Set access privileges to the created privilege object. It is recommended not to provide administrator privileges as this could bypass some security checks.

3 Associate the device object and privilege object using the association object.
4 Add the preceding SSO user (login user) to the device object.
5 Provide access privilege to *Authenticated Users* for accessing the created association object.

Configuring iDRAC SSO login for Active Directory users

Before configuring iDRAC for Active Directory SSO login, make sure that you have completed all the prerequisites.

You can configure iDRAC for Active Directory SSO when you setup an user account based on Active Directory.

Configuring iDRAC SSO login for Active Directory users using web interface

To configure iDRAC for Active Directory SSO login:

NOTE: For information about the options, see the *iDRAC Online Help*.

1 Verify whether the iDRAC DNS name matches the iDRAC Fully Qualified Domain Name. To do this, in iDRAC Web interface, go to **iDRAC Settings** > **Network** > **Common Settings** and see the **DNS iDRAC Name** property.
2 While configuring Active Directory to setup a user account based on standard schema or extended schema, perform the following two additional steps to configure SSO:
   - Upload the keytab file on the **Active Directory Configuration and Management Step 1 of 4** page.
   - Select **Enable Single Sign-On** option on the **Active Directory Configuration and Management Step 2 of 4** page.

Configuring iDRAC SSO login for Active Directory users using RACADM

To enable SSO, complete the steps to configure Active Directory, and run the following command:

```
racadm set iDRAC.ActiveDirectory.SSOEnable 1
```

Configuring iDRAC smart card login for local users

To configure iDRAC local user for smart card login:

1 Upload the smart card user certificate and trusted CA certificate to iDRAC.
2 Enable smart card login.

Uploading smart card user certificate

Before you upload the user certificate, make sure that the user certificate from the smart card vendor is exported in Base64 format. SHA-2 certificates are also supported.

Uploading smart card user certificate using web interface

To upload smart card user certificate:

1 In iDRAC Web interface, go to **iDRAC Settings** > **Users** > **Smart Card**.

NOTE: The Smart Card log-On feature requires the configuration of the local and/or Active Directory user certificate.

2 Under **Configure Smart Card Logon**, select **Enabled With Remote RACADM** to enable the configuration..

3 Enable **Enable CRL Check for Smart Card Logon**.

4 Click **Apply**.

Uploading smart card user certificate using RACADM

To upload smart card user certificate, use the **usercertupload** object. For more information, see the iDRAC RACADM CLI Guide available at www.dell.com/idracmanuals.

Uploading trusted CA certificate for smart card

Before you upload the CA certificate, make sure that you have a CA-signed certificate.

Uploading trusted CA certificate for smart card using web interface

To upload trusted CA certificate for smart card login:

1 In iDRAC Web interface, go to **iDRAC Settings** > **Network** > **User Authentication** > **Local Users**.
The **Users** page is displayed.

2 In the **User ID** column, click a user ID number.
The **Users Main Menu** page is displayed.

3 Under **Smart Card Configurations**, select **Upload Trusted CA Certificate** and click **Next**.
The **Trusted CA Certificate Upload** page is displayed.

4 Browse and select the trusted CA certificate, and click **Apply**.

Uploading trusted CA certificate for smart card using RACADM

To upload trusted CA certificate for smart card login, use the **usercertupload** object. For more information, see the iDRAC RACADM CLI Guide available at www.dell.com/idracmanuals.

Configuring iDRAC smart card login for Active Directory users

Before configuring iDRAC Smart Card login for Active Directory users, make sure that you have completed the required prerequisites.

To configure iDRAC for smart card login:

1 In iDRAC Web interface, while configuring Active Directory to set up an user account based on standard schema or extended schema, on the **Active Directory Configuration and Management Step 1 of 4** page:

- Enable certificate validation.

- Upload a trusted CA-signed certificate.
- Upload the keytab file.

2 Enable smart card login. For information about the options, see the *iDRAC Online Help*.

Enabling or disabling smart card login

Before enabling or disabling smart card login for iDRAC, make sure that:

- You have configure iDRAC permissions.
- iDRAC local user configuration or Active Directory user configuration with the appropriate certificates is complete.

NOTE: If smart card login is enabled, then SSH, Telnet, IPMI Over LAN, Serial Over LAN, and remote RACADM are disabled. Again, if you disable smart card login, the interfaces are not enabled automatically.

Enabling or disabling smart card login using web interface

To enable or disable the Smart Card logon feature:

1 In the iDRAC web interface, go to **iDRAC Settings** > **Users** > **Smart Card**.
The **Smart Card** page is displayed.

2 From the **Configure Smart Card Logon** drop-down menu, select **Enabled** to enable smart card logon or select **Enabled With Remote RACADM**. Else, select **Disabled**.
For more information about the options, see the *iDRAC Online Help*.

3 Click **Apply** to apply the settings.
You are prompted for a Smart Card login during any subsequent logon attempts using the iDRAC web interface.

Enabling or disabling smart card login using RACADM

To enable smart card login, use the **set** command with objects in the **iDRAC.SmartCard** group.
For more information, see the iDRAC RACADM CLI Guide available at www.dell.com/idracmanuals.

Enabling or disabling smart card login using iDRAC settings utility

To enable or disable the Smart Card logon feature:

1 In the iDRAC Settings utility, go to **Smart Card**.
The **iDRAC Settings Smart Card** page is displayed.

2 Select **Enabled** to enable smart card logon. Else, select **Disabled**. For more information about the options, see *iDRAC Settings Utility Online Help*.

3 Click **Back**, click **Finish**, and then click **Yes**.
The smart card logon feature is enabled or disabled based on the selection.

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Configuring iDRAC to send alerts

You can set alerts and actions for certain events that occur on the managed system. An event occurs when the status of a system component is greater than the pre-defined condition. If an event matches an event filter and you have configured this filter to generate an alert (e-mail, SNMP trap, IPMI alert, remote system logs, Redfish event, or WS events), then an alert is sent to one or more configured destinations. If the same event filter is also configured to perform an action (such as reboot, power cycle, or power off the system), the action is performed. You can set only one action for each event.

To configure iDRAC to send alerts:

1 Enable alerts.
2 Optionally, you can filter the alerts based on category or severity.
3 Configure the e-mail alert, IPMI alert, SNMP trap, remote system log, Redfish event, operating system log, and/or WS-event settings.
4 Enable event alerts and actions such as:
   - Send an email alert, IPMI alert, SNMP traps, remote system logs, Redfish event, operating system log, or WS events to configured destinations.
   - Perform a reboot, power off, or power cycle the managed system.

Topics:

- Enabling or disabling alerts
- Filtering alerts
- Setting event alerts
- Setting alert recurrence event
- Setting event actions
- Configuring email alert, SNMP trap, or IPMI trap settings
- Configuring WS Eventing
- Configuring Redfish Eventing
- Alerts message IDs

Enabling or disabling alerts

For sending an alert to configured destinations or to perform an event action, you must enable the global alerting option. This property overrides individual alerting or event actions that is set.

Enabling or disabling alerts using web interface

To enable or disable generating alerts:

1 In iDRAC Web interface, go to **Configuration** > **System Settings** > **Alert Configuration**.
   The **Alerts** page is displayed.
2 Under **Alerts** section:
   - Select **Enable** to enable alert generation or perform an event action.
   - Select **Disable** to disable alert generation or disable an event action.
3 Click **Apply** to save the setting.

Enabling or disabling alerts using RACADM

Use the following command:

```
racadm set iDRAC.IPMILan.AlertEnable <n>
```

n=0 — Disabled

n=1 — Enabled

Enabling or disabling alerts using iDRAC settings utility

To enable or disable generating alerts or event actions:

1 In the iDRAC Settings utility, go to **Alerts**.

The **iDRAC Settings Alerts** page is displayed.

2 Under **Platform Events**, select **Enabled** to enable alert generation or event action. Else, select **Disabled**. For more information about the options, see *iDRAC Settings Utility Online Help.*

3 Click **Back**, click **Finish**, and then click **Yes**.

The alert settings are configured.

Filtering alerts

You can filter alerts based on category and severity.

Filtering alerts using iDRAC web interface

To filter the alerts based on category and severity:

NOTE: Even if you are a user with read-only privileges, you can filter the alerts.

1 In iDRAC Web interface, go to **Configuration** > **System Settings** > **Alerts and Remote System Log Configuration**.

2 Under **Alerts and Remote System Log Configuration** section, select **Filter**:

- System Health — System Health category represents all the alerts that are related to hardware within the system chassis. Examples include temperature errors, voltage errors, device errors.
- Storage Health — Storage Health category represents alerts that are related to the storage subsystem. Examples include, controller errors, physical disk errors, virtual disk errors.
- Configuration — Configuration category represents alerts that are related to hardware, firmware and software configuration changes. Examples include, PCI-e card added/removed, RAID configuration changed, iDRAC license changed.
- Audit — Audit category represents the audit log. Examples include, user login/logout information, Password authentication failures, session info, power states.
- Updates — Update category represents alerts that are generated due to firmware/Driver upgrades/downgrades.

  NOTE: This doesn't represent firmware inventory.
- Work Notes

3 Select one or more of the following severity levels:

- Informational
- Warning
- Critical

4 Click **Apply**.

The **Alert Results** section displays the results based on the selected category and severity.

Filtering alerts using RACADM

To filter the alerts, use the **eventfilters** command. For more information, see the iDRAC RACADM CLI Guide available at www.dell.com/idracmanuals.

Setting event alerts

You can set event alerts such as e-mail alerts, IPMI alerts, SNMP traps, remote system logs, operating system logs, and WS events to be sent to configured destinations.

Setting event alerts using web interface

To set an event alert using the web interface:

1. Make sure that you have configured the e-mail alert, IPMI alert, SNMP trap settings, and/or remote system log settings.
2. In iDRAC Web interface, go to **Configuration** > **System Settings** > **Alerts and Remote System Log Configuration**.
3. Under **Category**, select one or all of the following alerts for the required events:
   - Email
   - SNMP Trap
   - IPMI Alert
   - Remote System Log
   - WS Eventing
   - OS Log
   - Redfish Event
4. Select **Action**.
   The setting is saved.
5. Optionally, you can send a test event. In the **Message ID to Test Event** field, enter the message ID to test if the alert is generated and click **Test**. For information about the event and error messages generated by the system firmware and agents that monitor system components, see the Error Code Lookup page, at qrl.dell.com.

Setting event alerts using RACADM

To set an event alert, use the **eventfilters** command. For more information, see the iDRAC RACADM CLI Guide available at www.dell.com/idracmanuals.

Setting alert recurrence event

You can configure iDRAC to generate additional events at specific intervals if the system continues to operate at a temperature which is greater than the inlet temperature threshold limit. The default interval is 30 days. The valid range is 0 to 366 days. A value of '0' indicates no event recurrence.

NOTE: You must have Configure iDRAC privilege to set the alert recurrence value.

Setting alert recurrence events using RACADM

To set the alert recurrence event using RACADM, use the **eventfilters** command. For more information, see the iDRAC RACADM CLI Guide available at www.dell.com/idracmanuals.

Setting alert recurrence events using iDRAC web interface

To set the alert recurrence value:

1 In iDRAC Web interface, go to **Configuration** > **System Settings** > **Alert Recurrence**.
2 In the **Recurrence** column, enter the alert frequency value for the required category, alert, and severity type(s).
For more information, see the *iDRAC Online help*.
3 Click **Apply**.
The alert recurrence settings are saved.

Setting event actions

You can set event actions such as perform a reboot, power cycle, power off, or perform no action on the system.

Setting event actions using web interface

To set an event action:

1 In iDRAC Web interface, go to **Configuration** > **System Settings** > **Alert and Remote System Log Configuration**.
2 From the **Actions** drop-down menu, for each event select an action:
- Reboot
- Power Cycle
- Power Off
- No Action

3 Click **Apply**.
The setting is saved.

Setting event actions using RACADM

To configure an event action, use the **eventfilters** command. For more information, see the iDRAC RACADM CLI Guide available at www.dell.com/idracmanuals.

Configuring email alert, SNMP trap, or IPMI trap settings

The management station uses Simple Network Management Protocol (SNMP) and Intelligent Platform Management Interface (IPMI) traps to receive data from iDRAC. For systems with large number of nodes, it may not be efficient for a management station to poll each iDRAC for every condition that may occur. For example, event traps can help a management station with load balancing between nodes or by issuing an alert if an authentication failure occurs. SNMP v1, v2, and v3 formats are supported.

You can configure the IPv4 and IPv6 alert destinations, email settings, and SMTP server settings, and test these settings. You can also specify the SNMP v3 user to whom you want to send the SNMP traps.

Before configuring the email, SNMP, or IPMI trap settings, make sure that:

- You have Configure RAC permission.
- You have configured the event filters.

Configuring IP alert destinations

You can configure the IPv6 or IPv4 addresses to receive the IPMI alerts or SNMP traps.

For information about the iDRAC MIBs required to monitor the servers using SNMP, see the Dell EMC OpenManage SNMP Reference Guide available at www.dell.com/openmanagemanuals.

Configuring IP alert destinations using web interface

To configure alert destination settings using Web interface:

1 In iDRAC Web interface, go to **Configuration** > **System Settings** > **SNMP and E-mail Settings**.

2 Select the **State** option to enable an alert destination (IPv4 address, IPv6 address, or Fully Qualified Domain Name (FQDN)) to receive the traps.

You can specify up to eight destination addresses. For more information about the options, see the *iDRAC Online Help*.

3 Select the SNMP v3 user to whom you want to send the SNMP trap.

4 Enter the iDRAC SNMP community string (applicable only for SNMPv1 and v2) and the SNMP alert port number.

For more information about the options, see the *iDRAC Online Help*.

NOTE: The Community String value indicates the community string to use in a Simple Network Management Protocol (SNMP) alert trap sent from iDRAC. Make sure that the destination community string is the same as the iDRAC community string. The default value is Public.

5 To test whether the IP address is receiving the IPMI or SNMP traps, click **Send** under **Test IPMI Trap** and **Test SNMP Trap** respectively.

6 Click **Apply**.

The alert destinations are configured.

7 In the **SNMP Trap Format** section, select the protocol version to be used to send the traps on the trap destination(s) — **SNMP v1**, **SNMP v2**, or **SNMP v3** and click **Apply**.

NOTE: The SNMP Trap Format option applies only for SNMP Traps and not for IPMI Traps. IPMI Traps are always sent in SNMP v1 format and is not based on the configured SNMP Trap Format option.

The SNMP trap format is configured.

Configuring IP alert destinations using RACADM

To configure the trap alert settings:

1 To enable traps:

```
racadm set idrac.SNMP.Alert.<index>.Enable <n>
```

Parameter	Description
<index>	Destination index. Allowed values are 1 through 8.

Parameter	Description
<n>=0	Disable the trap
<n>=1	Enable the trap

2 To configure the trap destination address:

```
racadm set idrac.SNMP.Alert.<index>.DestAddr <Address>
```

Parameter	Description
<index>	Destination index. Allowed values are 1 through 8.
<Address>	A valid IPv4, IPv6, or FQDN address

3 Configure the SNMP community name string:

```
racadm set idrac.ipmilan.communityname <community_name>
```

Parameter	Description
<community_name>	The SNMP Community Name.

4 To configure SNMP destination:

- Set the SNMP trap destination for SNMPv3:

  ```
  racadm set idrac.SNMP.Alert.<index>.DestAddr <IP address>
  ```

- Set SNMPv3 users for trap destinations:

  ```
  racadm set idrac.SNMP.Alert.<index>.SNMPv3Username <user_name>
  ```

- Enable SNMPv3 for a user:

  ```
  racadm set idrac.users.<index>.SNMPv3Enable Enabled
  ```

5 To test the trap, if required:

```
racadm testtrap -i <index>
```

For more information, see the iDRAC RACADM CLI Guide available at www.dell.com/idracmanuals.

Configuring IP alert destinations using iDRAC settings utility

You can configure alert destinations (IPv4, IPv6, or FQDN) using the iDRAC Settings utility. To do this:

1 In the **iDRAC Settings utility**, go to **Alerts**.

The **iDRAC Settings Alerts** page is displayed.

2 Under **Trap Settings**, enable the IP address(es) to receive the traps and enter the IPv4, IPv6, or FQDN destination address(es). You can specify up to eight addresses.

3 Enter the community string name.

For information about the options, see the *iDRAC Settings Utility Online Help*.

4 Click **Back**, click **Finish**, and then click **Yes**.

The alert destinations are configured.

Configuring email alert settings

You can configure the email address to receive the email alerts. Also, configure the SMTP server address settings.

NOTE: If your mail server is Microsoft Exchange Server 2007, ensure that the iDRAC domain name is configured for the mail server to receive the email alerts from iDRAC.

NOTE: Email alerts support both IPv4 and IPv6 addresses. The iDRAC DNS Domain Name must be specified when using IPv6.

NOTE: If you are using an external SMTP server, ensure that iDRAC can communicate with that server. If the server is unreachable, the error RAC0225 is displayed while trying to send a test mail.

Configuring email alert settings using web interface

To configure the email alert settings using Web interface:

1 In iDRAC Web interface, go to **Configuration** > **System Settings** > **SMTP (E-mail) Configuration**.
2 Type a valid email address.
3 Click **Send** under **Test Email** to test the configured email alert settings.
4 Click **Apply**.
5 For SMTP (E-mail) Server Settings provide the following details:
   - SMTP (E-mail) Server IP Address or FQDN/DNS Name
   - SMTP Port Number
   - Authentication
   - Username
6 Click **Apply**. For more information about the options, see the *iDRAC Online Help*.

Configuring email alert settings using RACADM

1 To enable email alert:

```
racadm set iDRAC.EmailAlert.Enable.[index] [n]
```

Parameter	Description
index	Email destination index. Allowed values are 1 through 4.
n=0	Disables email alerts.
n=1	Enables email alerts.

2 To configure email settings:

```
racadm set iDRAC.EmailAlert.Address.[index] [email-address]
```

Parameter	Description
index	Email destination index. Allowed values are 1 through 4.
email-address	Destination email address that receives the platform event alerts.

3 To configure a custom message:

```
racadm set iDRAC.EmailAlert.CustomMsg.[index] [custom-message]
```

Parameter	Description
index	Email destination index. Allowed values are 1 through 4.
custom-message	Custom message

4 To test the configured email alert, if required:

```
racadm testemail -i [index]
```

Parameter	Description
index	Email destination index to be tested. Allowed values are 1 through 4.

For more information, see the iDRAC RACADM CLI Guide available at www.dell.com/idracmanuals.

Configuring SMTP email server address settings

You must configure the SMTP server address for email alerts to be sent to specified destinations.

Configuring SMTP email server address settings using iDRAC web interface

To configure the SMTP server address:

1 In iDRAC Web interface, go to **Configuaration** > **System Settings** > **Alert Configuration** > **SNMP (E-mail Configuration)**.
2 Enter the valid IP address or fully qualified domain name (FQDN) of the SMTP server to be used in the configuration.
3 Select the **Enable Authentication** option and then provide the user name and password (of a user who has access to SMTP server).
4 Enter the SMTP port number.
For more information about the fields, see the *iDRAC Online Help*.
5 Click **Apply**.
The SMTP settings are configured.

Configuring SMTP email server address settings using RACADM

To configure the SMTP email server:

```
racadm set iDRAC.RemoteHosts.SMTPServerIPAddress <SMTP E-mail Server IP Address>
```

Configuring WS Eventing

The WS Eventing protocol is used for a client service (subscriber) to register interest (subscription) with a server (event source) for receiving messages containing the server events (notifications or event messages). Clients interested in receiving the WS Eventing messages can subscribe with iDRAC and receive Lifecycle Controller job related events.

The steps required to configure WS Eventing feature to receive WS Eventing messages for changes related to Lifecycle Controller jobs are described in the Web service Eventing Support for iDRAC 1.30.30 specification document. In addition to this specification, see the DSP0226 (DMTF WS Management Specification), Section 10 Notifications (Eventing) document for the complete information on the WS Eventing protocol. The Lifecycle Controller related jobs are described in the DCIM Job Control Profile document.

Configuring Redfish Eventing

The Redfish eventing protocol is used for a client service (subscriber) to register interest (subscription) with a server (event source) for receiving messages containing the Redfish events (notifications or event messages). Clients interested in receiving the Redfish eventing messages can subscribe with iDRAC and receive Lifecycle Controller job related events.

Alerts message IDs

The following table provides the list of message IDs that are displayed for the alerts.

Table 33. Alert message IDs

Message ID	Description
AMP	Amperage
ASR	Auto Sys Reset
BAR	Backup/Restore
BAT	Battery Event
BIOS	BIOS Management

Message ID	Description
BOOT	BOOT Control
CBL	Cable
CPU	Processor
CPUA	Proc Absent
CTL	Storage Contr
DH	Cert Mgmt
DIS	Auto-Discovery
ENC	Storage Enclosr
FAN	Fan Event
FSD	Debug
HWC	Hardware Config
IPA	DRAC IP Change
ITR	Intrusion
JCP	Job Control
LC	Lifecycle Controller
LIC	Licensing
LNK	Link Status
LOG	Log event
MEM	Memory
NDR	NIC OS Driver
NIC	NIC Config
OSD	OS Deployment
OSE	OS Event
PCI	PCI Device
PDR	Physical Disk
PR	Part Exchange
PST	BIOS POST
PSU	Power Supply

Message ID	Description
PSUA	PSU Absent
PWR	Power Usage
RAC	RAC Event
RDU	Redundancy
RED	FW Download
RFL	IDSDM Media
RFLA	IDSDM Absent
RRDU	IDSDM Redundancy
RSI	Remote Service
SEC	Security Event
SEL	Sys Event Log
SRD	Software RAID
SSD	PCIe SSD
STOR	Storage
SUP	FW Update Job
SWC	Software Config
SWU	Software Change
SYS	System Info
TMP	Temperature
TST	Test Alert
UEFI	UEFI Event
USR	User Tracking
VDR	Virtual Disk
VF	vFlash SD card
VFL	vFlash Event
VFLA	vFlash Absent
VLT	Voltage
VME	Virtual Media

Message ID	Description
VRM	Virtual Console
WRK	Work Note

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iDRAC 9 Group Manager

iDRAC Group Manager feature is available for Dell's 14th generation servers to offer simplified basic management of iDRACs and associated servers on the associated servers on the local network using the iDRAC GUI. Group Manager allows 1XMany console experience without involving a separate application. It allows the users to view the details of a set of servers by permitting more powerful management than by inspecting servers visually for faults and other manual methods.

Group manager is a licensed feature and part of the Enterprise license. Only iDRAC admin users can access the Group Manager functionality.

NOTE: For better user experience Group Manager supports up to 100 server nodes.

Topics:

- Group Manager
- Summary View
- Manage Logins
- Configure Alerts
- Export
- Discovered Servers View
- Jobs View
- Jobs Export
- Group Information Panel
- Group Settings
- Actions on a selected Server

Group Manager

To use **Group Manager** feature, you need to enable the **Group Manager** from iDRAC index page or on the Group Manager Welcome screen. The group manager welcome screen provides options listed in the below table.

Table 34. Options in Group Manager

Option	Description
Join Existing Group	Allows you to join an existing group, you need to know the **GroupName** and **Passcode** to join a specific group. **NOTE: Passwords are associated to iDRAC user credentials. Whereas, a passcode is associated to a group to establish authenticated device communication between different iDRACs in the same group.**
Create New Group	Allows you to create a new group. The specific iDRAC which has created the group would be the master (primary controller) of the group.
Disable Group Manager for this System	You can select this option in case you do not want to join any group from a specific system. However, you can access Group Manager at any point of time by selecting Open Group Manager from the

Option	Description
	iDRAC index page. Once you disable the group manager, user needs to wait for 60 seconds to perform any further group manager operations.

Once the group manager feature is enabled, that iDRAC allows you the option to create or join an iDRAC local group. More than one iDRAC group can be setup in the local network but an individual iDRAC can only be a member of one group at a time. To change group (join a new group) the iDRAC must first leave its current group and then join the new group. The iDRAC from where the group was created gets chosen as the primary controller of the group by default. The user does not define a dedicated group manager primary controller to control that group. The primary controller hosts the group manager web interface and provides the GUI based work flows. The iDRAC members self-select a new primary controller for the group if the current primary goes offline for a prolonged duration, but that does not have any impact on the end user. You can normally access the group manager from all iDRAC members by clicking group manager from the iDRAC index page.

Summary View

You need to have administrator privileges to access group manager pages. If a non-administrator user logs onto the iDRAC, the group manager section does not appear with their credentials. The group manager home page (summary view) is broadly categorized as three sections. The first section shows rollup summary with aggregated summary details.

- Total number of servers in the local group.
- Chart showing number of servers per server model.
- Doughnut chart showing the servers per their health status (clicking on a chart section filters the server list to show only the servers with selected health).
- Warning box if there is a duplicate group detected in the local network. Duplicate group is typically the group with the same name but with a different passcode. This warning box does not appear if there is no duplicate group.
- Displays the iDRACs, that are controlling the group (Primary and Secondary controller).

The second section provides buttons for actions that are taken on the group as whole and the third section displays the list of all iDRACs in the group.

It shows all the systems in the group and their current health status and allows the user to take corrective action as needed. Server attributes specific to a server is described in the below table.

Table 35. Server Attributes

Server Attribute	Description
Health	Indicates the health status of that specific server.
Host Name	Displays the Server name.
iDRAC IP Address	Displays the exact IPV4 and IPV6 addresses.
Service Tag	Displays the Service Tag information.
Model	Displays the Model number of the Dell Server.
iDRAC	Displays the iDRAC version.
Last Status Update	Displays the time stamp when the server Status was last updated.

The System Information panel provides further details on the server like iDRAC network connectivity status, server host power state, express service code, operating system, asset tag, node ID, IDRAC DNS name, Server BIOS version, Server CPU information, System memory and location information. You may double click on a row or click on the launch iDRAC button to perform a single sign on redirect to the selected iDRAC index page. On the selected server, virtual console can be accessed or server power actions can be performed from More Actions dropped down list.

Manage iDRAC user logins, Alert configuration and group inventory export are the group actions supported.

Manage Logins

Use this section to **Add New User**, **Change User Password** and **Delete User** from the Group.

Group jobs including Manage Logins are one time configurations of the servers. Group manager uses SCP and jobs to make any changes. Every iDRAC in the group owns an individual job in its job queue for each Group Manager job. Group Manager does not detect changes on member iDRACs or lock member configurations.

NOTE: Group jobs does not configure or override the lockdown mode for any specific iDRAC.

Leaving a group does not change local user or change settings on a member iDRAC.

Add a New User

Use this section to create and add a new user profile on all the servers in that group. A group job would be created to add the user to all servers in that group. The status of group job can be found at **GroupManager** > **Jobs** page.

NOTE: By default iDRAC is configured with a local administrator account. You can access further information for each parameter with local administrator account.

For more information see, Configuring user accounts and privileges.

Table 36. New User Options

Option	Description
New User Information	Allows you to provide the new user's information details.
iDRAC Permissions	Allows you to define the user's role for future usage.
Advanced User Settings	Allows you to set (IPMI) user privileges and helps you to enable SNMP.

NOTE: Any member iDRAC with system lockdown enabled, that is part of the same group returns an error that the user password was not updated.

Change User Password

Use this section to change the password information for the user. You can see the **Users** detail with the **User Name**, **Role** and **Domain** information for individual user. A group job would be created to change the user password on all the servers in that group. The status of group job can be found at **GroupManager** > **Jobs** page.

If user already exists then the password can be updated. Any member iDRAC with system lockdown enabled, that is part of the group returns an error that the user password was not updated. If the user does not exist, then an error is returned to group manager indicating that the user does not exist on the system. The list of users shown in Group Manager GUI is based on the current user list on the iDRAC that is acting as the primary controller. It does not show all users for all iDRACs.

Delete User

Use this section to delete users from all the group servers. A group job would be created to delete users from all the group servers. The status of group job can be found at **GroupManager** > **Jobs** page.

If user already exists on a member iDRAC then the user can be deleted. Any member iDRAC with system lockdown enabled that is part of the group returns an error that the user is not deleted. If the user does not exist then it shows a successful deletion for that iDRAC. The list of users shown in Group Manager GUI is based on the current user list on the iDRAC which is acting as the primary controller. It does not show all users for all iDRACs.

Configure Alerts

Use this section to configure e-mail alerts. By default alerting is disabled. However, you can enable the alerting anytime. A group job would be created to apply the e-mail alert configuration to all the group servers. The status of group job can be monitored at **GroupManager** > **Jobs** page. Group manager email alert configures email alerts on all members. It sets the SMTP server settings on all members in the same group. Each iDRAC is configured separately. Email configuration is not globally saved. Current values are based on the iDRAC that is acting as a primary controller. Leaving a group does not reconfigure email alerts.

For more information on Configuring Alerts, see Configuring iDRAC to send alerts.

Table 37. Configuring alerts options

Option	Description
SMTP (Email) Server Address Settings	Allows you to configure Server IP Address, SMTP Port Number and enable the authentication. In case you are enabling authentication, you need to provide username and password.
Email Addresses	Allows you to configure multiple Email IDs to receive email notifications about system status change. You can send one test email to the configured account from the system.
Alert Categories	Allows you to select multiple alert categories to receive email notifications.

NOTE: Any member iDRAC with system lockdown enabled, that is part of the same group returns an error that the user password was not updated.

Export

Use this section to export the Group Summary to the local system. The information can be exported to a csv file format. It contains data related to each individual system in the group. Export includes the following information in csv format. Server details:

- Health
- Host Name
- iDRAC IPV4 Address
- iDRAC IPV6 Address
- Asset Tag
- Model
- iDRAC Firmware Version
- Last Status Update
- Express Service Code
- iDRAC Connectivity
- Power State
- Operating System
- Service Tag
- Node ID
- iDRAC DNS Name
- BIOS Version

- CPU Details
- System Memory(MB)
- Location Details

NOTE: In case, you are using Internet Explorer, disable the Enhanced Security settings to successfully download the csv file.

Discovered Servers View

After creating the local group, iDRAC group manager notifies all other iDRACs on the local network that a new group has been created. For iDRACs to be displayed under Discovered Servers, group manager feature should be enabled in each iDRAC. Discovered Servers View displays the list of the iDRACs detected on the same network, which can be part of any group. If an iDRAC does not show up in the discovered systems list then the user must logon to the specific iDRAC and join the group. The iDRAC that created the group will be shown as the only member in the essentials view until more iDRACs are joined to the group.

NOTE: Discovered servers view at the Group manager console allows you to onboard one or more servers listed in the view in to that group. The progress of the activity can be tracked from GroupManager > Jobs. Alternatively you can logon to the iDRAC and select the group you would like to onboard from the drop down list to join that group. You can access the GroupManager welcome screen from iDRAC index page.

Table 38. Group onboard options

Option	Description
Onboard and Change Login	Select a specific row and select the Onboard and Change Login option to get the newly discovered systems to the group. You must provide the admin logon credentials for the new systems to join the group. If the system has the default password, you need to change it while onboarding it to a group. Group onboarding allows you to apply the same group alert settings to the new systems.
Ignore	Allows you to ignore the systems from the discovered servers list, in case you do not want to add them in any group.
Un-Ignore	Allows you to select the systems that you would like to reinstate in the discovered servers list.
Rescan	Allows you to scan and generate the list of discovered servers at any time.

Jobs View

Jobs view allows the user to track the progress of a group job, helps with simple recovery steps to correct connectivity induced failures. It also shows the history of the last group actions that were performed as an audit log. The user can use the jobs view to track the progress of the action across the group or to cancel an action that is schedule to occur in the future. The Jobs view allows the user to view the status of the last 50 jobs that have been run and any success or failures that has occurred.

Table 39. Jobs View

Option	Description
Status	Shows the job's status and the state of the ongoing job.
Job	Displays the Job's name.
ID	Displays the Job's ID.
Start Time	Displays the start time.

Option	Description
End Time	Displays the end time.
Actions	• Cancel — A scheduled job can be cancelled, before it moves to running state. A running job can be stopped by using the stop button. • Rerun — Allows the user to rerun the job in case the job is in failure state. • Remove — Allows the user to remove the completed old jobs.
Export	You can export the group job information to the local system for future references. The jobs list can be exported to csv file format. It contains data related to individual job.

NOTE: For each job entry, the list of systems provide details up to 100 systems. Each system entry contains Hostname, Service Tag, Member Job Status and Message if in case the job failed.

All Group actions that create jobs are performed on all the group members with immediate effect. You can perform the following tasks:

- Add/Edit/Remove users
- Configure email alerts
- Change group passcode and name

NOTE: Group jobs complete quickly as long as all members are online and accessible. It may take 10 minutes from job start to job complete. A job will wait and retry for up to 10 hours for the systems that are not accessible.

NOTE: While an onboarding job is running no other Job can be scheduled. Jobs include:

- Add New User
- Change User Password
- Delete User
- Configure Alerts
- Onboard additional systems
- Change Group Passcode
- Change Group Name

Attempting to invoke another Job while an Onboarding task is active, consequences GMGR0039 error code. Once the onboarding task has made its first attempt to onboard all the new systems, Jobs can be created at any point in time.

Jobs Export

You can export the log to the local system for further references. The jobs list can be exported to a csv file format. It contains all the data related to each job.

NOTE: Exported CSV files are available only in English.

Group Information Panel

Group Information panel in the top right of group manager summary view shows a consolidated group summary. Current group configuration can be edited from the Group Settings page accessible by clicking Group Settings button. It shows how many systems are there in the group. It also provides the information about the Primary and the Secondary controller of the Group.

Group Settings

Group settings page provides a listing of selected group attributes.

Table 40. Group setting attributes

Group Attribute	Description
Group Name	Displays the name of that Group.
Number of Systems	Displays the total number of systems in that group.
Created on	Displays the time stamp details.
Created by	Displays the details of Group admin.
Controlling System	Displays the Service Tag of the system, that acts as the controlling system and coordinates the group management tasks.
Backup System	Displays the Service Tag of the system, that acts as the backup system. In case the controlling system is unavailable, it takes up roles of the controlling system.

Allows the user to perform actions listed on the table below on the group. A group configuration job would be created for these actions (change group name, change group passcode, remove the members and delete the group). The status of group job can be viewed or modified from **GroupManager** > **Jobs** page.

Table 41. Group setting actions

Actions	Description
Change Name	Allows you to change the **Current Group Name** with a **New Group Name**.
Change Passcode	Allows you to change the existing group password by entering a **New Group Passcode** and validating that password by **Reenter New Group Passcode**.
Remove Systems	Allows you to remove multiple systems from the group at a time.
Delete Group	Allows you to delete the group. To use any feature of group manager, the user should have administrator privileges. Any pending jobs will be stopped in case the group is deleted.

Actions on a selected Server

On the Summary page, you can double click on a row to launch iDRAC for that server through a single sign on redirect. Ensure to turn off the popup blocker in the browser settings. You can perform following actions on the selected server by clicking appropriate item from the **More Actions** drop down list.

Table 42. Actions on a selected Server

Option	Description
Graceful Shutdown	Shuts down the operating system and powers off the system.
Cold Reboot	Powers off, then reboots the system.
Virtual Console	Launches Virtual Console with single sign on a new browser window. **NOTE: Disable Popup blocker from the browser to use this functionality.**

Group Manager Single Sign On

All iDRACs in the group trust each other based on the shared passcode secret and shared group name. As a result an administrator user at a group member IDRAC is grant administrator level privileges at any group member iDRAC when accessed through Group Manager web interface single sign on. iDRACs logs <user>-<SVCTAG> as the user that logged on into peer members. <SVCTAG> is the service tag of the iDRAC where the user first logged in.

Group Manager Concepts — Controlling System

- Automatically selected — by default the first iDRAC configured for Group Manager.
- Provides Group Manager GUI workflow.
- Keeps track of all members.
- Coordinates tasks.
- If a user logs in to any member and clicks on Open Group Manager the browser will be redirected to the primary controller.

Group Manager Concepts — Backup System

- Primary controller automatically selects a secondary controller to take over if the primary goes offline for an extended period of time (10 mins or more).
- If both primary and secondary goes offline for an extended duration (for more than 14 mins) a new primary and secondary controller gets elected.
- Keeps a copy of the group manager cache of all the groups members and tasks.
- The controlling system and backup system are automatically determined by group manager.
- No user configuration or involvement required.

12

Managing logs

iDRAC provides Lifecycle log that contains events related to system, storage devices, network devices, firmware updates, configuration changes, license messages, and so on. However, the system events are also available as a separate log called System Event Log (SEL). The lifecycle log is accessible through iDRAC Web interface, RACADM, and WSMan interface.

When the size of the lifecycle log reaches 800 KB, the logs are compressed and archived. You can only view the non-archived log entries, and apply filters and comments to non-archived logs. To view the archived logs, you must export the entire lifecycle log to a location on your system.

Topics:

- Viewing System Event Log
- Viewing Lifecycle log
- Exporting Lifecycle Controller logs
- Adding work notes
- Configuring remote system logging

Viewing System Event Log

When a system event occurs on a managed system, it is recorded in the System Event Log (SEL). The same SEL entry is also available in the LC log.

Viewing System Event Log using web interface

To view the SEL, in iDRAC Web interface, go to **Maintenance** > **System Event Log**.

The **System Event Log** page displays a system health indicator, a time stamp, and a description for each event logged. For more information, see the *iDRAC Online Help*.

Click **Save As** to save the **SEL** to a location of your choice.

NOTE: If you are using Internet Explorer and if there is a problem when saving, download the Cumulative Security Update for Internet Explorer. You can download it from the Microsoft Support website at support.microsoft.com.

To clear the logs, click **Clear Log**.

NOTE: Clear Log only appears if you have Clear Logs permission.

After the SEL is cleared, an entry is logged in the Lifecycle Controller log. The log entry includes the user name and the IP address from where the SEL was cleared.

Viewing System Event Log using RACADM

To view the SEL:

```
racadm getsel <options>
```

If no arguments are specified, the entire log is displayed.

To display the number of SEL entries: `racadm getsel -i`

To clear the SEL entries: `racadm clrsel`

For more information, see iDRAC RACADM CLI Guide available at www.dell.com/idracmanuals.

Viewing System Event Log using iDRAC settings utility

You can view the total number of records in the System Event Log (SEL) using the iDRAC Settings Utility and clear the logs. To do this:

1 In the iDRAC Settings Utility, go to **System Event Log**.
The **iDRAC Settings.System Event Log** displays the **Total Number of Records**.
2 To clear the records, select **Yes**. Else, select **No**.
3 To view the system events, click **Display System Event Log**.
4 Click **Back**, click **Finish**, and then click **Yes**.

Viewing Lifecycle log

Lifecycle Controller logs provide the history of changes related to components installed on a managed system. You can also add work notes to each log entry.

The following events and activities are logged:

- All
- System Health — System Health category represents all the alerts that are related to hardware within the system chassis.
- Storage — Storage Health category represents alerts that are related to the storage subsystem.
- Updates — Update category represents alerts that are generated due to firmware/Driver upgrades/downgrades.
- Audit — Audit category represents the audit log.
- Configuration — Configuration category represents alerts that are related to hardware, firmware and software configuration changes.
- Work Notes

When you log in to or log out of iDRAC using any of the following interfaces, the log-in, log-out, or login failure events are recorded in the Lifecycle logs:

- Telnet
- SSH
- Web interface
- RACADM
- Redfish
- SM-CLP
- IPMI over LAN
- Serial
- Virtual console
- Virtual media

You can view and filter logs based on the category and severity level. You can also export and add a work note to a log event.

NOTE: Lifecycle logs for Personality Mode change is generated only during the warm boot of the host.

If you initiate configuration jobs using RACADM CLI or iDRAC web interface, the Lifecycle log contains information about the user, interface used, and the IP address of the system from which you initiate the job.

NOTE: In MX platform, if you initiate a configuration or an installation job through OME - Modular, the LC logs will report multiple job ids for each job created. Refer to the OME - Modular logs for information on the jobs performed.

Viewing Lifecycle log using web interface

To view the Lifecycle Logs, click **Maintenance** > **Lifecycle Log**. The **Lifecycle Log** page is displayed. For more information about the options, see the *iDRAC Online Help*.

Filtering Lifecycle logs

You can filter logs based on category, severity, keyword, or date range.

To filter the lifecycle logs:

1. In the **Lifecycle Log** page, under the **Log Filter** section, do any or all of the following:
   - Select the **Log Type** from the drop-down list.
   - Select the severity level from the **Severity** drop-down list.
   - Enter a keyword.
   - Specify the date range.
2. Click **Apply**.
   The filtered log entries are displayed in **Log Results**.

Adding comments to Lifecycle logs

To add comments to the Lifecycle logs:

1. In the **Lifecycle Log** page, click the + icon for the required log entry.
   The Message ID details are displayed.
2. Enter the comments for the log entry in the **Comment** box.
   The comments are displayed in the **Comment** box.

Viewing Lifecycle log using RACADM

To view Lifecycle logs, use the `lclog` command.

For more information, see the iDRAC RACADM CLI Guide available at www.dell.com/idracmanuals.

Exporting Lifecycle Controller logs

You can export the entire Lifecycle Controller log (active and archived entries) in a single zipped XML file to a network share or to the local system. The zipped XML file extension is **.xml.gz**. The file entries are ordered sequentially based on their sequence numbers, ordered from the lowest sequence number to the highest.

Exporting Lifecycle Controller logs using web interface

To export the Lifecycle Controller logs using the Web interface:

1. In the **Lifecycle Log** page, click **Export**.
2. Select any of the following options:

- **Network** — Export the Lifecycle Controller logs to a shared location on the network.
- **Local** — Export the Lifecycle Controller logs to a location on the local system.

NOTE: While specifying the network share settings, it is recommended to avoid special characters for user name and password or percent encode the special characters.

For information about the fields, see the *iDRAC Online Help*.

3 Click **Export** to export the log to the specified location.

Exporting Lifecycle Controller logs using RACADM

To export the Lifecycle Controller logs, use the `lclog export` command.

For more information, see the iDRAC RACADM CLI Guide available at www.dell.com/idracmanuals.

Adding work notes

Each user who logs in to iDRAC can add work notes and this is stored in the lifecycle log as an event. You must have iDRAC logs privilege to add work notes. A maximum of 255 characters are supported for each new work note.

NOTE: You cannot delete a work note.

To add a work note:

1 In the iDRAC Web interface, go to **Dashboard** > **Notes** > **add note**.
The **Work Notes** page is displayed.

2 Under **Work Notes**, enter the text in the blank text box.

NOTE: It is recommended not to use too many special characters.

3 Click **Save**.
The work note is added to the log. For more information, see the *iDRAC Online Help*.

Configuring remote system logging

You can send lifecycle logs to a remote system. Before doing this, make sure that:

- There is network connectivity between iDRAC and the remote system.
- The remote system and iDRAC is on the same network.

Configuring remote system logging using web interface

To configure the remote syslog server settings:

1 In the iDRAC Web interface, go to **Configuration** > **System Settings** > **Remote Syslog Settings**.
The **Remote Syslog Settings** page is displayed

2 Enable remote syslog, specify the server address, and the port number. For information about the options, see the *iDRAC Online Help*.

3 Click **Apply**.
The settings are saved. All logs written to the lifecycle log are also simultaneously written to configured remote server(s).

Configuring remote system logging using RACADM

To configure the remote system-logging settings, use the **set** command with the objects in the **iDRAC.SysLog** group.

For more information, see the iDRAC RACADM CLI Guide available at www.dell.com/idracmanuals.

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Monitoring and managing power

You can use iDRAC to monitor and manage the power requirements of the managed system. This helps to protect the system from power outages by appropriately distributing and regulating the power consumption on the system.

The key features are:

- **Power Monitoring** — View the power status, history of power measurements, the current averages, peaks, and so on for the managed system.
- **Power Capping** — View and set the power cap for the managed system, including displaying the minimum and maximum potential power consumption. This is a licensed feature.
- **Power Control** — Enables you to remotely perform power control operations (such as, power on, power off, system reset, power cycle, and graceful shutdown) on the managed system.
- **Power Supply Options** — Configure the power supply options such as redundancy policy, hot spare, and power factor correction.

Topics:

- Monitoring power
- Setting warning threshold for power consumption
- Executing power control operations
- Power capping
- Configuring power supply options
- Enabling or disabling power button
- Multi-Vector Cooling

Monitoring power

iDRAC monitors the power consumption in the system continuously and displays the following power values:

- Power consumption warning and critical thresholds.
- Cumulative power, peak power, and peak amperage values.
- Power consumption over the last hour, last day or last week.
- Average, minimum, and maximum power consumption.
- Historical peak values and peak timestamps.
- Peak headroom and instantaneous headroom values (for rack and tower servers).

NOTE: The histogram for the system power consumption trend (hourly, daily, weekly) is maintained only while iDRAC is running. If iDRAC is restarted, the existing power consumption data is lost and the histogram is restarted.

Monitoring performance index of CPU, memory, and input output modules using web interface

To monitor the performance index of CPU, memory, and I/O modules, in the iDRAC web interface, go to **System** > **Performance**.

- **System Performance** section — Displays the current reading and the warning reading for CPU, Memory and I/O utilization index, and system level CUPS index in a graphical view.

- **System Performance Historical Data** section:
  - Provides the statistics for CPU, memory, IO utilization, and the system level CUPS index. If the host system is powered off, then the graph displays the power off line below 0 percent.
  - You can reset the peak utilization for a particular sensor. Click **Reset Historical Peak**. You must have Configure privilege to reset the peak value.
- **Performance Metrics** section:
  - Displays status and present reading
  - Displays or specifies the warning threshold utilization limit. You must have server configure privilege to set the threshold values.

For information about the displayed properties, see the *iDRAC Online Help*.

Monitoring performance index for of CPU, memory, and input output modules using RACADM

Use the **SystemPerfStatistics** sub command to monitor performance index for CPU, memory, and I/O modules. For more information, see the iDRAC RACADM CLI Guide available at www.dell.com/idracmanuals.

Setting warning threshold for power consumption

You can set the warning threshold value for the power consumption sensor in the rack and tower systems. The warning/critical power threshold for rack and tower systems may change, after the system is power-cycled, based on PSU capacity and redundancy policy. However, the warning threshold must not exceed the critical threshold even if Power Supply Unit capacity of the redundancy policy is changed.

The warning power threshold for blade systems is set to OME Modular power allocation.

If reset to default action is performed, the power thresholds will be set to default.

You must have Configure user privilege to set the warning threshold value for power consumption sensor.

NOTE: The Warning Threshold value is reset to the default value after performing a racreset or an iDRAC update.

Setting warning threshold for power consumption using web interface

1. In the iDRAC Web interface, go to **System** > **Overview** > **Present Power Reading and Thresholds**.
2. In the **Present Power Reading and Thresholds** section, click **Edit Warning Threshold**.
   The **Edit Warning Threshold** page is displayed.
3. In the **Warning Threshold** column, enter the value in **Watts** or **BTU/hr**.
   The values must be lower than the **Failure Threshold** values. The values are rounded off to the nearest value that is divisible by 14. If you enter **Watts**, the system automatically calculates and displays the **BTU/hr** value. Similarly, if you enter BTU/hr, the value for **Watts** is displayed.
4. Click **Save**. The values are configured.

Executing power control operations

iDRAC enables you to remotely perform a power-on, power off, reset, graceful shutdown, Non-Masking Interrupt (NMI), or power cycle using the Web interface or RACADM.

You can also perform these operations using Lifecycle Controller Remote Services or WSMan. For more information, see the Lifecycle Controller Remote Services Quick Start Guide available at www.dell.com/idracmanuals and the *Dell Power State Management Profile* document available at www.dell.com/support.

Server power-control operations initiated from iDRAC are independent of the power-button behavior configured in the BIOS. You can use the PushPowerButton function to gracefully shut down the system, or power it on, even if the BIOS is configured to do nothing when the physical power button is pressed.

Executing power control operations using web interface

To perform power control operations:

1 In iDRAC web interface, go to **Configuration** > **Power Management** > **Power Control**. The **Power Control** options are displayed.
2 Select the required power operation:
   - Power On System
   - Power Off System
   - NMI (Non-Masking Interrupt)
   - Graceful Shutdown
   - Reset System (warm boot)
   - Power Cycle System (cold boot)
3 Click **Apply**. For more information, see the *iDRAC Online Help*.

Executing power control operations using RACADM

To perform power actions, use the **serveraction** command.

For more information, see the iDRAC RACADM CLI Guide available at www.dell.com/idracmanuals.

Power capping

You can view the power threshold limits that covers the range of AC and DC power consumption that a system under heavy workload presents to the datacenter. This is a licensed feature.

Power capping in Blade servers

Before a blade system powers up, iDRAC provides the power requirements of the blade system to the chassis manager based on limited hardware inventory information. If the power consumption increases over time and if the system consumes power near its maximum allocation, iDRAC may request OME Modular to increase the maximum potential power, which results in an increase in the power envelope. iDRAC requests OME Modular only to increase the power delivery, however, it does not request OME Modular to reduce the power delivery if the consumption decreases. If sufficient power is not allocated, the blade system does not power on.

After the system is powered on and initialized, iDRAC calculates a new power requirement based on the actual hardware configuration. The system stays powered on even if the OME Modular fails to allocate new power request.

OME Modular reclaims any unused power from lower priority servers and allocates that power to a higher-priority infrastructure module or a server.

Viewing and configuring power cap policy

When power cap policy is enabled, it enforces a user-defined power limits on the system. If power-capping is not enabled, the default hardware power-protection policy is used. This power-protection policy is independent of the user-defined policy. The system performance is dynamically adjusted to maintain power consumption close to the specified threshold.

Actual power consumption depends on the workload. It may momentarily exceed the threshold until performance adjustments are completed. For example, consider a system that has a minimum and maximum Potential Power Consumption values of 500 W and 700 W respectively. You can specify a Power Budget Threshold to reduce consumption to 525 W. When this power budget is configured, the performance of the system is dynamically adjusted to maintain power consumption of 525 W or less.

If you set a very low power cap or if the ambient temperature is unusually high, power consumption may temporarily exceed the power-cap while the system is powering up or being reset.

If the power cap value is set lower than the minimum recommended threshold, iDRAC may not be able maintain the requested power cap.

You can specify the value in Watts, BTU/hr, or as a percentage of the recommended maximum power limit.

When setting the power cap threshold in BTU/hr, the conversion to Watts is rounded off to the nearest integer. When the power cap threshold are read from the system, the Watts to BTU/hr conversion is also rounded off. Because of the rounding off, the actual values may slightly differ.

Configuring power cap policy using web interface

To view and configure the power policies:

1 In iDRAC Web interface, go to **Configuration** > **Power Management** > **Power Cap Policy**.
The current power policy limit is displayed under the **Power Cap Limits** section.
2 Select **Enable** under **Power Cap**.
3 Under **Power Cap Limits** section, enter the power limit within recommended range in Watts and BTU/hr or the maximum % of recommended system limit.
4 Click **Apply** to apply the values.

Configuring power cap policy using RACADM

To view and configure the current power cap values, use the following objects with the `set` command:

- System.Power.Cap.Enable
- System.Power.Cap.Watts
- System.Power.Cap.Btuhr
- System.Power.Cap.Percent

For more information, see the iDRAC RACADM CLI Guide available at www.dell.com/idracmanuals.

Configuring power cap policy using iDRAC settings utility

To view and configure power policies:

1 In iDRAC Settings utility, go to **Power Configuration**.

NOTE: The Power Configuration link is available only if the server power supply unit supports power monitoring.

The **iDRAC Settings Power Configuration** page is displayed.

2 Select **Enabled** to enable the **Power Cap Policy** Else, select **Disabled**.

3 Use the recommended settings, or under **User Defined Power Cap Policy**, enter the required limits.
For more information about the options, see the *iDRAC Settings Utility Online Help*.

4 Click **Back**, click **Finish**, and then click **Yes**.
The power cap values are configured.

Configuring power supply options

You can configure the power supply options such as redundancy policy, hot spare, and power factor correction.

Hot spare is a power supply feature that configures redundant Power Supply Units (PSUs) to turn off depending on the server load. This allows the remaining PSUs to operate at a higher load and efficiency. This requires PSUs that support this feature, so that it quickly powers ON when needed.

In a two PSU system, either PSU1 or PSU2 can be configured as the primary PSU.

After Hot Spare is enabled, PSUs can become active or go to sleep based on load. If Hot Spare is enabled, asymmetric electrical current sharing between the two PSUs is enabled. One PSU is *awake* and provides the majority of the current; the other PSU is in sleep mode and provides a small amount of the current. This is often called 1 + 0 with two PSUs and hot spare enabled. If all PSU-1s are on Circuit-A and all PSU-2s are on Circuit-B, then with hot spare enabled (default hot spare factory configuration), Circuit-B has much less load and triggers the warnings. If hot spare is disabled, the electrical current sharing is 50-50 between the two PSUs, the Circuit-A and Circuit-B normally has the same load.

Power factor is the ratio of real power consumed to the apparent power. When power factor correction is enabled, the server consumes a small amount of power when the host is OFF. By default, power factor correction is enabled when the server is shipped from the factory.

Configuring power supply options using web interface

To configure the power supply options:

1 In iDRAC Web interface, go to **Configuration** > **Power Management** > **Power Configuration**.

2 Under **Power Redundancy Policy**, select the required options. For more information, see *iDRAC Online Help*.

3 Click **Apply**. The power supply options are configured.

Configuring power supply options using RACADM

To configure the power supply options, use the following objects with the `get/set` command:

- System.Power.RedundancyPolicy
- System.Power.Hotspare.Enable
- System.Power.Hotspare.PrimaryPSU
- System.Power.PFC.Enable

For more information, see the iDRAC RACADM CLI Guide available at www.dell.com/idracmanuals.

Configuring power supply options using iDRAC settings utility

To configure the power supply options:

1 In iDRAC Settings utility, go to **Power Configuration**.

NOTE: The Power Configuration link is available only if the server power supply unit supports power monitoring.

The **iDRAC Settings Power Configuration** page is displayed.

2 Under **Power Supply Options**:

- Enable or disable power supply redundancy.
- Enable or disable hot spare.
- Set the primary power supply unit.
- Enable or disable power factor correction. For more information about the options, see the *iDRAC Settings Utility Online Help*.

3 Click **Back**, click **Finish**, and then click **Yes**.

The power supply options are configured.

Enabling or disabling power button

To enable or disable the power button on the managed system:

1 In iDRAC Settings utility, go to **Front Panel Security**.

The **iDRAC Settings Front Panel Security** page is displayed.

2 Select **Enabled** to enable the power button or **Disabled** to disable it.

3 Click **Back**, click **Finish**, and then click **Yes**.

The settings are saved.

Multi-Vector Cooling

Multi-Vector Cooling implements multi-prong approach to Thermal Controls in Dell EMC Server Platforms. You can configure multi-vector cooling options through iDRAC web interface by navigating to **Configuration** > **System Settings** > **Hardware Settings** > **Fan Configuration**. It includes (but not limited to):

- Large set of sensors (thermal, power, inventory etc.) that allows accurate interpretation of real-time system thermal state at various locations within the server. It displays only a small subset of sensors that are relevant to users need based on the configuration.
- Intelligent and adaptive closed loop control algorithm optimizes fan response to maintain component temperatures. It also conserves fan power, airflow consumption, and acoustics.
- Using fan zone mapping, cooling can be initiated for the components when it requires. Thus, it results maximum performance without compromising the efficiency of power utilization.
- Accurate representation of slot by slot PCIe airflow in terms of LFM metric (Linear Feet per Minute - an accepted industry standard on how PCIe card airflow requirement is specified). Display of this metric in various iDRAC interfaces allows user to:
  - a know the maximum LFM capability of each slot within the server.
  - b know what approach is being taken for PCIe cooling for each slot (airflow controlled, temperature controlled).
  - c know the minimum LFM being delivered to a slot, if the card is a 3rd Party Card (user defined custom card).
  - d dial in custom minimum LFM value for the 3rd Party Card allowing more accurate definition of the card cooling needs for which the user is better aware of through their custom card specification.
- Displays real-time system airflow metric (CFM, cubic feet per minute) in various iDRAC interfaces to the user to enable datacenter airflow balancing based on aggregation of per server CFM consumption.
- Allows custom thermal settings like Thermal Profiles (Maximum Performance vs. Maximum Performance per Watt, Sound Cap), custom fan speed options (minimum fan speed, fan speed offsets) and custom Exhaust Temperature settings.

a Most of these settings allow additional cooling over the baseline cooling generated by thermal algorithms and do not allow fan speeds to go below system cooling requirements.

NOTE: One exception to above statement is for fan speeds that are added for 3rd Party PCIe cards. The thermal algorithm provision airflow for 3rd party cards may be more or less than the actual card cooling needs and customer may fine tune the response for the card by entering the LFM corresponding to the 3rd Party Card.

b Custom Exhaust Temperature option limits exhaust temperature to customer desired settings.

NOTE: It is important to note that with certain configurations and workloads, it may not be physically possible to reduce exhaust below a desired set point (e.g. Custom exhaust setting of 45C with a high inlet temp {e.g. 30C} and a loaded config {high system power consumption, low airflow}).

c Sound Cap option is new in the 14th generation of PowerEdge server. It limits CPU power consumption and controls fan speed and acoustical ceiling. This is unique for acoustical deployments and may result in reduced system performance.

- System layout and design enables increased airflow capability (by allowing high power) and dense system configurations. It provides less system restrictions and increased feature density.
  a Streamlined airflow permits efficient airflow to fan power consumption ratio.
- Custom fans are designed for higher efficiency, better performance, longer life and less vibration. It also delivers better acoustics outcome.
  a Fans are capable of long life (in general it may run for more than 5 years), even if it runs at full speed all the time.
- Custom heat-sinks are designed for optimize component cooling at minimum (required) airflow yet supports high performance CPUs.

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Inventorying, monitoring, and configuring network devices

You can inventory, monitor, and configure the following network devices:

- Network Interface Cards (NICs)
- Converged Network Adapters (CNAs)
- LAN On Motherboards (LOMs)
- Network Daughter Cards (NDCs)
- Mezzanine cards (only for blade servers)

Before you disable NPAR or an individual partition on CNA devices, ensure that you clear all I/O identity attributes (Example: IP address, virtual addresses, initiator, and storage targets) and partition-level attributes (Example: Bandwidth allocation). You can disable a partition either by changing the VirtualizationMode attribute setting to NPAR or by disabling all personalities on a partition.

Depending on the type of installed CNA device, the settings of partition attributes may not be retained from the last time the partition was active. Set all I/O identity attributes and partition-related attributes when enabling a partition. You can enable a partition by either changing the VirtualizationMode attribute setting to NPAR or by enabling a personality (Example: NicMode) on the partition.

Topics:

- Inventorying and monitoring network devices
- Inventorying and monitoring FC HBA devices
- Dynamic configuration of virtual addresses, initiator, and storage target settings

Inventorying and monitoring network devices

You can remotely monitor the health and view the inventory of the network devices in the managed system.

For each device, you can view the following information of the ports and enabled partitions:

- Link Status
- Properties
- Settings and Capabilities
- Receive and Transmit Statistics
- iSCSI, FCoE initiator, and target information

Monitoring network devices using web interface

To view the network device information using Web interface, go to **System** > **Overview** > **Network Devices**. The **Network Devices** page is displayed. For more information about the displayed properties, see *iDRAC Online Help*.

Monitoring network devices using RACADM

To view information about network devices, use the **hwinventory** and **nicstatistics** commands.

For more information, see the iDRAC RACADM CLI Guide available at www.dell.com/idracmanuals.

Additional properties may be displayed when using RACADM or WSMan in addition to the properties displayed in the iDRAC web interface.

Connection View

Manually checking and troubleshooting the servers' networking connections is unmanageable in a datacenter environment. iDRAC9 streamlines the job with iDRAC Connection View. This feature allows you to remotely check and troubleshoot network connections from the same centralized GUI that you are using for deploying, updating, monitoring, and maintaining the servers. Connection View in iDRAC9 provide details of the physical mapping of switch ports to server's network ports and iDRAC (integrated Dell Remote Access Controller) dedicated port connections. All supported network cards are visible in Connection View, irrespective of the brand.

Instead of manually checking and troubleshooting the server's networking connections, you can view and manage network cable connections remotely.

The Connection View provides the information of the switch ports which are connected to the server ports, and iDRAC dedicated port. The server network ports include those on PowerEdge LOM, NDC, Mezz cards, and PCIe add-in cards.

To View network devices connection view, navigate to **System** > **Overview** > **Network Device** > **Network Device FQDD** > **Ports and Partitioned ports** .

You can click **iDRAC Settings** > **Overview** > **Connection View** to view the Connection View.

Also, you can click **iDRAC Settings** > **Connectivity** > **Common Settings** > **Switch Connection View** to enable or disable the connection view.

Connection View can be explored with racadm `SwitchConnection View` command and it can also be viewed with `winrm` command.

Field or Option	Description
Enabled	Select **Enabled**, to enable Connection View. By default the **Enabled** option is selected.
State	Displays **Enabled**, if you enable the connection view option from the **Connection View** from iDRAC settings.
Switch Connection ID	Displays the LLDP chassis ID of the switch through which the device port is connected.
Switch Port Connection ID	Displays the LLDP port ID of the switch port to which the device port is connected.

NOTE: Switch Connection ID and Switch Port Connection ID are available once the Connection View is enabled and the Link is connected. The associated network card needs to be compatible with the Connection View. Only users with iDRAC Configure privilege can modify the Connection View settings.

Refresh Connection View

Use **Refresh Connection View** to get the latest information of Switch Connection ID and Switch Port Connection ID.

NOTE: If iDRAC has switch connection and switch port connection information for server network port or iDRAC network port and due to some reason, the switch connection and switch port connection information is not refreshed for 5min, then the switch connection and switch port connection information is shown as stale (last known good data) data for all user interfaces. In the UI, you see yellow bang which is a natural representation and it does not indicate any warning.

Connection View Possible Values

Possible Connection View Data	Description
Feature Disabled	Connection view feature is disabled, to view the connection view data enable the feature.
No Link	Indicates that the link associated with network controller port is down.
Not Available	LLDP is not enabled on the switch. Check whether LLDP is enabled on the switch port.
Not Supported	Network controller does not support Connection view feature.
Stale Data	Last known good data, either the Network controller port link is down or the system is powered off. Use the refresh option to refresh the connection view details to get the latest data.
Valid Data	Displays the Valid Switch Connection ID and the Switch Port Connection ID information.

Connection View Supported Network Controllers

Following cards or controllers support Connection View feature.

Manufacturer	Type
Broadcom	• 57414 rNDC 25GE • 57416/5720 rNDC 10GbE • 57412/5720 rNDC 10GbE • 57414 PCIe FH/LP 25GE • 57412 PCIe FH/LP 10GbE • 57416 PCIe FH/LP 10GbE
Intel	• X710 bNDC 10Gb • X710 DP PCIe 10Gb • X710 QP PCIe 10Gb • X710 + I350 rNDC 10Gb+1Gb • X710 rNDC 10Gb • X710 bNDC 10Gb • XL710 PCIe 40Gb • XL710 OCP Mezz 10Gb • X710 PCIe 10Gb
Mellanox	• MT27710 rNDC 40Gb • MT27710 PCIe 40Gb • MT27700 PCIe 100Gb
QLogic	• QL41162 PCIe 10GE 2P • QL41112 PCIe 10GE 2P

Manufacturer	Type
	• QL41262 PCIe 25GE 2P

Inventorying and monitoring FC HBA devices

You can remotely monitor the health and view the inventory of the Fibre Channel Host Bus Adapters (FC HBA) devices in the managed system. The Emulex and QLogic FC HBAs are supported. For each FC HBA device, you can view the following information for the ports:

- Link Status and Information
- Port Properties
- Receive and Transmit Statistics

NOTE: Emulex FC8 HBAs are not supported.

Monitoring FC HBA devices using web interface

To view the FC HBA device information using Web interface, go to **System** > **Overview** > **Network Devices** > **Fibre Channel**. For more information about the displayed properties, see *iDRAC Online Help*.

The page name also displays the slot number where the FC HBA device is available and the type of FC HBA device.

Monitoring FC HBA devices using RACADM

To view the FC HBA device information using RACADM, use the **hwinventory** command.

For more information, see the iDRAC RACADM CLI Guide available at www.dell.com/idracmanuals.

Dynamic configuration of virtual addresses, initiator, and storage target settings

You can dynamically view and configure the virtual address, initiator and storage target settings, and apply a persistence policy. It allows the application to apply the settings based on power state changes (that is, operating system restart, warm reset, cold reset, or AC cycle) and also based on persistence policy setting for that power state. This provides more flexibility in deployments that need rapid re-configuration of system workloads to another system.

The virtual addresses are:

- Virtual MAC Address
- Virtual iSCSI MAC Address
- Virtual FIP MAC Address
- Virtual WWN
- Virtual WWPN

NOTE: When you clear the persistence policy, all the virtual addresses are reset to the default permanent address set at the factory.

NOTE: Some cards with the virtual FIP, virtual WWN, and virtual WWPN MAC attributes, the virtual WWN and virtual WWPN MAC attributes are automatically configured when you configure virtual FIP.

Using the IO Identity feature, you can:

- View and configure the virtual addresses for network and fibre channel devices (for example, NIC, CNA, FC HBA).

- Configure the initiator (for iSCSI and FCoE) and storage target settings (for iSCSI, FCoE, and FC).
- Specify persistence or clearance of the configured values over a system AC power loss, cold, and warm system resets.

The values configured for virtual addresses, initiator and storage targets may change based on the way the main power is handled during system reset and whether the NIC, CNA, or FC HBA device has auxiliary power. The persistence of IO identity settings can be achieved based on the policy setting made using iDRAC.

Only if the I/O identity feature is enabled, the persistence policies take effect. Each time the system resets or powers on, the values are persisted or cleared based on the policy settings.

NOTE: After the values are cleared, you cannot re-apply the values before running the configuration job.

Supported cards for IO Identity Optimization

The following table provides the cards that support the I/O Identity Optimization feature.

Table 43. Supported cards for I/O Identity Optimization

Manufacturer	Type
Intel	XXV710 Fab A/B Mezz 25 Gb
Mellanox	ConnectX-4 LX Fab A/B Mezz 25GB
Qlogic	• QME2692-DEL Fab C Mezz FC16 • QME2742-DEL Fab C Mezz FC32 • QL41262HMKR-DE Fab A/B Mezz 25 Gb • QL41232HMKR-DE Fab A/B Mezz 25 Gb
Emulex	• LPe31002-D Fab C Mezz FC16 • LPe32002-D Fab C Mezz FC32

Virtual or Remote assigned Address and Persistence Policy behavior when iDRAC is set to Remote-Assigned Address mode or Console mode

The following table describes the Virtual Address Management (VAM) configuration and Persistence Policy behavior, and the dependencies.

Table 44. Virtual/Remote-Assigned Address and Persistence Policy behavior

Remote assigned Address Feature State in OME Modular	Mode set in iDRAC	IO Identity Feature State in iDRAC	SCP	Persistence Policy	Clear Persistence Policy — Virtual Address
Remote-Assigned Address enabled	RemoteAssignedAddress Mode	Enabled	Virtual address management (VAM) configured	Configured VAM persists	Set to Remote assigned Address
Remote-Assigned Address enabled	RemoteAssignedAddress Mode	Enabled	VAM not configured	Set to Remote assigned Address	No persistence — Is set to Remote assigned Address

Remote assigned Address Feature State in OME Modular	Mode set in iDRAC	IO Identity Feature State in iDRAC	SCP	Persistence Policy	Clear Persistence Policy — Virtual Address
Remote-Assigned Address enabled	RemoteAssigned Address Mode	Disabled	Configured using the path provided in Lifecycle Controller	Set to Remote assigned Address for that cycle	No persistence — Is set to Remote assigned Address
Remote-Assigned Address enabled	RemoteAssigned Address Mode	Disabled	VAM not configured	Set to Remote assigned Address	Set to Remote assigned Address
Remote-Assigned Address disabled	RemoteAssigned Address Mode	Enabled	VAM configured	Configured VAM persists	Persistence only — clear is not possible
Remote-Assigned Address disabled	RemoteAssigned Address Mode	Enabled	VAM not configured	Set to hardware MAC address	No persistence supported. Depends on card behavior
Remote-Assigned Address disabled	RemoteAssigned Address Mode	Disabled	Configured using the path provided in Lifecycle Controller	Lifecycle Controller configuration persists for that cycle	No persistence supported. Depends on card behavior
Remote-Assigned Address disabled	RemoteAssigned Address Mode	Disabled	VAM not configured	Set to hardware MAC address	Set to hardware MAC address
Remote-Assigned Address enabled	Console Mode	Enabled	VAM configured	Configured VAM persists	Both persistence and clear must work
Remote-Assigned Address enabled	Console Mode	Enabled	VAM not configured	Set to hardware MAC address	Set to hardware MAC address
Remote-Assigned Address enabled	Console Mode	Disabled	Configured using the path provided in Lifecycle Controller	Lifecycle Controller configuration persists for that cycle	No persistence supported. Depends on card behavior
Remote-Assigned Address disabled	Console Mode	Enabled	VAM configured	Configured VAM persists	Both persistence and clear must work
Remote-Assigned Address disabled	Console Mode	Enabled	VAM not configured	Set to hardware MAC address	Set to hardware MAC address
Remote-Assigned Address disabled	Console Mode	Disabled	Configured using the path provided in Lifecycle Controller	Lifecycle Controller configuration persists for that cycle	No persistence supported. Depends on card behavior
Remote-Assigned Address enabled	Console Mode	Disabled	VAM not configured	Set to hardware MAC address	Set to hardware MAC address

System behavior for Remote-Assigned Address and IO Identity

Table 45. System behavior for Remote-Assigned Address and I/O Identity

Type	Remote-Assigned Address Feature State in OME Modular	IO Identity Feature State in iDRAC	Availability of Remote Agent VA for the Reboot Cycle	VA Programming Source	Reboot Cycle VA Persistence Behavior
Server with FA-equivalent Persistence	Enabled	Disabled		Remote-Assigned Address from OME Modular	Per Remote-Assigned Address spec
	N/A, Enabled, or Disabled	Enabled	Yes - New or Persisted	Remote Agent Virtual Address	Per Remote-Assigned Address spec
			No	Virtual Address Cleared	
	Disabled	Disabled			
Server with VAM Persistence Policy Feature	Enabled	Disabled		Remote-Assigned Address from OME Modular	Per Remote-Assigned Address spec
	Enabled	Enabled	Yes — New or Persisted	Remote Agent Virtual Address	Per Remote Agent Policy Setting
			No	Remote-Assigned Address from OME Modular	Per Remote-Assigned Address spec
	Disabled	Enabled	Yes — New or Persisted	Remote Agent Virtual Address	Per Remote Agent Policy Setting
			No	Virtual Address Cleared	
	Disabled	Disabled			

Enabling or disabling IO Identity Optimization

Normally, after the system boots, the devices are configured and then after a reboot the devices are initialized. You can enable the I/O Identity Optimization feature to achieve boot optimization. If it is enabled, it sets the virtual address, initiator, and storage target attributes after the device is reset and before it is initialized, thus eliminating a second BIOS restart. The device configuration and boot operation occur in a single system start and is optimized for boot time performance.

Before enabling I/O identity optimization, make sure that:

- You have the Login, Configure, and System Control privileges.
- BIOS, iDRAC, and network cards are updated to the latest firmware.

After enabling I/O Identity Optimization feature, export the Server Configuration Profile file from iDRAC, modify the required I/O Identity attributes in the SCP file, and import the file back to iDRAC.

For the list of I/O Identity Optimization attributes that you can modify in the SCP file, see the *NIC Profile* document available at www.dell.com/support.

NOTE: Do not modify non I/O Identity Optimization attributes.

Enabling or disabling IO Identity Optimization using web interface

To enable or disable I/O Identity Optimization:

1. In the iDRAC Web interface, go to **Configuration** > **System Settings** > **Hardware Settings** > **I/O Identity Optimization**. The **I/O Identity Optimization** page is displayed.
2. Click the **I/O Identity Optimization** tab, select the **Enable** option to enable this feature. To disable, clear this option.
3. Click **Apply** to apply the setting.

Enabling or disabling IO Identity Optimization using RACADM

To enable I/O Identity Optimization, use the command:

```
racadm set idrac.ioidopt.IOIDOptEnable Enabled
```

After enabling this feature, you must restart the system for the settings to take effect.

To disable I/O Identity Optimization, use the command:

```
racadm set idrac.ioidopt.IOIDOptEnable Disabled
```

To view the I/O Identity Optimization setting, use the command:

```
racadm get iDRAC.IOIDOpt
```

Configuring persistence policy settings

Using IO identity, you can configure policies specifying the system reset and power cycle behaviors that determine the persistence or clearance of the virtual address, initiator, and storage target settings. Each individual persistence policy attribute applies to all ports and partitions of all applicable devices in the system. The device behavior changes between auxiliary powered devices and non-auxiliary powered devices.

NOTE: The Persistence Policy feature may not work when set to default, if the VirtualAddressManagement attribute is set to RemoteAssignedAddress mode on iDRAC and if the Remote-Assigned Address feature is disabled in OME Modular. Ensure that you set the VirtualAddressManagement attribute to Console mode in iDRAC or enable the Remote-Assigned Address feature in OME Modular.

You can configure the following persistence policies:

- Virtual Address: Auxiliary powered devices
- Virtual Address: Non-Auxiliary powered devices
- Initiator
- Storage target

Before applying the persistence policy, make sure to:

- Inventory the network hardware at least once, that is, enabled Collect System Inventory On Restart.
- Enable I/O Identity Optimization.

Events are logged to the Lifecycle Controller log when:

- I/O Identity Optimization is enabled or disabled.
- Persistence policy is changed.

- Virtual address, initiator and target values are set based on the policy. A single log entry is logged for the configured devices and the values that are set for those devices when the policy is applied.

Event actions are enabled for SNMP, email, or WS-eventing notifications. Logs are also included in the remote syslogs.

Default values for persistence policy

Table 46. Default values for persistence policy

Persistence Policy	AC Power Loss	Cold Boot	Warm Boot
Virtual Address: Auxiliary Powered Devices	Not selected	Selected	Selected
Virtual Address: Non-Auxiliary Powered Devices	Not selected	Not selected	Selected
Initiator	Selected	Selected	Selected
Storage Target	Selected	Selected	Selected

NOTE: When a persistent policy is disabled and when you perform the action to lose the virtual address, re-enabling the persistent policy does not retrieve the virtual address. You must set the virtual address again after you enable the persistent policy.

NOTE: If there is a persistence policy in effect and the virtual addresses, initiator, or storage targets are set on a CNA-device partition, do not reset or clear the values configured for virtual addresses, initiator, and storage targets before changing the VirtualizationMode or the personality of the partition. The action is performed automatically when you disable the persistence policy. You can also use a configuration job to explicitly set the virtual address attributes to 0s and the initiator and storage targets values as defined in iSCSI initiator and storage target default values.

Configuring persistence policy settings using iDRAC web interface

To configure the persistence policy:

1. In the iDRAC Web interface, go to **Configuration** > **System Settings** > **I/O Identity Optimization**.
2. Click **I/O Identity Optimization** tab.
3. In the **Persistence Policy** section, select one or more of the following for each persistence policy:
   - **Warm Reset** - The virtual address or target settings persist when warm reset condition occurs.
   - **Cold Reset** - The virtual address or target settings persist when cold reset conditions occur.
   - **AC Power Loss** - The virtual address or target settings persist when AC power loss conditions occur.
4. Click **Apply**.
   The persistence policies are configured.

Configuring persistence policy settings using RACADM

To set persistence policy, use the following racadm object with the **set** sub command:

- For virtual addresses, use **iDRAC.IOIDOpt.VirtualAddressPersistencePolicyAuxPwrd** and **iDRAC.IOIDOpt.VirtualAddressPersistencePolicyNonAuxPwrd** objects
- For initiator, use **iDRAC.IOIDOPT.InitiatorPersistencePolicy** object
- For storage targets, use **iDRAC.IOIDOpt.StorageTargetPersistencePolicy** object

For more information, see the iDRAC RACADM CLI Guide available at www.dell.com/idracmanuals.

iSCSI initiator and storage target default values

The following tables provide the list of default values for iSCSI initiator and storage targets when the persistence policies are cleared.

Table 47. iSCSI initiator —default values

iSCSI Initiator	Default Values in IPv4 mode	Default Values in IPv6 mode
IscsiInitiatorIpAddr	0.0.0.0	::
IscsiInitiatorIpv4Addr	0.0.0.0	0.0.0.0
IscsiInitiatorIpv6Addr	::	::
IscsiInitiatorSubnet	0.0.0.0	0.0.0.0
IscsiInitiatorSubnetPrefix	0	0
IscsiInitiatorGateway	0.0.0.0	::
IscsiInitiatorIpv4Gateway	0.0.0.0	0.0.0.0
IscsiInitiatorIpv6Gateway	::	::
IscsiInitiatorPrimDns	0.0.0.0	::
IscsiInitiatorIpv4PrimDns	0.0.0.0	0.0.0.0
IscsiInitiatorIpv6PrimDns	::	::
IscsiInitiatorSecDns	0.0.0.0	::
IscsiInitiatorIpv4SecDns	0.0.0.0	0.0.0.0
IscsiInitiatorIpv6SecDns	::	::
IscsiInitiatorName	Value Cleared	Value Cleared
IscsiInitiatorChapId	Value Cleared	Value Cleared
IscsiInitiatorChapPwd	Value Cleared	Value Cleared
IPVer	Ipv4	

Table 48. ISCSI storage target attributes — default values

iSCSI Storage Target Attributes	Default Values in IPv4 mode	Default Values in IPv6 mode
ConnectFirstTgt	Disabled	Disabled
FirstTgtIpAddress	0.0.0.0	::
FirstTgtTcpPort	3260	3260

iSCSI Storage Target Attributes	Default Values in IPv4 mode	Default Values in IPv6 mode
FirstTgtBootLun	0	0
FirstTgtIscsiName	Value Cleared	Value Cleared
FirstTgtChapId	Value Cleared	Value Cleared
FirstTgtChapPwd	Value Cleared	Value Cleared
FirstTgtIpVer	Ipv4	
ConnectSecondTgt	Disabled	Disabled
SecondTgtIpAddress	0.0.0.0	::
SecondTgtTcpPort	3260	3260
SecondTgtBootLun	0	0
SecondTgtIscsiName	Value Cleared	Value Cleared
SecondTgtChapId	Value Cleared	Value Cleared
SecondTgtChapPwd	Value Cleared	Value Cleared
SecondTgtIpVer	Ipv4	

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Managing storage devices

Starting with iDRAC 3.15.15.15 release, iDRAC supports Boot Optimized Storage Solution (BOSS) controller in the 14th generation of PowerEdge servers. BOSS controllers are designed specifically for booting the operating system of the server. These controllers support limited RAID features and the configuration is staged.

NOTE: BOSS controllers support only RAID level1.

iDRAC has expanded its agent-free management to include direct configuration of the PERC controllers. It enables you to remotely configure the storage components attached to your system at run-time. These components include RAID and non-RAID controllers and the channels, ports, enclosures, and disks attached to them. For the 14th generation of PowerEdge servers, PERC 9 and PERC 10 controllers are supported.

The complete storage subsystem discovery, topology, health monitoring, and configuration are accomplished in the Comprehensive Embedded Management (CEM) framework by interfacing with the internal and external PERC controllers through the MCTP protocol over I2C interface. For real-time configuration, CEM supports PERC9 controllers and above. The firmware version for PERC9 controllers must be 9.1 or later.

NOTE: The S140 or Software RAID (SWRAID) is not supported by CEM and thus is not supported in the iDRAC GUI. SWRAID can be managed using the WSMan API and RACADM.

Using iDRAC, you can perform most of the functions that are available in OpenManage Storage Management including real-time (no reboot) configuration commands (for example, create virtual disk). You can completely configure RAID before installing the operating system.

You can configure and manage the controller functions without accessing the BIOS. These functions include configuring virtual disks and applying RAID levels and hot spares for data protection. You can initiate many other controller functions such as rebuilds and troubleshooting. You can protect your data by configuring data-redundancy or assigning hot spares.

The storage devices are:

- Controllers — Most operating systems do not read and write data directly from the disks, but instead send read and write instructions to a controller. The controller is the hardware in your system that interacts directly with the disks to write and retrieve data. A controller has connectors (channels or ports) which are attached to one or more physical disks or an enclosure containing physical disks. RAID controllers can span the boundaries of the disks to create an extended amount of storage space— or a virtual disk — using the capacity of more than one disk. Controllers also perform other tasks, such as initiating rebuilds, initializing disks, and more. To complete their tasks, controllers require special software known as firmware and drivers. In order to function properly, the controller must have the minimum required version of the firmware and the drivers installed. Different controllers have different characteristics in the way they read and write data and execute tasks. It is helpful to understand these features to most efficiently manage the storage.
- Physical disks or physical devices — Reside within an enclosure or are attached to the controller. On a RAID controller, physical disks or devices are used to create virtual disks.
- Virtual disk — It is storage created by a RAID controller from one or more physical disks. Although a virtual disk may be created from several physical disks, it is viewed by the operating system as a single disk. Depending on the RAID level used, the virtual disk may retain redundant data if there is a disk failure or have particular performance attributes. Virtual disks can only be created on a RAID controller.
- Enclosure — It is attached to the system externally while the backplane and its physical disks are internal.
- Backplane — It is similar to an enclosure. In a Backplane, the controller connector and physical disks are attached to the enclosure, but it does not have the management features (temperature probes, alarms, and so on) associated with external enclosures. Physical disks can be contained in an enclosure or attached to the backplane of a system.

NOTE: In iDRAC web interface, the value displayed for *Connector* under the enclosure properties is not applicable for MX platforms, therefore must be ignored.

In addition to managing the physical disks contained in the enclosure, you can monitor the status of the fans, power supply, and temperature probes in an enclosure. You can hot-plug enclosures. Hot-plugging is defined as adding of a component to a system while the operating system is still running.

The physical devices connected to the controller must have the latest firmware. For the latest supported firmware, contact your service provider.

Storage events from PERC are mapped to SNMP traps and WSMan events as applicable. Any changes to the storage configurations are logged in the Lifecycle Log.

Table 49. PERC capability

PERC Capability	CEM configuration Capable Controller (PERC 9.1 or later)	CEM configuration Non-capable Controller (PERC 9.0 and lower)
Real-time	**NOTE: For the 14th generation of PowerEdge servers, PERC 9 and PERC 10 controllers are supported.** If there is no existing pending or scheduled jobs for the controller, then configuration is applied. If there are pending or scheduled jobs for that controller, then the jobs have to be cleared or you must wait for the jobs to be completed before applying the configuration at run-time. Run-time or real-time means, a reboot is not required.	Configuration is applied. An error message is displayed. Job creation is not successful and you cannot create real-time jobs using Web interface.
Staged	If all the set operations are staged, the configuration is staged and applied after reboot or it is applied at real-time.	Configuration is applied after reboot

Topics:

- Understanding RAID concepts
- Supported controllers
- Supported enclosures
- Summary of supported features for storage devices
- Inventorying and monitoring storage devices
- Viewing storage device topology
- Managing physical disks
- Managing virtual disks
- Managing controllers
- Managing PCIe SSDs
- Managing enclosures or backplanes
- Choosing operation mode to apply settings
- Viewing and applying pending operations
- Storage devices — apply operation scenarios
- Blinking or unblinking component LEDs

Understanding RAID concepts

Storage Management uses the Redundant Array of Independent Disks (RAID) technology to provide Storage Management capability. Understanding Storage Management requires an understanding of RAID concepts, as well as some familiarity with how the RAID controllers and operating system view disk space on your system.

What is RAID

RAID is a technology for managing the storage of data on the physical disks that reside or are attached to the system. A key aspect of RAID is the ability to span physical disks so that the combined storage capacity of multiple physical disks can be treated as a single, extended disk space. Another key aspect of RAID is the ability to maintain redundant data which can be used to restore data in the event of a disk failure. RAID uses different techniques, such as striping, mirroring, and parity, to store and reconstruct data. There are different RAID levels that use different methods for storing and reconstructing data. The RAID levels have different characteristics in terms of read/write performance, data protection, and storage capacity. Not all RAID levels maintain redundant data, which means for some RAID levels lost data cannot be restored. The RAID level you choose depends on whether your priority is performance, protection, or storage capacity.

NOTE: The RAID Advisory Board (RAB) defines the specifications used to implement RAID. Although RAB defines the RAID levels, commercial implementation of RAID levels by different vendors may vary from the actual RAID specifications. An implementation of a particular vendor may affect the read and write performance and the degree of data redundancy.

Hardware and software RAID

RAID can be implemented with either hardware or software. A system using hardware RAID has a RAID controller that implements the RAID levels and processes data reads and writes to the physical disks. When using software RAID provided by the operating system, the operating system implements the RAID levels. For this reason, using software RAID by itself can slow the system performance. You can, however, use software RAID along with hardware RAID volumes to provide better performance and variety in the configuration of RAID volumes. For example, you can mirror a pair of hardware RAID 5 volumes across two RAID controllers to provide RAID controller redundancy.

RAID concepts

RAID uses particular techniques for writing data to disks. These techniques enable RAID to provide data redundancy or better performance. These techniques include:

- Mirroring — Duplicating data from one physical disk to another physical disk. Mirroring provides data redundancy by maintaining two copies of the same data on different physical disks. If one of the disks in the mirror fails, the system can continue to operate using the unaffected disk. Both sides of the mirror contain the same data always. Either side of the mirror can act as the operational side. A mirrored RAID disk group is comparable in performance to a RAID 5 disk group in read operations but faster in write operations.
- Striping — Disk striping writes data across all physical disks in a virtual disk. Each stripe consists of consecutive virtual disk data addresses that are mapped in fixed-size units to each physical disk in the virtual disk using a sequential pattern. For example, if the virtual disk includes five physical disks, the stripe writes data to physical disks one through five without repeating any of the physical disks. The amount of space consumed by a stripe is the same on each physical disk. The portion of a stripe that resides on a physical disk is a stripe element. Striping by itself does not provide data redundancy. Striping in combination with parity does provide data redundancy.
- Stripe size — The total disk space consumed by a stripe not including a parity disk. For example, consider a stripe that contains 64KB of disk space and has 16KB of data residing on each disk in the stripe. In this case, the stripe size is 64KB and the stripe element size is 16KB.
- Stripe element — A stripe element is the portion of a stripe that resides on a single physical disk.
- Stripe element size — The amount of disk space consumed by a stripe element. For example, consider a stripe that contains 64KB of disk space and has 16KB of data residing on each disk in the stripe. In this case, the stripe element size is 16KB and the stripe size is 64KB.
- Parity — Parity refers to redundant data that is maintained using an algorithm in combination with striping. When one of the striped disks fails, the data can be reconstructed from the parity information using the algorithm.

- Span — A span is a RAID technique used to combine storage space from groups of physical disks into a RAID 10, 50, or 60 virtual disk.

RAID levels

Each RAID level uses some combination of mirroring, striping, and parity to provide data redundancy or improved read and write performance. For specific information on each RAID level, see Choosing raid levels.

Organizing data storage for availability and performance

RAID provides different methods or RAID levels for organizing the disk storage. Some RAID levels maintain redundant data so that you can restore data after a disk failure. Different RAID levels also entail an increase or decrease in the I/O (read and write) performance of a system.

Maintaining redundant data requires the use of additional physical disks. The possibility of a disk failure increases with an increase in the number of disks. Since the differences in I/O performance and redundancy, one RAID level may be more appropriate than another based on the applications in the operating environment and the nature of the data being stored.

When choosing a RAID level, the following performance and cost considerations apply:

- Availability or fault-tolerance — Availability or fault-tolerance refers to the ability of a system to maintain operations and provide access to data even when one of its components has failed. In RAID volumes, availability or fault-tolerance is achieved by maintaining redundant data. Redundant data includes mirrors (duplicate data) and parity information (reconstructing data using an algorithm).
- Performance — Read and write performance can be increased or decreased depending on the RAID level you choose. Some RAID levels may be more appropriate for particular applications.
- Cost efficiency — Maintaining the redundant data or parity information associated with RAID volumes requires additional disk space. In situations where the data is temporary, easily reproduced, or non-essential, the increased cost of data redundancy may not be justified.
- Mean Time Between Failure (MTBF) — Using additional disks to maintain data redundancy also increases the chance of disk failure at any given moment. Although this option cannot be avoided in situations where redundant data is a requirement, it does have implications on the workload of the system support staff within your organization.
- Volume — Volume refers to a single disk non-RAID virtual disk. You can create volumes using external utilities like the O-ROM <Ctrl> <r>. Storage Management does not support the creation of volumes. However, you can view volumes and use drives from these volumes for creation of new virtual disks or Online Capacity Expansion (OCE) of existing virtual disks, provided free space is available.

Choosing RAID levels

You can use RAID to control data storage on multiple disks. Each RAID level or concatenation has different performance and data protection characteristics.

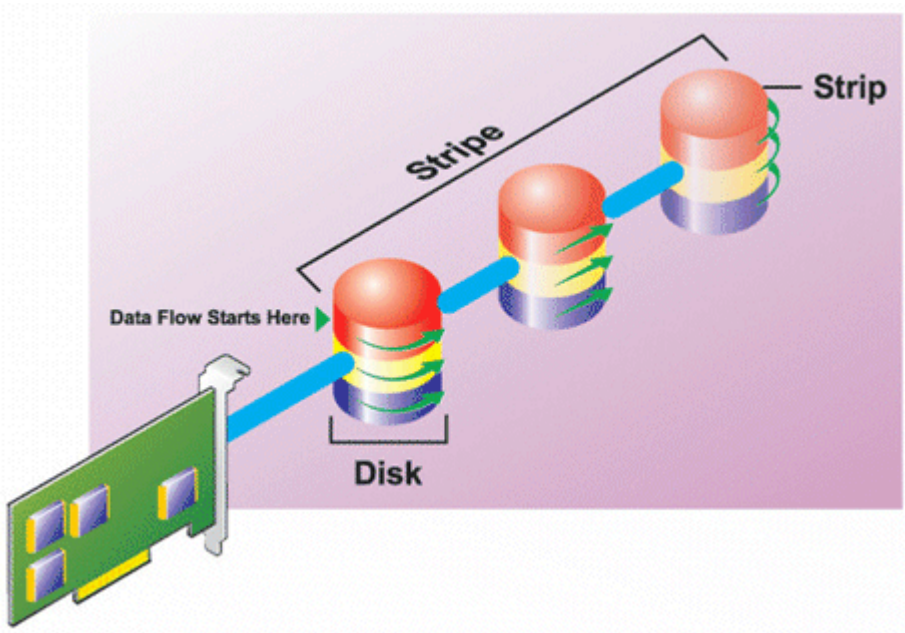
NOTE: The H3xx PERC controllers do not support RAID levels 6 and 60.

The following topics provide specific information on how each RAID level store data as well as their performance and protection characteristics:

- Raid level 0 (striping)
- Raid level 1 (mirroring)
- Raid level 5 (striping with distributed parity)
- Raid level 6 (striping with additional distributed parity)
- Raid level 50 (striping over raid 5 sets)
- Raid level 60 (striping over raid 6 sets)
- Raid level 10 (striping over mirror sets)

RAID level 0 - striping

RAID 0 uses data striping, which is writing data in equal-sized segments across the physical disks. RAID 0 does not provide data redundancy.

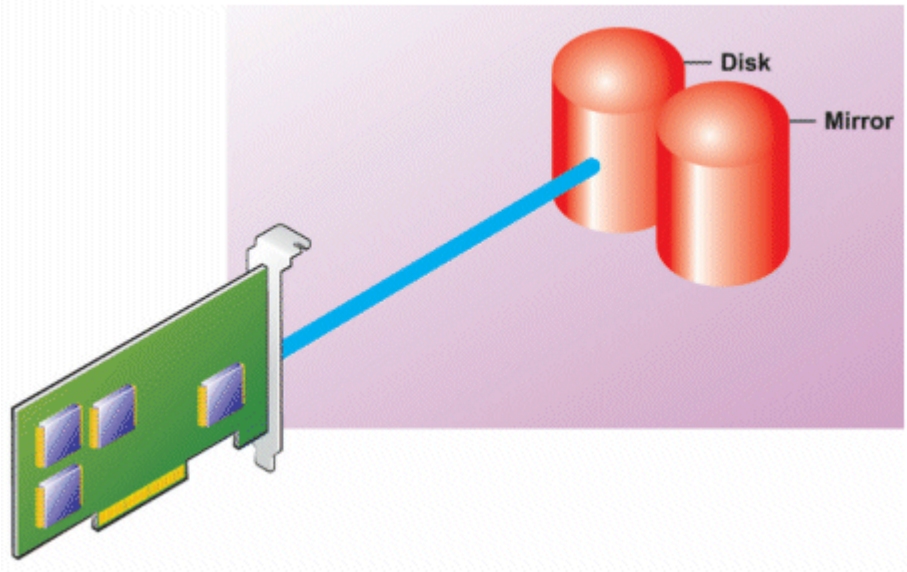


RAID 0 characteristics:

- Groups *n* disks as one large virtual disk with a capacity of (smallest disk size) **n* disks.
- Data is stored to the disks alternately.
- No redundant data is stored. When a disk fails, the large virtual disk fails with no means of rebuilding the data.
- Better read and write performance.

RAID level 1 - mirroring

RAID 1 is the simplest form of maintaining redundant data. In RAID 1, data is mirrored or duplicated on one or more physical disks. If a physical disk fails, data can be rebuilt using the data from the other side of the mirror.

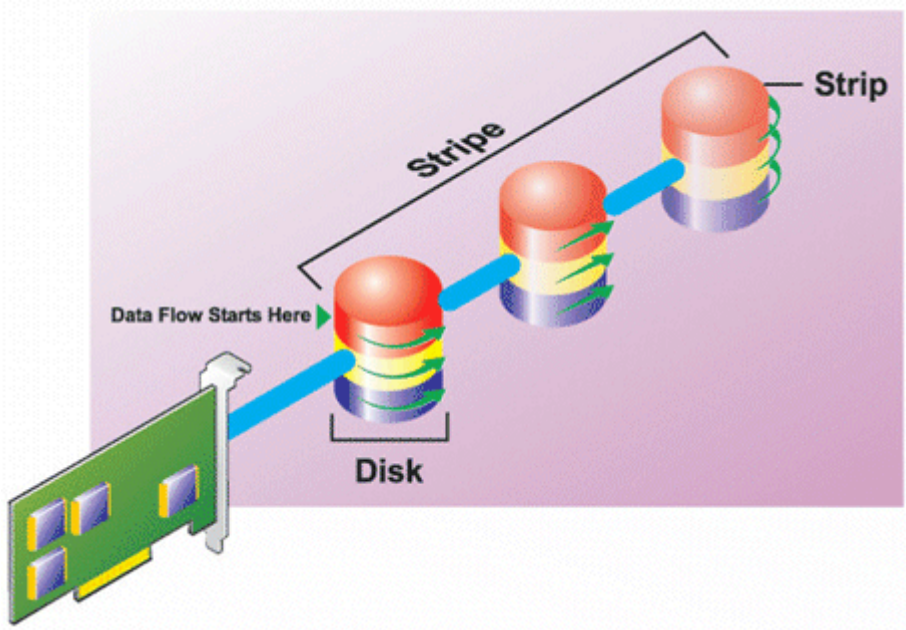


RAID 1 characteristics:

- Groups *n* + *n* disks as one virtual disk with the capacity of *n* disks. The controllers currently supported by Storage Management allow the selection of two disks when creating a RAID 1. Because these disks are mirrored, the total storage capacity is equal to one disk.
- Data is replicated on both the disks.
- When a disk fails, the virtual disk still works. The data is read from the mirror of the failed disk.
- Better read performance, but slightly slower write performance.
- Redundancy for protection of data.
- RAID 1 is more expensive in terms of disk space since twice the number of disks are used than required to store the data without redundancy.

RAID level 5 or striping with distributed parity

RAID 5 provides data redundancy by using data striping in combination with parity information. Rather than dedicating a physical disk to parity, the parity information is striped across all physical disks in the disk group.

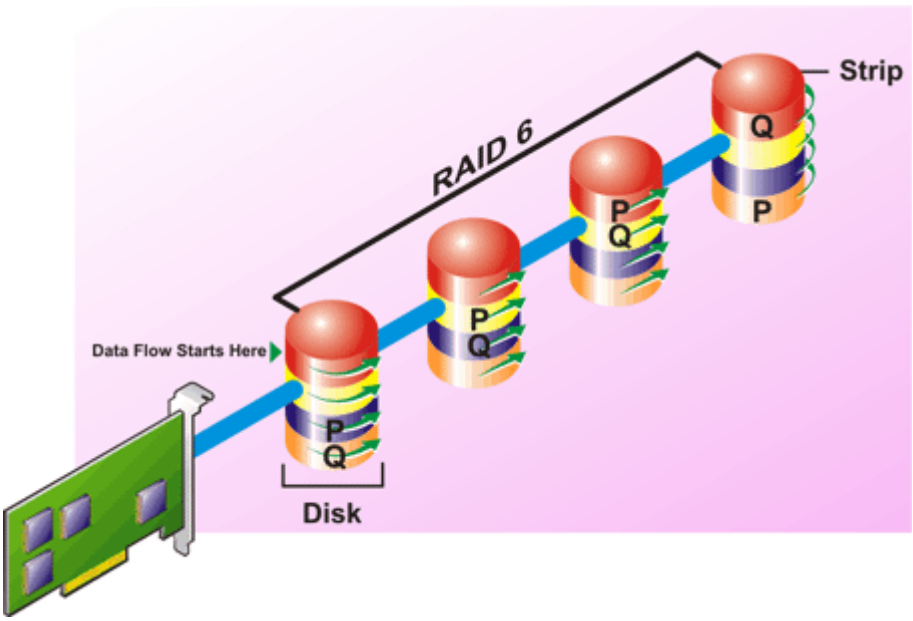


RAID 5 characteristics:

- Groups *n* disks as one large virtual disk with a capacity of (*n*-1) disks.
- Redundant information (parity) is alternately stored on all disks.
- When a disk fails, the virtual disk still works, but it is operating in a degraded state. The data is reconstructed from the surviving disks.
- Better read performance, but slower write performance.
- Redundancy for protection of data.

RAID level 6-striping with additional distributed parity

RAID 6 provides data redundancy by using data striping in combination with parity information. Similar to RAID 5, the parity is distributed within each stripe. RAID 6, however, uses an additional physical disk to maintain parity, such that each stripe in the disk group maintains two disk blocks with parity information. The additional parity provides data protection in the event of two disk failures. In the following image, the two sets of parity information are identified as **P** and **Q**.



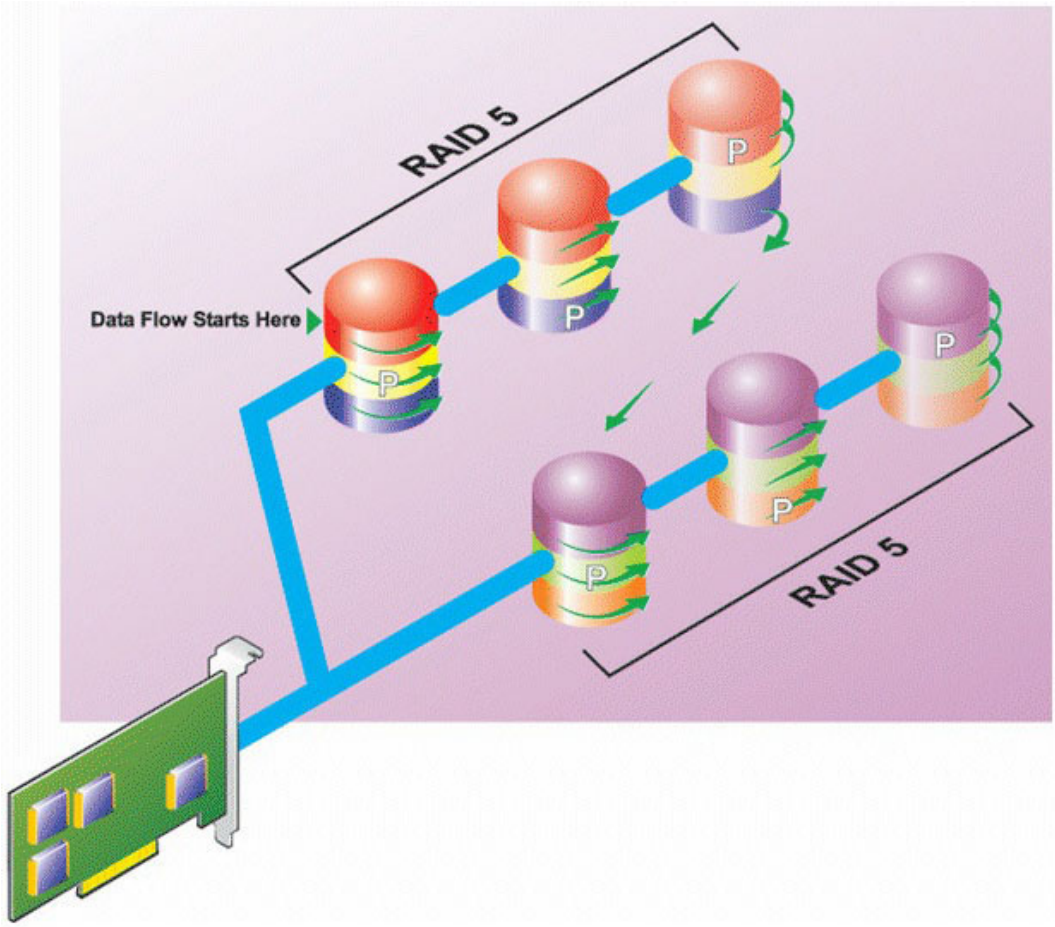
RAID 6 characteristics:

- Groups *n* disks as one large virtual disk with a capacity of (*n*-2) disks.
- Redundant information (parity) is alternately stored on all disks.
- The virtual disk remains functional with up to two disk failures. The data is reconstructed from the surviving disks.
- Better read performance, but slower write performance.
- Increased redundancy for protection of data.
- Two disks per span are required for parity. RAID 6 is more expensive in terms of disk space.

RAID level 50 - striping over RAID 5 sets

RAID 50 is striping over more than one span of physical disks. For example, a RAID 5 disk group that is implemented with three physical disks and then continues on with a disk group of three more physical disks would be a RAID 50.

It is possible to implement RAID 50 even when the hardware does not directly support it. In this case, you can implement more than one RAID 5 virtual disks and then convert the RAID 5 disks to dynamic disks. You can then create a dynamic volume that is spanned across all RAID 5 virtual disks.

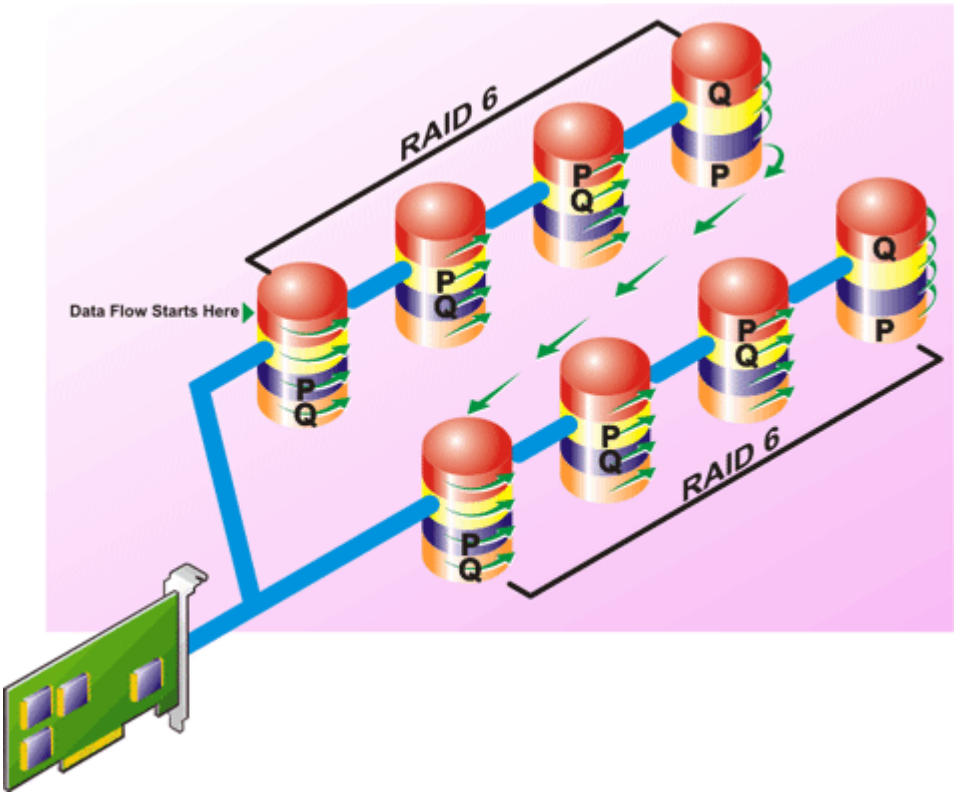


RAID 50 characteristics:

- Groups *n***s* disks as one large virtual disk with a capacity of *s**(*n*-1) disks, where *s* is the number of spans and *n* is the number of disks within each span.
- Redundant information (parity) is alternately stored on all disks of each RAID 5 span.
- Better read performance, but slower write performance.
- Requires as much parity information as standard RAID 5.
- Data is striped across all spans. RAID 50 is more expensive in terms of disk space.

RAID level 60 - striping over RAID 6 sets

RAID 60 is striping over more than one span of physical disks that are configured as a RAID 6. For example, a RAID 6 disk group that is implemented with four physical disks and then continues on with a disk group of four more physical disks would be a RAID 60.

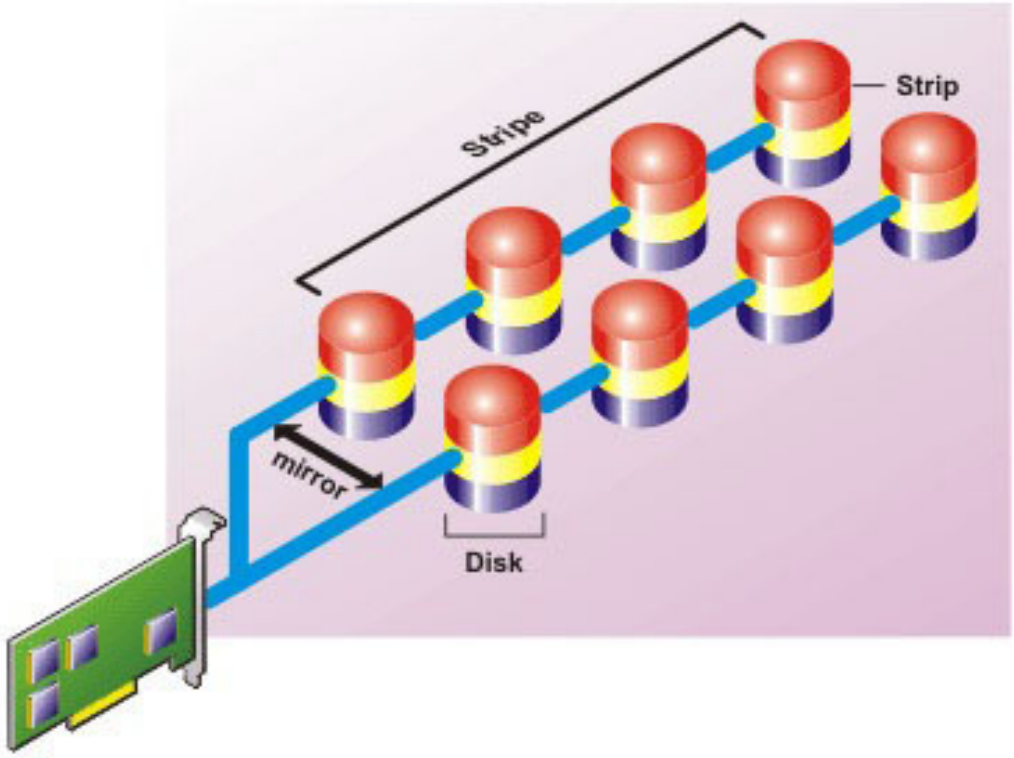


RAID 60 characteristics:

- Groups *n***s* disks as one large virtual disk with a capacity of *s**(*n*-2) disks, where *s* is the number of spans and *n* is the number of disks within each span.
- Redundant information (parity) is alternately stored on all disks of each RAID 6 span.
- Better read performance, but slower write performance.
- Increased redundancy provides greater data protection than a RAID 50.
- Requires proportionally as much parity information as RAID 6.
- Two disks per span are required for parity. RAID 60 is more expensive in terms of disk space.

RAID level 10 - striped with mirrors

The RAB considers RAID level 10 to be an implementation of RAID level 1. RAID 10 combines mirrored physical disks (RAID 1) with data striping (RAID 0). With RAID 10, data is striped across multiple physical disks. The striped disk group is then mirrored onto another set of physical disks. RAID 10 can be considered a *mirror of stripes*.



RAID 10 characteristics:

- Groups *n* disks as one large virtual disk with a capacity of (*n*/2) disks, where *n* is an even integer.
- Mirror images of the data are striped across sets of physical disks. This level provides redundancy through mirroring.
- When a disk fails, the virtual disk still works. The data is read from the surviving mirrored disk.
- Improved read performance and write performance.
- Redundancy for protection of data.

Comparing RAID level performance

The following table compares the performance characteristics associated with the more common RAID levels. This table provides general guidelines for choosing a RAID level. Evaluate your specific environment requirements before choosing a RAID level.

Table 50. RAID level performance comparison

RAID Level	Data Availability	Read Performance	Write Performance	Rebuild Performance	Minimum Disks Required	Suggested Uses
RAID 0	None	Very Good	Very Good	N/A	N	Noncritical data.
RAID 1	Excellent	Very Good	Good	Good	2N (N = 1)	Small databases, database logs, and critical information.
RAID 5	Good	Sequential reads: good. Transactional reads: Very good	Fair, unless using writeback cache	Fair	N + 1 (N = at least two disks)	Databases and other read intensive

RAID Level	Data Availability	Read Performance	Write Performance	Rebuild Performance	Minimum Disks Required	Suggested Uses
						transactional uses.
RAID 10	Excellent	Very Good	Fair	Good	2N x X	Data intensive environments (large records).
RAID 50	Good	Very Good	Fair	Fair	N + 2 (N = at least 4)	Medium sized transactional or data intensive uses.
RAID 6	Excellent	Sequential reads: good. Transactional reads: Very good	Fair, unless using writeback cache	Poor	N + 2 (N = at least two disks)	Critical information. Databases and other read intensive transactional uses.
RAID 60	Excellent	Very Good	Fair	Poor	X x (N + 2) (N = at least 2)	Critical information. Medium sized transactional or data intensive uses.
N = Number of physical disks X = Number of RAID sets						

Supported controllers

Supported RAID controllers

The iDRAC interfaces support BOSS-S1 Modular controller, PERC H745P (PERC10) and PERC H730P MX (PERC 9) controllers.

Supported non-RAID controllers

iDRAC supports HBA330 MMZ, HBA330 MX adapters.

Supported enclosures

iDRAC supports MD1400, and MD1420 enclosures.

NOTE: Redundant Array of Inexpensive Disks (RBODS) that are connected to HBA controllers are not supported.

Summary of supported features for storage devices

The following tables provide the features supported by the storage devices through iDRAC.

Table 51. Supported features for storage controllers

Feature	PERC 10	PERC 9
	H745P MX	H730P MX
Assign or unassign physical disk as a global hot spare	Real-time	Real-time
Convert to RAID/Non RAID,	Real-time	Real-time
Rebuild	Real-time	Real-time
Cancel Rebuild	Real-time	Real-time
Create virtual disks	Real-time	Real-time
Rename virtual disks	Real-time	Real-time
Edit virtual disks cache policies	Real-time	Real-time
Check virtual disk consistency	Real-time	Real-time
Cancel check consistency	Real-time	Real-time
Initialize virtual disks	Real-time	Real-time
Cancel initialization	Real-time	Real-time
Encrypt virtual disks	Real-time	Real-time
Assign or unassign dedicated hot spare	Real-time	Real-time
Delete virtual disks	Real-time	Real-time
Cancel Background Initialization	Real-time	Real-time
Online Capacity Expansion	Real-time	Real-time
RAID Level Migration	Real-time	Real-time
Discard Preserved Cache	Real-time	Real-time
Set Patrol Read Mode	Real-time	Real-time
Manual Patrol Read Mode	Real-time	Real-time
Patrol Read Unconfigured Areas	Real-time	Real-time (only in web interface)
Check Consistency Mode	Real-time	Real-time
Copyback Mode	Real-time	Real-time
Load Balance Mode	Real-time	Real-time
Check Consistency Rate	Real-time	Real-time
Rebuild Rate	Real-time	Real-time
BGI Rate	Real-time	Real-time
Reconstruct Rate	Real-time	Real-time
Import foreign configuration	Real-time	Real-time
Auto-import foreign configuration	Real-time	Real-time
Clear foreign configuration	Real-time	Real-time

Feature	PERC 10	PERC 9
	H745P MX	H730P MX
Reset controller configuration	Real-time	Real-time
Create or change security keys	Real-time	Real-time
Inventory and remotely monitor the health of PCIe SSD devices	Not applicable	Not applicable
Prepare the PCIe SSD to be removed	Not applicable	Not applicable
Securely erase the data for PCIe SSD	Not applicable	Not applicable
Configure Backplane mode (split/ unified)	Real-time	Real-time
Blink or unblink component LEDs	Real-time	Real-time
Switch controller mode	Not applicable	Staged
T10PI support for Virtual Disks	Not applicable	Not applicable

NOTE: PERC 10 no longer supports convert drives to non-RAID, convert controller to HBA mode and RAID 10 uneven span support.

Table 52. Supported features for storage devices

Feature	PCIe SSD	BOSS
Create virtual disks	Not applicable	Staged
Reset controller configuration	Not applicable	Staged
Fast Initialization	Not applicable	Staged
Delete virtual disks	Not applicable	Staged
Full Initialization	Not applicable	Not applicable
Inventory and remotely monitor the health of PCIe SSD devices	Real-time	Not applicable
Prepare the PCIe SSD to be removed	Real-time	Not applicable
Securely erase the data for PCIe SSD	Staged	Not applicable
Blink or unblink component LEDs	Real-time	Not applicable

Inventorying and monitoring storage devices

You can remotely monitor the health and view the inventory of the following Comprehensive Embedded Management (CEM) enabled storage devices in the managed system using iDRAC web interface:

- RAID controllers, non-RAID controllers, BOSS controllers and PCIe extenders
- Enclosures that include Enclosure Management Modules (EMMs), power supply, fan probe, and temperature probe
- Physical disks
- Virtual disks
- Batteries

The recent storage events and topology of storage devices are also displayed.

Alerts and SNMP traps are generated for storage events. The events are logged in the Lifecycle Log.

NOTE: For an accurate inventory of BOSS controllers, ensure that Collect System Inventory On Reboot Operation (CSIOR) is completed. CSIOR is enabled by default.

NOTE: If you enumerate the enclosure view's WSMan command on a system while one PSU-cable is removed, the primary status of the enclosure view is reported as Healthy instead of Warning.

NOTE: The storage health rollup follows the same convention of Dell EMC OpenManage product. For more information see the OpenManage Server Administrator User's Guide available at www.dell.com/openmanagemanuals.

NOTE: Physical disks in system with multiple backplanes may be listed under a different backplane. Use the blink function to identify the disks.

Monitoring storage devices using web interface

To view the storage device information using web interface:

- Go to **Storage** > **Overview** > **Summary** to view the summary of the storage components and the recently logged events. This page is automatically refreshed every 30 seconds.
- Go to **Storage** > **Overview** > **Controllers** to view the RAID controller information. The **Controllers** page is displayed.
- Go to **Storage** > **Overview** > **Physical Disks** to view physical disk information. The **Physical Disks** page is displayed.
- Go to **Storage** > **Overview** > **Virtual Disks** to view virtual disk information. The **Virtual Disks** page is displayed.
- Go to **Storage** > **Overview** > **Enclosures** to view the enclosure information. The **Enclosures** page is displayed.

You can also use filters to view specific device information.

NOTE: The storage hardware list is not displayed in case the system does not have storage devices with CEM support.

NOTE: When NVMe SSDs are in RAID mode behind S140 controller, web interface does not display NVMe SSD's slot information in the Enclosure page. Refer Physical Disks page for the details.

NOTE: If the NVMe SSDs in the backplane slots support NVMe-MI commands and the I2C connection to backplane slots are fine, the iDRAC discovers these NVMe SSDs and reports them in the interfaces irrespective of the PCI connections to the respective backplane slots.

For more information about the displayed properties and to use the filter options, see the iDRAC Online Help.

Monitoring storage devices using RACADM

To view the storage device information, use the **storage** command.

For more information, see the iDRAC RACADM CLI Guide available at www.dell.com/idracmanuals.

Monitoring backplane using iDRAC settings utility

In the iDRAC Settings utility, go to **System Summary**. The **iDRAC Settings.System Summary** page is displayed. The **Backplane Inventory** section displays the backplane information. For information about the fields, see the *iDRAC Settings Utility Online Help*.

Viewing storage device topology

You can view the hierarchical physical containment view of the key storage components, that is, a list of controllers, enclosures connected to the controller and a link to the physical disk contained in each enclosure. The physical disks attached directly to the controller are also displayed.

To view the storage device topology, go to **Storage** > **Overview**. The **Overview** page displays the hierarchical representation of the storage components in the system. The available options are:

- Controllers

- Physical Disks
- Virtual Disks
- Enclosures

Click the links to view the respective component details.

Managing physical disks

You can perform the following for physical disks:

- View physical disk properties.
- Assign or unassign physical disk as a global hot-spare.
- Convert to RAID capable disk.
- Convert to non-RAID disk.
- Blink or unblink the LED.
- Rebuild physical disk
- Cancel rebuild physical disk
- Cryptographic erase

Assigning or unassigning physical disk as global hot spare

A global hot spare is an unused backup disk that is part of the disk group. Hot spares remain in standby mode. When a physical disk that is used in a virtual disk fails, the assigned hot spare is activated to replace the failed physical disk without interrupting the system or requiring your intervention. When a hot spare is activated, it rebuilds the data for all redundant virtual disks that were using the failed physical disk.

NOTE: From iDRAC v2.30.30.30 or later, you can add global hot spares when virtual disks are not created.

You can change the hot spare assignment by unassigning a disk and choosing another disk as needed. You can also assign more than one physical disk as a global hot spare.

Global hot spares must be assigned and unassigned manually. They are not assigned to specific virtual disks. If you want to assign a hot spare to a virtual disk (it replaces any physical disk that fails in the virtual disk), then see Assigning or unassigning dedicated hot spares.

When deleting virtual disks, all assigned global hot spares may be automatically unassigned when the last virtual disk associated with the controller is deleted.

If you reset the configuration, the virtual disks are deleted and all the hot spares are unassigned.

You must be familiar with the size requirements and other considerations associated with hot spares.

Before assigning a physical disk as a global hot spare:

- Make sure that Lifecycle Controller is enabled.
- If there are no disk drives available in ready state, insert additional disk drives and make sure that the drives are in ready state.
- If physical disks are in non-RAID mode convert them to RAID mode using iDRAC interfaces such as iDRAC web interface, RACADM, Redfish or WSMan, or <CTRL+R>.

  NOTE: During POST, press F2 to enter System Setup or Device Setup. CTRL+R option is no longer supported for PERC 10. CTRL+R only works with PERC 9 while boot mode is set to BIOS.

If you have assigned a physical disk as a global hot spare in Add to Pending Operation mode, the pending operation is created but a job is not created. Then, if you try to unassign the same disk as global hot spare, the assign global hot spare pending operation is cleared.

If you have unassigned a physical disk as a global hot spare in Add to Pending Operation mode, the pending operation is created but a job is not created. Then, if you try to assign the same disk as a global hot spare, the unassign global hot spare pending operation is cleared.

If the last VD is deleted, the global hot spares also returns to ready state.

If a PD is already a global hot spares, user can still assign it again as a global hot spares.

Assigning or unassigning global hot spare using web interface

To assign or unassign a global hot spare for a physical disk drive:

1 In the iDRAC web interface, go to **Configuration** > **Storage Configuration**.
The **Storage Configuration** page is displayed.
2 From the **Controller** drop-down menu, select the controller to view the associated physical disks.
3 Click **Physical Disk Configuration**.
All the physical disks associated to the controller are displayed.
4 To assign as a global hotspare, from the drop-down menus in the **Action** column, select **Assign Global Hotspare** for one or more physical disks.
5 To unassign a hot spare, from the drop-down menus in the **Action** column, select **Unassign Hotspare** for one or more physical disks.
6 Click **Apply Now**.
Depending on your requirement, you can also choose to apply **At Next Reboot** or **At Scheduled Time**. Based on the selected operation mode, the settings are applied.

Assigning or unassigning global hot spare using RACADM

Use the **storage** command and specify the type as global hot spare.
For more information, see the iDRAC RACADM CLI Guide available at www.dell.com/idracmanuals.

Converting a physical disk to RAID or non-RAID mode

Converting a physical disk to RAID mode enables the disk for all RAID operations. When a disk is in a non-RAID mode, the disk is exposed to the operating system unlike unconfigured good disks and is used in a direct pass-through mode.

PERC 10 is not supported to convert drives to non-RAID.

You can convert the physical disk drives to RAID or non-RAID mode by:

- Using iDRAC interfaces such as iDRAC web interface, RACADM, Redfish or WSMan.
- Pressing <Ctrl+R> while restarting the server and selecting the required controller.

NOTE: If the physical drives connected to a PERC controller are in non-RAID mode, the size of the disk displayed in the iDRAC interfaces, such as iDRAC GUI, RACADM, Redfish and WSMan, may be slightly less than the actual size of the disk. However, you can use the full capacity of the disk to deploy operating systems.

Converting physical disks to RAID capable or non-RAID mode using the iDRAC web interface

To convert the physical disks to RAID mode or non-RAID mode, perform the following steps:

1 In the iDRAC web interface, click **Storage** > **Overview** > **Physical Disks**.
2 Click **Advanced Filter**.
An elaborated list is displayed that allows you to configure different parameters.
3 From the **Group By** drop-down menu, select an enclosure or virtual disks.

The parameters associated with the enclosure or the VD are displayed.

4 Click **Apply**, once you select all the desired parameters. For more information about the fields, see the *iDRAC Online Help*.
The settings are applied based on the option selected in the operation mode.

Converting physical disks to RAID capable or non-RAID mode using RACADM

Depending on whether you want to convert to RAID or Non-RAID mode, use the following RACADM commands

- To convert to RAID mode, use the `racadm storage converttoraid` command.
- To convert to Non-RAID mode, use the `racadm storage converttononraid` command.

NOTE: On the S140 controller, you can only use the RACADM interface to convert the drives from non-RAID to RAID mode. The supported Software RAID modes are Windows or Linux Mode.

For more information about the commands, see the iDRAC RACADM CLI Guide available at www.dell.com/idracmanuals.

Erasing physical disks

The System Erase feature allows you to erase the contents of the physical drives. This feature is accessible using RACADM or the LC GUI. Physical drives on the server are grouped into two categories.

- Secure erase drives— Includes drives that provide cryptographic erase such as ISE and SED SAS and SATA drives, and PCIe SSDs.
- Overwrite erase drives— Includes all drives that do not support cryptographic erase.

The RACADM SystemErase sub-command includes options for the following categories:

- The **SecureErasePD** option cryptographically erases all the secure erase drives.
- The **OverwritePD** option overwrites data on all drives.

Before performing SystemErase, use the following command to check the erase capability of all physical disks for a server:

```
# racadm storage get pdisks -o -p SystemEraseCapability
```

To erase ISE and SED drives, use this command:

```
# racadm systemerase -secureerasepd
```

To erase overwrite erase drives, use the following command:

```
# racadm systemerase -overwritepd
```

NOTE: RACADM SystemErase removes all the virtual disks from the physical disks that are erased by the above commands.

NOTE: RACADM SystemErase causes the server to restart in order to perform the erase operations.

NOTE: Individual PCIe SSD or SED devices can be erased using the iDRAC GUI or RACADM. For more information, see the *Erasing PCIe SSD device data* and the *Erasing SED device data* section.

For information on the System Erase function within the Lifecycle Controller GUI, see the Lifecycle Controller User's Guide available at www.dell.com/idracmanuals.

Erasing SED device data

NOTE: This operation is not supported when SED device is a part of a Virtual Disk. The target SED device must be removed from the virtual disk prior to performing device erase.

Cryptographic Erase permanently erases all data present on the disk. Performing a Cryptographic Erase on an SED overwrites all blocks and results in permanent loss of all data on the SED. During Cryptographic Erase, the host is unable to access the SED. SED device erase can be performed either in real time or be applied after a system reboot.

If the system reboots or experiences a power loss during cryptographic erase, the operation is canceled. You must reboot the system and restart the process.

Before erasing SED device data, ensure that:

- Lifecycle Controller is enabled.
- You have Server Control and Login privileges.
- Selected SED drive is not part of a virtual disk.

NOTE:

- Erasing SEDs can be performed either as a real time or as a staged operation.
- After the SED drive is erased, it may still be displayed as active within the OS due to data caching. If this occurs, reboot the OS and the erased SED drive will no longer be displayed or report any data.
- Cryptographic erase feature is supported for SEDs for 14th generation PowerEdge servers.

Erasing SED device data using web interface

To erase the data on the SED device:

1. In the iDRAC Web interface, go to **Storage** > **Overview** > **Physical Disks**.
   The **Physical Disk** page is displayed.
2. From the **Controller** drop-down menu, select the controller to view the associated SEDs.
3. From the drop-down menus, select **Cryptographic Erase** for one or more SEDs.
   If you have selected **Cryptographic Erase** and you want to view the other options in the drop-down menu, then select **Action** and then click the drop-down menu to view the other options.
4. From the **Apply Operation Mode** drop-down menu, select one of the following options:
   - **Apply Now** — Select this option to apply the actions immediately with no system reboot required.
   - **At Next Reboot** — Select this option to apply the actions during the next system reboot.
   - **At Scheduled Time** — Select this option to apply the actions at a scheduled day and time:
     - **Start Time** and **End Time** — Click the calendar icons and select the days. From the drop-down menus, select the time. The action is applied between the start time and end time.
     - From the drop-down menu, select the type of reboot:
       - No Reboot (Manually Reboot System)
       - Graceful Shutdown
       - Force Shutdown
       - Power Cycle System (cold boot)
5. Click **Apply**.
   If the job is not created, a message indicating that the job creation was not successful is displayed. Also, the message ID and the recommended response action is displayed.
   If the job is created successfully, a message indicating that the job ID is created for the selected controller is displayed. Click **Job Queue** to view the progress of the job in the Job Queue page.

   If pending operation is not created, an error message is displayed. If pending operation is successful and job creation is not successful, then an error message is displayed.

Erasing SED device data using RACADM

To securely erase an SED device:

```
racadm storage cryptographicerase:<SED FQDD>
```

To create the target job after executing the **cryptographicerase** command:

```
racadm jobqueue create <SED FQDD> -s TIME_NOW -realtime
```

To create the target staged job after executing the cryptographicerase command:

```
racadm jobqueue create <SED FQDD> -s TIME_NOW -e <start_time>
```

To query the job ID returned:

```
racadm jobqueue view -i <job ID>
```

For more information, see the iDRAC RACADM CLI Guide available at www.dell.com/idracmanuals.

Rebuild Physical Disk

Rebuild Physical Disk is the ability to reconstruct the contents of a failed disk. This is true only when auto rebuild option is set to false. If there is a redundant virtual disk, the rebuild operation can reconstruct the contents of a failed physical disk. A rebuild can take place during normal operation, but it degrades performance.

Cancel Rebuild can be used to cancel a rebuild that is in progress. If you cancel a rebuild, the virtual disk remains in a degraded state. The failure of an additional physical disk can cause the virtual disk to fail and may result in data loss. It is recommended to perform a rebuild on the failed physical disk at the earliest.

In case, you cancel the rebuild of a physical disk that is assigned as a hot spare, reinitiate the rebuild on the same physical disk in order to restore the data. Canceling the rebuild of a physical disk and then assigning another physical disk as a hot spare does not cause the newly assigned hot spare to rebuild the data.

Managing virtual disks

You can perform the following operations for the virtual disks:

- Create
- Delete
- Edit policies
- Initialize
- Check consistency
- Cancel check consistency
- Encrypt virtual disks
- Assign or unassign dedicated hot spares
- Blink and unblink virtual disk
- Cancel background initialization
- Online capacity expansion
- RAID level migration

NOTE: You can manage and monitor 240 virtual disks using iDRAC interfaces. To create VDs, use either Device Setup (F2), PERCCLI command line tool, or Dell OpenManage Server Administrator (OMSA).

NOTE: PERC 10 count is less since it does not support daisy chain arrangements.

Creating virtual disks

To implement RAID functions, you must create a virtual disk. A virtual disk refers to storage created by a RAID controller from one or more physical disks. Although a virtual disk may be created from several physical disks, it is seen by the operating system as a single disk.

Before creating a virtual disk, you should be familiar with the information in Considerations Before Creating Virtual Disks.

You can create a Virtual Disk using the Physical Disks attached to the PERC controller. To create a Virtual Disk, you must have the Server Control user privilege. You can create a maximum of 64 virtual drives and a maximum of 16 virtual drives in the same drive group.

You cannot create a virtual disk if:

- Physical disk drives are not available for virtual disk creation. Install additional physical disk drives.
- Maximum number of virtual disks that can be created on the controller has been reached. You must delete at least one virtual disk and then create a new virtual disk.
- Maximum number of virtual disks supported by a drive group has been reached. You must delete one virtual disk from the selected group and then create a new virtual disk.
- A job is currently running or scheduled on the selected controller. You must wait for this job to complete or you can delete the job before attempting a new operation. You can view and manage the status of the scheduled job in the Job Queue page.
- Physical disk is in non-RAID mode. You must convert to RAID mode using iDRAC interfaces such as iDRAC web interface, RACADM, Redfish, WSMan, or <CTRL+R>.

NOTE: If you create a virtual disk in Add to Pending Operation mode and a job is not created, and then if you delete the Virtual disk, then the create pending operation for the virtual disk is cleared.

NOTE: BOSS controller allows you to create virtual disk only of size equal to the full size of the M.2 physical storage media. Ensure that you set the virtual disk size to zero when using the Server Configuration Profile to create a BOSS virtual disk. For other interfaces such as RACADM and WSMan, the virtual disk size should not be specified.

Considerations before creating virtual disks

Before creating virtual disks, consider the following:

- Virtual disk names not stored on controller—The names of the virtual disks that you create are not stored on the controller. This means that if you reboot using a different operating system, the new operating system may rename the virtual disk using its own naming conventions.
- Disk grouping is a logical grouping of disks attached to a RAID controller on which one or more virtual disks are created, such that all virtual disks in the disk group use all of the physical disks in the disk group. The current implementation supports the blocking of mixed disk groups during the creation of logical devices.
- Physical disks are bound to disk groups. Therefore, there is no RAID level mixing on one disk group.
- There are limitations on the number of physical disks that can be included in the virtual disk. These limitations depend on the controller. When creating a virtual disk, controllers support a certain number of stripes and spans (methods for combining the storage on physical disks). Because the number of total stripes and spans is limited, the number of physical disks that can be used is also limited. The limitations on stripes and spans affect the RAID levels as follows:
  - Maximum number of spans affects RAID 10, RAID 50, and RAID 60.
  - Maximum number of stripes affects RAID 0, RAID 5, RAID 50, RAID 6, and RAID 60.
  - Number of physical disks in a mirror is always 2. This affects RAID 1 and RAID 10.
- Cannot create virtual disks on PCIe SSDs.

Creating virtual disks using web interface

To create virtual disk:

1 In the iDRAC Web interface, go to **Storage** > **Overview** > **Virtual DisksAdvanced Filter**.

2 In the **Virtual Disk** section, do the following:

a From the **Controller** drop-down menu, select the controller for which you want to create the virtual disk.

b From the **Layout** drop-down menu, select the RAID level for the Virtual Disk.

Only those RAID levels supported by the controller appear in the drop-down menu and it is based on the RAID levels are available based on the total number of physical disks available.

c Select the **Media Type**, **Stripe Size**, **Read Policy**, **Write Policy**, **Disk Cache Policy**, .

Only those values supported by the controller appear in the drop-down menus for these properties.

d In the **Capacity** field, enter the size of the virtual disk.

The maximum size is displayed and then updated as disks are selected.

e The **Span Count** field is displayed based on the selected physical disks (step 3). You cannot set this value. It is automatically calculated after selecting disks for multi-raid level. If you have selected RAID 10 and if the controller supports uneven RAID 10, then the span count value is not displayed. The controller automatically sets the appropriate value.

3 In the **Select Physical Disks** section, select the number of physical disks.

For more information about the fields, see the *iDRAC Online Help*

4 From the **Apply Operation Mode** drop-down menu, select when you want to apply the settings.

5 Click **Create Virtual Disk**.

Based on the selected **Apply Operation Mode**, the settings are applied.

NOTE: You can use alphanumeric characters, spaces, dashes, and underscores in the disk name. Any other special characters that you enter are removed while creating the virtual disk.

Creating virtual disks using RACADM

Use the `racadm storage createvd` command.

For more information, see the iDRAC RACADM CLI Guide available at www.dell.com/idracmanuals.

NOTE: Disk slicing or configuring partial VDs is not supported using RACADM on the drives managed by S140 controller.

Editing virtual disk cache policies

You can change the read, write, or disk cache policy of a virtual disk.

NOTE: Some of the controllers do not support all read or write policies. Therefore, when a policy is applied, an error message is displayed.

The read policies indicate whether the controller must read sequential sectors of the virtual disk searching for data:

- **Adaptive Read Ahead** — The controller initiates read ahead only if the two most recent reads requests accessed sequential sectors of the disk. If subsequent read requests access random sectors of the disk, the controller reverts to no read ahead policy. The controller continues to evaluate whether read requests are accessing sequential sectors of the disk, and initiates read ahead if necessary.
- **Read Ahead** — The controller reads sequential sectors of the virtual disk when seeking data. Read ahead policy may improve system performance if the data is written to the sequential sectors of the virtual disk.
- **No Read Ahead** — Selecting no read ahead policy indicates that the controller should not use read ahead policy.

The write policies specify if the controller sends a write-request completion signal when the data is in the cache or after it has been written to the disk.

- **Write Through** — The controller sends a write-request completion signal only after the data is written to the disk. Write-through caching provides better data security than write-back caching, since the system assumes that the data is available only after it has been safely written to the disk.
- **Write Back** — The controller sends a write-request completion signal as soon as the data is in the controller cache but has not yet been written to disk. Write back caching may provide improved performance since subsequent read requests can retrieve data quickly from the cache then from the disk. However, data loss may occur in the event of a system failure which prevents that data from being written on a disk. Other applications may also experience problems when actions assume that the data is available on the disk.
- **Force Write Back** — The write cache is enabled regardless of whether the controller has a battery. If the controller does not have a battery and force write-back caching is used, data loss may occur in the event of a power failure.

The Disk Cache policy applies to readings on a specific virtual disk. These settings do not affect the read-ahead policy.

NOTE:

- Controller non-volatile cache and battery backup of controller cache affects the read-policy or the write policy that a controller can support. All PERCs do not have battery and cache.
- Read ahead and write back requires cache. Therefore, if the controller does not have cache, it does not allow you to set the policy value.

  Similarly, if the PERC has cache but not battery and the policy is set that requires accessing cache, then data loss may occur if base of power off. So few PERCs may not allow that policy.

  Therefore, depending upon the PERC, the policy value is set.

Deleting virtual disks

Deleting a virtual disk destroys all information including file systems and volumes residing on the virtual disk and removes the virtual disk from the controller's configuration. When deleting virtual disks, all assigned global hot spares may be automatically unassigned when the last virtual disk associated with the controller is deleted. When deleting the last virtual disk of a disk group, all assigned dedicated hot spares automatically become global hot spares.

If you delete all the VDs for a global hotspare, then the global hotspare gets automatically deleted.

You must have the Login and Server Control privilege to perform delete virtual disks.

When this operation is allowed, you can delete a boot virtual drive. It is done from sideband and the independent of the operating system. Hence, a warning message appears before you delete the virtual drive.

If you delete a virtual disk and immediately create a new virtual disk with all the same characteristics as the one that was deleted, the controller recognizes the data as if the first virtual disk were never deleted. In this situation, if you do not want the old data after recreating a new virtual disk, re-initialize the virtual disk.

Checking virtual disk consistency

This operation verifies the accuracy of the redundant (parity) information. This task only applies to redundant virtual disks. When necessary, the check consistency task rebuilds the redundant data. If the virtual drive has a degraded status, running a check consistency may be able to return the virtual drive to ready status. You can perform a consistency check using the web interface or RACADM.

You can also cancel the check consistency operation. The cancel check consistency is a real-time operation.

You must have Login and Server Control privilege to check consistency of virtual disks.

NOTE: Consistency check is not supported when the drives are set up in RAID0 mode.

Initializing virtual disks

Initializing virtual disks erases the all the data on the disk but does not change the virtual disk configuration. You must initialize a virtual disk that is configured before it is used.

NOTE: Do not initialize virtual disks when attempting to recreate an existing configuration.

You can perform a fast initialization, a full Initialization, or cancel the initialization operation.

NOTE: The cancel initialization is a real-time operation. You can cancel the initialization using only the iDRAC Web interface and not RACADM.

Fast initialization

The fast initialize operation initializes all physical disks included in the virtual disk. It updates the metadata on the physical disks so that all disk space is available for future write operations. The initialize task can be completed quickly because the existing information on the physical disks is not erased, although future write operations overwrite any information that remains on the physical disks.

Fast initialization only deletes the boot sector and stripe information. Perform a fast initialize only if you are constrained for time or the hard drives are new or unused. Fast Initialization takes less time to complete (usually 30-60 seconds).

CAUTION: Performing a fast initialize causes existing data to be inaccessible.

The fast initialize task does not write zeroes to the disk blocks on the physical disks. It is because the Fast Initialize task does not perform a write operation, it causes less degradation to the disk.

A fast initialization on a virtual disk overwrites the first and last 8 MB of the virtual disk, clearing any boot records or partition information. The operation takes only 2-3 seconds to complete and is recommended when you are recreating virtual disks.

A background initialization starts five minutes after the Fast Initialization is completed.

Full or slow initialization

The full initialization (also called slow initialize) operation initializes all physical disks included in the virtual disk. It updates the metadata on the physical disks and erases all existing data and file systems. You can perform a full initialization after creating the virtual disk. In comparison with the fast initialize operation, you may want to use the full initialize if you have trouble with a physical disk or suspect that it has bad disk blocks. The full initialize operation remaps bad blocks and writes zeroes to all disk blocks.

If full initialization of a virtual disk is performed, background initialization is not required. During full initialization, the host is not able to access the virtual disk. If the system reboots during a full initialization, the operation terminates and a background initialization process starts on the virtual disk.

It is always recommended to do a full initialization on drives that previously contained data. Full initialization can take up to 1-2 minutes per GB. The speed of initialization depends on the controller model, speed of hard drives, and the firmware version.

The full initialize task initializes one physical disk at a time.

NOTE: Full initialize is supported only in real-time. Only few controllers support full initialization.

Encrypting virtual disks

When encryption is disabled on a controller (that is, the security key is deleted), manually enable encryption for virtual disks created using SED drives. If the virtual disk is created after encryption is enabled on a controller, the virtual disk is automatically encrypted. It is automatically configured as an encrypted virtual disk unless the enabled encryption option is disabled during the virtual disk creation.

You must have Login and Server Control privilege to manage the encryption keys.

NOTE: Though encryption is enabled in the controllers, user needs to manually enable encryption on the VD if VD is created from iDRAC. Only if the VD is created from OMSA, it would be automatically encrypted.

Assigning or unassigning dedicated hot spares

A dedicated hot spare is an unused backup disk that is assigned to a virtual disk. When a physical disk in the virtual disk fails, the hot spare is activated to replace the failed physical disk without interrupting the system or requiring your intervention.

You must have Login and Server Control privilege to run this operation.

You can assign only 4K drives as hot spare to 4K virtual disks.

If you have assigned a physical disk as a dedicated hot spare in Add to Pending Operation mode, the pending operation is created but a job is not created. Then, if you try to unassign the dedicated hot spare, the assign dedicated hot spare pending operation is cleared.

If you have unassigned a physical disk as a dedicated hot spare in Add to Pending Operation mode, the pending operation is created but a job is not created. Then, if you try to assign the dedicated hot spare, the unassign dedicated hot spare pending operation is cleared.

NOTE: While the log export operation is in progress, you cannot view information about dedicated hot spares on the Manage Virtual Disks page. After the log export operation is complete, reload or refresh the Manage Virtual Disks page to view the information.

Rename VD

To change the name of a Virtual Disk, the user must have System Control privilege. The virtual disk name can contain only alphanumeric characters, spaces, dashes and underscores. The maximum length of the name depends on the individual controller. In most cases, the maximum length is 15 characters. The name cannot start with a space, end with a space, or be left blank. Every time a virtual disk is renamed, an LC Log gets created.

Edit Disk capacity

Online Capacity Expansion (OCE) allows you to increase the storage capacity of selected RAID levels while the system remains online. The controller redistributes the data on the array(called Reconfiguration), placing new space available at the end of each RAID array.

Online Capacity Expansion (OCE) can be achieved in two ways:

- If free space is available on the smallest physical drive on the virtual disks group after starting LBA of Virtual disks, the virtual disk´s capacity can be expanded within that free space. This option allows you to enter the new increased virtual disk size. If disk group in a virtual disk has space available only before starting LBA, then Edit Disk Capacity in same disk group is not permitted even though there is Available Space on a physical drive.
- A virtual disk's capacity can also be expanded by adding additional compatible physical disks to the existing virtual disk group. This option does not allow you to enter the new increased virtual disk size. New increased virtual disk size is calculated and displayed to the user based on the used disk space of existing physical disk group on a particular virtual disk, existing raid level of the virtual disk and the number of new drives added to the virtual disk.

Capacity Expansion allows user to specify the final VD size. Internally final VD size is conveyed to PERC in percentage (this percentage is the space user would like to use from empty space left in the array for the local disk to expand). Because of this percentage logic final VD size after reconfiguration completes may be different from what user provided for scenario where user is not giving maximum VD size possible as the final VD size (percentage turns out to be less than 100%). User does not see difference in this entered VD size and final VD size after reconfiguration, if maximum possible VD size is entered by user.

Raid Level Migration

RAID Level Migration (RLM) refers to changing a virtual disk´s RAID level. iDRAC9 provides an option to increase the VD size using RLM. In a way, RLM allows migrating the RAID level of a virtual disk which in turn may increase the size of virtual disk.

RAID level migration is the process of converting a VD with one RAID Level to another. When you migrate a VD to a different Raid Level, the user data on it is redistributed to the format of the new configuration.

This configuration is supported by both staged and realtime.

The below table describes possible reconfigurable VD layouts while reconfiguring (RLM) a VD with addition of disks and without addition of disks.

Table 53. Possible VD Layout

Source VD Layout	Possible target VD Layout with Disk Add	Possible target VD Layout Without disk addition
R0 (single disk)	R1	NA
R0	R5/R6	NA
R1	R0/R5/R6	R0
R5	R0/R6	R0
R6	R0/R5	R0/R5

Permitted operations when OCE or RLM is going on

The following operations are allowed when OCE/RLM is going on:

Table 54. Permitted operations

From Controller End behind which a VD is going through OCE/RLM	From VD End (which is going through OCE/RLM)	From any other Ready State Physical Disk on the same controller	From any other VD (which is not going through OCE/RLM) End on the same controller
Reset Configuration	Delete	Blink	Delete
Export Log	Blink	Unblink	Blink
Set Patrol Read Mode	Unblink	Assign Global Hot Spare	Unblink
Start Patrol Read		Convert to non-RAID Disks	Rename
Change Controller Properties			Change Policy
Manage Physical Disk Power			Slow Initialize

Convert to RAID Capable Disks	Fast Initialize
Convert to Non-RAID Disks	Replace Member Disk
Change Controller Mode	

OCE and RLM Restrictions or Limitations

Following are the common limitations for OCE and RLM:

- OCE/RLM is restricted to the scenario where the disk group contains only one VD.
- OCE is not supported on RAID50 and RAID60. RLM is not supported on RAID10,RAID50 and RAID60.
- If the controller already contains the maximum number of virtual disks, you cannot perform a RAID level migration or capacity expansion on any virtual disk.
- The controller changes the write cache policy of all virtual disks undergoing a RLM/OCE to Write-Through until RLM/OCE is complete.
- Reconfiguring Virtual Disks typically impacts disk performance until the reconfiguration operation is complete.
- The total number of physical disks in a disk group cannot exceed 32.
- If any background operation (like BGI/rebuild/copyback/patrol read) is already running on the corresponding VD/PD then Reconfiguration (OCE/RLM) is not allowed at that time.
- Any kind of disk migration when Reconfiguration (OCE/RLM) is on progress on drives associated with VD causes reconfiguration to fail.
- Any new drive added for OCE/RLM becomes part of the VD after reconstruction completes. But State for those new drive changes to Online just after reconstruction starts.

Cancel Initialization

This feature is the ability to cancel the background initialization on a virtual disk. On PERC controllers, the background initialization of redundant virtual disk starts automatically after a virtual disk is created. The background initialization of redundant virtual disk prepares the virtual disk for parity information and improves write performance. However, some processes such as creating a virtual disk cannot be run while the background initialization is in progress. Cancel Initialization provides the ability to cancel the background initialization manually. Once cancelled, the background initialization automatically restarts within 0 to 5 minutes.

NOTE: Background initialization is not applicable for RAID 0 virtual disks.

Managing virtual disks using web interface

1 In the iDRAC web interface, go to **Storage** > **Overview** > **Virtual Disks** > **Advanced Filter**.

2 From the **Virtual Disks**, select the controller for which you want to manage the virtual disks.

3 For one or more Virtual Disks, from each **Action** drop-down menu, select an action.

You can specify more than one action for a virtual drive. When you select an action, an additional **Action** drop-down menu is displayed. Select another action from this drop-down menu. The action that is already selected does not appear in the additional **Action** drop-down menus. Also, the **Remove** link is displayed next to the selected action. Click this link to remove the selected action.

- **Delete**
- **Edit Policy: Read Cache** — Change the read cache policy to one of the following options:
  - **No Read Ahead** — Indicates that for the given volume, no read ahead policy is used.
  - **Read Ahead** — Indicates that for the given volume, the controller reads sequentially ahead of the requested data and stores the additional data in cache memory, anticipating a data requirement. This speeds up sequential data reads, but there is less improvement when accessing random data.
  - **Adaptive Read Ahead** — Indicates that for the given volume, the control uses the Read-Ahead cache policy if the two most recent disks accesses occurred in sequential sectors. If the read requests are random, the controller returns to No Read Ahead mode.

- **Edit Policy: Write Cache** — Change the write cache policy to one of the following options:
  - **Write Through** — Indicates that for the given volume, the controller sends a data transfer completion signal to the host system when the disk subsystem has received all the data in a transaction.
  - **Write Back** — Indicates that for the given volume, the controller sends a data transfer completion signal to the host system when the controller cache has received all the data in a transaction. The controller then writes the cached data to the storage device in the background.
  - **Force Write Back** — When using force write-back caching, the write cache is enabled regardless of whether the controller has a battery. If the controller does not have a battery and force write-back caching is used, data loss may occur in the event of a power failure.
- **Edit Policy: Disk Cache** — Change the disk cache policy to one of the following options:
  - **Default** — Indicates that the disk is using its default write cache mode. For SATA disks, this is enabled and for SAS disks this is disabled.
  - **Enabled** — Indicates that the disk's write cache is enabled. This increases performance and the probability of data loss if there is power loss.
  - **Disabled** — Indicates that the disk's write cache is disabled. This decreases performance and the probability of data loss.
- **Initialize: Fast** — Updates the metadata on the physical disks so that all the disk space is available for future write operations. The initialize option can be completed quickly because existing information on the physical disks is not erased, although future write operations overwrites any information that remains on the physical disks.
- **Initialize: Full** — All existing data and file systems are erased.

  NOTE: The Initialize: Full option is not applicable for PERC H330 controllers.
- **Check Consistency** — To check the consistency of a virtual disk, select **Check Consistency** from the corresponding drop-down menu.

  NOTE: Consistency check is not supported on drives set up in RAID0 mode.
- **Encrypt Virtual Disk** — Encrypts the virtual disk drive. If the controller is encryption capable, you can create, change or delete the security keys.

  NOTE: The Encrypt Virtual Disk option is available only if the virtual disk is created using the Self-Encrypting Drive (SED) drives.
- **Manage Dedicated Hotspares** — Assign or unassign a physical disk as a dedicated hot spare. Only the valid dedicated hot spares are displayed. If there are no valid dedicated hot spares, then this section does not appear in the drop-down menu.

For more information about these options, see the *iDRAC Online Help*.

4 From the **Apply Operation Mode** drop-down menu, select when you want to apply the settings.

5 Click **Apply**.

Based on the selected operation mode, the settings are applied.

The other options are:

RAID Level Migration — Displays the Disk Name, Current RAID Level, and size of the virtual disk. Allows you to select a New RAID Level. User may have to add additional drives to existing Virtual disks to migrate to new raid level. This feature is not applicable on RAID 10, 50 and 60.

Managing virtual disks using RACADM

Use the following commands to manage virtual disks:

- To delete virtual disk:
  ```
  racadm storage deletevd:<VD FQDD>
  ```
- To initialize virtual disk:
  ```
  racadm storage init:<VD FQDD> -speed {fast|full}
  ```
- To check consistency of virtual disks (not supported on RAID0):
  ```
  racadm storage ccheck:<vdisk fqdd>
  ```

To cancel the consistency check:

```
racadm storage cancelcheck: <vdisks fqdd>
```

- To encrypt virtual disks:

```
racadm storage encryptvd:<VD FQDD>
```

- To assign or unassign dedicated hot spares:

```
racadm storage hotspare:<Physical Disk FQDD> -assign <option> -type dhs -vdkey: <FQDD of VD>
```

<option>=yes	Assign hot spare
<Option>=no	Unassign hot spare

Managing controllers

You can perform the following for controllers:

- Configure controller properties
- Import or auto import foreign configuration
- Clear foreign configuration
- Reset controller configuration
- Create, change, or delete security keys
- Discard preserved cache

Configuring controller properties

You can configure the following properties for the controller:

- Patrol read mode (auto or manual)
- Start or stop patrol read if patrol read mode is manual
- Patrol read unconfigured areas
- Check consistency mode
- Copyback mode
- Load balance mode
- Check consistency rate
- Rebuild rate
- BGI rate
- Reconstruct rate
- Enhanced auto import foreign configuration
- Create or change security keys

You must have Login and Server Control privilege to configure the controller properties.

Patrol read mode considerations

Patrol read identifies disk errors to avoid disk failures, data loss, or corruption. It runs automatically once a week on SAS and SATA HDDs.

The Patrol Read does not run on a physical disk in the following circumstances:

- The physical disk is an SSD.
- The physical disk is not included in a virtual disk or assigned as a hot spare.

- The physical disk is included in a virtual disk that is undergoing one of the following:
  - A rebuild
  - A reconfiguration or reconstruction
  - A background initialization
  - A check consistency

In addition, the Patrol Read operation suspends during heavy I/O activity and resumes when the I/O is complete.

NOTE: For more information on how often the Patrol Read operation runs when in auto mode, see the respective controller documentation.

NOTE: Patrol read mode operations such as Start and Stop are not supported if there are no virtual disks available in the controller. Though you can invoke the operations successfully using the iDRAC interfaces, the operations fail when the associated job is started.

Load balance

The Load Balance property provides the ability to automatically use both controller ports or connectors connected to the same enclosure to route I/O requests. This property is available only on SAS controllers.

Bgi rate

On PERC controllers, background initialization of a redundant virtual disk begins automatically within 0 to 5 minutes after the virtual disk is created. The background initialization of a redundant virtual disk prepares the virtual disk to maintain redundant data and improves write performance. For example, after the background initialization of a RAID 5 virtual disk completes, the parity information has been initialized. After the background initialization of a RAID 1 virtual disk completes, the physical disks are mirrored.

The background initialization process helps the controller identify and correct problems that may occur with the redundant data later. In this regard, the background initialization process is similar to a check consistency. The background initialization should be allowed to run to completion. If cancelled, the background initialization automatically restarts within 0 to 5 minutes. Some processes such as read and write operations are possible while the background initialization is running. Other processes, such as creating a virtual disk, cannot be run concurrently with a background initialization. These processes cause the background initialization to cancel.

The background initialization rate, configurable between 0% and 100%, represents the percentage of the system resources dedicated to running the background initialization task. At 0%, the background initialization has the lowest priority for the controller, takes the most time to complete, and is the setting with the least impact to system performance. A background initialization rate of 0% does not mean that the background initialization is stopped or paused. At 100%, the background initialization is the highest priority for the controller. The background initialization time is minimized and is the setting with the most impact to system performance.

Check consistency

The Check Consistency task verifies the accuracy of the redundant (parity) information. This task only applies to redundant virtual disks. When necessary, the Check Consistency task rebuilds the redundant data. If the virtual disk is in a Failed Redundancy state, running a check consistency may be able to return the virtual disk to a Ready state.

The check consistency rate, configurable between 0% and 100%, represents the percentage of the system resources dedicated to running the check consistency task. At 0%, the check consistency has the lowest priority for the controller, takes the most time to complete, and is the setting with the least impact to system performance. A check consistency rate of 0% does not mean that the check consistency is stopped or paused. At 100%, the check consistency is the highest priority for the controller. The check consistency time is minimized and is the setting with the most impact to system performance.

Create or change security keys

When configuring the controller properties, you can create or change the security keys. The controller uses the encryption key to lock or unlock access to SED. You can create only one encryption key for each encryption-capable controller. The security key is managed using the Local Key Management (LKM) feature. LKM is used to generate the key ID and the password or key required to secure the virtual disk. If you are using LKM, you must create the encryption key by providing the Security Key Identifier and the Passphrase.

This task is not supported on PERC hardware controllers running in HBA mode.

If you create the security key-in Add to Pending Operation mode and a job is not created, and then if you delete the security key, the create security key pending operation is cleared.

Configuring controller properties using web interface

1 In the iDRAC web interface, go to **Storage** > **Overview** > **Controllers**.
The **Setup Controllers** page is displayed.
2 In the **Controller** section, select the controller that you want to configure.
3 Specify the required information for the various properties.
The **Current Value** column displays the existing values for each property. You can modify this value by selecting the option from the **Action** drop-down menu for each property.
For information about the fields, see the *iDRAC Online Help*.
4 From the **Apply Operation Mode**, select when you want to apply the settings.
5 Click **Apply**.
Based on the selected operation mode, the settings are applied.

Configuring controller properties using RACADM

- To set Patrol Read Mode:
```
racadm set storage.controller.<index>.PatrolReadMode  {Automatic | Manual | Disabled}
```
- If Patrol read mode is set to manual, use the following commands to start and stop Patrol read Mode:
```
racadm storage patrolread:<Controller FQDD> -state {start|stop}
```

NOTE: Patrol read mode operations such as Start and Stop are not supported if there are no virtual disks available in the controller. Though you can invoke the operations successfully using the iDRAC interfaces, the operations will fail when the associated job is started.

- To specify the Check Consistency Mode, use **Storage.Controller.CheckConsistencyMode** object.
- To enable or disable the Copyback Mode, use **Storage.Controller.CopybackMode** object.
- To enable or disable the Load Balance Mode, use **Storage.Controller.PossibleloadBalancedMode** object.
- To specify the percentage of the system's resources dedicated to perform a check consistency on a redundant virtual disk, use **Storage.Controller.CheckConsistencyRate** object.
- To specify the percentage of the controller's resources dedicated to rebuild a failed disk, use **Storage.Controller.RebuildRate** object
- To specify the percentage of the controller's resources dedicated to perform the background initialization (BGI) of a virtual disk after it is created, use**Storage.Controller.BackgroundInitializationRate** object
- To specify the percentage of the controller's resources dedicated to reconstruct a disk group after adding a physical disk or changing the RAID level of a virtual disk residing on the disk group, use **Storage.Controller.ReconstructRate** object
- To enable or disable the enhanced auto import of foreign configuration for the controller, use **Storage.Controller.EnhancedAutoImportForeignConfig** object

- To create, modify, or delete security key to encrypt virtual drives:

```
racadm storage createsecuritykey:<Controller FQDD> -key <Key id> -passwd <passphrase>
racadm storage modifysecuritykey:<Controller FQDD> -key <key id> -oldpasswd <old passphrase> -
newpasswd <new passphrase>
racadm storage deletesecuritykey:<Controller FQDD>
```

Importing or auto importing foreign configuration

A foreign configuration is data residing on physical disks that have been moved from one controller to another. Virtual disks residing on physical disks that have been moved are considered to be a foreign configuration.

You can import foreign configurations so that virtual disks are not lost after moving Physical Disks. A foreign configuration can be imported only if it contains a virtual disk that is in either Ready or Degraded state or a hotspare that is dedicated to a virtual disk which can be imported or is already present.

All of the virtual disk data must be present, but if the virtual disk is using a redundant RAID level, the additional redundant data is not required.

For example, if the foreign configuration contains only one side of a mirror in a RAID 1 virtual disk, then the virtual disk is in a Degraded state and can be imported. If the foreign configuration contains only one physical disk that was originally configured as a RAID 5 using three physical disks, then the RAID 5 virtual disk is in a Failed state and cannot be imported.

In addition to virtual disks, a foreign configuration may consist of a physical disk that was assigned as a hot spare on one controller and then moved to another controller. The Import Foreign Configuration task imports the new physical disk as a hot spare. If the physical disk was set as a dedicated hot spare on the previous controller, but the virtual disk to which the hot spare was assigned is no longer present in the foreign configuration, then the physical disk is imported as a global hot spare.

If any foreign configurations locked using Local Key manager (LKM) are Detected, then import foreign configuration operation is not possible in iDRAC in this release. You must unlock the drives through CTRL-R and then continue to import foreign configuration from iDRAC.

The Import Foreign Configuration task is only displayed when the controller has detected a foreign configuration. You can also identify whether a physical disk contains a foreign configuration (virtual disk or hot spare) by checking the physical disk state. If the physical disk state is Foreign, then the physical disk contains all or some portion of a virtual disk or has a hot spare assignment.

NOTE: The task of importing foreign configuration imports all virtual disks residing on physical disks that have been added to the controller. If more than one foreign virtual disk is present, all the configurations are imported.

PERC9 controller provides support for auto import of foreign configuration without requiring user interactions. The auto import can be enabled or disabled. If enabled, the PERC controller can auto import any foreign configuration detected without manual intervention. If disabled the PERC does not auto import any foreign configuration.

You must have Login and Server Control privilege to import foreign configurations.

This task is not supported on PERC hardware controllers running in HBA mode.

NOTE: It is not recommended to remove an external enclosure cable while the operating system is running on the system. Removing the cable could result in a foreign configuration when the connection is re-established.

You can manage foreign configurations in the following cases:

- All the physical disks in a configuration are removed and re-inserted.
- Some of the physical disks in a configuration are removed and re-inserted.
- All the physical disks in a virtual disk are removed, but at different times, and then re-inserted.
- The physical disks in a non-redundant virtual disk are removed.

The following constraints apply to the physical disks that are considered for import:

- The drive state of a physical disk can change from the time the foreign configuration is scanned to when the actual import occurs. The foreign import occurs only on drives that are in the Unconfigured Good state.
- Drives in the failed or offline state cannot be imported.
- The firmware does not allow you to import more than eight foreign configurations.

Importing foreign configuration using web interface

NOTE: If there is an incomplete foreign disk configuration in the system, then the state of one or more existing online virtual disks is also displayed as foreign.

NOTE: Importing foreign configuration for BOSS controller is not supported.

To import foreign configuration:

1 In the iDRAC web interface, go to **Configuration** > **Storage Configuration**;.
2 From the **Controller** drop-down menu, select the controller you want to import the foreign configuration to.
3 Click **Import** under the **Foreign Configuration** and then click **Apply**.

Importing foreign configuration using RACADM

To import foreign configuration:

```
racadm storage importconfig:<Controller FQDD>
```

For more information, see the *iDRAC RACADM Command Line Reference Guide* available at **dell.com/idracmanuals**.

Clearing foreign configuration

After moving a physical disk from one controller to another, you may find that the physical disk contains all or some portion of a virtual disk (foreign configuration). You can identify whether a previously used physical disk contains a foreign configuration (virtual disk) by checking the physical disk state. If the physical disk state is Foreign, then the physical disk contains all or some portion of a virtual disk. You can clear or erase the virtual disk information from the newly attached physical disks.

The Clear Foreign Configuration operation permanently erases all data residing on the physical disks that are added to the controller. If more than one foreign virtual disk is present, all the configurations are erased. You may prefer to import the virtual disk rather than destroy the data. An initialization must be performed to remove foreign data. If you have an incomplete foreign configuration which cannot be imported, you can use the Clearing Foreign Configuration option to erase the foreign data on the physical disks.

Clearing foreign configuration using web interface

To clear the foreign configuration:

1 In the iDRAC web interface, go to **Configuration** > **Storage Configuration** > **Controller Configuration**.
The **Controller Configuration** page is displayed.
2 From the **Controller** drop-down menu, select the controller for which you want to clear the foreign configuration.

NOTE: To clear foreign configuration on BOSS controllers, click "Reset Configuration".

3 Click **Clear Configuration**.
4 Click **Apply**
Based on the selected operation mode, the virtual disks residing on the physical disk is erased.

Clearing foreign configuration using RACADM

To clear foreign configuration:

```
racadm storage clearconfig:<Controller FQDD>
```

For more information, see the *iDRAC RACADM Command Line Reference Guide* available at **dell.com/idracmanuals**.

Resetting controller configuration

You can reset the configuration for a controller. This operation deletes virtual disk drives and unassigns all hot spares on the controller. It does not erase any data other than removing the disks from the configuration. Reset configuration also does not remove any foreign configurations. The real-time support of this feature is available only in PERC 9.1 firmware. Reset configuration does not erase any data. You may recreate the exact same configuration without an initialize operation which may result in the data being recovered. You must have server control privilege.

NOTE: Resetting the controller configuration does not remove a foreign configuration. To remove a foreign configuration, perform clear configuration operation.

Resetting controller configuration using web interface

To reset the controller configuration:

1. In the iDRAC Web interface, go to **Storage** > **Overview** > **Controllers**.
2. From the **Actions**, select **Reset Configuration** for one or more controllers.
3. For each controller, from the **Apply Operation Mode** drop-down menu, select when you want to apply the settings.
4. Click **Apply**.

   Based on the selected operation mode, the settings are applied.

Resetting controller configuration using RACADM

To reset the controller configuration:

```
racadm storage resetconfig:<Controller FQDD>
```

For more information, see the *iDRAC RACADM Command Line Reference Guide* available at **dell.com/idracmanuals**.

Switching the controller mode

NOTE: Switching the controller mode is not supported for PERC 10 controllers.

On PERC 9.1 controllers, you can change the personality of the controller by switching the mode from RAID to HBA. The controller operates similar to a HBA controller where the drivers are passed through the operating system. The controller mode change is a staged operation and does not occur in real time. Before you change the mode of the controller from RAID to HBA, ensure that:

- The RAID controller supports the controller mode change. The option to change the controller mode is not available on controllers where the RAID personality requires a license.
- All virtual disks must be deleted or removed.
- Hot spares must be deleted or removed.
- Foreign configurations must be deleted or cleared.
- All physical disks that are in a failed state, must be removed or the pinned cache needs to be cleared.

- Any local security key associated with SEDs must be deleted.
- The controller must not have preserved cache.
- You have server control privileges to switch the controller mode.

NOTE: Ensure that you back up the foreign configuration, security key, virtual disks, and hot spares before you switch the mode as the data is deleted.

Exceptions while switching the controller mode

The following list provides the exceptions while setting the controller mode using the iDRAC interfaces such as web interface, RACADM, and WSMan:

- If the PERC controller is in RAID mode, you must clear any virtual disks, hot spares, foreign configurations, controller keys, or preserved cache before changing it to HBA mode.
- You cannot configure other RAID operations while setting the controller mode. For example, if the PERC is in RAID mode and you set the pending value of the PERC to HBA mode, and you try to set the BGI attribute, the pending value is not initiated.
- When you switch the PERC controller from HBA to RAID mode, the drives remain in Non-RAID state and are not automatically set to Ready state. Additionally, the **RAIDEnhancedAutoImportForeignConfig** attribute is automatically set to **Enabled**.

The following list provides the exceptions while setting the controller mode using the Server Configuration Profile feature using the WSMan or RACADM interface:

- Server Configuration Profile feature allows you to configure multiple RAID operations along with setting the controller mode. For example, if the PERC controller is in HBA mode, you can edit the export Server Configuration Profile (SCP) to change the controller mode to RAID, convert drives to ready and create a virtual disk.
- While changing the mode from RAID to HBA, the **RAIDaction pseudo** attribute is set to update (default behavior). The attribute runs and creates a virtual disk which fails. The controller mode is changed, however, the job is completed with errors. To avoid this issue, you must comment out the RAIDaction attribute in the SCP file.
- When the PERC controller is in HBA mode, if you run import preview on export SCP which is edited to change controller mode to RAID, and try creating a VD, the virtual disk creation fails. Import preview does not support validating stacking RAID operations with changing controller mode.

Switching the controller mode using the iDRAC web interface

To switch the controller mode, perform the following steps:

1. In the iDRAC web interface, click **Storage** > **Overview** > **Controllers**.
2. On the **Controllers** page, click **Setup** > **Controller Mode**.
   The **Current Value** column displays the current setting of the controller.
3. From the drop-down menu, select the controller mode you want to switch to, and click **Apply**.
   Reboot the system for the change to take effect.

Switching the controller mode using RACADM

To switch the controller mode using RACADM, run the following commands.

- To view the current mode of the controller:

  ```
  $ racadm get Storage.Controller.1.RequestedControllerMode[key=<Controller_FQDD>]
  ```

  The following output is displayed:

  ```
  RequestedControllerMode = NONE
  ```

- To set the controller mode as HBA:

  ```
  $ racadm set Storage.Controller.1.RequestedControllerMode  HBA [Key=<Controller_FQDD>]
  ```

For more information, see the *iDRAC RACADM Command Line Interface Reference Guide* available at **dell.com/idracmanuals**.

12 Gbps SAS HBA adapter operations

The non-RAID controllers are the HBAs that do not have few RAID capabilities. They do not support virtual disks.

14G iDRAC interface supports 12 Gbps SAS HBA controller, and HBA330 (integrated and adapter) controllers.

You can perform the following for non-RAID controllers:

- View controller, physical disks, and enclosure properties as applicable for the non-RAID controller. Also, view EMM, fan, power supply unit, and temperature probe properties associated with the enclosure. The properties are displayed based on the type of controller.
- View software and hardware inventory information.
- Update firmware for enclosures behind the 12 Gbps SAS HBA controller (staged)
- Monitor the polling or polling frequency for physical disk SMART trip status when there is change detected
- Monitor the physical disks hot plug or hot removal status
- Blink or unblink LEDs

NOTE:

- You must perform Collect System Inventory On Reboot (CSIOR) operation before inventorying or monitoring the non-RAID controllers.
- Reboot the system after performing a firmware update.
- Real-time monitoring for SMART enabled drives and SES enclosure sensors is only done for the 12 Gbps SAS HBA controllers and HBA330 internal controllers.

Monitoring predictive failure analysis on drives

Storage management supports Self Monitoring Analysis and Reporting Technology (SMART) on physical disks that are SMART-enabled.

SMART performs predictive failure analysis on each disk and sends alerts if a disk failure is predicted. The controllers check physical disks for failure predictions and, if found, pass this information to iDRAC. iDRAC immediately logs an alert.

Controller operations in non-RAID mode or HBA mode

If the controller is in non-RAID mode (HBA mode), then:

- Virtual disks or hot spares are not available.
- Security state of the controller is disabled.
- All physical disks are in non-RAID mode.

You can perform the following operations if the controller is in non-RAID mode:

- Blink/unblink the physical disk.
- Configure all properties including the following:
  - Load balanced mode
  - Check consistency mode
  - Patrol read mode
  - Copyback mode

  - Controller boot mode
  - Enhanced auto import foreign configuration
  - Rebuild rate
  - Check consistency rate
  - Reconstruct rate
  - BGI rate
  - Enclosure or backplane mode
  - Patrol read unconfigured areas
- View all properties that are applicable to a RAID controller expect for virtual disks.
- Clear foreign configuration

NOTE: If an operation is not supported in non-RAID mode, an error message is displayed.

You cannot monitor the enclosure temperature probes, fans, and power supplies when the controller is in non-RAID mode.

Running RAID configuration jobs on multiple storage controllers

While performing operations on more than two storage controllers from any supported iDRAC interface, make sure to:

- Run the jobs on each controller individually. Wait for each job to complete before starting the configuration and job creation on the next controller.
- Schedule multiple jobs to run at a later time using the scheduling options.

Manage Preserved cache

The Managed Preserved Cache feature is a controller option which provides the user an option to discard the controller cache data. In the write-back policy, data is written to the cache before being written to the physical disk. If the virtual disk goes offline or is deleted for any reason, the data in the cache gets deleted.

The PREC Controller preserves the data written on the preserved or dirty cache in an event of power failure or cable disconnect until you recover the virtual disk or clear the cache.

The status of the controller is affected by the preserved cache. The controller status is displayed as degraded if the controller has preserved cache. Discard the preserved cache is possible only if all of the following conditions are met:

- The controller does not have any foreign configuration.
- The controller does not have any offline or missing virtual disks.
- Cables to any virtual disk are not disconnected.

Managing PCIe SSDs

Peripheral Component Interconnect Express (PCIe) solid-state device (SSD) is a high-performance storage device designed for solutions requiring low latency, high Input Output Operations per Second (IOPS), and enterprise class storage reliability and serviceability. The PCIe SSD is designed based on Single Level Cell (SLC) and Multi-Level Cell (MLC) NAND flash technology with a high-speed PCIe 2.0 or PCIe 3.0 compliant interface. In 14th generation of PowerEdge servers, we have three different ways to connect SSDs. You can use an extender to connect the SSDs via backplane, directly connect the SSDs from backplane to mother board using slimline cable without extender, and use HHHL (Add-In) card which sits on the motherboard.

NOTE: 14th generation of PowerEdge servers are supporting Industry standard NVMe-MI specification based NVMe SSDs. However, 13th generation of PowerEdge servers used to support Dell proprietary specification based SSDs. Adding SSDs from any previous generation of server are not supported by iDRAC9.

Using iDRAC interfaces, you can view and configure NVMe PCIe SSDs.

The key features of PCIe SSD are:

- Hot plug capability
- High-performance device

In few of the 14th generation of PowerEdge servers, up to 32 NVMe SSDs are supported.

You can perform the following operations for PCIe SSDs:

- Inventory and remotely monitor the health of PCIe SSDs in the server
- Prepare to remove the PCIe SSD
- Securely erase the data
- Blink or unblink the device LED (Identify the device)

You can perform the following operations for HHHL SSDs:

- Inventory and real-time monitoring of the HHHL SSD in the server
- Failed card reporting and logging in iDRAC and OMSS
- Securely erasing the data and removing the card
- TTY logs reporting

You can perform the following operations for SSDs:

- Drive status reporting such as Online, Failed, and Offline

NOTE: Hot plug capability, prepare to remove, and blink or unblink the device LED is not applicable for HHHL PCIe SSD devices.

NOTE: When NVMe devices are controlled behind S140, prepare to remove and cryptographic erase operations are not supported, blink and unblink are supported.

Inventorying and monitoring PCIe SSDs

The following inventory and monitoring information is available for PCIe SSDs:

- Hardware information:
  - PCIe SSD Backplane

    If the system has a dedicated PCIe backplane, two FQDDs are displayed. One FQDD is for regular drives and the other is for SSDs. If the backplane is shared (universal), only one FQDD is displayed. In case the SSDs are directly attached, the controller FQDD reports as CPU.1, indicating that the SSD is directly attached to the CPU.
- Software inventory includes only the firmware version for the PCIe SSD.

Inventorying and monitoring PCIe SSDs using web interface

To inventory and monitor PCIe SSD devices, in the iDRAC web interface, go to **Storage** > **Overview** > **Physical Disks**. The **Properties** page is displayed. For PCIe SSDs, the **Name** column displays **PCIe SSD**. Expand to view the properties.

Inventorying and monitoring PCIe SSDs using RACADM

Use the `racadm storage get controllers:<PcieSSD controller FQDD>` command to inventory and monitor PCIe SSDs.

To view all PCIe SSD drives:

```
racadm storage get pdisks
```

To view PCIe extender cards:

```
racadm storage get controllers
```

To view PCIe SSD backplane information:

```
racadm storage get enclosures
```

NOTE: For all the mentioned commands, PERC devices are also displayed.

For more information, see the *iDRAC RACADM Command Line Reference Guide* available at **dell.com/idracmanuals**.

Preparing to remove PCIe SSD

NOTE: This operation is not supported when PCIe SSD is configured using the S140 controller.

PCIe SSDs support orderly hot swap allowing you to add or remove a device without halting or rebooting the system in which the devices are installed. To prevent data loss, you must use the Prepare to Remove operation before physically removing a device.

Orderly hot swap is supported only when PCIe SSDs are installed in a supported system running a supported operating system. To ensure that you have the correct configuration for your PCIe SSD, see the system-specific owner's manual.

The Prepare to Remove operation is not supported for PCIe SSDs on the VMware vSphere (ESXi) systems and HHHL PCIe SSD devices.

NOTE: Prepare to Remove operation is supported on systems with ESXi 6.0 with iDRAC Service Module version 2.1 or higher.

The Prepare to Remove operation can be performed in real-time using iDRAC Service Module.

The Prepare to Remove operation stops any background activity and any ongoing I/O activity so that device can be removed safely. It causes the status LEDs on the device to blink. You can safely remove the device from the system under the following conditions after you initiate the Prepare to Remove operation:

- The PCIe SSD is blinking the safe to remove LED pattern (blinks amber).
- The PCIe SSD is no longer accessible by the system.

Before preparing the PCIe SSD for removal, ensure that:

- iDRAC Service Module is installed.
- Lifecycle Controller is enabled.
- You have Server Control and Login privileges.

Preparing to remove PCIe SSD using web interface

To prepare the PCIe SSD for removal:

1. In the iDRAC Web interface, go to **Storage** > **Overview** > **Physical Disks**.
   The **Setup Physical Disk** page is displayed.
2. From the **Controller** drop-down menu, select the extender to view the associated PCIe SSDs.
3. From the drop-down menus, select **Prepare to Remove** for one or more PCIe SSDs.
   If you have selected **Prepare to Remove** and you want to view the other options in the drop-down menu, then select **Action** and then click the drop-down menu to view the other options.

   NOTE: Ensure that iSM is installed and running to perform the `preparetoremove` operation.
4. From the **Apply Operation Mode** drop-down menu, select **Apply Now** to apply the actions immediately.
   If there are jobs to be completed, then this option is grayed-out.

   NOTE: For PCIe SSD devices, only the Apply Now option is available. This operation is not supported in staged mode.

5 Click **Apply**.

If the job is not created, a message indicating that the job creation was not successful is displayed. Also, the message ID and the recommended response action is displayed.

If the job is created successfully, a message indicating that the job ID is created for the selected controller is displayed. Click **Job Queue** to view the progress of the job in the **Job Queue** page.

If pending operation is not created, an error message is displayed. If pending operation is successful and job creation is not successful, then an error message is displayed.

Preparing to remove PCIe SSD using RACADM

To prepare the PCIeSSD drive for removal:

```
racadm storage preparetoremove:<PCIeSSD FQDD>
```

To create the target job after executing **preparetoremove** command:

```
racadm jobqueue create <PCIe SSD FQDD> -s TIME_NOW --realtime
```

To query the job ID returned:

```
racadm jobqueue view -i <job ID>
```

For more information, see the iDRAC RACADM CLI Guide available at www.dell.com/idracmanuals.

Erasing PCIe SSD device data

NOTE: This operation is not supported when PCIe SSD is configured using the S140 controller.

Cryptographic Erase permanently erases all data present on the disk. Performing a Cryptographic Erase on an PCIe SSD overwrites all blocks and results in permanent loss of all data on the PCIe SSD. During Cryptographic Erase, the host is unable to access the PCIe SSD. The changes are applied after system reboot.

If the system reboots or experiences a power loss during cryptographic erase, the operation is canceled. You must reboot the system and restart the process.

Before erasing PCIe SSD device data, make sure that:

- Lifecycle Controller is enabled.
- You have Server Control and Login privileges.

NOTE:

- Erasing PCIe SSDs can only be performed as a staged operation.
- After the drive is erased, it displays in the operating system as online but it is not initialized. You must initialize and format the drive before using it again.
- After you hot-plug a PCIe SSD, it may take several seconds to appear on the web interface.
- Cryptographic erase feature is supported for hot-plugged PCIe SSDs for 14th generation PowerEdge servers.

Erasing PCIe SSD device data using web interface

To erase the data on the PCIe SSD device:

1 In the iDRAC Web interface, go to **Storage** > **Overview** > **Physical Disks**.

The **Physical Disk** page is displayed.

2 From the **Controller** drop-down menu, select the controller to view the associated PCIe SSDs.

3 From the drop-down menus, select **Cryptographic Erase** for one or more PCIe SSDs.

If you have selected **Cryptographic Erase** and you want to view the other options in the drop-down menu, then select **Action** and then click the drop-down menu to view the other options.

4 From the **Apply Operation Mode** drop-down menu, select one of the following options:

- **At Next Reboot** — Select this option to apply the actions during the next system reboot.
- **At Scheduled Time** — Select this option to apply the actions at a scheduled day and time:
  - **Start Time** and **End Time** — Click the calendar icons and select the days. From the drop-down menus, select the time. The action is applied between the start time and end time.
  - From the drop-down menu, select the type of reboot:
    - No Reboot (Manually Reboot System)
    - Graceful Shutdown
    - Force Shutdown
    - Power Cycle System (cold boot)

5 Click **Apply**.

If the job is not created, a message indicating that the job creation was not successful is displayed. Also, the message ID and the recommended response action is displayed.

If the job is created successfully, a message indicating that the job ID is created for the selected controller is displayed. Click **Job Queue** to view the progress of the job in the Job Queue page.

If pending operation is not created, an error message is displayed. If pending operation is successful and job creation is not successful, then an error message is displayed.

Erasing PCIe SSD device data using RACADM

To securely erase a PCIe SSD device:

```
racadm storage secureerase:<PCIeSSD FQDD>
```

To create the target job after executing the **secureerase** command:

```
racadm jobqueue create <PCIe SSD FQDD> -s TIME_NOW -e <start_time>
```

To query the job ID returned:

```
racadm jobqueue view -i <job ID>
```

For more information, see the *iDRAC RACADM Command Line Reference Guide* available at **dell.com/idracmanuals**.

Managing enclosures or backplanes

You can perform the following for enclosures or backplanes:

- View properties
- Configure universal mode or split mode
- View slot information (universal or shared)
- Set SGPIO mode
- Set Asset Tag
- Asset Name

Viewing universal slots

Some 14th generation PowerEdge server backplanes supports both SAS/SATA and PCIe SSD drives in the same slot. These slots are called universal slots and are wired to the primary storage controller (PERC) and a PCIe extender card. The backplane firmware provides

information about the slots that support this feature. The backplane supports SAS/SATA disks or PCIe SSDs. Typically, the four higher number slots are universal. For example, in a universal backplane that supports 24 slots, slots 0-19 support only SAS/SATA disks while slots 20-23 support either SAS/SATA or PCIe SSD.

The roll-up health status for the enclosure provides the combined health status for all the drives in the enclosure. The enclosure link on the **Topology** page displays the entire enclosure information irrespective of which controller it is associated with. Because two storage controllers (PERC and PCIe extender) can be connected to the same backplane, only the backplane associated with the PERC controller is displayed in **System Inventory** page.

In the **Storage** > **Enclosures** > **Properties** page, the **Physical Disks Overview** section displays the following:

- **Slot Empty** — If a slot is empty.
- **PCIe Capable** — If there are no PCIe capable slots, this column is not displayed.
- **Bus Protocol** — If it is a universal backplane with PCIe SSD installed in one of the slots, this column displays **PCIe**.
- **Hotspare** — This column is not applicable for PCIe SSD.

NOTE: Hot swapping is supported for universal slots. If you want to remove a PCIe SSD drive and swap it with a SAS/SATA drive, ensure that you first complete the PrepareToRemove task for the PCIe SSD drive. If you do not perform this task, the host operating system may have issues such as a blue screen, kernel panic, and so on.

Setting SGPIO mode

The storage controller can connect to the backplane in I2C mode (default setting for Dell backplanes) or Serial General Purpose Input/Output (SGPIO) mode. This connection is required for blinking LEDs on the drives. Dell PERC controllers and backplane support both these modes. To support certain channel adapters, the backplane mode must be changed SGPIO mode.

The SGPIO mode is only supported for passive backplanes. It is not supported for expander-based backplanes or passive backplanes in downstream mode. Backplane firmware provides information on capability, current state, and requested state.

After LC wipe operation or iDRAC reset to default, the SGPIO mode is reset to disabled state. It compares the iDRAC setting with the backplane setting. If the backplane is set to SGPIO mode, iDRAC changes its setting to match the backplane setting.

Server power cycle is required for any change in setting to take effect.

You must have Server Control privilege to modify this setting.

NOTE: You cannot set the SGPIO mode using iDRAC Web interface.

Setting SGPIO mode using RACADM

To configure the SGPIO mode, use the **set** command with the objects in the **SGPIOMode** group.

If it is set to disabled, it is I2C mode. If enabled, it is set to SGPIO mode.

For more information, see the *iDRAC RACADM Command Line Interface Reference Guide* available at **dell.com/idracmanuals**.

Choosing operation mode to apply settings

While creating and managing virtual disks, setting up physical disks, controllers, and enclosures or resetting controllers, before you apply the various settings, you must select the operation mode. That is, specify when you want to apply the settings:

- Immediately
- During the next system reboot
- At a scheduled time

- As a pending operation to be applied as a batch as part of a single job.

Choosing operation mode using web interface

To select the operation mode to apply the settings:

1 You can select the operation mode on when you are on any of the following pages:
   - **Storage** > **Physical Disks** .
   - **Storage** > **Virtual Disks**
   - **Storage** > **Controllers**
   - **Storage** > **Enclosures**
2 Select one of the following from the **Apply Operation Mode** drop-down menu:
   - **Apply Now** — Select this option to apply the settings immediately. This option is available for PERC 9 controllers only. If there are jobs to be completed, then this option is grayed-out. This job take at least 2 minutes to complete.
   - **At Next Reboot** — Select this option to apply the settings during the next system reboot.
   - **At Scheduled Time** — Select this option to apply the settings at a scheduled day and time:
     - **Start Time** and **End Time** — Click the calendar icons and select the days. From the drop-down menus, select the time. The settings are applied between the start time and end time.
     - From the drop-down menu, select the type of reboot:
       - No Reboot (Manually Reboot System)
       - Graceful Shutdown
       - Force Shutdown
       - Power Cycle System (cold boot)
   - **Add to Pending Operations** — Select this option to create a pending operation to apply the settings. You can view all pending operations for a controller in the **Storage** > **Overview** > **Pending Operations** page.

   NOTE:
   - The **Add to Pending Operations** option in not applicable for the **Pending Operations** page and for PCIe SSDs in the **Physical Disks** > **Setup** page.
   - Only the **Apply Now** option is available on the **Enclosure Setup** page.
3 Click **Apply**.

   Based on the operation mode selected, the settings are applied.

Choosing operation mode using RACADM

To select the operation mode, use the `jobqueue` command.

For more information, see the iDRAC RACADM CLI Guide available at www.dell.com/idracmanuals.

Viewing and applying pending operations

You can view and commit all pending operations for the storage controller. All the settings are either applied at once, during the next reboot, or at a scheduled time based on the selected options. You can delete all the pending operations for a controller. You cannot delete individual pending operations.

Pending Operations are created on the selected components (controllers, enclosures, physical disks, and virtual disks).

Configuration jobs are created only on controller. In case of PCIe SSD, job is created on PCIe SSD disk and not on the PCIe Extender.

Viewing, applying, or deleting pending operations using web interface

1 In the iDRAC web interface, go to **Storage** > **Overview** > **Pending Operations**.

The **Pending Operations** page is displayed.

2 From the **Component** drop-down menu, select the controller for which you want to view, commit, or delete the pending operations.

The list of pending operations is displayed for the selected controller.

NOTE:

- Pending operations are created for import foreign configuration, clear foreign configuration, security key operations, and encrypt virtual disks. But, they are not displayed in the **Pending Operations** page and in the Pending Operations pop-up message.
- Jobs for PCIe SSD cannot be created from the **Pending Operations** page

3 To delete the pending operations for the selected controller, click **Delete All Pending Operations**.

4 From the drop-down menu, select one of the following and click **Apply** to commit the pending operations:

- **Apply Now** — Select this option to commit all the operations immediately. This option is available for PERC 9 controllers with the latest firmware versions.
- **At Next Reboot** — Select this option to commit all the operations during the next system reboot.
- **At Scheduled Time** — Select this option to commit the operations at a scheduled day and time.
  - **Start Time** and **End Time** — Click the calendar icons and select the days. From the drop-down menus, select the time. The action is applied between the start time and end time.
  - From the drop-down menu, select the type of reboot:
    - No Reboot (Manually Reboot System)
    - Graceful Shutdown
    - Force Shutdown
    - Power Cycle System (cold boot)

5 If the commit job is not created, a message indicating that the job creation was not successful is displayed. Also, the message ID and the recommended response action are displayed.

6 If the commit job is created successfully, a message indicating that the job ID is created for the selected controller is displayed. Click **Job Queue** to view the progress of the job in the **Job Queue** page.

If the clear foreign configuration, import foreign configuration, security key operations, or encrypt virtual disk operations are in pending state, and if these are the only operations pending, then you cannot create a job from the **Pending Operations** page. You must perform any other storage configuration operation or use RACADM or WSMan to create the required configuration job on the required controller.

You cannot view or clear pending operations for PCIe SSDs in the **Pending Operations** page. Use the racadm command to clear the pending operations for PCIe SSDs.

Viewing and applying pending operations using RACADM

To apply pending operations, use the **jobqueue** command.

For more information, see the *iDRAC RACADM Command Line Reference Guide* available at **dell.com/idracmanuals**.

Storage devices — apply operation scenarios

Case 1: selected an apply operation (apply now, at next reboot, or at scheduled time) and there are no existing pending operations

If you have selected **Apply Now**, **At Next Reboot**, or **At Scheduled Time** and then clicked **Apply**, first the pending operation is created for the selected storage configuration operation.

- If the pending operation is successful and there are no prior existing pending operations, then the job is created. If the job is created successfully, a message indicating that the job ID is created for the selected device is displayed. Click **Job Queue** to view the progress of the job in the **Job Queue** page. If the job is not created, a message indicating that the job creation was not successful is displayed. Also, the message ID and the recommended response action are displayed.
- If the pending operation creation is unsuccessful and there are no prior existing pending operations, an error message with ID and recommended response action is displayed.

Case 2: selected an apply operation (apply now, at next reboot, or at scheduled time) and there are existing pending operations

If you have selected **Apply Now**, **At Next Reboot**, or **At Scheduled Time** and then clicked **Apply**, first the pending operation is created for the selected storage configuration operation.

- If the pending operation is created successfully and if there are existing pending operations, then a message is displayed.
  - Click the **View Pending Operations** link to view the pending operations for the device.
  - Click **Create Job** to create job for the selected device. If the job is created successfully, a message indicating that the job ID is created for the selected device is displayed. Click **Job Queue** to view the progress of the job in the **Job Queue** page. If the job is not created, a message indicating that the job creation was not successful is displayed. Also, the message ID and the recommended response action is displayed.
  - Click **Cancel** to not create the job and remain on the page to perform more storage configuration operations.
- If the pending operation is not created successfully and if there are existing pending operations, then an error message is displayed.
  - Click **Pending Operations** to view the pending operations for the device.
  - Click **Create Job For Successful Operations** to create the job for the existing pending operations. If the job is created successfully, a message indicating that the job ID is created for the selected device is displayed. Click **Job Queue** to view the progress of the job in the **Job Queue** page. If the job is not created, a message indicating that the job creation was not successful is displayed. Also, the message ID and the recommended response action are displayed.
  - Click **Cancel** to not create the job and remain on the page to perform more storage configuration operations.

Case 3: selected add to pending operations and there are no existing pending operations

If you have selected **Add to Pending Operations** and then clicked **Apply**, first the pending operation is created for the selected storage configuration operation.

- If the pending operation is created successfully and if there are no existing pending operations, then an information message is displayed:
  - Click **OK** to remain on the page to perform more storage configuration operations.
  - Click **Pending Operations** to view the pending operations for the device. Until the job is created on the selected controller, these pending operations are not applied.
- If the pending operation is not created successfully and if there are no existing pending operations, then an error message is displayed.

Case 4: selected add to pending operations and there are prior existing pending operations

If you have selected **Add to Pending Operations** and then clicked **Apply**, first the pending operation is created for the selected storage configuration operation.

- If the pending operation is created successfully and if there are existing pending operations, then an information message is displayed:
  - Click **OK** to remain on the page to perform more storage configuration operations.
  - Click **Pending Operations** to view the pending operations for the device.
- If the pending operation is not created successfully and if there are existing pending operations, then an error message is displayed.
  - Click **OK** to remain on the page to perform more storage configuration operations.
  - Click **Pending Operations** to view the pending operations for the device.

NOTE:

- At any time, if you do not see the option to create a job on the storage configuration pages, go to **Storage Overview** > **Pending Operations** page to view the existing pending operations and to create the job on the required controller.
- Only cases 1 and 2 are applicable for PCIe SSD. You cannot view the pending operations for PCIe SSDs and hence **Add to Pending Operations** option is not available. Use racadm command to clear the pending operations for PCIe SSDs.

Blinking or unblinking component LEDs

You can locate a physical disk, virtual disk drive and PCIe SSDs within an enclosure by blinking one of the Light Emitting Diodes (LEDs) on the disk.

You must have Login privilege to blink or unblink an LED.

The controller must be real-time configuration capable. The real-time support of this feature is available only in PERC 9.1 firmware and later.

NOTE: Blink or unblink is not supported for servers without backplane.

Blinking or unblinking component LEDs using web interface

To blink or unblink a component LED:

1 In the iDRAC Web interface, go to any of the following pages as per your requirement:
   - **Storage** > **Overview** > **Physical Disks** > **Status**– Displays the identified Physical Disks page where you can blink or unblink the physical disks and PCIe SSDs.
   - **Storage** > **Overview** > **Virtual Disks** > **Status**- Displays the identified Virtual Disks page where you can blink or unblink the virtual disks.
2 If you select the physical disk:
   - Select or deselect all component LEDs — Select the **Select/Deselect All** option and click **Blink** to start blinking the component LEDs. Similarly, click **Unblink** to stop blinking the component LEDs.
   - Select or deselect individual component LEDs — Select one or more component(s) and click **Blink** to start blinking the selected component LED(s). Similarly, click **Unblink** to stop blinking the component LEDs.
3 If you select the virtual disk:
   - Select or deselect all physical disk drives or PCIe SSDs — Select the **Select/Deselect All** option and click **Blink** to start blinking all the physical disk drives and the PCIe SSDs. Similarly, click **Unblink** to stop blinking the LEDs.
   - Select or deselect individual physical disk drives or PCIe SSDs — Select one or more physical disk drives and click **Blink** to start blinking the LEDs for the physical disk drives or the PCIe SSDs. Similarly, click **Unblink** to stop blinking the LEDs.
4 If you are on the **Identify Virtual Disk** page:
   - Select or deselect all virtual disks — Select the **Select/Deselect All** option and click **Blink** to start blinking the LEDs for all the virtual disks. Similarly, click **Unblink** to stop blinking the LEDs.
   - Select or deselect individual virtual disks — Select one or more virtual disks and click **Blink** to start blinking the LEDs for the virtual disks. Similarly, click **Unblink** to stop blinking the LEDs.

   If the blink or unblink operation is not successful, error messages are displayed.

Blinking or unblinking component LEDs using RACADM

To blink or unblink component LEDs, use the following commands:

```
racadm storage blink:<PD FQDD, VD FQDD, or PCIe SSD FQDD>
```

```
racadm storage unblink:<PD FQDD, VD FQDD, or PCIe SSD FQDD>
```

For more information, see the *iDRAC RACADM Command Line Reference Guide* available at **dell.com/idracmanuals**.

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BIOS Settings

You can view multiple attributes, which are being used for a specific server under the BIOS Settings. You can modify different parameters of each attribute from this BIOS configuration setting. Once you select one attribute, it shows different parameters which are related to that specific attribute. You can modify multiple parameters of an attribute and apply changes before modifying a different attribute. When a user expands a configuration group, attributes are displayed in an alphabetical order.

NOTE: Attribute level help content are dynamically generated.

Apply

Apply button remains greyed-out until any of the attributes are modified. Once you made changes to an attribute and click **Apply,** it allows you to modify the attribute with required changes. In case, the request fails to set the BIOS attribute, it throws an error with corresponding HTTP Response Status code mapped to SMIL API error or Job Creation error. A message is generated and displayed at that point. For more information, see Event and Error Message Reference Guide for 14th Generation Dell EMC PowerEdge Servers available at www.dell.com/idracmanuals.

Discard changes

The **Discard Changes** button is greyed-out until any of the attributes are modified . If you click **Discard Changes** button , all the recent changes are discarded and restored with the previous or initial values.

Apply and Reboot

When a user modifies value of an attribute or boot sequence, user is presented with two choices to apply the configuration; **Apply and Reboot** or **Apply on Next Reboot**. In either of the apply options, user is redirected to the job queue page to monitor the progress of that specific job.

A user can view auditing information related to BIOS configuration in the LC logs.

If you click **Apply and Reboot**, it restarts the server immediately to configure all the required changes. In case, the request fails to set the BIOS attributes, it throws an error with corresponding HTTP Response Status code mapped to SMIL API error or Job Creation error. An EEMI message is generated and displayed at that point.

Apply At Next Reboot

When a user modifies value of an attribute or boot sequence, user is presented with two choices to apply the configuration; **Apply and Reboot** or **Apply on Next Reboot**. In either of the apply options, user is redirected to the job queue page to monitor the progress of that specific job.

A user can view auditing information related to BIOS configuration in the LC logs.

If you click **Apply At Next Reboot** , it configures all the required changes on the next restart of the server. You will not experience any immediate modifications based on the recent configuration changes until the next reboot session is taking place successfully. In case, the request fails to set the BIOS attributes, it throws an error with corresponding HTTP Response Status code mapped to SMIL API error or Job Creation error. An EEMI message is generated and displayed at that point.

Delete All Pending Values

Delete All pending Values button is enabled only when there are pending values based on the recent configuration changes. In case, user decides not to apply the configuration changes, user can click **Delete All Pending Values** button to terminate all the modifications. In case, the request fails to remove the BIOS attributes, it throws an error with corresponding HTTP Response Status code mapped to SMIL API error or Job Creation error. An EEMI message is generated and displayed at that point.

Pending Value

Configuration of a BIOS attribute via iDRAC is not applied immediately to BIOS. It requires a server reboot for the changes to take place. When you modify a BIOS attribute then **Pending Value** gets updated. If an attribute already has a pending value (and that has been configured) it is displayed on the GUI.

Modifying Bios Configuration

Modifying BIOS configuration results in audit log entries, which gets entered in LC logs.

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Configuring and using virtual console

You can use the virtual console to manage a remote system using the keyboard, video, and mouse on your management station to control the corresponding devices on a managed server. This is a licensed feature for rack and tower servers. It is available by default in blade servers.

The key features are:

- A maximum of six simultaneous Virtual Console sessions are supported. All the sessions view the same managed server console simultaneously.
- You can launch virtual console in a supported Web browser by using Java, ActiveX, or HTML5 plug-in.

  NOTE: By default, the virtual console type is set to HTML5.
- When you open a Virtual Console session, the managed server does not indicate that the console has been redirected.
- You can open multiple Virtual Console sessions from a single management station to one or more managed systems simultaneously.
- You cannot open two virtual console sessions from the management station to the managed server using the same plug-in.
- If a second user requests a Virtual Console session, the first user is notified and is given the option to refuse access, allow read-only access, or allow full shared access. The second user is notified that another user has control. The first user must respond within thirty seconds, or else access is granted to the second user based on the default setting. When two sessions are concurrently active, the first user sees a message in the upper-right corner of the screen that the second user has an active session. If neither the first or second user has administrator privileges, terminating the first user's session automatically terminates the second user's session.

NOTE: The number of active virtual-console sessions displayed in the web interface is only for active web-interface sessions. This number does not include sessions from other interfaces such as Telnet, SSH, and RACADM.

NOTE: For information about configuring your browser to access the virtual console, see Configuring web browsers to use virtual console.

NOTE: Disabling Local Server Video using the iDRAC is not supported in MX platforms. To disable KVM access, use the option under the settings for chassis in the OME Modular web interface.

Topics:

- Supported screen resolutions and refresh rates
- Configuring virtual console
- Previewing virtual console
- Launching virtual console
- Using virtual console viewer

Supported screen resolutions and refresh rates

The following table lists the supported screen resolutions and corresponding refresh rates for a Virtual Console session running on the managed server.

Table 55. Supported screen resolutions and refresh rates

Screen Resolution	Refresh Rate (Hz)
720x400	70
640x480	60, 72, 75, 85
800x600	60, 70, 72, 75, 85
1024x768	60, 70, 72, 75, 85
1280x1024	60
1920x1200	60

It is recommended that you configure the monitor display resolution to 1920x1200 pixels.

NOTE: If you have an active Virtual Console session and a lower resolution monitor is connected to the Virtual Console, the server console resolution may reset if the server is selected on the local console. If the system is running a Linux operating system, an X11 console may not be viewable on the local monitor. Press <Ctrl><Alt><F1> at the iDRAC Virtual Console to switch Linux to a text console.

Configuring virtual console

Before configuring the Virtual Console, make sure that the management station is configured.

You can configure the virtual console using iDRAC Web interface or RACADM command line interface.

Configuring virtual console using web interface

To configure Virtual Console using iDRAC Web interface:

1. Go to **Configuration** > **Virtual Console**. The **Virtual Console** page is displayed.
2. Enable virtual console and specify the required values. For information about the options, see the *iDRAC Online Help*.

   NOTE: If you are using Nano operating system, disable the Automatic System Lock feature on the Virtual Console page.
3. Click **Apply**. The virtual console is configured.

Configuring virtual console using RACADM

To configure the Virtual Console, use the **set** command with the objects in the **iDRAC.VirtualConsole** group.

For more information, see the iDRAC RACADM CLI Guide available at www.dell.com/idracmanuals.

Previewing virtual console

Before launching the Virtual Console, you can preview the state of the Virtual Console on the **System** > **Properties** > **System Summary** page. The **Virtual Console Preview** section displays an image showing the state of the Virtual Console. The image is refreshed every 30 seconds. This is a licensed feature.

NOTE: The Virtual Console image is available only if you have enabled Virtual Console.

Launching virtual console

You can launch the virtual console using the iDRAC Web Interface or a URL.

NOTE: Do not launch a Virtual Console session from a Web browser on the managed system.

Before launching the Virtual Console, make sure that:

- You have administrator privileges.
- Web browser is configured to use HTML5, Java, or ActiveX plug-ins.
- Minimum network bandwidth of one MB/sec is available.

NOTE: If the embedded video controller is disabled in BIOS and if you launch the Virtual Console, the Virtual Console Viewer is blank.

While launching Virtual Console using 32-bit or 64-bit IE browsers, use HTML5, or use the required plug-in (Java or ActiveX) that is available in the respective browser. The Internet Options settings are common for all browsers.

While launching the Virtual Console using Java plug-in, occasionally you may see a Java compilation error. To resolve this, go to **Java control panel** > **General** > **Network Settings** and select **Direct Connection**.

If the Virtual Console is configured to use ActiveX plug-in, it may not launch the first time. This is because of the slow network connection and the temporary credentials (that Virtual Console uses to connect) timeout is two minutes. The ActiveX client plug-in download time may exceed this time. After the plug-in is successfully downloaded, you can launch the Virtual Console normally.

To launch the Virtual Console by using HTML5 plug-in, you must disable the pop-up blocker.

Launching virtual console using web interface

You can launch the virtual console in the following ways:

- Go to **Configuration** > **Virtual Console**. The **Virtual Console** page is displayed. Click **Launch Virtual Console**. The **Virtual Console Viewer** is launched.

The **Virtual Console Viewer** displays the remote system's desktop. Using this viewer, you can control the remote system's mouse and keyboard functions from your management station.

Multiple message boxes may appear after you launch the application. To prevent unauthorized access to the application, navigate through these message boxes within three minutes. Otherwise, you are prompted to relaunch the application.

If one or more Security Alert windows appear while launching the viewer, click Yes to continue.

Two mouse pointers may appear in the viewer window: one for the managed server and another for your management station. To synchronize the cursors, see Synchronizing mouse pointers.

Launching virtual console using a URL

To launch the Virtual Console using the URL:

1. Open a supported Web browser and in the address box, type the following URL in lower case: **https://iDRAC_ip/console**
2. Based on the login configuration, the corresponding **Login** page is displayed:
   - If Single Sign On is disabled and Local, Active Directory, LDAP, or Smart Card login is enabled, the corresponding **Login** page is displayed.

- If Single-Sign On is enabled, the **Virtual Console Viewer** is launched and the **Virtual Console** page is displayed in the background.

NOTE: Internet Explorer supports Local, Active Directory, LDAP, Smart Card (SC) and Single Sign-On (SSO) logins. Firefox supports Local, AD, and SSO logins on Windows-based operating system and Local, Active Directory, and LDAP logins on Linux-based operating systems.

NOTE: If you do not have Access Virtual Console privilege but have Access Virtual Media privilege, then using this URL launches the Virtual Media instead of the Virtual Console.

Disabling warning messages while launching virtual console or virtual media using Java or ActiveX plug-in

You can disable the warning messages while launching the Virtual Console or Virtual Media using Java plug-in.

NOTE: You need Java 8 or later to use this feature and to launch iDRAC Virtual Console over an IPv6 network.

1 Initially, when you launch Virtual Console or Virtual Media using Java plug-in, the prompt to verify the publisher is displayed. Click **Yes**.
A certificate warning message is displayed indicating that a trusted certificate is not found.

NOTE: If the certificate is found in the operating system's certificate store or if it is found in a previously specified user location, then this warning message is not displayed.

2 Click **Continue**.
The Virtual Console Viewer or Virtual Media Viewer is launched.

NOTE: The Virtual Media viewer is launched if Virtual Console is disabled.

3 From the **Tools** menu, click **Session Options** and then **Certificate** tab.
4 Click **Browse Path**, specify the location to store the user's certificate, click **Apply**, click **OK**, and exit from the viewer.
5 Launch Virtual Console again.
6 In the certificate warning message, select the **Always trust this certificate** option, and then click **Continue**.
7 Exit from the viewer.
8 When you re-launch Virtual Console, the warning message is not displayed.

Using virtual console viewer

The Virtual Console Viewer provides various controls such as mouse synchronization, virtual console scaling, chat options, keyboard macros, power actions, next boot devices, and access to Virtual Media. For information to use these features, see the *iDRAC Online Help*.

NOTE: If the remote server is powered off, the message 'No Signal' is displayed.

The Virtual Console Viewer title bar displays the DNS name or the IP address of the iDRAC you are connected to from the management station. If iDRAC does not have a DNS name, then the IP address is displayed. The format is:

- For rack and tower servers:
  `<DNS name / IPv6 address / IPv4 address>, <Model>, User: <username>, <fps>`
- For blade servers:
  `<DNS name / IPv6 address / IPv4 address>, <Model>, <Slot number>, User: <username>, <fps>`

Sometimes the Virtual Console Viewer may display low quality video. This is due to slow network connectivity that leads to loss of one or two video frames when you start the Virtual Console session. To transmit all the video frames and improve the subsequent video quality, do any of the following:

- In the **System Summary** page, under **Virtual Console Preview** section, click **Refresh**.

- In the **Virtual Console Viewer**, under **Performance** tab, set the slider to **Maximum Video Quality**.

HTML5 based virtual console

NOTE: Check the release notes for the expanded OS support for HTML5.

NOTE: While using HTML5 to access virtual console, the language must be consistent across client and target keyboard layout, OS, and browser. For example, all must be in English (US) or any of the supported languages.

To launch the HTML5 virtual console, you must enable the virtual console feature from the iDRAC Virtual Console page and set the **Virtual Console Type** option to HTML5.

NOTE: By default the virtual console type is set to HTML5.

You can launch virtual console as a pop-up window by using one of the following methods:

- From iDRAC Home page, click the **Launch** link available in the Console Preview session
- From iDRAC Virtual Console page, click **Launch Virtual Console**.
- From iDRAC login page, type **https//<iDRAC IP>/console**. This method is called as Direct Launch.

In the HTML5 virtual console, the following menu options are available:

- Add Power Control
- Boot Order
- Chat
- Keyboard
- Screen Capture
- Refresh
- Full Screen
- Disconnect Viewer
- Console Control
- Virtual Media

The **Pass all keystrokes to server** option is not supported on HTML5 virtual console. Use keyboard and keyboard macros for all the functional keys.

- Console control — This has the following configuration options:
  - Keyboard
  - Keyboard Macros
  - Aspect Ratio
  - Touch Mode
  - Mouse Acceleration
- Keyboard — This keyboard uses open source code. The difference from physical keyboard is that the number keys are switched to special character when you the **Caps Lock** key is enabled. Functionality remains the same and number is entered if you press the special character when the **Caps Lock** key is enabled.
- Keyboard Macros — This is supported in HTML5 virtual console and are listed as the following drop-down options. Click **Apply** to apply the selected key combination on the server.
  - Ctrl+Alt+Del
  - Ctrl+Alt+F1
  - Ctrl+Alt+F2
  - Ctrl+Alt+F3
  - Ctrl+Alt+F4

  - Ctrl+Alt+F5
  - Ctrl+Alt+F6
  - Ctrl+Alt+F7
  - Ctrl+Alt+F8
  - Ctrl+Alt+F9
  - Ctrl+Alt+F10
  - Ctrl+Alt+F11
  - Ctrl+Alt+F12
  - Alt+Tab
  - Alt+ESC
  - Ctrl+ESC
  - Alt+Space
  - Alt+Enter
  - Alt+Hyphen
  - Alt+F1
  - Alt+F2
  - Alt+F3
  - Alt+F4
  - Alt+F5
  - Alt+F6
  - Alt+F7
  - Alt+F8
  - Alt+F9
  - Alt+F10
  - Alt+F11
  - Alt+F12
  - PrntScrn
  - Alt+PrntScrn
  - F1
  - Pause
  - Tab
  - Ctrl+Enter
  - SysRq
  - Alt+SysRq
- Aspect Ratio — The HTML5 virtual console video image automatically adjusts the size to make the image visible. The following configuration options are displayed as a drop-down list:
  - Maintain
  - Don't Maintain

  Click **Apply** to apply the selected settings on the server.
- Touch Mode — The HTML5 virtual console supports the Touch Mode feature. The following configuration options are displayed as a drop-down list:
  - Direct
  - Relative

  Click **Apply** to apply the selected settings on the server.
- Mouse Acceleration — Select the mouse acceleration based on the operating system. The following configuration options are displayed as a drop-down list:

- Absolute (Windows, latest versions of Linux, Mac OS-X)
- Relative, no acceleration
- Relative (RHEL, earlier versions of Linux)
- Linux RHEL 6.x and SUSE Linux Enterprise Server 11 or later

Click **Apply** to apply the selected settings on the server.

- Virtual Media — Click **Connect Virtual Media** option to start the virtual media session. The virtual media menu displays the **Browse** option to browse and map the ISO and IMG files.

NOTE: You cannot map physical media such USB-based drives, CD, or DVD by using the HTML5 based virtual console.

NOTE: For security reasons read/write access is disabled while accessing virtual console in HTML5. With Java or ActiveX plug-ins, you can accept security messaging before the plug-in is given the read/write authority.

Supported Browsers

The HTML5 virtual console is supported on the following browsers:

- Internet Explorer 11
- Chrome 36
- Firefox 30
- Safari 7.0

NOTE: It is recommended to have Mac OS version 10.10.2 (or onward) installed in the system.

For more details on supported browsers and versions, see the iDRAC Release Notes available at www.dell.com/idracmanuals.

Synchronizing mouse pointers

When you connect to a managed system through the Virtual Console, the mouse acceleration speed on the managed system may not synchronize with the mouse pointer on the management station and displays two mouse pointers in the Viewer window.

When using Red Hat Enterprise Linux or Novell SUSE Linux, configure the mouse mode for Linux before you launch the Virtual Console viewer. The operating system's default mouse settings are used to control the mouse arrow in the Virtual Console viewer.

When two mouse cursors are seen on the client Virtual Console viewer, it indicates that the server's operating system supports Relative Positioning. This is typical for Linux operating systems or Lifecycle Controller and causes two mouse cursors if the server's mouse acceleration settings are different from the mouse acceleration settings on the Virtual Console client. To resolve this, switch to single cursor or match the mouse acceleration on the managed system and the management station:

- To switch to single cursor, from the **Tools** menu, select **Single Cursor**.
- To set the mouse acceleration, go to **Tools** > **Session Options** > **Mouse**. Under **Mouse Acceleration** tab, select **Windows** or **Linux** based on the operating system.

To exit single cursor mode, press <F9> or the configured termination key.

NOTE: This is not applicable for managed systems running Windows operating system since they support Absolute Positioning.

When using the Virtual Console to connect to a managed system with a recent Linux distribution operating system installed, you may experience mouse synchronization problems. This may be due to the Predictable Pointer Acceleration feature of the GNOME desktop. For correct mouse synchronization in the iDRAC Virtual Console, this feature must be disabled. To disable Predictable Pointer Acceleration, in the mouse section of the **/etc/X11/xorg.conf** file, add:

```
Option "AccelerationScheme" "lightweight".
```

If synchronization problems continue, do the following additional change in the **<user_home>/.gconf/desktop/gnome/peripherals/mouse/%gconf.xml** file:

Change the values for `motion_threshold` and `motion_acceleration` to `-1`.

If you turn off mouse acceleration in GNOME desktop, in the Virtual Console viewer, go to **Tools** > **Session Options** > **Mouse**. Under **Mouse Acceleration** tab, select **None**.

For exclusive access to the managed server console, you must disable the local console and re-configure the **Max Sessions** to `1` on the **Virtual Console page**.

Passing all keystrokes through virtual console for Java or ActiveX plug-in

You can enable the **Pass all keystrokes to server** option and send all keystrokes and key combinations from the management station to the managed system through the Virtual Console Viewer. If it is disabled, it directs all the key combinations to the management station where the Virtual Console session is running. To pass all keystrokes to the server, in the Virtual Console Viewer, go to **Tools** > **Session Options** > **General** tab and select the **Pass all keystrokes to server** option to pass the management station's keystrokes to the managed system.

The behavior of the Pass all keystrokes to server feature depends on the:

- Plug-in type (Java or ActiveX) based on which Virtual Console session is launched.
  For the Java client, the native library must be loaded for Pass all keystrokes to server and Single Cursor mode to function. If the native libraries are not loaded, the **Pass all keystrokes to server** and **Single Cursor** options are deselected. If you attempt to select either of these options, an error message is displayed indicating that the selected options are not supported.

  For the ActiveX client, the native library must be loaded for Pass all keystrokes to server function to work. If the native libraries are not loaded, the **Pass all keystrokes to server** option is deselected. If you attempt to select this option, an error message is displayed indicating that the feature is not supported

  For MAC operating systems, enable the **Enable access of assistive device** option in **Universal Access** for the Pass all keystrokes to server feature to work.
- Operating system running on the management station and managed system. The key combinations that are meaningful to the operating system on the management station are not passed to the managed system.
- Virtual Console Viewer mode—Windowed or Full Screen.
  In Full Screen mode, **Pass all keystrokes to server** is enabled by default.

  In Windowed mode, the keys passed only when the Virtual Console Viewer is visible and is active.

  When changed from Full Screen mode to Windowed mode, the previous state of Pass all keys is resumed.

Java-based virtual console session running on Windows operating system

- Ctrl+Alt+Del key is not sent to the managed system, but always interpreted by the management station.
- When Pass All Keystrokes to Server is enabled, the following keys are not sent to the managed system:
  - Browser Back Key
  - Browser Forward Key
  - Browser Refresh key
  - Browser Stop Key
  - Browser Search Key
  - Browser Favorites key

- Browser Start and Home key
- Volume mute key
- Volume down key
- Volume up key
- Next track key
- Previous track key
- Stop Media key
- Play/Pause media key
- Start mail key
- Select media key
- Start Application 1 key
- Start Application 2 key

- All the individual keys (not a combination of different keys, but a single key stroke) are always sent to the managed system. This includes all the Function keys, Shift, Alt, Ctrl key and Menu keys. Some of these keys affect both management station and managed system.

  For example, if the management station and the managed system is running Windows operating system, and Pass All Keys is disabled, when you press the Windows key to open the **Start** Menu, the **Start** menu opens on both management station and managed system. However, if Pass All Keys is enabled, then the **Start** menu is opened only on the managed system and not on the management station.
- When Pass All Keys is disabled, the behavior depends on the key combinations pressed and the special combinations interpreted by the operating system on the management station.

Java based virtual console session running on Linux operating system

The behavior mentioned for Windows operating system is also applicable for Linux operating system with the following exceptions:

- When Pass all keystrokes to server is enabled, <Ctrl+Alt+Del> is passed to the operating system on the managed system.
- Magic SysRq keys are key combinations interpreted by the Linux Kernel. It is useful if the operating system on the management station or the managed system freezes and you need to recover the system. You can enable the magic SysRq keys on the Linux operating system using one of the following methods:
  - Add an entry to **/etc/sysctl.conf**
  - echo "1" > /proc/sys/kernel/sysrq
- When Pass all keystrokes to server is enabled, the magic SysRq keys are sent to the operating system on the managed system. The key sequence behavior to reset the operating system, that is reboot without un-mounting or sync, depends on whether the magic SysRq is enabled or disabled on the management station:
  - If SysRq is enabled on the management station, then <Ctrl+Alt+SysRq+b> or <Alt+SysRq+b> resets the management station irrespective of the system's state.
  - If SysRq is disabled on the management station, then the <Ctrl+Alt+SysRq+b> or <Alt+SysRq+b>keys resets the operating system on the managed system.
  - Other SysRq key combinations (example, <Alt+SysRq+k>, <Ctrl+Alt+SysRq+m>, and so on) are passed to the managed system irrespective of the SysRq keys enabled or not on the management station.

Using SysRq magic keys through remote console

You can enable SysRq magic keys through the remote console using any of the following:

- Opensoure IPMI tool
- Using SSH/Telnet or External Serial Connector

Using opensource IPMI tool

Make sure that BIOS/iDRAC settings supports console redirection using SOL.

1 At the command prompt, run the SOL activate command:

```
Ipmitool –I lanplus –H <ipaddr> -U <username> -P <passwd> sol activate
```

The SOL session is activated.

2 After the server boots to the operating system, the `localhost.localdomain` login prompt appears. Log in using the operating system user name and password.

3 If SysRq is not enabled, enable using `echo 1 >/proc/sys/kernel/sysrq`.

4 Run break sequence `~B`.

5 Use the SysRq magic key to enable the SysRq function. For example, the following command displays the memory information on the console:

```
echo m > /proc/sysrq-trigger displays
```

Using SSH or Telnet or external serial connector directly connecting through serial cable

1 For telnet/SSH sessions, after logging in using the iDRAC username and password, at the `/admin>` prompt, run the command `console com2`. The `localhost.localdomain` prompt appears.

2 For console redirection using external serial connector directly connected to the system through a serial cable, the `localhost.localdomain` login prompt appears after the server boots to the operating system.

3 Log in using the operating system user name and password.

4 If SysRq is not enabled, enable using `echo 1 >/proc/sys/kernel/sysrq`.

5 Use the magic key to enable the SysRq function. For example, the following command reboots the server:

```
echo b > /proc/sysrq-trigger
```

NOTE: You do not have to run break sequence before using the magic SysRq keys.

ActiveX based virtual console session running on Windows operating system

The behavior of the pass all keystrokes to server feature in ActiveX based Virtual Console session running on Windows operating system is similar to the behavior explained for Java based Virtual Console session running on the Windows management station with the following exceptions:

- When Pass All Keys is disabled, pressing F1 launches the application Help on both management station and managed system, and the following message is displayed:

  ```
  Click Help on the Virtual Console page to view the online Help
  ```

- The media keys may not be blocked explicitly.
- <Alt + Space>, <Ctrl + Alt + +>, <Ctrl + Alt + -> are not sent to the managed system and is interpreted by the operating system on the management station.

18

Using iDRAC Service Module

The iDRAC Service Module is a software application that is recommended to be installed on the server (it is not installed by default). It complements iDRAC with monitoring information from the operating system. It complements iDRAC by providing additional data to work with iDRAC interfaces such as the Web interface, Redfish, RACADM, and WSMan. You can configure the features monitored by the iDRAC Service Module to control the CPU and memory consumed on the server's operating system. Host OS command line interface has been introduced to enable or disable status of Full Power Cycle for all System components except the PSU.

NOTE: iDRAC9 uses iSM version 3.01 and higher.

NOTE: You can use the iDRAC Service Module only if you have installed iDRAC Express or iDRAC Enterprise license.

Before using iDRAC Service Module, ensure that:

- You have login, configure, and server control privileges in iDRAC to enable or disable the iDRAC Service Module features.
- You do not disable the **iDRAC Configuration using local RACADM** option.
- OS to iDRAC pass-through channel is enabled through the internal USB bus in iDRAC.

NOTE:

- When iDRAC Service Module runs for the first time, by default it enables the OS to iDRAC pass-through channel in iDRAC. If you disable this feature after installing the iDRAC Service Module, then you must enable it manually in iDRAC.
- If the OS to iDRAC pass-through channel is enabled through LOM in iDRAC, then you cannot use the iDRAC Service Module.

Topics:

- Installing iDRAC Service Module
- Supported operating systems for iDRAC Service Module
- iDRAC Service Module monitoring features
- Using iDRAC Service Module from iDRAC web interface
- Using iDRAC Service Module from RACADM
- Using iDRAC Service Module on Windows Nano OS

Installing iDRAC Service Module

You can download and install the iDRAC Service Module from **dell.com/support**. You must have administrator privilege on the server's operating system to install the iDRAC Service Module. For information on installation, see the iDRAC Service Module User's Guide available at www.dell.com/esmmanuals.

NOTE: This feature is not applicable for Dell Precision PR7910 systems.

Installing iDRAC Service Module from iDRAC Express and Basic

From the **iDRAC Service Module Setup** page, click **Install Service Module**.

1 The Service Module Installer is available to the host operating system and a job is created in iDRAC.

For Microsoft Windows operating system or Linux operating system, log in to the server either remotely or locally.

2 Find the mounted volume labeled as "**SMINST**" on your device list and run the appropriate script:
   - On Windows, open the command prompt and run the **ISM-Win.bat** batch file.
   - On Linux, open the shell prompt and run the **ISM-Lx.sh** script file.
3 After the installation is complete, iDRAC displays the Service Module as **Installed** and the installation date.

NOTE: The installer will be available to the host operating system for 30 minutes. If you do not start the installation within 30 minutes, you must restart the Service Module installation.

Installing iDRAC Service Module from iDRAC Enterprise

1 On the **SupportAssist Registration** wizard, click **Next**.
2 On the **iDRAC Service Module Setup** page, click **Install Service Module**.
3 Click **Launch Virtual Console** and click **Continue** on the security warning dialog box.
4 To locate the iSM installer file, log in to the server either remotely or locally.

NOTE: The installer will be available to the host operating system for 30 minutes. If you do not start the installation within 30 minutes, you must restart the installation.

5 Find the mounted volume labeled as "**SMINST**" on your device list and run the appropriate script:
   - On Windows, open the command prompt and run the **ISM-Win.bat** batch file.
   - On Linux, open the shell prompt and run the **ISM-Lx.sh** script file.
6 Follow the instructions on the screen to complete the installation.

   On the **iDRAC Service Module Setup** page, the **Install Service Module** button is disabled after the installation is complete and the Service Module status is displayed as **Running**.

Supported operating systems for iDRAC Service Module

For the list of operating systems supported by the iDRAC Service Module, see the iDRAC Service Module User's Guide available at www.dell.com/esmmanuals.

iDRAC Service Module monitoring features

The iDRAC Service Module (iSM) provides the following monitoring features:

- Redfish profile support for network attributes
- iDRAC Hard Reset
- iDRAC access via Host OS (Experimental Feature)
- In-band iDRAC SNMP alerts
- View operating system (OS) information
- Replicate Lifecycle Controller logs to operating system logs
- Perform automatic system recovery options
- Populate Windows Management Instrumentation (WMI) Management Providers
- Integrate with SupportAssist Collection. This is applicable only if iDRAC Service Module version 2.0 or later is installed.
- Prepare to Remove NVMe PCIe SSD. For more information.
- Remote Server Power Cycle

Redfish profile support for network attributes

iDRAC Service Module v2.3 or later provides additional network attributes to iDRAC, which can be obtained through the REST clients from iDRAC. For more details, see iDRAC Redfish profile support.

Operating system information

The OpenManage Server Administrator currently shares operating system information and host name with iDRAC. The iDRAC Service Module provides similar information such as OS name, OS version, and Fully Qualified Domain Name (FQDN) with iDRAC. By default, this monitoring feature is enabled. It is not disabled if OpenManage Server Administrator is installed on the host OS.

In iSM version 2.0 or later, the operating system information feature is amended with the OS network interface monitoring. When iDRAC Service Module version 2.0 or later is used with iDRAC 2.00.00.00, it starts monitoring the operating system network interfaces. You can view this information using iDRAC web interface, RACADM, or WSMan.

Replicate Lifecycle logs to OS log

You can replicate the Lifecycle Controller Logs to the OS logs from the time when the feature is enabled in iDRAC. This is similar to the System Event Log (SEL) replication performed by OpenManage Server Administrator. All events that have the **OS Log** option selected as the target (in the **Alerts** page, or in the equivalent RACADM or WSMan interfaces) are replicated in the OS log using the iDRAC Service Module. The default set of logs to be included in the OS logs is the same as configured for SNMP alerts or traps.

iDRAC Service Module also logs the events that have occurred when the operating system is not functioning. The OS logging performed by iDRAC Service Module follows the IETF syslog standards for Linux-based operating systems.

NOTE: Starting iDRAC Service Module version 2.1, the Lifecycle Controller Logs replication location in the Windows OS logs can be configured using the iDRAC Service Module installer. You can configure the location while installing iDRAC Service Module or modifying the iDRAC Service Module installer.

If OpenManage Server Administrator is installed, this monitoring feature is disabled to avoid duplicate SEL entries in the OS log.

NOTE: On Microsoft Windows, if iSM events get logged under System logs instead of Application logs, restart the Windows Event Log service or restart the host OS.

Automatic system recovery options

The Automatic system recovery feature is a hardware-based timer. If a hardware failure occurs, a notification may not be available, but the server is reset as if the power switch was activated. ASR is implemented using a timer that continuously counts down. The Health Monitor frequently reloads the counter to prevent it from counting down to zero. If the ASR counts down to zero, it is assumed that the operating system has locked up and the system automatically attempts to reboot.

You can perform automatic system recovery operations such as reboot, power cycle, or power off the server after a specified time interval. This feature is enabled only if the operating system watchdog timer is disabled. If OpenManage Server Administrator is installed, this monitoring feature is disabled to avoid duplicate watchdog timers.

Windows Management Instrumentation providers

WMI is a set of extensions to the Windows Driver Model that provides an operating system interface through which instrumented components provide information and notification. WMI is Microsoft's implementation of the Web-Based Enterprise Management (WBEM) and Common Information Model (CIM) standards from the Distributed Management Task Force (DMTF) to manage Server hardware, operating systems and applications. WMI Providers helps to integrate with Systems Management Consoles such as Microsoft System Center and enables scripting to manage Microsoft Windows Servers.

You can enable or disable the WMI option in iDRAC. iDRAC exposes the WMI classes through the iDRAC Service Module providing the server's health information. By default, WMI information feature is enabled. The iDRAC Service Module exposes the WSMan monitored classes in iDRAC through WMI. The classes are exposed in the **root/cimv2/dcim** namespace.

The classes can be accessed using any of the standard WMI client interfaces. For more information, see the profile documents.

The following examples use the DCIM_account class to illustrate the capability that WMI information feature provides in iDRAC Service Module. For the details of the supported classes and profiles, see the WSMan profiles documentation available at www.dell.com/support.

Table 56. Examples of DCIM_account class

CIM Interface	WinRM	WMIC	PowerShell
Enumerate instances of a class	`winrm e wmi/root/cimv2/dcim/dcim_account`	`wmic /namespace:\\root\cimv2\dcim PATH dcim_account`	`Get-WmiObject dcim_account -namespace root/cimv2/dcim`
Get a specific instance of a class	`winrm g wmi/root/cimv2/dcim/DCIM_Account?CreationClassName=DCIM_Account+Name=iDRAC.Embedded.1#Users.2+SystemCreationClassName=DCIM_SPComputerSystem+SystemName=systemmc`	`wmic /namespace:\\root\cimv2\dcim PATH dcim_account where Name="iDRAC.Embedded.1#Users.16"`	`Get-WmiObject -Namespace root\cimv2\dcim -Class dcim_account -filter "Name='iDRAC.Embedded.1#Users.16'"`
Get associated instances of an instance	`winrm e wmi/root/cimv2/dcim/* -dialect:association -filter:{object=DCIM_Account?CreationClassName=DCIM_Account+Name=iDRAC.Embedded.1#Users.1+SystemCreationClassName=DCIM_SPComputerSystem+SystemName=systemmc}`	`wmic /namespace:\\root\cimv2\dcim PATH dcim_account where Name='iDRAC.Embedded.1#Users.2' ASSOC`	`Get-Wmiobject -Query "ASSOCIATORS OF {DCIM_Account.CreationClassName='DCIM_Account',Name='iDRAC.Embedded.1#Users.2',SystemCreationClassName='DCIM_SPComputerSystem',SystemName='systemmc'}" -namespace root/cimv2/dcim`
Get references of an instance	`winrm e wmi/root/cimv2/dcim/* -dialect:association -associations -filter:{object=DCIM_Account?CreationClassName=DCIM_Account+Name=iDRAC.Embedded.1#Users.1+SystemCreationClassNa`	Not applicable	`Get-Wmiobject -Query "REFERENCES OF {DCIM_Account.CreationClassName='DCIM_Account',Name='iDRAC.Embedded.1#Users.2',SystemCreationClassName='DCIM_SPComputerSystem',SystemName='systemmc'}" -namespace root/cimv2/dcim`

CIM Interface	WinRM	WMIC	PowerShell
	me=DCIM_SPComputerSyste m+SystemName=systemmc}		

Remote iDRAC Hard Reset

By using iDRAC, you can monitor the supported servers for critical system hardware, firmware, or software issues. Sometimes, iDRAC may become unresponsive due to various reasons. During such scenarios, you must turn off the server and reset iDRAC. To reset the iDRAC CPU, you must either power off and power on the server or perform an AC power cycle.

By using the remote iDRAC hard reset feature, whenever iDRAC becomes unresponsive, you can perform a remote iDRAC reset operation without an AC power cycle.. To reset the iDRAC remotely, make sure that you have administrative privileges on the host OS. By default, the remote iDRAC hard reset feature is enabled. You can perform a remote iDRAC hard reset using iDRAC Web interface, RACADM, and WSMan.

Command usage

This section provides the command usages for Windows, Linux, and ESXi operating systems to perform iDRAC hard reset.

- **Windows**
  - Using the local Windows Management Instrumentation (WMI):

    ```
    winrm  i  iDRACHardReset wmi/root/cimv2/dcim/DCIM_iSMService?
    InstanceID="iSMExportedFunctions"
    ```

  - Using the remote WMI interface:

    ```
    winrm i iDRACHardReset wmi/root/cimv2/dcim/dcim_ismservice -u:<admin-username> -p:<admin-
    passwd> -r: http://<remote-hostname OR IP>/wsman -a:Basic -encoding:utf-8 -skipCACheck -
    skipCNCheck
    ```

  - Using the Windows PowerShell script with force and without force:

    ```
    Invoke-iDRACHardReset -force
    ```

    ```
    Invoke-iDRACHardReset
    ```

  - Using the **Program Menu** shortcut:

    For simplicity, iSM provides a shortcut in the **Program Menu** of the Windows operating system. When you select the **Remote iDRAC Hard Reset** option, you are prompted for a confirmation to reset the iDRAC. After you confirm, the iDRAC is reset and the result of the operation is displayed.

  NOTE: The following warning message appears in the Event Viewer under the Application Logs category. This warning does not require any further action.

  ```
  A provider, ismserviceprovider, has been registered in the Windows Management
  Instrumentation namespace Root\CIMV2\DCIM to use the LocalSystem account. This account is
  privileged and the provider may cause a security violation if it does not correctly
  impersonate user requests.
  ```

- **Linux**

  iSM provides an executable command on all iSM supported Linux operating system. You can run this command by logging into the operating system by using SSH or equivalent.

  ```
  Invoke-iDRACHardReset
  ```

  ```
  Invoke-iDRACHardReset -f
  ```

- **ESXi**

On all iSM supported ESXi operating systems, the iSM v2.3 supports a Common Management Programming Interface (CMPI) method provider to perform the iDRAC reset remotely by using the WinRM remote commands.

```
winrm i iDRACHardReset http://schemas.dell.com/wbem/wscim/1/cim-schema/2/root/cimv2/dcim/
DCIM_iSMService?__cimnamespace=root/cimv2/dcim+InstanceID=
iSMExportedFunctions -u:<root-username> -p:<passwd> -r:https://<Host-IP>:443/WSMan -a:basic -
encoding:utf-8 -skipCNCheck -skipCACheck -skipRevocationcheck
```

NOTE: VMware ESXi operating system does not prompt for confirmation before resetting the iDRAC.

NOTE: Due to limitations on the VMware ESXi operating system, iDRAC connectivity is not restored completely after the reset. Ensure that you manually reset iDRAC.

Table 57. Error Handling

Result	Description
0	Success
1	Unsupported BIOS version for iDRAC reset
2	Unsupported platform
3	Access denied
4	iDRAC reset failed

In-band Support for iDRAC SNMP Alerts

By using iDRAC Service Module v2.3, you can receive SNMP alerts from the host operating system, which is similar to the alerts that are generated by iDRAC.

You can also monitor the iDRAC SNMP alerts without configuring the iDRAC and manage the server remotely by configuring the SNMP traps and destination on the host OS. In iDRAC Service Module v2.3 or later, this feature converts all the Lifecycle logs replicated in the OS logs into SNMP traps.

NOTE: This feature is active only if the Lifecycle Logs replication feature is enabled.

NOTE: On Linux operating systems, this feature requires a master or OS SNMP enabled with SNMP multiplexing (SMUX) protocol.

By default, this feature is disabled. Though the In-band SNMP alerting mechanism can coexist along with iDRAC SNMP alerting mechanism, the recorded logs may have redundant SNMP alerts from both the sources. It is recommended to either use the in-band or out-of-band option, instead of using both.

Command usage

This section provides the command usages for Windows, Linux, and ESXi operating systems.

- **Windows operating system**
  - Using the local Windows Management Instrumentation (WMI):

    ```
    winrm i EnableInBandSNMPTraps
    wmi/root/cimv2/dcim/DCIM_iSMService?InstanceID="iSMExportedFunctions" @{state="[0/1]"}
    ```

  - Using the remote WMI interface:

    ```
    winrm i EnableInBandSNMPTraps wmi/root/cimv2/dcim/DCIM_iSMService?
    InstanceID="iSMExportedFunctions" @{state="[0/1]"}
    -u:<admin-username> -p:<admin-passwd> -r:http://<remote-hostname OR IP>/WSMan  -a:Basic -
    encoding:utf-8 -skipCACheck -skipCNCheck
    ```

- **Linux operating system**

On all iSM supported Linux operating system, iSM provides an executable command. You can run this command by logging into the operating system by using SSH or equivalent.

Beginning with iSM 2.4.0, you can configure Agent-x as the default protocol for in-band iDRAC SNMP alerts using the following command:

```
./Enable-iDRACSNMPTrap.sh 1/agentx –force
```

If `–force` is not specified, ensure that the net-SNMP is configured and restart the snmpd service.

– To enable this feature:

```
Enable-iDRACSNMPTrap.sh 1
```

```
Enable-iDRACSNMPTrap.sh enable
```

– To disable this feature:

```
Enable-iDRACSNMPTrap.sh 0
```

```
Enable-iDRACSNMPTrap.sh disable
```

NOTE: The --force option configures the Net-SNMP to forward the traps. However, you must configure the trap destination.

- **VMware ESXi operating system**

  On all iSM supported ESXi operating systems, the iSM v2.3 supports a Common Management Programming Interface (CMPI) method provider to enable this feature remotely by using the WinRM remote commands.

```
winrm i EnableInBandSNMPTraps http://schemas.dell.com/wbem/wscim/1/cim-schema/2/root/cimv2/dcim/DCIM_iSMService?__cimnamespace=root/cimv2/dcim+InstanceID=iSMExportedFunctions -u:<user-name> -p:<passwd> -r:https://<remote-host-name
```

```
ip-address>:443/WSMan -a:basic -encoding:utf-8 -skipCNCheck -skipCACheck -skipRevocationcheck @{state="[0/1]"}
```

NOTE: You must review and configure the VMware ESXi system-wide SNMP settings for traps.

NOTE: For more details, refer to the In-BandSNMPAlerts technical white paper available at www.dell.com/support.

iDRAC access via Host OS

By using this feature, you can configure and monitor the hardware parameters through iDRAC Web interface, WSMan, and RedFish interfaces using the host IP address without configuring the iDRAC IP address. You can use the default iDRAC credentials if the iDRAC server is not configured or continue to use the same iDRAC credentials if the iDRAC server was configured earlier.

iDRAC access via Windows Operating Systems

You can perform this task by using the following methods:

- Install the iDRAC access feature by using the webpack.
- Configure using iSM PowerShell script

Installation by using MSI

You can install this feature by using the web-pack. This feature is disabled on a typical iSM installation. If enabled, the default listening port number is 1266. You can modify this port number within the range 1024 through 65535. iSM redirects the connection to the iDRAC. iSM then creates an inbound firewall rule, OS2iDRAC. The listening port number is added to the OS2iDRAC firewall rule in the host operating system, which allows incoming connections. The firewall rule is enabled automatically when this feature is enabled.

Beginning with iSM 2.4.0, you can retrieve the current status and listening-port configuration by using the following Powershell cmdlet:

```
Enable-iDRACAccessHostRoute –status get
```

The output of this command indicates whether this feature is enabled or disabled. If the feature is enabled, it displays the listening-port number.

NOTE: Ensure that the Microsoft IP Helper Services is running on your system for this feature to function.

To access the iDRAC Web interface, use the format `https://<host-name>` or `OS-IP>:443/login.html` in the browser, where:

- `<host-name>` — Complete host name of the server on which iSM is installed and configured for iDRAC access via OS feature. You can use the OS IP address if the host name is not present.
- `443` — Default iDRAC port number. This is called the Connect Port number to which all the incoming connections on listen port number are redirected. You can modify the port number through iDRAC Web interface, WSMan, and RACADM interfaces.

Configuration by using iSM PowerShell cmdlet

If this feature is disabled while installing iSM, you can enable the feature by using the following Windows PowerShell command provided by iSM:

```
Enable-iDRACAccessHostRoute
```

If the feature is already configured, you can disable or modify it by using the PowerShell command and the corresponding options. The available options are as follows:

- **Status** — This parameter is mandatory. The values are not case sensitive and the value can be **true**, **false**, or **get**.
- **Port** — This is the listening port number. If you do not provide a port number, the default port number (1266) is used. If the **Status** parameter value is FALSE, then you can ignore rest of the parameters. You must enter a new port number that is not already configured for this feature. The new port number settings overwrite the existing OS2iDRAC in-bound firewall rule and you can use the new port number to connect to iDRAC. The value range is from 1024 to 65535.
- **IPRange** — This parameter is optional and it provides a range of IP addresses that are allowed to connect to iDRAC through the host operating system. The IP address range format is in Classless Inter-Domain Routing (CIDR) format, which is a combination of IP address and subnet mask. For example, 10.94.111.21/24. Access to iDRAC is restricted for IP addresses that are not within the range.

NOTE: This feature supports only IPv4 addresses.

iDRAC access via Linux Operating Systems

You can install this feature by using the **setup.sh** file that is available with the web-pack. This feature is disabled on a default or typical iSM installation. To get the status of this feature, use the following command:

```
Enable-iDRACAccessHostRoute get-status
```

To install, enable, and configure this feature, use the following command:

```
./Enable-iDRACAccessHostRoute <Enable-Flag> [ <source-port> <source-IP-range/source-ip-range-mask>]
```

<Enable-Flag>=0	Disable `<source-port>` and `<source-IP-range/source-ip-range-mask>` are not required.
<Enable-Flag>=1	Enable `<source-port>` is required and `<source-ip-range-mask>` is optional.
<source-IP-range>	IP range in *<IP-Address/subnet-mask>* format. Example: 10.95.146.98/24

Coexistence of OpenManage Server Administrator and iDRAC Service Module

In a system, both OpenManage Server Administrator and the iDRAC Service Module can co-exist and continue to function correctly and independently.

If you have enabled the monitoring features during the iDRAC Service Module installation, then after the installation is complete if the iDRAC Service Module detects the presence of OpenManage Server Administrator, it disables the set of monitoring features that overlap. If OpenManage Server Administrator is running, the iDRAC Service Module disables the overlapping monitoring features after logging to the OS and iDRAC.

When you re-enable these monitoring features through the iDRAC interfaces later, the same checks are performed and the features are enabled depending on whether OpenManage Server Administrator is running or not.

Using iDRAC Service Module from iDRAC web interface

To use the iDRAC Service Module from the iDRAC web interface:

1 Go to **IDRAC Settings** > **Overview** > **iDRAC Service Module** > **Configure Service Module**.
The **iDRAC Service Module Setup** page is displayed.

2 You can view the following:
- Installed iDRAC Service Module version on the host operating system
- Connection status of the iDRAC Service Module with iDRAC.

3 To perform out-of-band monitoring functions, select one or more of the following options:
- **OS Information** — View the operating system information.
- **Replicate Lifecycle Log in OS Log** — Include Lifecycle Controller logs to operating system logs. This option is disabled if OpenManage Server Administrator is installed on the system.
- **WMI Information** — Include WMI information.
- **Auto System Recovery Action** — Perform auto recovery operations on the system after a specified time (in seconds):
  - **Reboot**
  - **Power Off System**
  - **Power Cycle System**

  This option is disabled if OpenManage Server Administrator is installed on the system.

Using iDRAC Service Module from RACADM

To use the iDRAC Service Module from RACADM, use the objects in the **ServiceModule** group.
For more information, see the iDRAC RACADM CLI Guide available at www.dell.com/idracmanuals.

Using iDRAC Service Module on Windows Nano OS

For installation instructions, see the iDRAC Service Module User's Guide available at www.dell.com/esmmanuals.

To check if iSM service is running, use the following command cmdlet:

```
Get-Service "iDRAC Service Module"
```

You can view the replicated Lifecycle logs using the WMI or Windows PowerShell query:

```
GetCimInstance –Namespace root/cimv2 – className win32_NTLogEvent
```

By default, the logs are available at **Event viewer** > **Applications and Services Logs** > **System**.

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Using USB port for server management

On the 14th generation servers, a dedicated micro USB port is available to configure iDRAC. You can perform the following functions using the micro USB port:

- Connect to the system using the USB network interface to access system management tools such as iDRAC web interface and RACADM.
- Configure a server by using SCP files that are stored on a USB drive.

NOTE: To manage a USB port or to configure a server by importing Server Configuration Profile (SCP) files on a USB drive, you must have the System Control privilege. For more information about managing a USB port, read the white paper Assigning USB Ports and Managing USB drives on 13th Generation Servers and Later.

To configure Management USB Settings, go to **iDRAC Settings** > **Settings** > **Management USB Settings**. Following options are available:

- **USB Management Port**—Select **Enabled** to enable the port either to import the SCP file when a USB drive is connected or to access iDRAC using the micro USB port.

  NOTE: Ensure that the USB drive contains a valid SCP file.

  NOTE: Use an OTG adapter to convert from Type-A to Micro-B USB. Connections from USB hubs are not supported.
- **iDRAC Managed: USB SCP**—Select from following options to configure the system by importing SCP stored on a USB drive:
  - **Disabled**—Disables SCP imports
  - **Enabled only when server has default credential settings**— If this option is selected then the SCP can only be imported when the default password is not changed for the following:
    - BIOS
    - iDRAC web interface
  - **Enabled only for compressed configuration files**—Select this option to allow SCP file import only if the files are in compressed format.

    NOTE: Selecting this option allows you to password protect the compressed file. You can enter a password to secure the file by using Password for Zip file option.
  - **Enabled**—Select this option to allow importing SCP file without running a check during runtime.

Topics:

- Accessing iDRAC interface over direct USB connection
- Configuring iDRAC using server configuration profile on USB device

Accessing iDRAC interface over direct USB connection

The iDRAC direct feature allows you to directly connect your laptop to the iDRAC USB port. This feature allows you to interact directly with the iDRAC interfaces such as the web interface, RACADM, and WSMan for advanced server management and servicing.

For a list of supported browsers and operating systems, see the iDRAC Release Notes available at www.dell.com/idracmanuals.

NOTE: If you are using Windows operating system, you may need to install an RNDIS driver to use this feature.

To access the iDRAC interface over the USB port:

1 Turn off any wireless networks and disconnect from any other hard wired network.
2 Ensure that the USB port is enabled. For more information, see Configuring USB management port settings.
3 Wait for the laptop to acquire IP address 169.254.0.4. It may take several seconds for the IP addresses to be acquired. iDRAC acquires the IP address 169.254.0.3.
4 Start using iDRAC network interfaces such as the web interface, RACADM, Redfish or WSMan.
   For example, to access the iDRAC web interface, open a supported browser, and type the address *169.254.0.3* and press enter.
5 When iDRAC is using the USB port, the LED blinks indicating activity. The blink frequency is four per second.
6 After completing the desired actions, disconnect the USB cable from the system.
   The LED turns off.

Configuring iDRAC using server configuration profile on USB device

With the iDRAC USB management port, you can configure iDRAC at-the-server. Configure the USB Management port settings in iDRAC, insert the USB device that has the server configuration profile, and then import the server configuration profile from the USB device to iDRAC.

NOTE: You can set the USB Management port settings using the iDRAC interfaces only if there is no USB device connected to the server.

Configuring USB management port settings

You can enable or disable the iDRAC Direct USB Port using the system BIOS. Navigate to **System BIOS** > **Integrated Devices**. Select **On** to enable and **Off** to disable the iDRAC Direct USB Port.

In iDRAC, you must have Server Control privilege to configure the USB management port. When a USB device is connected, the **System Inventory** page displays the USB device information under the Hardware Inventory section.

An event is logged in the Lifecycle Controller logs when:

- The device is in Automatic or iDRAC mode, and USB device is inserted or removed.
- USB Management Port Mode is modified.
- Device is automatically switched from iDRAC to OS.
- Device is ejected from iDRAC or OS

When a device exceeds its power requirements as allowed by USB specification, the device is detached and an over-current event is generated with the following properties:

- Category : System Health
- Type: USB device
- Severity: Warning
- Allowed notifications: Email, SNMP trap, remote syslog, and WS-Eventing
- Actions: None

An error message is displayed and logged to Lifecycle Controller log when:

- You try to configure the USB management port without the Server Control user privilege.
- A USB device is in use by iDRAC, and you attempt to modify the USB Management Port Mode.
- A USB device is in use by iDRAC, and you remove the device.

Configuring USB management port using web interface

To configure the USB port:

1 In the iDRAC Web interface, go to **iDRAC Settings** > **Settings** > **Management USB Settings**.

2 The **USB Management Port** is set to Enabled.

3 From the **iDRAC Managed: USB SCP** Configuration drop-down menu, select options to configure a server by importing Server Configuration Profile files stored on a USB drive:

- **Disabled**
- **Enabled only when server has default credential settings**
- **Enabled only for compressed configuration files**
- **Enabled**

For information about the fields, see the *iDRAC Online Help*.

NOTE: iDRAC9 allows you to password protect the compressed file after you select Enabled only for compressed configuration files to compress the file before importing. You can enter a password to secure the file by using Password for Zip file option.

4 Click **Apply** to apply the settings.

Configuring USB management port using RACADM

To configure the USB management port, use the following RACADM sub commands and objects:

- To view the USB port status:
  ```
  racadm get iDRAC.USB.PortStatus
  ```
- To view the USB port configuration:
  ```
  racadm get iDRAC.USB.ManagementPortMode
  ```
- To view USB device inventory:
  ```
  racadm hwinventory
  ```
- To set up overcurrent alert configuration:
  ```
  racadm eventfilters
  ```

For more information, see the iDRAC RACADM CLI Guide available at www.dell.com/idracmanuals.

Configuring USB management port using iDRAC settings utility

To configure the USB port:

1 In the iDRAC Settings Utility, go to **Media and USB Port Settings**.

The **iDRAC Settings Media and USB Port Settings** page is displayed.

2 From the **iDRAC Direct: USB Configuration XML** drop-down menu, select options to configure a server by importing server configuration profile stored on a USB drive:

- **Disabled**
- **Enabled while server has default credential settings only**
- **Enabled only for compressed configuration files**
- **Enabled**

For information about the fields, see the *iDRAC Settings Utility Online Help*.

3 Click **Back**, click **Finish** and then click **Yes** to apply the settings.

Importing Server Configuration Profile from USB device

Make sure to create a directory in root of the USB device called **System_Configuration_XML** that contains both the config and control files:

- Server Configuration Profile (SCP) is in the **System_Configuration_XML** sub-directory under the USB device root directory. This file includes all the attribute-value pairs of the server. This includes attributes of iDRAC, PERC, RAID, and BIOS. You can edit this file to configure any attribute on the server. The file name can be **<servicetag>-config.xml**, **<servicetag>-config.json**, **<modelnumber>-config.xml**, **<modelnumber>-config.json**,**config.xml** or **config.json**.
- Control file – Includes parameters to control the import operation and does not have attributes of iDRAC or any other component in the system. The control file contain three parameters:
  - ShutdownType – Graceful, Forced, No Reboot.
  - TimeToWait (in secs) – 300 minimum and 3600 maximum.
  - EndHostPowerState – on/off.

Example of **control.xml** file:

```
<InstructionTable>
  <InstructionRow>
     <InstructionType>Configuration XML import Host control Instruction
     </InstructionType>
     <Instruction>ShutdownType</Instruction>
     <Value>NoReboot</Value>
     <ValuePossibilities>Graceful,Forced,NoReboot</ValuePossibilities>
  </InstructionRow>
  <InstructionRow>
     <InstructionType>Configuration XML import Host control Instruction
     </InstructionType>
     <Instruction>TimeToWait</Instruction>
     <Value>300</Value>
     <ValuePossibilities>Minimum value is 300 -Maximum value is
      3600 seconds.</ValuePossibilities>
  </InstructionRow>
  <InstructionRow>
     <InstructionType>Configuration XML import Host control Instruction
     </InstructionType>
     <Instruction>EndHostPowerState</Instruction>
     <Value>On</Value>
     <ValuePossibilities>On,Off</ValuePossibilities>
  </InstructionRow>
</InstructionTable>
```

You must have Server Control privilege to perform this operation.

NOTE: While importing the SCP, changing the USB management settings in the SCP file results in a failed job or job completed with errors. You can comment out the attributes in the SCP to avoid the errors.

To import the server configuration profile from the USB device to iDRAC:

1 Configure the USB management port:
   - Set **USB Management Port Mode** to **Automatic** or **iDRAC**.
   - Set **iDRAC Managed: USB XML Configuration** to **Enabled with default credentials** or **Enabled**.
2 Insert the USB key (that has the **configuration.xml** and the **control.xml** file) to the iDRAC USB port.
3 The server configuration profile is discovered on the USB device in the **System_Configuration_XML** sub-directory under the USB device root directory. It is discovered in the following sequence:
   - **<servicetag>-config.xml** / **<servicetag>-config.json**
   - **<modelnum>-config.xml** / **<modelnum>-config.json**
   - **config.xml** / **config.json**

4 A server configuration profile import job starts.

If the profile is not discovered, then the operation stops.

If **iDRAC Managed: USB XML Configuration** was set to **Enabled with default credentials** and the BIOS setup password is not null or if one of the iDRAC user accounts have been modified, an error message is displayed and the operation stops.

5 LCD panel and LED, if present, display the status that an import job has started.

6 If there is a configuration that needs to be staged and the **Shut Down Type** is specified as **No Reboot** is specified in the control file, you must reboot the server for the settings to be configured. Else, server is rebooted and the configuration is applied. Only when the server was already powered down, then the staged configuration is applied even if the **No Reboot** option is specified.

7 After the import job is complete, the LCD/LED indicates that the job is complete. If a reboot is required, LCD displays the job status as "Paused waiting on reboot".

8 If the USB device is left inserted on the server, the result of the import operation is recorded in the **results.xml** file in the USB device.

LCD messages

If the LCD panel is available, it displays the following messages in a sequence:

1 Importing – When the server configuration profile is being copied from the USB device.

2 Applying — When the job is in-progress.

3 Completed — When the job has completed successfully.

4 Completed with errors — When the job has completed with errors.

5 Failed — When the job has failed.

For more details, see the results file on the USB device.

LED blinking behavior

The USB LED indicates the status of a server-configuration profile operation being performed using the USB port. The LED may not be available on all systems.

- Solid green — The server configuration profile is being copied from the USB device.
- Blinking green — The job is in progress.
- Blinking amber — The job has failed or completed with errors.
- Solid green — The job has completed successfully.

NOTE: On PowerEdge R840 and R940xa, if there is a LCD present, the USB LED does not blink when an import operation is in progress using the USB port. Check the status of the operation using the LCD.

Logs and results file

The following information is logged for the import operation:

- Automatic import from USB is logged in the Lifecycle Controller log file.
- If the USB device is left inserted, the job results are recorded in the Results file located in the USB key.

A Result file named **Results.xml** is updated or created in the subdirectory with the following information:

- Service tag – Data is recorded after the import operation has either returned a job ID or returned an error.
- Job ID – Data is recorded after the import operation has returned a job ID.
- Start Date and Time of Job - Data is recorded after the import operation has returned a job ID.
- Status – Data is recorded when the import operation returns an error or when the job results are available.

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Using Quick Sync 2

With Dell OpenManage Mobile running on an Android or iOS mobile device, you can easily access server directly or through OpenManage Essentials or OpenManage Enterprise (OME) console. It allows you to review server details and inventory, view LC and System Event logs, get automatic notifications on mobile device from an OME console, assign IP address and modify iDRAC password, configure key BIOS attributes, and take remediation actions as needed. You can also power cycle a server, access system console, or access iDRAC GUI.

OMM can be downloaded for free from the Apple App Store, or from Google Play Store.

You must install the OpenManage Mobile application on the mobile device (supports Android 5.0+ and iOS 9.0+ mobile devices) to manage server using iDRAC Quick Sync 2 interface.

NOTE: This section is displayed only in those servers that has Quick Sync 2 module in left rack ear.

NOTE: This feature is currently supported on mobile devices with Android operating system and Apple iOS.

In the current release, this feature is available on all 14th generation of PowerEdge servers. It requires Quick Sync 2 Left Control Panel (embedded in **Left rack ear**) and Bluetooth Low Energy (and optionally Wi-Fi) enabled mobile devices. Therefore, it is a hardware up-sell and the feature capabilities are not dependent on iDRAC software licensing.

NOTE: To configure Quick Sync 2 in MX platform systems, see the *OpenManage Enterprise Modular User's Guide* and *OpenManage Mobile User's Guide* available at dell.com/support/manuals

Once configured activate the Quick Sync 2 button on the Left Control Panel. Make sure the Quick Sync 2 light turns on. Access the Quick Sync 2 Information via a mobile device (Android 5.0+ or IOS 9.0+, OMM 2.0 or above).

Using OpenManage Mobile, you can:

- View inventory information
- View monitoring information
- Configure the basic iDRAC network settings

For more information about OpenManage Mobile, see the Dell EMC OpenManage Mobile User's Guide available at www.dell.com/openmanagemanuals.

Using mobile device to view iDRAC information

To view iDRAC information from the mobile device, see the Dell EMC OpenManage Mobile User's Guide available at www.dell.com/openmanagemanuals for the steps.

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Managing virtual media

Virtual media allows the managed server to access media devices on the management station or ISO CD/DVD images on a network share as if they were devices on the managed server.

Using the Virtual Media feature, you can:

- Remotely access media connected to a remote system over the network
- Install applications
- Update drivers
- Install an operating system on the managed system

This is a licensed feature for rack and tower servers. It is available by default for blade servers.

The key features are:

- Virtual Media supports virtual optical drives (CD/DVD), floppy drives (including USB-based drives), and USB flash drives.
- You can attach only one floppy, USB flash drive, image, or key and one optical drive on the management station to a managed system. Supported floppy drives include a floppy image or one available floppy drive. Supported optical drives include a maximum of one available optical drive or one ISO image file.

  The following figure shows a typical Virtual Media setup.
- Virtual floppy media of iDRAC is not accessible from virtual machines.
- Any connected Virtual Media emulates a physical device on the managed system.
- On Windows-based managed systems, the Virtual Media drives are auto-mounted if they are attached and configured with a drive letter.
- On Linux-based managed systems with some configurations, the Virtual Media drives are not auto-mounted. To manually mount the drives, use the mount command.
- All the virtual drive access requests from the managed system are directed to the management station across the network.
- Virtual devices appear as two drives on the managed system without the media being installed in the drives.
- You can share the management station CD/DVD drive (read only), but not a USB media, between two managed systems.
- Virtual media requires a minimum available network bandwidth of 128 Kbps.
- If LOM or NIC failover occurs, then the Virtual Media session may be disconnected.

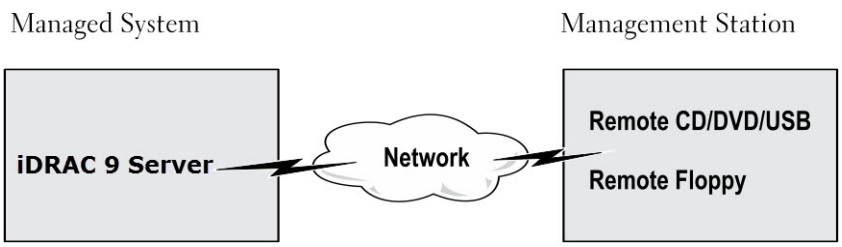

Figure 4. Virtual media setup

Topics:

- Supported drives and devices
- Configuring virtual media
- Accessing virtual media

- Setting boot order through BIOS
- Enabling boot once for virtual media

Supported drives and devices

The following table lists the drives supported through virtual media.

Table 58. Supported drives and devices

Drive	Supported Storage Media
Virtual Optical Drives	• Legacy 1.44 floppy drive with a 1.44 floppy diskette • CD-ROM • DVD • CD-RW • Combination drive with CD-ROM media
Virtual floppy drives	• CD-ROM/DVD image file in the ISO9660 format • Floppy image file in the ISO9660 format
USB flash drives	• USB CD-ROM drive with CD-ROM media • USB Key image in the ISO9660 format

Configuring virtual media

Before you configure the Virtual Media settings, make sure that you have configured your Web browser to use Java or ActiveX plug-in.

Configuring virtual media using iDRAC web interface

To configure virtual media settings:

CAUTION: Do not reset iDRAC when running a Virtual Media session. Otherwise, undesirable results may occur, including data loss.

1 In the iDRAC Web interface, go to **Configuration** > **Virtual Media** > **Attached Media**.
2 Specify the required settings. For more information, see the *iDRAC Online Help*.
3 Click **Apply** to save the settings.

Configuring virtual media using RACADM

To configure the virtual media, use the **set** command with the objects in the **iDRAC.VirtualMedia** group.
For more information, see the iDRAC RACADM CLI Guide available at www.dell.com/idracmanuals.

Configuring virtual media using iDRAC settings utility

You can attach, detach, or auto-attach virtual media using the iDRAC Settings utility. To do this:

1 In the iDRAC Settings utility, go to **Media and USB Port Settings**.

The **iDRAC Settings Media and USB Port Settings** page is displayed.

2 In the **Virtual Media** section, select **Detach**, **Attach**, or **Auto attach** based on the requirement. For more information about the options, see *iDRAC Settings Utility Online Help*.

3 Click **Back**, click **Finish**, and then click **Yes**.

The Virtual Media settings are configured.

Attached media state and system response

The following table describes the system response based on the Attached Media setting.

Table 59. Attached media state and system response

Attached Media State	System Response
Detach	Cannot map an image to the system.
Attach	Media is mapped even when **Client View** is closed.
Auto-attach	Media is mapped when **Client View** is opened and unmapped when **Client View** is closed.

Server settings for viewing virtual devices in virtual media

You must configure the following settings in the management station to allow visibility of empty drives. To do this, in Windows Explorer, from the **Organize** menu, click **Folder and search options**. On the **View** tab, deselect **Hide empty drives in the Computer folder** option and click **OK**.

Accessing virtual media

You can access Virtual Media with or without using the Virtual Console. Before you access Virtual Media, make sure to configure your Web browser(s).

Virtual Media and RFS are mutually exclusive. If the RFS connection is active and you attempt to launch the Virtual Media client, the following error message is displayed: *Virtual Media is currently unavailable. A Virtual Media or Remote File Share session is in use.*

If the RFS connection is not active and you attempt to launch the Virtual Media client, the client launches successfully. You can then use the Virtual Media client to map devices and files to the Virtual Media virtual drives.

Launching virtual media using virtual console

Before you launch Virtual Media through the Virtual Console, make sure that:

- Virtual Console is enabled.
- System is configured to not hide empty drives — In Windows Explorer, navigate to **Folder Options**, clear the **Hide empty drives in the Computer folder** option, and click **OK**.

To access Virtual Media using Virtual Console:

1 In the iDRAC web interface, go to **Configuration** > **Virtual Console**.

The **Virtual Console** page is displayed.

2 Click **Launch Virtual Console**.

The **Virtual Console Viewer** is launched.

NOTE: On Linux, Java is the default plug-in type for accessing the Virtual Console. On Windows, open the .jnlp file to launch the Virtual Console using Java.

3 Click **Virtual Media** > **Connect Virtual Media**.

The Virtual Media session is established and the **Virtual Media** menu displays the list of devices available for mapping.

NOTE: The Virtual Console Viewer window must remain active while you access the Virtual Media.

Launching virtual media without using virtual console

Before you launch Virtual Media when the **Virtual Console** is disabled, make sure that

- Virtual Media is in *Attach* state.
- System is configured to unhide empty drives. To do this, in Windows Explorer, navigate to **Folder Options**, clear the **Hide empty drives in the Computer folder** option, and click **OK**.

To launch Virtual Media when Virtual Console is disabled:

1 In the iDRAC web Interface, go to **Configuration** > **Virtual Console**.

2 Click **Launch Virtual Console**.

The following message is displayed:

```
Virtual Console has been disabled. Do you want to continue using Virtual Media redirection?
```

3 Click **OK**.

The **Virtual Media** window is displayed.

4 From the **Virtual Media** menu, click **Map CD/DVD** or **Map Removable Disk**.

For more information, see Mapping virtual drive.

NOTE: The virtual device drive letters on the managed system do not coincide with the physical drive letters on the management station.

NOTE: The Virtual Media may not function correctly on Windows operating system clients that are configured with Internet Explorer Enhanced Security. To resolve this issue, see the Microsoft operating system documentation or contact the system administrator.

NOTE: HTML5 plug-in is not supported for stand-alone virtual media.

Adding virtual media images

You can create a media image of the remote folder and mount it as a USB attached device to the server's operating system. To add Virtual Media images:

1 Click **Virtual Media** > **Create Image...**.

2 In the **Source Folder** field, click **Browse** and browse to the folder or directory to be used as the source for the image file. The image file is on the management station or the C: drive of the managed system.

3 In the **Image File Name** field, the default path to store the created image files (typically the desktop directory) appears. To change this location, click **Browse** and navigate to a location.

4 Click **Create Image**.

The image creation process starts. If the image file location is within the source folder, a warning message is displayed indicating that the image creation cannot proceed as the image file location within the source folder causes an infinite loop. If the image file location is not within the source folder, then the image creation proceeds.

After the image is created, a success message is displayed.

5 Click **Finish**.

The image is created.

When a folder is added as an image, a **.img** file is created on the Desktop of the management station from which this feature is used. If this **.img** file is moved or deleted, then the corresponding entry for this folder in the **Virtual Media** menu does not work. Therefore, it is recommended not to move or delete the **.img** file while the *image* is being used. However, the **.img** file can be removed after the relevant entry is first deselected and then removed using **Remove Image** to remove the entry.

Viewing virtual device details

To view the virtual device details, in the Virtual Console Viewer, click **Tools** > **Stats**. In the **Stats** window, the **Virtual Media** section displays the mapped virtual devices and the read/write activity for each device. If Virtual Media is connected, this information is displayed. If Virtual Media is not connected, the "Virtual Media is not connected" message is displayed.

If the Virtual Media is launched without using the Virtual Console, then the **Virtual Media** section is displayed as a dialog box. It provides information about the mapped devices.

Resetting USB

To reset the USB device:

1 In the Virtual Console viewer, click **Tools** > **Stats**.

The **Stats** window is displayed.

2 Under **Virtual Media**, click **USB Reset**.

A message is displayed warning the user that resetting the USB connection can affect all the input to the target device including Virtual Media, keyboard, and mouse.

3 Click **Yes**.

The USB is reset.

NOTE: iDRAC Virtual Media does not terminate even after you log out of iDRAC Web interface session.

Mapping virtual drive

To map the virtual drive:

NOTE: While using ActiveX or Java-based Virtual Media, you must have administrative privileges to map an operating system DVD or a USB flash drive (that is connected to the management station). To map the drives, launch IE as an administrator or add the iDRAC IP address to the list of trusted sites.

1 To establish a Virtual Media session, from the **Virtual Media** menu, click **Connect Virtual Media**.

For each device available for mapping from the host server, a menu item appears under the **Virtual Media** menu. The menu item is named according to the device type such as:

- Map CD/DVD
- Map Removable Disk
- Map Floppy Disk

NOTE: The Map Floppy Disk menu item appears on the list if the Floppy Emulation option is enabled on the Attached Media page. When Floppy Emulation is enabled, Map Removable Disk is replaced with Map Floppy Disk.

The **Map DVD/CD** option can be used for ISO files and the **Map Removable Disk** option can be used for images.

NOTE: You cannot map physical media such USB-based drives, CD, or DVD by using the HTML5 based virtual console.

NOTE: You cannot map USB keys as virtual media disks using Virtual Console/Virtual media over a RDP session.

2 Click the device type that you want to map.

NOTE: The active session displays if a Virtual Media session is currently active from the current Web interface session, from another Web interface session, or from VMCLI.

3 In the **Drive/Image File** field, select the device from the drop-down list.

The list contains all the available (unmapped) devices that you can map (CD/DVD, Removable Disk, Floppy Drive) and image file types that you can map (ISO or IMG). The image files are located in the default image file directory (typically the user's desktop). If the device is not available in the drop-down list, click **Browse** to specify the device.

The correct file type for CD/DVD is ISO and for removable disk and floppy disk it is IMG.

If the image is created in the default path (Desktop), when you select **Map Removable Disk**, the created image is available for selection in the drop-down menu.

If image is created in a different location, when you select **Map Removable Disk**, the created image is not available for selection in the drop-down menu. Click **Browse** to specify the image.

4 Select **Read-only** to map writable devices as read-only.

For CD/DVD devices, this option is enabled by default and you cannot disable it.

NOTE: The ISO and IMG files map as read-only files if you map these files by using the HTML5 virtual console.

5 Click **Map Device** to map the device to the host server.

After the device/file is mapped, the name of its **Virtual Media** menu item changes to indicate the device name. For example, if the CD/DVD device is mapped to an image file named **foo.iso**, then the CD/DVD menu item on the Virtual Media menu is named **foo.iso mapped to CD/DVD**. A check mark for that menu item indicates that it is mapped.

Displaying correct virtual drives for mapping

On a Linux-based management station, the Virtual Media **Client** window may display removable disks and floppy disks that are not part of the management station. To make sure that the correct virtual drives are available to map, you must enable the port setting for the connected SATA hard drive. To do this:

1 Reboot the operating system on the management station. During POST, press <F2> to enter **System Setup**.

2 Go to **SATA settings**. The port details are displayed.

3 Enable the ports that are actually present and connected to the hard drive.

4 Access the Virtual Media **Client** window. It displays the correct drives that can be mapped.

Unmapping virtual drive

To unmap the virtual drive:

1 From the **Virtual Media** menu, do any of the following:

- Click the device that you want to unmap.
- Click **Disconnect Virtual Media**.

A message appears asking for confirmation.

2 Click **Yes**.

The check mark for that menu item does not appear indicating that it is not mapped to the host server.

NOTE: After unmapping a USB device attached to vKVM from a client system running the Macintosh operating system, the unmapped device may be unavailable on the client. Restart the system or manually mount the device on the client system to view the device.

NOTE: To unmap a virtual DVD drive on Linux OS, unmount the drive and eject it.

Setting boot order through BIOS

Using the System BIOS Settings utility, you can set the managed system to boot from virtual optical drives or virtual floppy drives.

NOTE: Changing Virtual Media while connected may stop the system boot sequence.

To enable the managed system to boot:

1. Boot the managed system.
2. Press <F2> to enter the **System Setup** page.
3. Go to **System BIOS Settings** > **Boot Settings** > **BIOS Boot Settings** > **Boot Sequence**.
   In the pop-up window, the virtual optical drives and virtual floppy drives are listed with the standard boot devices.
4. Make sure that the virtual drive is enabled and listed as the first device with bootable media. If required, follow the on-screen instructions to modify the boot order.
5. Click **OK**, navigate back to **System BIOS Settings** page, and click **Finish**.
6. Click **Yes** to save the changes and exit.
   The managed system reboots.

   The managed system attempts to boot from a bootable device based on the boot order. If the virtual device is connected and a bootable media is present, the system boots to the virtual device. Otherwise, the system overlooks the device—similar to a physical device without bootable media.

Enabling boot once for virtual media

You can change the boot order only once when you boot after attaching remote Virtual Media device.

Before you enable the boot once option, make sure that:

- You have *Configure User* privilege.
- Map the local or virtual drives (CD/DVD, Floppy, or USB flash device) with the bootable media or image using the Virtual Media options
- Virtual Media is in *Attached* state for the virtual drives to appear in the boot sequence.

To enable the boot once option and boot the managed system from the Virtual Media:

1. In the iDRAC Web interface, go to **Overview** > **Server** > **Attached Media**.
2. Under **Virtual Media**, select the **Enable Boot Once** and click **Apply**.
3. Turn on the managed system and press **<F2>** during boot.
4. Change the boot sequence to boot from the remote Virtual Media device.
5. Reboot the server.
   The managed system boots once from the Virtual Media.

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Installing and using VMCLI utility

The Virtual Media Command Line Interface (VMCLI) utility is an interface that provides virtual media features from the management station to iDRAC on the managed system. Using this utility you can access virtual media features, including image files and physical drives, to deploy an operating system on multiple remote systems in a network.

The VMCLI utility supports the following features:

- Manage removable devices or images that are accessible through virtual media.
- Automatically terminate the session when the iDRAC firmware **Boot Once** option is enabled.
- Secure communications to iDRAC using Secure Sockets Layer (SSL).
- Execute VMCLI commands until:
  - The connections automatically terminate.
  - An operating system terminates the process.

NOTE: To terminate the process in Windows, use the Task Manager.

Topics:

- Installing VMCLI
- Running VMCLI utility
- VMCLI syntax

Installing VMCLI

The VMCLI utility is included in the *Dell Systems Management Tools and Documentation* DVD.

To install the VMCLI utility:

1. Insert the *Dell Systems Management Tools and Documentation* DVD into the management station's DVD drive.
2. Follow the on-screen instructions to install DRAC tools.
3. After successful install, check **install\Dell\SysMgt\rac5** folder to make sure **vmcli.exe** exists. Similarly, check the respective path for UNIX.

   The VMCLI utility is installed on the system.

Running VMCLI utility

- If the operating system requires specific privileges or group membership, you require similar privileges to run the VMCLI commands.
- On Windows systems, non-administrators must have **Power User** privileges to run the VMCLI utility.
- On Linux systems, to access iDRAC, run VMCLI utility, and log user commands, non-administrators must prefix `sudo` to the VMCLI commands. However, to add or edit users in the VMCLI administrators group, use the `visudo` command.

VMCLI syntax

The VMCLI interface is identical on both Windows and Linux systems. The VMCLI syntax is:

```
VMCLI [parameter] [operating_system_shell_options]
```

For example, `vmcli -r iDRAC-IP-address:iDRAC-SSL-port`

The *parameter* enables VMCLI to connect to the specified server, access iDRAC, and map to the specified virtual media.

NOTE: VMCLI syntax is case-sensitive.

To ensure security, it is recommended to use the following VMCLI parameters:

- `vmcli -i` — Enables an interactive method of starting VMCLI. It ensures that the user name and password are not visible when processes are examined by other users.
- vmcli `-r <iDRAC-IP-address[:iDRAC-SSL-port]> -S -u <iDRAC-user-name> -p <iDRAC-user-password> -c {< device-name > | < image-file >}` — Indicates whether the iDRAC CA certificate is valid. If the certificate is not valid, a warning message is displayed when you run this command. However, the command is executed successfully and a VMCLI session is established. For more information on VMCLI parameters, see the *VMCLI Help* or the *VMCLI Man pages*.

VMCLI commands to access virtual media

The following table provides the VMCLI commands required for accessing different virtual media.

Table 60. VMCLI commands

Virtual Media	Command
Floppy drive	`vmcli -r [RAC IP or hostname] -u [iDRAC user name] -p [iDRAC user password] -f [device name]`
Bootable floppy or USB key image	`vmcli -r [iDRAC IP address] [iDRAC user name] -p [iDRAC password] -f [floppy.img]`
CD drive using -f option	`vmcli -r [iDRAC IP address] -u [iDRAC user name] -p [iDRAC password] -f [device name]|[image file]-f [cdrom - dev ]`
Bootable CD/DVD image	`vmcli -r [iDRAC IP address] -u [iDRAC user name] -p [iDRAC password] -c [DVD.img]`

If the file is not write-protected, Virtual Media may write to the image file. To make sure that Virtual Media does not write to the media:

- Configure the operating system to write-protect a floppy image file that must not be overwritten.
- Use the write-protection feature of the device.

When virtualizing read-only image files, multiple sessions can use the same image media simultaneously.

When virtualizing physical drives, only one session can access a given physical drive at a time.

VMCLI operating system shell options

VMCLI uses shell options to enable the following operating system features:

- stderr/stdout redirection — Redirects any printed utility output to a file.

  For example, using the greater-than character (>) followed by a filename overwrites the specified file with the printed output of the VMCLI utility.

  NOTE: The VMCLI utility does not read from standard input (stdin). Hence, stdin redirection is not required.
- Background execution — By default, the VMCLI utility runs in the foreground. Use the operating system's command shell features for the utility to run in the background.

For example, under a Linux operating system, the ampersand character (&) following the command causes the program to be spawned as a new background process. This technique is useful in script programs, as it allows the script to proceed after a new process is started for the VMCLI command (otherwise, the script blocks until the VMCLI program is terminated).

When multiple VMCLI sessions are started, use the operating system-specific facilities for listing and terminating processes.

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Managing vFlash SD card

The vFlash SD card is a Secure Digital (SD) card that can be ordered and installed from the factory. You can use a card with a maximum of 16 GB capacity. After you insert the card, you must enable vFlash functionality to create and manage partitions. vFlash is a licensed feature.

NOTE: There is no limitation of the size of SD card, you can open and replace the factory installed SD card with a higher capacity SD card. Since vFlash uses FAT32 file system, file size is limited to 4GB.

If the card is not available in the system's vFlash SD card slot, the following error message is displayed in the iDRAC Web interface at **Overview** > **Server** > **vFlash**:

```
SD card not detected. Please insert an SD card of size 256MB or greater.
```

NOTE: Make sure that you only insert a vFlash compatible SD card in the iDRAC vFlash card slot. If you insert a non-compatible SD card, the following error message is displayed when you initialize the card: *An error has occurred while initializing SD card.*

The key features are:

- Provides storage space and emulates USB device (s).
- Create up to 16 partitions. These partitions, when attached, are exposed to the system as a Floppy drive, Hard Disk drive, or a CD/DVD drive depending on the selected emulation mode.
- Create partitions from supported file system types. Supports **.img** format for floppy, **.iso** format for CD/DVD, and both **.iso** and **.img** formats for Hard Disk emulation types.
- Create bootable USB device(s).
- Boot once to an emulated USB device.

NOTE: It is possible that a vFlash license may expire during a vFlash operation. If it happens, the on-going vFlash operations complete normally.

NOTE: If FIPS mode is enabled, you cannot perform any vFlash actions.

Topics:

- Configuring vFlash SD card
- Managing vFlash partitions

Configuring vFlash SD card

Before configuring vFlash, make sure that the vFlash SD card is installed on the system. For information on how to install and remove the card from your system, see the Installation and Service Manual available at www.dell.com/poweredgemanuals.

NOTE: You must have Access Virtual Media privilege to enable or disable vFlash functionality, and initialize the card.

Viewing vFlash SD card properties

After vFlash functionality is enabled, you can view the SD card properties using iDRAC Web interface or RACADM.

Viewing vFlash SD card properties using web interface

To view the vFlash SD card properties, in the iDRAC Web interface, go to **Configuration** > **System Settings** > **Hardware Settings** > **vFlash**. The Card Properties page is displayed. For information about the displayed properties, see the *iDRAC Online Help*.

Viewing vFlash SD card properties using RACADM

To view the vFlash SD card properties using RACADM, use the `get` command with the following objects:

- iDRAC.vflashsd.AvailableSize
- iDRAC.vflashsd.Health
- iDRAC.vflashsd.Licensed
- iDRAC.vflashsd.Size
- iDRAC.vflashsd.WriteProtect

For more information about these objects, see the iDRAC RACADM CLI Guide available at www.dell.com/idracmanuals.

Viewing vFlash SD card properties using iDRAC settings utility

To view the vFlash SD card properties, in the **iDRAC Settings Utility**, go to **Media and USB Port Settings**. The **Media and USB Port Settings** page displays the properties. For information about the displayed properties, see the *iDRAC Settings Utility Online Help*.

Enabling or disabling vFlash functionality

You must enable the vFlash functionality to perform partition management.

Enabling or disabling vFlash functionality using web interface

To enable or disable the vFlash functionality:

1. In the iDRAC web interface, go to **Configuration** > **System Settings** > **Hardware Settings** > **vFlash**.
   The **SD Card Properties** page is displayed.
2. Select or clear the **vFLASH Enabled** option to enable or disable the vFlash functionality. If any vFlash partition is attached, you cannot disable vFlash and an error message is displayed.

   NOTE: If vFlash functionality is disabled, SD card properties are not displayed.
3. Click **Apply**. The vFlash functionality is enabled or disabled based on the selection.

Enabling or disabling vFlash functionality using RACADM

To enable or disable the vFlash functionality using RACADM:

```
racadm set iDRAC.vflashsd.Enable [n]
```

n=0	Disabled
n=1	Enabled

NOTE: The RACADM command functions only if a vFlash SD card is present. If a card is not present, the following message is displayed: *ERROR: SD Card not present*.

Enabling or disabling vFlash functionality using iDRAC settings utility

To enable or disable the vFlash functionality:

1 In the iDRAC Settings utility, go to **Media and USB Port Settings**.
The **iDRAC Settings . Media and USB Port Settings** page is displayed.
2 In the **vFlash Media** section, select **Enabled** to enable vFlash functionality or select **Disabled** to disable the vFlash functionality.
3 Click **Back**, click **Finish**, and then click **Yes**.
The vFlash functionality is enabled or disabled based on the selection.

Initializing vFlash SD card

The initialize operation reformats the SD card and configures the initial vFlash system information on the card.

NOTE: If the SD card is write-protected, then the Initialize option is disabled.

Initializing vFlash SD card using web interface

To initialize the vFlash SD card:

1 In the iDRAC Web interface, go to **Configuration** > **System Settings** > **Hardware Settings** > **vFlash**.
The **SD Card Properties** page is displayed.
2 Enable **vFLASH** and click **Initialize**.
All existing contents are removed and the card is reformatted with the new vFlash system information.

If any vFlash partition is attached, the initialize operation fails and an error message is displayed.

Initializing vFlash SD card using RACADM

To initialize the vFlash SD card using RACADM:

```
racadm set iDRAC.vflashsd.Initialized 1
```

All existing partitions are deleted and the card is reformatted.

For more information, see the iDRAC RACADM CLI Guide available at www.dell.com/idracmanuals.

Initializing vFlash SD card using iDRAC settings utility

To initialize the vFlash SD card using iDRAC Settings utility:

1 In the iDRAC Settings utility, go to **Media and USB Port Settings**.
The **iDRAC Settings . Media and USB Port Settings** page is displayed.
2 Click **Initialize vFlash**.
3 Click **Yes**. The initialization operation starts.
4 Click **Back** and navigate to the same **iDRAC Settings . Media and USB Port Settings** page to view the successful message.
All existing contents are removed and the card is reformatted with the new vFlash system information.

Getting the last status using RACADM

To get the status of the last initialize command sent to the vFlash SD card:

1 Open a telnet, SSH, or Serial console to the system and log in.
2 Enter the command: `racadm vFlashsd status`
The status of commands sent to the SD card is displayed.
3 To get the last status of all the vflash partitions, use the command:`racadm vflashpartition status -a`
4 To get the last status of a particular partition, use command:`racadm vflashpartition status -i (index)`

NOTE: If iDRAC is reset, the status of the last partition operation is lost.

Managing vFlash partitions

You can perform the following using the iDRAC Web interface or RACADM:

NOTE: An administrator can perform all operations on the vFlash partitions. Else, you must have Access Virtual Media privilege to create, delete, format, attach, detach, or copy the contents for the partition.

- Creating an empty partition
- Creating a partition using an image file
- Formatting a partition
- Viewing available partitions
- Modifying a partition
- Attaching or detaching partitions
- Deleting existing partitions
- Downloading partition contents
- Booting to a partition

NOTE: If you click any option on the vFlash pages when an application such as WSMan, iDRAC Settings utility, or RACADM is using vFlash, or if you navigate to some other page in the GUI, iDRAC may display the message: `vFlash is currently in use by another process. Try again after some time.`

vFlash is capable of performing fast partition creation when there is no other on-going vFlash operation such as formatting, attaching partitions, and so on. Therefore, it is recommended to first create all partitions before performing other individual partition operations.

Creating an empty partition

An empty partition, when attached to the system, is similar to an empty USB flash drive. You can create empty partitions on a vFlash SD card. You can create partitions of type *Floppy* or *Hard Disk*. The partition type CD is supported only while creating partitions using images.

Before creating an empty partition, make sure that:

- You have **Access Virtual Media** privilege.
- The card is initialized.
- The card is not write-protected.
- An initialize operation is not being performed on the card.

Creating an empty partition using the web interface

To create an empty vFlash partition:

1 In iDRAC Web interface, go to **Configuration** > **Systems Settings** > **Hardware Settings** > **vFlash** > **Create Empty Partition**.

The **Create Empty Partition** page is displayed.

2 Specify the required information and click **Apply**. For information about the options, see the *iDRAC Online Help*.

A new unformatted empty partition is created that is read-only by default. A page indicating the progress percentage is displayed. An error message is displayed if:

- The card is write-protected.
- The label name matches the label of an existing partition.
- A non-integer value is entered for the partition size, the value exceeds the available space on the card, or the partition size is greater than 4 GB.
- An initialize operation is being performed on the card.

Creating an empty partition using RACADM

To create an empty partition:

1 Log in to the system using telnet, SSH, or Serial console.

2 Enter the command:

```
racadm vflashpartition create -i 1 -o drive1 -t empty -e HDD -f fat16 -s [n]
```

where `[n]` is the partition size.

By default, an empty partition is created as read-write.

Creating a partition using an image file

You can create a new partition on the vFlash SD card using an image file (available in the **.img** or **.iso** format.) The partitions are of emulation types: Floppy (**.img**), Hard Disk (**.img**), or CD (**.iso**). The created partition size is equal to the image file size.

Before creating a partition from an image file, make sure that:

- You have Access Virtual Media privilege.
- The card is initialized.
- The card is not write-protected.
- An initialize operation is not being performed on the card.
- The image type and the emulation type match.

  NOTE: The uploaded image and the emulation type must match. There are issues when iDRAC emulates a device with incorrect image type. For example, if the partition is created using an ISO image and the emulation type is specified as Hard Disk, then the BIOS cannot boot from this image.
- Image file size is less than or equal to the available space on the card.
- Image file size is less than or equal to 4 GB as the maximum partition size supported is 4 GB. However, while creating a partition using a Web browser, the image file size must be less than 2 GB.

NOTE: The vFlash partition is an image file on a FAT32 file system. Thus, the image file has the 4 GB limitation.

NOTE: Installation of a full OS is not supported.

Creating a partition using an image file using web interface

To create a vFlash partition from an image file:

1 In iDRAC Web interface, go to **Configuration** > **System Settings** > **Hardware Settings** > **vFlash** > **Create From Image**.
The **Create Partition from Image File** page is displayed.

2 Enter the required information and click **Apply**. For information about the options, see the *iDRAC Online Help*.
A new partition is created. For CD emulation type, a read-only partition is created. For Floppy or Hard Disk emulation type, a read-write partition is created. An error message is displayed if:

- The card is write-protected
- The label name matches the label of an existing partition.
- The size of the image file is greater than 4 GB or exceeds the available space on the card.
- The image file does not exist or the image file extension is neither .img nor .iso.
- An initialize operation is already being performed on the card.

Creating a partition from an image file using RACADM

To create a partition from an image file using RACADM:

1 Log in to the system using telnet, SSH, or Serial console.

2 Enter the command

```
racadm vflashpartition create -i 1 -o drive1 -e HDD -t image -l //myserver/sharedfolder/
foo.iso -u root -p mypassword
```

By default, the created partition is read-only. This command is case sensitive for the image file name extension. If the file name extension is in upper case, for example FOO.ISO instead of FOO.iso, then the command returns a syntax error.

NOTE: This feature is not supported in local RACADM.

NOTE: Creating vFlash partition from an image file located on the CFS or NFS IPv6 enabled network share is not supported.

Formatting a partition

You can format an existing partition on the vFlash SD card based on the type of file system. The supported file system types are EXT2, EXT3, FAT16, and FAT32. You can only format partitions of type Hard Disk or Floppy, and not CD. You cannot format read-only partitions.

Before creating a partition from an image file, ensure that:

- You have **Access Virtual Media** privilege.
- The card is initialized.
- The card is not write-protected.
- An initialize operation is not being performed on the card.

To format vFlash partition:

1 In iDRAC Web interface, go to **Configuration** > **System Settings** > **Hardware Settings** > **vFlash** > **Format**.
The **Format Partition** page is displayed.

2 Enter the required information and click **Apply**.
For information about the options, see the *iDRAC Online Help*.

A warning message indicating that all the data on the partition will be erased is displayed.

3 Click **OK**.

The selected partition is formatted to the specified file system type. An error message is displayed if:

- The card is write-protected.
- An initialize operation is already being performed on the card.

Viewing available partitions

Make sure that the vFlash functionality is enabled to view the list of available partitions.

Viewing available partitions using web interface

To view the available vFlash partitions, in the iDRAC Web interface, go to **Configuration** > **System Settings** > **Hardware Settings** > **vFlash** > **Manage**. The **Manage Partitions** page is displayed listing the available partitions and related information for each partition. For information on the partitions, see the *iDRAC Online Help*.

Viewing available partitions using RACADM

To view the available partitions and their properties using RACADM:

1 Open a Telnet, SSH, or Serial console to the system and log in.

2 Enter the following commands:

- To list all existing partitions and its properties:

  ```
  racadm vflashpartition list
  ```

- To get the status of operation on partition 1:

  ```
  racadm vflashpartition status -i 1
  ```

- To get the status of all existing partitions:

  ```
  racadm vflashpartition status -a
  ```

NOTE: The -a option is valid only with the status action.

Modifying a partition

You can change a read-only partition to read-write or vice-versa. Before modifying the partition, make sure that:

- The vFlash functionality is enabled.
- You have **Access Virtual Media** privileges.

NOTE: By default, a read-only partition is created.

Modifying a partition using web interface

To modify a partition:

1 In the iDRAC Web interface, go to **Configuration** > **System Settings** > **Hardware Settings** > **vFlash** > **Manage**.

The **Manage Partitions** page is displayed.

2 In the **Read-Only** column:

- Select the checkbox for the partition(s) and click **Apply** to change to read-only.

- Clear the checkbox for the partition(s) and click **Apply** to change to read-write.
  The partitions are changed to read-only or read-write, based on the selections.

NOTE: If the partition is of type CD, the state is read-only. You cannot change the state to read-write. If the partition is attached, the check box is grayed-out.

Modifying a partition using RACADM

To view the available partitions and their properties on the card:

1 Log in to the system using telnet, SSH, or Serial console.
2 Use one of the following:
   - Using `set` command to change the read-write state of the partition:
     – To change a read-only partition to read-write:
       `racadm set iDRAC.vflashpartition.<index>.AccessType 1`
     – To change a read-write partition to read-only:
       `racadm set iDRAC.vflashpartition.<index>.AccessType 0`
   - Using `set` command to specify the Emulation type:
     `racadm set iDRAC.vflashpartition.<index>.EmulationType <HDD, Floppy, or CD-DVD>`

Attaching or detaching partitions

When you attach one or more partitions, they are visible to the operating system and BIOS as USB mass storage devices. When you attach multiple partitions, based on the assigned index, they are listed in an ascending order in the operating system and the BIOS boot order menu.

If you detach a partition, it is not visible in the operating system and the BIOS boot order menu.

When you attach or detach a partition, the USB bus in the managed system is reset. This affects applications that are using vFlash and disconnects the iDRAC Virtual Media sessions.

Before attaching or detaching a partition, make sure that:

- The vFlash functionality is enabled.
- An initialize operation is not already being performed on the card.
- You have **Access Virtual Media** privileges.

Attaching or detaching partitions using web interface

To attach or detach partitions:

1 In the iDRAC Web interface, go to **Configuration** > **System Settings** > **Hardware Settings** > **vFlash** > **Manage**.
  The **Manage Partitions** page is displayed.
2 In the **Attached** column:
   - Select the checkbox for the partition(s) and click **Apply** to attach the partition(s).
   - Clear the checkbox for the partition(s) and click **Apply** to detach the partition(s).
     The partitions are attached or detached, based on the selections.

Attaching or detaching partitions using RACADM

To attach or detach partitions:

1 Log in to the system using telnet, SSH, or Serial console.

2 Use the following commands:

- To attach a partition:

  ```
  racadm set iDRAC.vflashpartition.<index>.AttachState 1
  ```

- To detach a partition:

  ```
  racadm set iDRAC.vflashpartition.<index>.AttachState 0
  ```

Operating system behavior for attached partitions

For Windows and Linux operating systems:

- The operating system controls and assigns the drive letters to the attached partitions.
- Read-only partitions are read-only drives in the operating system.
- The operating system must support the file system of an attached partition. Else, you cannot read or modify the contents of the partition from the operating system. For example, in a Windows environment the operating system cannot read the partition type EXT2 which is native to Linux. Also, in a Linux environment the operating system cannot read the partition type NTFS which is native to Windows.
- The vFlash partition label is different from the volume name of the file system on the emulated USB device. You can change the volume name of the emulated USB device from the operating system. However, it does not change the partition label name stored in iDRAC.

Deleting existing partitions

Before deleting existing partition(s), make sure that:

- The vFlash functionality is enabled.
- The card is not write-protected.
- The partition is not attached.
- An initialize operation is not being performed on the card.

Deleting existing partitions using web interface

To delete an existing partition:

1 In the iDRAC Web interface, go to **Configuration** > **System Settings** > **Hardware Settings** > **vFlash** > **Manage**.

The **Manage Partitions** page is displayed.

2 In the **Delete** column, click the delete icon for the partition that you want to delete.

A message is displayed indicating that this action permanently deletes the partition.

3 Click **OK**.

The partition is deleted.

Deleting existing partitions using RACADM

To delete partitions:

1 Open a telnet, SSH, or Serial console to the system and log in.
2 Enter the following commands:
   - To delete a partition:
     ```
     racadm vflashpartition delete -i 1
     ```
   - To delete all partitions, re-initialize the vFlash SD card.

Downloading partition contents

You can download the contents of a vFlash partition in the **.img** or **.iso** format to the:

- Managed system (where iDRAC is operated from)
- Network location mapped to a management station.

Before downloading the partition contents, make sure that:

- You have Access Virtual Media privileges.
- The vFlash functionality is enabled.
- An initialize operation is not being performed on the card.
- For a read-write partition, it must not be attached.

To download the contents of the vFlash partition:

1 In the iDRAC Web interface, go to **Configuration** > **System Settings** > **Hardware Settings** > **vFlash** > **Download**.
   The **Download Partition** page is displayed.
2 From the **Label** drop-down menu, select a partition that you want to download and click **Download**.

   NOTE: All existing partitions (except attached partitions) are displayed in the list. The first partition is selected by default.
3 Specify the location to save the file.
   The contents of the selected partition are downloaded to the specified location.

   NOTE: If only the folder location is specified, then the partition label is used as the file name, along with the extension .iso for CD and Hard Disk type partitions, and .img for Floppy and Hard Disk type partitions.

Booting to a partition

You can set an attached vFlash partition as the boot device for the next boot operation.

Before booting a partition, make sure that:

- The vFlash partition contains a bootable image (in the **.img** or **.iso** format) to boot from the device.
- The vFlash functionality is enabled.
- You have Access Virtual Media privileges.

Booting to a partition using web interface

To set the vFlash partition as a first boot device, see Booting to a partition using web interface.

NOTE: If the attached vFlash partition(s) are not listed in the First Boot Device drop-down menu, make sure that the BIOS is updated to the latest version.

Booting to a partition using RACADM

To set a vFlash partition as the first boot device, use the **iDRAC.ServerBoot** object.

For more information, see the iDRAC RACADM CLI Guide available at www.dell.com/idracmanuals.

NOTE: When you run this command, the vFlash partition label is automatically set to boot once (`iDRAC.ServerBoot.BootOnce` is set to `1`.) Boot once boots the device to the partition only once and does not keep it persistently first in the boot order.

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Using SMCLP

The Server Management Command Line Protocol (SMCLP) specification enables CLI-based systems management. It defines a protocol for management commands transmitted over standard character oriented streams. This protocol accesses a Common Information Model Object Manager (CIMOM) using a human-oriented command set. The SMCLP is a sub-component of the Distributed Management Task Force (DMTF) SMASH initiative to streamline systems management across multiple platforms. The SMCLP specification, along with the Managed Element Addressing Specification and numerous profiles to SMCLP mapping specifications, describes the standard verbs and targets for various management task executions.

NOTE: It is assumed that you are familiar with the Systems Management Architecture for Server Hardware (SMASH) Initiative and the Server Management Working Group (SMWG) SMCLP specifications.

The SM-CLP is a subcomponent of the Distributed Management Task Force (DMTF) SMASH initiative to streamline server management across multiple platforms. The SM-CLP specification, along with the Managed Element Addressing Specification and numerous profiles to SM-CLP mapping specifications, describes the standard verbs and targets for various management task executions.

The SMCLP is hosted from the iDRAC controller firmware and supports Telnet, SSH, and serial-based interfaces. The iDRAC SMCLP interface is based on the SMCLP Specification Version 1.0 provided by the DMTF organization.

NOTE: Information about the profiles, extensions, and MOFs are available at www.dell.com/support and all DMTF information is available at dmtf.org/standards/profiles/.

SM-CLP commands implement a subset of the local RACADM commands. The commands are useful for scripting since you can execute these commands from a management station command line. You can retrieve the output of commands in well-defined formats, including XML, facilitating scripting and integration with existing reporting and management tools.

Topics:

- System management capabilities using SMCLP
- Running SMCLP commands
- iDRAC SMCLP syntax
- Navigating the map address space
- Using show verb
- Usage examples

System management capabilities using SMCLP

iDRAC SMCLP enables you to:

- Manage Server Power — Turn on, shut down, or reboot the system
- Manage System Event Log (SEL) — Display or clear the SEL records
- View iDRAC user accounts
- View system properties

Running SMCLP commands

You can run the SMCLP commands using SSH or Telnet interface. Open an SSH or Telnet interface and log in to iDRAC as an administrator. The SMCLP prompt (admin ->)is displayed.

SMCLP prompts:

- yx1x blade servers use `-$`.
- yx1x rack and tower servers use `admin->`.
- yx2x blade, rack, and tower servers use `admin->`.

where, y is an alpha-numeric character such as M (for blade servers), R (for rack servers), and T (for tower servers) and x is a number. This indicates the generation of Dell PowerEdge servers.

NOTE: Scripts using `-$` can use these for yx1x systems, but starting with yx2x systems one script with `admin->` can be used for blade, rack, and tower servers.

iDRAC SMCLP syntax

The iDRAC SMCLP uses the concept of verbs and targets to provide systems management capabilities through the CLI. The verb indicates the operation to perform, and the target determines the entity (or object) that runs the operation.

The SMCLP command line syntax:

```
<verb> [<options>] [<target>] [<properties>]
```

The following table provides the verbs and its definitions.

Table 61. SMCLP verbs

Verb	Definition
cd	Navigates through the MAP using the shell
set	Sets a property to a specific value
help	Displays help for a specific target
reset	Resets the target
show	Displays the target properties, verbs, and subtargets
start	Turns on a target
stop	Shuts down a target
exit	Exits from the SMCLP shell session
version	Displays the version attributes of a target
load	Moves a binary image to a specified target address from a URL

The following table provides a list of targets.

Table 62. SMCLP targets

Target	Definitions
`admin1`	admin domain
`admin1/profiles1`	Registered profiles in iDRAC

Target	Definitions
admin1/hdwr1	Hardware
admin1/system1	Managed system target
admin1/system1/capabilities1	Managed system SMASH collection capabilities
admin1/system1/capabilities1/elecap1	Managed system target capabilities
admin1/system1/logs1	Record Log collections target
admin1/system1/logs1/log1	System Event Log (SEL) record entry
admin1/system1/logs1/log1/record*	An individual SEL record instance on the managed system
admin1/system1/settings1	Managed system SMASH collection settings
admin1/system1/capacities1	Managed system capacities SMASH collection
admin1/system1/consoles1	Managed system consoles SMASH collection
admin1/system1/sp1	Service Processor
admin1/system1/sp1/timesvc1	Service Processor time service
admin1/system1/sp1/capabilities1	Service processor capabilities SMASH collection
admin1/system1/sp1/capabilities1/clpcap1	CLP service capabilities
admin1/system1/sp1/capabilities1/pwrmgtcap1	Power state management service capabilities on the system
admin1/system1/sp1/capabilities1/acctmgtcap*	Account management service capabilities
admin1/system1/sp1/capabilities1/rolemgtcap*	Local Role Based Management capabilities
admin1/system1/sp1/capabilities1/elecap1	Authentication capabilities
admin1/system1/sp1/settings1	Service Processor settings collection
admin1/system1/sp1/settings1/clpsetting1	CLP service settings data
admin1/system1/sp1/clpsvc1	CLP service protocol service
admin1/system1/sp1/clpsvc1/clpendpt*	CLP service protocol endpoint
admin1/system1/sp1/clpsvc1/tcpendpt*	CLP service protocol TCP endpoint
admin1/system1/sp1/jobq1	CLP service protocol job queue
admin1/system1/sp1/jobq1/job*	CLP service protocol job
admin1/system1/sp1/pwrmgtsvc1	Power state management service
admin1/system1/sp1/account1-16	Local user account
admin1/sysetm1/sp1/account1-16/identity1	Local user identity account

Target	Definitions
admin1/sysetm1/sp1/account1-16/identity2	IPMI identity (LAN) account
admin1/sysetm1/sp1/account1-16/identity3	IPMI identity (Serial) account
admin1/sysetm1/sp1/account1-16/identity4	CLP identity account
admin1/system1/sp1/acctsvc2	IPMI account management service
admin1/system1/sp1/acctsvc3	CLP account management service
admin1/system1/sp1/rolesvc1	Local Role Base Authorization (RBA) service
admin1/system1/sp1/rolesvc1/Role1-16	Local role
admin1/system1/sp1/rolesvc1/Role1-16/privilege1	Local role privilege
admin1/system1/sp1/rolesvc2	IPMI RBA service
admin1/system1/sp1/rolesvc2/Role1-3	IPMI role
admin1/system1/sp1/rolesvc2/Role4	IPMI Serial Over LAN (SOL) role
admin1/system1/sp1/rolesvc3	CLP RBA Service
admin1/system1/sp1/rolesvc3/Role1-3	CLP role
admin1/system1/sp1/rolesvc3/Role1-3/privilege1	CLP role privilege

Navigating the map address space

Objects that can be managed with SM-CLP are represented by targets arranged in a hierarchical space called the Manageability Access Point (MAP) address space. An address path specifies the path from the root of the address space to an object in the address space.

The root target is represented by a slash (/) or a backslash (\). It is the default starting point when you log in to iDRAC. Navigate down from the root using the `cd` verb.

NOTE: The slash (/) and backslash (\) are interchangeable in SM-CLP address paths. However, a backslash at the end of a command line continues the command on the next line and is ignored when the command is parsed.

For example to navigate to the third record in the System Event Log (SEL), enter the following command:

```
->cd /admin1/system1/logs1/log1/record3
```

Enter the `cd` verb with no target to find your current location in the address space. The `..` and `.` abbreviations work as they do in Windows and Linux: `..` refers to the parent level and `.` refers to the current level.

Using show verb

To learn more about a target use the `show` verb. This verb displays the target's properties, sub-targets, associations, and a list of the SM-CLP verbs that are allowed at that location.

Using the -display option

The `show -display` option allows you to limit the output of the command to one or more of properties, targets, associations, and verbs. For example, to display just the properties and targets at the current location, use the following command:

```
show -display properties,targets
```

To list only certain properties, qualify them, as in the following command:

```
show -d properties=(userid,name) /admin1/system1/sp1/account1
```

If you only want to show one property, you can omit the parentheses.

Using the -level option

The `show -level` option executes `show` over additional levels beneath the specified target. To see all targets and properties in the address space, use the `-l all` option.

Using the -output option

The `-output` option specifies one of four formats for the output of SM-CLP verbs: **text**, **clpcsv**, **keyword**, and **clpxml**.

The default format is **text**, and is the most readable output. The **clpcsv** format is a comma-separated values format suitable for loading into a spreadsheet program. The **keyword** format outputs information as a list of keyword=value pairs one per line. The **clpxml** format is an XML document containing a **response** XML element. The DMTF has specified the **clpcsv** and **clpxml** formats and their specifications can be found on the DMTF website at **dmtf.org**.

The following example shows how to output the contents of the SEL in XML:

```
show -l all -output format=clpxml /admin1/system1/logs1/log1
```

Usage examples

This section provides use case scenarios for SMCLP:

- Server power management
- SEL management
- Map target navigation

Server power management

The following examples show how to use SMCLP to perform power management operations on a managed system.

Type the following commands at the SMCLP command prompt:

- To switch off the server:
  ```
  stop /system1
  ```

The following message is displayed:

```
system1 has been stopped successfully
```

- To switch on the server:
  ```
  start /system1
  ```

  The following message is displayed:

  ```
  system1 has been started successfully
  ```

- To reboot the server:
  ```
  reset /system1
  ```

  The following message is displayed:

  ```
  system1 has been reset successfully
  ```

SEL management

The following examples show how to use the SMCLP to perform SEL-related operations on the managed system. Type the following commands at the SMCLP command prompt:

- To view the SEL:
  ```
  show/system1/logs1/log1
  ```

  The following output is displayed:

  ```
  /system1/logs1/log1

  Targets:

  Record1

  Record2

  Record3

  Record4

  Record5

  Properties:

  InstanceID = IPMI:BMC1 SEL Log

  MaxNumberOfRecords = 512

  CurrentNumberOfRecords = 5

  Name = IPMI SEL

  EnabledState = 2

  OperationalState = 2

  HealthState = 2
  ```

```
Caption = IPMI SEL

Description = IPMI SEL

ElementName = IPMI SEL

Commands:

cd

show

help

exit

version
```

- To view the SEL record:
  `show/system1/logs1/log1`

  The following output is displayed:

```
/system1/logs1/log1/record4

Properties:

LogCreationClassName= CIM_RecordLog

CreationClassName= CIM_LogRecord

LogName= IPMI SEL

RecordID= 1

MessageTimeStamp= 20050620100512.000000-000

Description= FAN 7 RPM: fan sensor, detected a failure

ElementName= IPMI SEL Record

Commands:

cd

show

help

exit

version
```

Map target navigation

The following examples show how to use the cd verb to navigate the MAP. In all examples, the initial default target is assumed to be /.

Type the following commands at the SMCLP command prompt:

- To navigate to the system target and reboot:
  cd system1 reset The current default target is /.
- To navigate to the SEL target and display the log records:
  `cd system1`

  `cd logs1/log1`

  `show`
- To display current target:
  type `cd .`
- To move up one level:
  type `cd ..`
- To exit:
  `exit`

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Deploying operating systems

You can use any of the following utilities to deploy operating systems to managed systems:

- Remote File Share
- Console

Topics:

- Deploying operating system using remote file share
- Deploying operating system using virtual media
- Deploying embedded operating system on SD card

Deploying operating system using remote file share

Before you deploy the operating system using Remote File Share (RFS), make sure that:

- **Configure User** and **Access Virtual Media** privileges for iDRAC are enabled for the user.
- Network share contains drivers and operating system bootable image file, in an industry standard format such as **.img** or **.iso**.

NOTE: While creating the image file, follow standard network-based installation procedures, and mark the deployment image as read-only to make sure that each target system boots and runs the same deployment procedure.

To deploy an operating system using RFS:

1. Using Remote File Share (RFS), mount the ISO or IMG image file to the managed system through NFS, CIFS, HTTP, or HTTPs.

   NOTE: RFS using HTTP or HTTPs feature is supported through iDRAC web interface and iDRAC RACADM command line interface.
2. Go to **Configuration** > **System Settings** > **Hardware Settings** > **First Boot Device**.
3. Set the boot order in the **First Boot Device** drop-down list to select a virtual media such as floppy, CD, DVD, or ISO.
4. Select the **Boot Once** option to enable the managed system to reboot using the image file for the next instance only.
5. Click **Apply**.
6. Reboot the managed system and follow the on-screen instructions to complete the deployment.

Managing remote file shares

Using Remote File Share (RFS) feature, you can set an ISO or IMG image file on a network share and make it available to the managed server's operating system as a virtual drive by mounting it as a CD or DVD using NFS, CIFS, HTTP, or HTTPs. RFS is a licensed feature.

NOTE: RFS through HTTP or HTTPs is not supported

Remote file share supports only **.img** and **.iso** image file formats. A **.img** file is redirected as a virtual floppy and a **.iso** file is redirected as a virtual CDROM.

You must have Virtual Media privileges to perform an RFS mounting.

RFS and Virtual Media features are mutually exclusive.

- If the Virtual Media client is not active, and you attempt to establish an RFS connection, the connection is established and the remote image is available to the host operating system.
- If the Virtual Media client is active, and you attempt to establish an RFS connection, the following error message is displayed:

  Virtual Media is detached or redirected for the selected virtual drive.

The connection status for RFS is available in iDRAC log. Once connected, an RFS-mounted virtual drive does not disconnect even if you log out from iDRAC. The RFS connection is closed if iDRAC is reset or the network connection is dropped. The Web interface and command-line options are also available in OME Modular and iDRAC to close the RFS connection.

NOTE:

- CIFS supports both IPv4 and IPv6 addresses and NFS supports only IPv4 address.
- When the iDRAC is configured with both IPv4 and IPv6, the DNS server can contain records associating the iDRAC hostname to both addresses. If IPv4 option is disabled in iDRAC, then iDRAC may not be able to access the external IPv6 share. This is because the DNS server may still contain IPv4 records, and DNS name resolution can return the IPv4 address. In such cases, it is recommended to delete the IPv4 DNS records from the DNS server, when disabling IPv4 option in iDRAC.
- If you are using CIFS and are part of an Active Directory domain, enter the domain name with the IP address in the image file path.
- If you want to access a file from an NFS share, configure the following share permissions. These permissions are required because iDRAC interfaces run in non-root mode.
  - Linux: Ensure that the share permissions are set to at least **Read** for the **Others** account.
  - Windows: Go to the **Security** tab of the share properties and add **Everyone** to **Groups or user names** field with **Read & execute** privilege.
- If ESXi is running on the managed system and if you mount a floppy image (**.img**) using RFS, the connected floppy image is not available to the ESXi operating system.
- iDRAC vFlash feature and RFS are not related.
- Only English ASCII characters are supported in network share file paths.
- The OS drive eject feature is not supported when virtual media is connected using RFS.

Configuring remote file share using web interface

To enable remote file sharing:

1. In iDRAC web interface, go to **Configuration** > **Virtual Media** > **Attached Media**.

   The **Attached Media** page is displayed.
2. Under **Attached Media**, select **Attach** or **Auto Attach**.
3. Under **Remote File Share**, specify the image file path, domain name, user name, and password. For information about the fields, see the *iDRAC Online Help*.

   Example for image file path:

   - CIFS — `//<IP to connect for CIFS file system>/<file path>/<image name>`
   - NFS — `< IP to connect for NFS file system>:/<file path>/<image name>`
   - HTTP — `http://<URL>/<file path>/<image name>`
   - HTTPs — `https://<URL>/<file path>/<image name>`

   NOTE: To avoid I/O errors when using CIFS shares hosted on Windows 7 systems, modify the following registry keys:

   - Set HKLM\SYSTEM\CurrentControlSet\Control\Session Manager\Memory Management\LargeSystemCache to `1`
   - Set HKLM\SYSTEM\CurrentControlSet\Services\LanmanServer\Parameters\Size to `3`

   NOTE: Both '/' or '\' characters can be used for the file path.

   CIFS supports both IPv4 and IPv6 addresses but NFS supports only IPv4 address.

If you are using NFS share, make sure that you provide the exact <file path> and <image name> as it is case-sensitive.

NOTE: For information on recommended characters for user names and passwords, see Recommended characters in user names and passwords.

NOTE: The characters allowed in user names and passwords for network shares are determined by the network-share type. iDRAC supports valid characters for network share credentials as defined by the share type, except <, >, and , (comma).

4 Click **Apply** and then click **Connect**.

After the connection is established, the **Connection Status** displays **Connected**.

NOTE: Even if you have configured remote file sharing, the Web interface does not display user credential information due to security reasons.

NOTE: If the image path contains user credentials, use HTTPS to avoid credentials from displaying in the GUI and RACADM. If entering the credentials in the URL, avoid using "@" symbol, because it is a separator character.

For Linux distributions, this feature may require a manual mount command when operating at runlevel init 3. The syntax for the command is:

```
mount /dev/OS_specific_device / user_defined_mount_point
```

Where, `user_defined_mount_point` is any directory you choose to use for the mount similar to any mount command.

For RHEL, the CD device (**.iso** virtual device) is `/dev/scd0` and floppy device (**.img** virtual device) is `/dev/sdc`.

For SLES, the CD device is `/dev/sr0` and the floppy device is /dev/sdc. To make sure that the correct device is used (for either SLES or RHEL), when you connect the virtual device, on the Linux OS you must immediately run the command:

```
tail /var/log/messages | grep SCSI
```

This displays the text that identifies the device (example, SCSI device sdc). This procedure also applies to Virtual Media when you are using Linux distributions in runlevel init 3. By default, the virtual media is not auto-mounted in init 3.

Configuring remote file share using RACADM

To configure remote file share using RACADM, use:

```
racadm remoteimage

racadm remoteimage <options>
```

Options are:

`-c` : connect image

`-d` : disconnect image

`-u` <username>: username to access the network share

`-p` <password>: password to access the network share

`-l` <image_location>: image location on the network share; use double quotes around the location. See examples for image file path in Configuring Remote File Share Using Web Interface section

`-s` : display current status

NOTE: All characters including alphanumeric and special characters are allowed as part of user name, password, and image_location except the following characters: ' (single quote), "(double quote), ,(comma), < (less than), and > (greater than).

NOTE: To avoid I/O errors when using CIFS shares hosted on Windows 7 systems, modify the following registry keys:

- Set HKLM\SYSTEM\CurrentControlSet\Control\Session Manager\Memory Management\LargeSystemCache to 1
- Set HKLM\SYSTEM\CurrentControlSet\Services\LanmanServer\Parameters\Size to 3

Deploying operating system using virtual media

Before you deploy the operating system using Virtual Media, make sure that:

- Virtual Media is in *Attached* state for the virtual drives to appear in the boot sequence.
- If Virtual Media is in *Auto Attached* mode, the Virtual Media application must be launched before booting the system.
- Network share contains drivers and operating system bootable image file, in an industry standard format such as **.img** or **.iso**.

To deploy an operating system using Virtual Media:

1. Do one of the following:
   - Insert the operating system installation CD or DVD into the management station CD or DVD drive.
   - Attach the operating system image.
2. Select the drive on the management station with the required image to map it.
3. Use one of the following methods to boot to the required device:
   - Set the boot order to boot once from **Virtual Floppy** or **Virtual CD/DVD/ISO** using the iDRAC Web interface.
   - Set the boot order through **System Setup** > **System BIOS Settings** by pressing <F2> during boot.
4. Reboot the managed system and follow the on-screen instructions to complete the deployment.

Installing operating system from multiple disks

1. Unmap the existing CD/DVD.
2. Insert the next CD/DVD into the remote optical drive.
3. Remap the CD/DVD drive.

Deploying embedded operating system on SD card

To install an embedded hypervisor on an SD card:

1. Insert the two SD cards in the Internal Dual SD Module (IDSDM) slots on the system.
2. Enable SD module and redundancy (if required) in BIOS.
3. Verify if the SD card is available on one of the drives when you <F11> during boot.
4. Deploy the embedded operating system and follow the operating system installation instructions.

Enabling SD module and redundancy in BIOS

To enable SD module and redundancy in BIOS:

1. Press <F2> during boot.
2. Go to **System Setup** > **System BIOS Settings** > **Integrated Devices**.
3. Set the **Internal USB Port** to **On**. If it is set to **Off**, the IDSDM is not available as a boot device.
4. If redundancy is not required (single SD card), set **Internal SD Card Port** to **On** and **Internal SD Card Redundancy** to **Disabled**.
5. If redundancy is required (two SD cards), set **Internal SD Card Port** to **On** and **Internal SD Card Redundancy** to **Mirror**.
6. Click **Back** and click **Finish**.

7 Click **Yes** to save the settings and press <Esc> to exit **System Setup**.

About IDSDM

Internal Dual SD Module (IDSDM) is available only on applicable platforms. IDSDM provides redundancy on the hypervisor SD card by using another SD card that mirrors the first SD card's content.

Either of the two SD cards can be the master. For example, if two new SD cards are installed in the IDSDM, SD1 is active (master) card and SD2 is the standby card. The data is written on both the cards, but the data is read from SD1. At any time if SD1 fails or is removed, SD2 automatically become the active (master) card.

You can view the status, health, and the availability of IDSDM using iDRAC Web Interface or RACADM. The SD card redundancy status and failure events are logged to SEL, displayed on the front panel, and PET alerts are generated if alerts are enabled.

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Troubleshooting managed system using iDRAC

You can diagnose and troubleshoot a remote managed system using:

- Diagnostic console
- Post code
- Boot and crash capture videos
- Last system crash screen
- System event logs
- Lifecycle logs
- Front panel status
- Trouble indicators
- System health

Topics:

- Using diagnostic console
- Viewing post codes
- Viewing boot and crash capture videos
- Viewing logs
- Viewing last system crash screen
- Viewing System status
- Hardware trouble indicators
- Viewing system health
- Checking server status screen for error messages
- Restarting iDRAC
- Erasing system and user data
- Resetting iDRAC to factory default settings

Using diagnostic console

iDRAC provides a standard set of network diagnostic tools that are similar to the tools included with Microsoft Windows or Linux-based systems. Using iDRAC Web interface, you can access the network debugging tools.

To access Diagnostics Console:

1 In the iDRAC Web interface, go to **Maintenance** > **Diagnostics**.
The **Diagnostics Console Command** page is displayed.

2 In the **Command** text box, enter a command and click **Submit**. For information about the commands, see the *iDRAC Online Help*.
The results are displayed on the same page.

Reset iDRAC and Reset iDRAC to default

1 In the iDRAC Web interface, go to **Maintenance** > **Diagnostics**.
You have the following options:

- Click **Reset iDRAC** to reset the iDRAC. A normal reboot operation is performed on the iDRAC. After reboot, refresh the browser to reconnect and log in to iDRAC.
- Click **Reset iDRAC to Default Settings** to reset the iDRAC to the default settings. After you click **Reset iDRAC to Default Settings**,**Reset iDRAC to factory default** window is displayed. This action reset the iDRAC to the factory defaults. Chose any of the following options:
  1 Discard all settings, but preserve user and network settings.
  2 Discard all settings and reset the default username to root and password to the shipping value (root/shipping value).
  3 Discard all settings and reset the default username to root and password to calvin (root/calvin).

2 Click **Continue**.

Scheduling remote automated diagnostics

You can remotely invoke automated offline diagnostics on a server as a one-time event and return the results. If the diagnostics require a reboot, you can reboot immediately or stage it for a subsequent reboot or maintenance cycle (similar to updates). When diagnostics are run, the results are collected and stored in the internal iDRAC storage. You can then export the results to an NFS, CIFS, HTTP, or HTTPs network share using the `diagnostics export` racadm command. You can also run diagnostics using the appropriate WSMan command(s). For more information, see the WSMan documentation.

You must have iDRAC Express license to use remote automated diagnostics.

You can perform the diagnostics immediately or schedule it on a particular day and time, specify the type of diagnostics, and the type of reboot.

For the schedule, you can specify the following:

- Start time – Run the diagnostic at a future day and time. If you specify TIME NOW, the diagnostic is run on the next reboot.
- End time - Run the diagnostic until a date and time after the Start time. If it is not started by End time, it is marked as failed with End time expired. If you specify TIME NA, then the wait time is not applicable.

The types of diagnostic tests are:

- Express test
- Extended test
- Both in a sequence

The types of reboot are:

- Power cycle system
- Graceful shutdown (waits for operating system to turn off or for system restart)
- Forced Graceful shutdown (signals operating system to turn off and waits for 10 minutes. If the operating system does not turn off, the iDRAC power cycles the system)

Only one diagnostic job can be scheduled or run at one time. A diagnostic job can complete successfully, complete with error, or is unsuccessful. The diagnostic events including the results are recorded in Lifecycle Controller log. You can retrieve the results of the last diagnostic execution using remote RACADM or WSMan.

You can export the diagnostic results of the last completed diagnostics that were scheduled remotely to a network share such as CIFS, NFS, HTTP or HTTPS. The maximum file size is 5 MB.

You can cancel a diagnostic job when the status of the job is Unscheduled or Scheduled. If the diagnostic is running, then restart the system to cancel the job.

Before you run the remote diagnostics, make sure that:

- Lifecycle Controller is enabled.

- You have Login and Server Control privileges.

Scheduling remote automated diagnostics using RACADM

- To run the remote diagnostics and save the results on the local system, use the following command:

```
racadm diagnostics run -m <Mode> -r <reboot type> -s <Start Time> -e <Expiration Time>
```

- To export the last run remote diagnostics results, use the following command:

```
racadm diagnostics export -f <file name> -l <NFS / CIFS / HTTP / HTTPs share> -u <username> -
p <password>
```

For more information about the options, see the iDRAC RACADM CLI Guide available at www.dell.com/idracmanuals.

Viewing post codes

Post codes are progress indicators from the system BIOS, indicating various stages of the boot sequence from power-on-reset, and allows you to diagnose any faults related to system boot-up. The **Post Codes** page displays the last system post code prior to booting the operating system.

To view the Post Codes, go to **Maintenance** > **Troubleshooting** > **Post Code**.

The **Post Code** page displays the system health indicator, a hexadecimal code, and a description of the code.

Viewing boot and crash capture videos

You can view the video recordings of:

- Last three boot cycles — A boot cycle video logs the sequence of events for a boot cycle. The boot cycle videos are arranged in the order of latest to oldest.
- Last crash video — A crash video logs the sequence of events leading to the failure.

This is a licensed feature.

iDRAC records fifty frames during boot time. Playback of the boot screens occur at a rate of 1 frame per second. If iDRAC is reset, the boot capture video is not available as it is stored in RAM and is deleted.

NOTE:

- You must have Access Virtual Console or administrator privileges to playback the Boot Capture and Crash Capture videos.
- The video capture time displayed in the iDRAC GUI video player may differ from the video capture time displayed in other video players. The iDRAC GUI video player displays the time in the iDRAC time zone while all other video players display the time in the respective operating system time zones.

NOTE: DVC boot capture files are not videos. They are sequence of screens (at 1 particular resolution) taken during the course of the server boot. The DVC player converts these screens together to create the boot video. When you export the video from DVC (continuous snapshot and differences) to .mov (actual video) format, it is expected to use the same resolution, or a similar resolution, that the video was initially encoded with. Videos need to be exported at a similar resolution that they have been captured with.

NOTE: The reason for the delay in boot capture file availability is because the boot capture buffer is not full after the host boot.

To view the **Boot Capture** screen, click **Maintenance** > **Troubleshooting** > **Video Capture**.

The **Video Capture** screen displays the video recordings. For more information, see the *iDRAC Online Help*.

Configuring video capture settings

To configure the video capture settings:

1 In the iDRAC Web interface, go to **Maintenance** > **Troubleshooting** > **Video Capture**.
The **Video Capture** page is displayed.
2 From the **Video Capture Settings** drop-down menu, select any of the following options:
- **Disable** — Boot capture is disabled.
- **Capture until buffer full** — Boot sequence is captured until the buffer size has reached.
- **Capture until end of POST** — Boot sequence is captured until end of POST.

3 Click **Apply** to apply the settings.

Viewing logs

You can view System Event Logs (SELs) and Lifecycle logs. For more information, see Viewing System Event Log and Viewing Lifecycle log.

Viewing last system crash screen

The last crash screen feature captures a screenshot of the most recent system crash, saves, and displays it in iDRAC. This is a licensed feature.

To view the last crash screen:

1 Make sure that the last system crash screen feature is enabled.
2 In iDRAC Web interface, go to **Overview** > **Server** > **Troubleshooting** > **Last Crash Screen**.
The **Last Crash Screen** page displays the last saved crash screen from the managed system.

Click **Clear** to delete the last crash screen.

NOTE: Once iDRAC is reset or an AC power cycle event occurs, then the crash capture data is cleared.

Viewing System status

The System Status summarizes the status of the following components in the system:

- Summary
- Batteries
- Cooling
- CPUs
- Front Panel
- Intrusion
- Memory
- Network Devices
- Power Supplies
- Voltages
- Removable Flash Media
- Chassis Controller

You can view the status of the managed system:

- For rack and tower servers: LCD front panel and system ID LED status or LED front panel and system ID LED status.
- For blade servers: Only system ID LEDs.

Viewing system front panel LCD status

To view the LCD front panel status for applicable rack and tower servers, in iDRAC Web interface, go to **System** > **Overview** > **Front Panel**. The **Front Panel** page is displayed.

The **Front Panel** section displays the live feed of the messages currently being displayed on the LCD front panel. When the system is operating normally (indicated by solid blue color in the LCD front panel), both **Hide Error** and **UnHide Error** are grayed-out.

NOTE: You can hide or unhide the errors only for rack and tower servers.

Based on the selection, the text box displays the current value. If you select User Defined, enter the required message in the text box. The character limit is 62. If you select None, home message is not displayed on the LCD.

To view LCD front panel status using RACADM, use the objects in the **System.LCD** group. For more information, see the iDRAC RACADM CLI Guide available at www.dell.com/idracmanuals.

Viewing system front panel LED status

To view the current system ID LED status, in iDRAC web interface, go to **System** > **Overview** > **Front Panel**. The **Front Panel** section displays the current front panel status:

- Solid blue — No errors present on the managed system.
- Blinking blue — Identify mode is enabled (regardless of managed system error presence).
- Solid amber — Managed system is in failsafe mode.
- Blinking amber — Errors present on managed system.

When the system is operating normally (indicated by blue Health icon on the LED front panel), then both **Hide Error** and **UnHide Error** is grayed-out. You can hide or unhide the errors only for rack and tower servers.

To view system ID LED status using RACADM, use the **getled** command.

For more information, see the iDRAC RACADM CLI Guide available at www.dell.com/idracmanuals.

Hardware trouble indicators

The hardware related problems are:

- Failure to power up
- Noisy fans
- Loss of network connectivity
- Hard drive failure
- USB media failure
- Physical damage

Based on the problem, use the following methods to correct the problem:

- Reseat the module or component and restart the system
- In case of a blade server, insert the module into a different bay in the chassis
- Replace hard drives or USB flash drives
- Reconnect or replace the power and network cables

If problem persists, see the Installation and Service Manual available at www.dell.com/poweredgemanuals for specific troubleshooting information about the hardware device.

CAUTION: You should only perform troubleshooting and simple repairs as authorized in your product documentation, or as directed by online or telephone service and support team. Damage due to servicing that is not authorized by Dell is not covered by your warranty. Read and follow the safety instructions that came with the product.

Viewing system health

iDRAC and OME-Modular Web interfaces display the status for the following:

- Batteries
- CPUs
- Cooling
- Intrusion
- Memory
- Power Supplies
- Removable Flash Media
- Voltages
- Miscellaneous

Click any component name in the **Server Health** section to view details about the component.

Checking server status screen for error messages

When a flashing amber LED is blinking, and a particular server has an error, the main Server Status Screen on the LCD highlights the affected server in orange. Use the LCD navigation buttons to highlight the affected server, then click the center button. Error and warning messages will be displayed on the second line. For the list of error messages displayed on the LCD panel, see the server's Owner's Manual.

Restarting iDRAC

You can perform a hard or soft iDRAC restart without turning off the server:

- Hard restart — On the server, press and hold the LED button for 15 seconds.
- Soft restart — Using iDRAC Web interface or RACADM.

Resetting iDRAC using iDRAC web interface

To restart iDRAC, do one of the following in the iDRAC Web interface:

- Go to **Maintenance** > **Diagnostics**. Click **Reset iDRAC**.

Resetting iDRAC using RACADM

To restart iDRAC, use the **racreset** command. For more information, see the OME - Modular for PowerEdge MX7000 Chassis RACADM CLI Guide available at www.dell.com/openmanagemanuals

Erasing system and user data

NOTE: Erasing system and user data is not supported from iDRAC GUI.

You can erase system component(s) and user data for the following components:

- Lifecycle Controller Data
- Embedded Diagnostics
- Embedded OS Driver Pack
- BIOS reset to default
- iDRAC reset to default

Before performing system erase, ensure that:

- You have iDRAC Server Control privilege.
- Lifecycle Controller is enabled.

The Lifecycle Controller Data option erases any content such as the LC Log, configuration database, rollback firmware, factory as-shipped logs, and the configuration information from the FP SPI (or management riser).

NOTE: The Lifecycle Controller log contains the information about the system erase request and any information generated when the iDRAC restarts. All previous information is removed.

You can delete individual or multiple system components using the **SystemErase** command:

```
racadm systemErase <BIOS | DIAG | DRVPACK | LCDATA | IDRAC >
```

where,

- bios — BIOS reset to default
- diag — Embedded Diagnostics
- drvpack — Embedded OS Driver Pack
- lcdata — Clear the Lifecycle Controller Data
- idrac — iDRAC reset to default
- overwritepd — Overwrite hard drives that do not support Instant Secure Erase (ISE)
- percnvcache — Reset controller cache
- vflash — Reset vFLASH
- secureerasepd — Erase Hard Drives, SSDs, and NVMes that support ISE
- allapps — Clears all OS applications

For more information, see the iDRAC RACADM CLI Guide available at www.dell.com/idracmanuals.

NOTE: The Dell tech center link appears on the iDRAC GUI on Dell branded systems. If you erase system data by using WSMan command and want the link to appear again, reboot the host manually and wait for CSIOR to run.

NOTE: After you run System Erase, the VDs may still appear. Run CSIOR after System Erase is completed and iDRAC is rebooted.

Resetting iDRAC to factory default settings

You can reset iDRAC to the factory default settings using the iDRAC Settings utility or the iDRAC Web interface.

Resetting iDRAC to factory default settings using iDRAC web interface

To reset iDRAC to factory default settings using the iDRAC Web interface:

1 Go to **Maintenance** > **Diagnostics**.

The **Diagnostics Console** page is displayed.

2 Click **Reset iDRAC to Default Settings**.

The completion status is displayed in percentage. iDRAC reboots and is restored to factory defaults. The iDRAC IP is reset and is not accessible. You can configure the IP using the front panel or BIOS.

Resetting iDRAC to factory default settings using iDRAC settings utility

To reset iDRAC to factory default values using the iDRAC Settings utility:

1 Go to **Reset iDRAC configurations to defaults**.

The **iDRAC Settings Reset iDRAC configurations to defaults** page is displayed.

2 Click **Yes**.

iDRAC reset starts.

3 Click **Back** and navigate to the same **Reset iDRAC configurations to defaults** page to view the success message.

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SupportAssist Integration in iDRAC

SupportAssist allows you to create SupportAssist collections and utilize other SupportAssist features to monitor your system and datacenter. iDRAC provides an application interfaces for gathering platform information that enables support services to resolve platform and system problems. iDRAC helps you to generate a SupportAssist collection of the server and then export the collection to a location on the management station (local) or to a shared network location such as Common Internet File System (CIFS) or Network File Share (NFS). The collection is generated in the standard ZIP format. You can send this collection to technical support for troubleshooting or inventory collection.

Topics:

- SupportAssist Registration
- Installing Service Module
- Server OS Proxy Information
- SupportAssist
- Service Request Portal
- Collection Log
- Generating SupportAssist Collection
- Settings
- Collection Settings
- Contact Information

SupportAssist Registration

To take advantage of the automated, proactive, and predictive features of SupportAssist, you must register your system with SupportAssist.

You can generate and save a collection locally or to a network, and also send to Dell EMC without registration.

Contact and shipping information

To complete the registration, you must provide the contact and shipping information.

Primary contact information

Enter First Name*, Last Name*, Phone Number*, Alternate Number, Email Address*, Service Address option (allows you to add physical address, where the device will be serviced or where replacement parts should be shipped), Company Name*, Address Line 1*, Address Line 2, City*, State*, Zip (or Postal) Code* and Country*. Check if the details are displayed correctly and make changes if you want to edit any of the fields.

*indicates that the fields are mandatory.

Secondary contact information

Enter First Name, Last name, Phone Number, Alternate Number, Email Address and check if the details are displayed correctly and make changes if you want to edit any of the fields.

NOTE: You can remove the secondary contact information at any point of time.

End user license agreement

After providing all the required information, you need to accept the End User License Agreement (EULA) to complete the registration process. You have the option to print the EULA for further references. You can cancel and terminate the registration process at any point of time.

Installing Service Module

In order to register and use SupportAssist, you must have iDRAC Service Module (iSM) installed in the system. Once you **initiate Service Module Installation** you can see the installation instructions. The **Next** button remains disabled until you successfully install iSM.

Server OS Proxy Information

In case there is an issue with the connection, then the user will be prompted to provide OS proxy information. Enter **Server, Port, Username** and **Password** to configure the proxy settings.

SupportAssist

Once SupportAssist is configured, you can check the SupportAssist dash board to view the **Service Request Summary**, **Warranty Status**, **SupportAssist Overview**, **Service Requests**, and **Collection log**. Registration is not required to view or send the Collection log.

Service Request Portal

Service Request shows the **Status** (Open/Closed)**, Description, Source** (Event/Phone)**, Service Request ID**, **Date Opened** and **Date Closed** details for each event. You can select and view further details of each event. You have the option to check Service Request Portal to view additional information for any individual case.

Collection Log

Collection Log shows the details of **Collection Date and Time, Collection Type** (Manual, Scheduled, Event based), **Data Collected** (Custom Selection, All Data), **Collection Status** (Complete with Errors, Complete), **Job ID**, **Sent Status**, and **Sent Date and Time.** You can send the last persisted collection in iDRAC to Dell.

NOTE: Once generated, the Collection Log Details can be filtered to remove the Personally Identifiable Information (PII) based on the user selection.

Generating SupportAssist Collection

For generating the OS and Application logs:

- iDRAC Service Module must be installed and running in Host Operating System.

- OS Collector, which comes factory installed in iDRAC, if removed must be installed in iDRAC.

If you have to work with Tech Support on an issue with a server but the security policies restrict direct internet connection, then you can provide Tech Support with necessary data to facilitate troubleshooting of the problem without having to install software or download tools from Dell and without having access to the Internet from the server operating system or iDRAC.

You can generate a health report of the server and then export the Collection log:

- To a location on the management station (local).
- To a shared network location such as Common Internet File System (CIFS) or Network File Share (NFS). To export to a network share such as CIFS or NFS, direct network connectivity to the iDRAC shared or dedicated network port is required.
- To Dell EMC.

The SupportAssist Collection is generated in the standard ZIP format. The collection may contain the following information:

- Hardware inventory for all components (includes system component configuration and firmware details, Motherboard System Event Logs, iDRAC state information and Lifecycle Controller logs).
- Operating system and application information.
- Storage Controller logs.
- iDRAC Debug Logs.
- It contains an HTML5 viewer, that can be accessed once the collection is complete.
- The collection provides a massive amount of detailed system information and logs in a user friendly format that can be viewed without uploading the collection to the Tech Support site.

After the data is generated, you can view the data which contains multiple XML files and log files.

Each time the data collection is performed, an event is recorded in the Lifecycle Controller log. The event includes information such as the user who initiated the report, interface used, and the date and time of export.

On Windows, If WMI is disabled, OS Collector collection stops with an error message.

Check the appropriate privilege levels and make sure there is no firewall or security settings that may prevent from collecting the registry or software data.

Before generating the health report, make sure:

- Lifecycle Controller is enabled.
- Collect System Inventory On Reboot (CSIOR) is enabled.
- You have Login and Server Control privileges.

Generating SupportAssist Collection manually using iDRAC web interface

To generate the SupportAssist collection manually:

1. In the iDRAC Web interface, go to **Maintenance** > **SupportAssist**.
2. If the server is not registered for SupportAssist, SupportAssist Registration Wizard is displayed. Click **Cancel** > **Cancel Registration**.
3. Click **Start a Collection**.
4. Select the data sets to be included in the Collection.
5. You can opt to filter the collection for PII.
6. Select the destination where Collection needs to be saved.
   a. If the server is connected to the internet and the **Send Now** option is enabled, then selecting this option transmits the Collection log to Dell EMC SupportAssist.

b **Save locally** option allows you to save the generated Collection in the local system.

c **Save to Network** option saves the generated Collection to user defined CIFS or NFS share location.

> **NOTE: If *Save to Network* is selected, and no default location is available, the provided network details will be saved as default location for future collections. If default location already exist, then the collection will use the details specified once only.**

If **Save to Network** option is selected, the user provided network details is saved as defaults (if no prior network share location have been saved) for any future collections.

7 Click **Collect** to proceed with Collection generation.

8 If prompted, accept the **End User Level Agreement (EULA)** to continue.

OS and Application Data option is grayed out and not selectable if:

- iSM is not installed or running in Host OS, or
- OS Collector has been removed from iDRAC, or
- OS-BMC pass through is disabled in iDRAC, or
- cached OS Application data is not available in iDRAC from a previous collection

Settings

This page allows you to configure the collection log settings, and if registered, you can update the contact details, enable or disable email notifications, and change the language settings.

Collection Settings

You can save the collections to a preferred network location. Use **Set Archive Directory** to set the network location. You can save the collections to a preferred network location. Use Set Archive Directory to set the network location. Enter the type of Protocol (CIFS/NFS) that you want to opt for, corresponding IP Address, Share Name, Domain Name, User Name and Password before you Test Network Connection. The Test Network Connection button will confirm a connection to the destination share.

If registered, you can opt to include Identification information while sending the data to Dell in the Collection Settings.

You can enable and schedule **Automatic Collection** options to avoid any manual intervention and keep a periodical check of the system. By default, when an event is triggered and support case is opened, SupportAssist is configured to automatically collect the system logs from the device that generated the alert and upload it to Dell. You can enable or disable Automatic Collection based on events. You can schedule the Automatic collections based on your suitable requirements. The available options are, weekly, monthly, quarterly or never. You can also configure the date and time for the scheduled periodic events. You have the option to enable or disable **ProSupport Plus Recommendation Report** while configuring the Automatic Collections.

Contact Information

This page shows the contact information details that were added during the registration of SupportAssist, and allows you to update them.

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Frequently asked questions

This section lists the frequently asked questions for the following:

- System Event Log
- Network security
- Active Directory
- Single Sign On
- Smart card login
- Virtual console
- Virtual media
- vFlash SD card
- SNMP authentication
- Storage devices
- iDRAC Service Module
- RACADM
- Miscellaneous

Topics:

- System Event Log
- Network security
- Active Directory
- Single Sign-On
- Smart card login
- Virtual console
- Virtual media
- vFlash SD card
- SNMP authentication
- Storage devices
- iDRAC Service Module
- RACADM
- Permanently setting the default password to calvin
- Miscellaneous

System Event Log

While using iDRAC Web interface through Internet Explorer, why does SEL not save using the Save As option?

This is due to a browser setting. To resolve this:

1 In Internet Explorer, go to **Tools** > **Internet Options** > **Security** and select the zone you are attempting to download in. For example, if the iDRAC device is on the local intranet, select **Local Intranet** and click **Custom level...**.

2 In the **Security Settings** window, under **Downloads** make sure that the following options are enabled:
   - Automatic prompting for file downloads (if this option is available)

- File download

CAUTION: To make sure that the computer used to access iDRAC is safe, under Miscellaneous, do not enable the Launching applications and unsafe files option.

Network security

While accessing the iDRAC Web interface, a security warning appears stating that the SSL certificate issued by the Certificate Authority (CA) is not trusted.

iDRAC includes a default iDRAC server certificate to ensure network security while accessing through the Web-based interface and remote RACADM. This certificate is not issued by a trusted CA. To resolve this, upload a iDRAC server certificate issued by a trusted CA (for example, Microsoft Certificate Authority, Thawte or Verisign).

Why the DNS server not registering iDRAC?

Some DNS servers register iDRAC names that contain only up to 31 characters.

When accessing the iDRAC Web-based interface, a security warning is displayed stating that the SSL certificate host name does not match the iDRAC host name.

iDRAC includes a default iDRAC server certificate to ensure network security while accessing through the Web-based interface and remote RACADM. When this certificate is used, the Web browser displays a security warning because the default certificate that is issued to iDRAC does not match the iDRAC host name (for example, the IP address).

To resolve this, upload an iDRAC server certificate issued to the IP address or the iDRAC host name. When generating the CSR (used for issuing the certificate), make sure that the common name (CN) of the CSR matches the iDRAC IP address (if certificate issued to IP) or the registered DNS iDRAC name (if certificate is issued to iDRAC registered name).

To make sure that the CSR matches the registered DNS iDRAC name:

1. In iDRAC Web interface, go to **Overview** > **iDRAC Settings** > **Network**. The **Network** page is displayed.
2. In the **Common Settings** section:
   - Select the **Register iDRAC on DNS** option.
   - In the **DNS iDRAC Name** field, enter the iDRAC name.
3. Click **Apply**.

Why am I unable to complete operations that involve a remote CIFS share?

Import/export or any other remote file share operations that involve a CIFS share fail if they use only SMBv1. Ensure that the SMBv2 protocol is enabled on the server providing SMB/CIFS share. Refer to the Operating System documentation on how to enable the SMBv2 protocol.

Active Directory

Active Directory login failed. How to resolve this?

To diagnose the problem, on the **Active Directory Configuration and Management** page, click **Test Settings**. Review the test results and fix the problem. Change the configuration and run the test until the test user passes the authorization step.

In general, check the following:

- While logging in, make sure that you use the correct user domain name and not the NetBIOS name. If you have a local iDRAC user account, log into iDRAC using the local credentials. After logging in, make sure that:
  - The **Active Directory Enabled** option is selected on the **Active Directory Configuration and Management** page.
  - The DNS setting is correct on the **iDRAC Networking configuration** page.
  - The correct Active Directory root CA certificate is uploaded to iDRAC if certificate validation was enabled.
  - The iDRAC name and iDRAC Domain name matches the Active Directory environment configuration if you are using extended schema.
  - The Group Name and Group Domain Name matches the Active Directory configuration if you are using standard schema.
  - If the user and the iDRAC object is in different domain, then do not select the **User Domain from Login** option. Instead select **Specify a Domain** option and enter the domain name where the iDRAC object resides.
- Check the domain controller SSL certificates to make sure that the iDRAC time is within the valid period of the certificate.

Active Directory login fails even if certificate validation is enabled. The test results display the following error message. Why does this occur and how to resolve this?

```
ERROR: Can't contact LDAP server, error:14090086:SSL
routines:SSL3_GET_SERVER_CERTIFICATE:certificate verify failed: Please check the correct
Certificate Authority (CA) certificate has been uploaded to iDRAC. Please also check if the
iDRAC date is within the valid period of the certificates and if the Domain Controller Address
configured in iDRAC matches the subject of the Directory Server Certificate.
```

If certificate validation is enabled, when iDRAC establishes the SSL connection with the directory server, iDRAC uses the uploaded CA certificate to verify the directory server certificate. The most common reasons for failing certification validation are:

- iDRAC date is not within the validity period of the server certificate or CA certificate. Check the iDRAC time and the validity period of your certificate.
- The domain controller addresses configured in iDRAC does not match the Subject or Subject Alternative Name of the directory server certificate. If you are using an IP address, read the next question. If you are using FQDN, make sure you are using the FQDN of the domain controller and not the domain. For example, **servername.example.com** instead of **example.com**.

Certificate validation fails even if IP address is used as the domain controller address. How to resolve this?

Check the Subject or Subject Alternative Name field of your domain controller certificate. Normally, Active Directory uses the host name and not the IP address of the domain controller in the Subject or Subject Alternative Name field of the domain controller certificate. To resolve this, do any of the following:

- Configure the host name (FQDN) of the domain controller as the *domain controller address(es)* on iDRAC to match the Subject or Subject Alternative Name of the server certificate.
- Reissue the server certificate to use an IP address in the Subject or Subject Alternative Name field, so that it matches the IP address configured in iDRAC.
- Disable certificate validation if you choose to trust this domain controller without certificate validation during the SSL handshake.

How to configure the domain controller address(es) when using extended schema in a multiple domain environment?

This must be the host name (FQDN) or the IP address of the domain controller(s) that serves the domain in which the iDRAC object resides.

When to configure Global Catalog Address(es)?

If you are using standard schema and the users and role groups are from different domains, Global Catalog Address(es) are required. In this case, you can use only Universal Group.

If you are using standard schema and all the users and role groups are in the same domain, Global Catalog Address(es) are not required.

If you are using extended schema, the Global Catalog Address is not used.

How does standard schema query work?

iDRAC connects to the configured domain controller address(es) first. If the user and role groups are in that domain, the privileges are saved.

If Global Controller Address(es) is configured, iDRAC continues to query the Global Catalog. If additional privileges are retrieved from the Global Catalog, these privileges are accumulated.

Does iDRAC always use LDAP over SSL?

Yes. All the transportation is over secure port 636 and/or 3269. During test setting, iDRAC does a LDAP CONNECT only to isolate the problem, but it does not do an LDAP BIND on an insecure connection.

Why does iDRAC enable certificate validation by default?

iDRAC enforces strong security to ensure the identity of the domain controller that iDRAC connects to. Without certificate validation, a hacker can spoof a domain controller and hijack the SSL connection. If you choose to trust all the domain controllers in your security boundary without certificate validation, you can disable it through the Web interface or RACADM.

Does iDRAC support the NetBIOS name?

Not in this release.

Why does it take up to four minutes to log in to iDRAC using Active Directory Single Sign–On or Smart Card Login?

The Active Directory Single Sign–On or Smart Card log in normally takes less than 10 seconds, but it may take up to four minutes to log in if you have specified the preferred DNS server and the alternate DNS server, and the preferred DNS server has failed. DNS time-outs are expected when a DNS server is down. iDRAC logs you in using the alternate DNS server.

The Active Directory is configured for a domain present in Windows Server 2008 Active Directory. A child or sub domain is present for the domain, the user and group is present in the same child domain, and the user is a member of that group. When trying to log in to iDRAC using the user present in the child domain, Active Directory Single Sign-On login fails.

This may be because of the an incorrect group type. There are two kinds of Group types in the Active Directory server:

- Security — Security groups allow you to manage user and computer access to shared resources and to filter group policy settings.
- Distribution — Distribution groups are intended to be used only as email distribution lists.

Always make sure that the group type is Security. You cannot use distribution groups to assign permission on any object, however use them to filter group policy settings.

Single Sign-On

SSO login fails on Windows Server 2008 R2 x64. What are the settings required to resolve this?

1. Run the **technet.microsoft.com/en-us/library/dd560670(WS.10).aspx** for the domain controller and domain policy.
2. Configure the computers to use the DES-CBC-MD5 cipher suite.
   These settings may affect compatibility with client computers or services and applications in your environment. The Configure encryption types allowed for Kerberos policy setting is located at **Computer Configuration** > **Security Settings** > **Local Policies** > **Security Options**.
3. Make sure that the domain clients have the updated GPO.
4. At the command line, type `gpupdate /force` and delete the old key tab with `klist purge` command.
5. After the GPO is updated, create the new keytab.
6. Upload the keytab to iDRAC.

You can now log in to iDRAC using SSO.

Why does SSO login fail with Active Directory users on Windows 7 and Windows Server 2008 R2?

You must enable the encryption types for Windows 7 and Windows Server 2008 R2. To enable the encryption types:

1 Log in as administrator or as a user with administrative privilege.
2 Go to **Start** and run **gpedit.msc**. The **Local Group Policy Editor** window is displayed.
3 Go to **Local Computer Settings** > **Windows Settings** > **Security Settings** > **Local Policies** > **Security Options**.
4 Right-click **Network Security: Configure encryption types allowed for kerberos** and select **Properties**.
5 Enable all the options.
6 Click **OK**. You can now log in to iDRAC using SSO.

Perform the following additional settings for Extended Schema:

1 In the **Local Group Policy Editor** window, navigate to **Local Computer Settings** > **Windows Settings** > **Security Settings** > **Local Policies** > **Security Options** .
2 Right-click **Network Security: Restrict NTLM: Outgoing NTLM traffic to remote server** and select **Properties**.
3 Select **Allow all**, click **OK**, and close the **Local Group Policy Editor** window.
4 Go to **Start** and run cmd. The command prompt window is displayed.
5 Run the command `gpupdate /force`. The group policies are updated. Close the command prompt window.
6 Go to **Start** and run regedit. The **Registry Editor** window is displayed.
7 Navigate to **HKEY_LOCAL_MACHINE** > **System** > **CurrentControlSet** > **Control** > **LSA** .
8 In the right-pane, right-click and select **New** > **DWORD (32-bit) Value**.
9 Name the new key as **SuppressExtendedProtection**.
10 Right-click **SuppressExtendedProtection** and click **Modify**.
11 In the **Value** data field, type **1** and click **OK**.
12 Close the **Registry Editor** window. You can now log in to iDRAC using SSO.

If you have enabled SSO for iDRAC and you are using Internet Explorer to log in to iDRAC, SSO fails and you are prompted to enter your user name and password. How to resolve this?

Make sure that the iDRAC IP address is listed in the **Tools** > **Internet Options** > **Security** > **Trusted sites**. If it is not listed, SSO fails and you are prompted to enter your user name and password. Click **Cancel** and proceed.

Smart card login

It takes up to four minutes to log into iDRAC using Active Directory Smart Card login.

The normal Active Directory Smart Card login normally takes less than 10 seconds, however it may take up to four minutes if you have specified the preferred DNS server and the alternate DNS server in the **Network** page, and the preferred DNS server has failed. DNS time-outs are expected when a DNS server is down. iDRAC logs you in using the alternate DNS server.

ActiveX plug-in unable to detect the Smart Card reader.

Make sure that the smart card is supported on the Microsoft Windows operating system. Windows supports a limited number of smart card Cryptographic Service Providers (CSPs).

In general, check if the smart card CSPs are present on a particular client, insert the smart card in the reader at the Windows logon (Ctrl-Alt-Del) screen and check if Windows detects the smart card and displays the PIN dialog-box.

Incorrect Smart Card PIN.

Check if the smart card is locked due to too many attempts with an incorrect PIN. In such cases, contact the smart card issuer in the organization to get a new smart card.

Virtual console

What is the required Java version to launch Virtual Console?

You need Java 8 or later to use this feature and to launch iDRAC Virtual Console over an IPv6 network.

Virtual Console session is active even if you have logged out of iDRAC web interface. Is this the expected behavior?

Yes. Close the Virtual Console Viewer window to log out of the corresponding session.

Can a new remote console video session be started when the local video on the server is turned off?

Yes.

Why does it take 15 seconds to turn off the local video on the server after requesting to turn off the local video?

It gives a local user an opportunity to take any action before the video is switched off.

Is there a time delay when turning on the local video?

No, after a local video turn ON request is received by iDRAC, the video is turned on instantly.

Can the local user also turn off or turn on the video?

When the local console is disabled, the local user cannot turn off or turn on the video.

Does switching off the local video also switch off the local keyboard and mouse?

No.

Does turning off the local console turn off the video on the remote console session?

No, turning the local video on or off is independent of the remote console session.

What privileges are required for an iDRAC user to turn on or turn off the local server video?

Any user with iDRAC configuration privileges can turn on or turn off the local console.

How to get the current status of the local server video?

The status is displayed on the Virtual Console page.

To display the status of the object `iDRAC.VirtualConsole.AttachState`, use the following command:

```
racadm get idrac.virtualconsole.attachstate
```

Or, use the following command from a Telnet, SSH, or a remote session:

```
racadm -r (iDrac IP) -u (username) -p (password) get iDRAC.VirtualConsole.AttachState
```

The status is also seen on the Virtual Console OSCAR display. When the local console is enabled, a green status is displayed next to the server name. When disabled, a yellow dot indicates that iDRAC has locked the local console.

Why is the bottom of the system screen not seen from the Virtual Console window?

Make sure that the management station's monitor resolution is set to 1280 x 1024.

Why is the Virtual Console Viewer window garbled on Linux operating system?

The console viewer on Linux requires a UTF-8 character set. Check your locale and reset the character set if required.

Why does the mouse not synchronize under the Linux text console in Lifecycle Controller?

Virtual Console requires the USB mouse driver, but the USB mouse driver is available only under the X-Window operating system. In the Virtual Console viewer, do any of the following:

- Go to **Tools** > **Session Options** > **Mouse** tab. Under **Mouse Acceleration**, select **Linux**.
- Under the **Tools** menu, select **Single Cursor** option.

How to synchronize the mouse pointers on the Virtual Console Viewer window?

Before starting a Virtual Console session, make sure that the correct mouse is selected for your operating system.

Make sure that the **Single Cursor** option under **Tools** in the iDRAC Virtual Console menu is selected on iDRAC Virtual Console client. The default is two cursor mode.

Can a keyboard or mouse be used while installing a Microsoft operating system remotely through the Virtual Console?

No. When you remotely install a supported Microsoft operating system on a system with Virtual Console enabled in the BIOS, an EMS Connection Message is sent that requires that you select **OK** remotely. You must either select **OK** on the local system or restart the remotely managed server, reinstall, and then turn off the Virtual Console in BIOS.

This message is generated by Microsoft to alert the user that Virtual Console is enabled. To make sure that this message does not appear, always turn off Virtual Console in the iDRAC Settings utility before remotely installing an operating system.

Why does the Num Lock indicator on the management station not reflect the status of the Num Lock on the remote server?

When accessed through the iDRAC, the Num Lock indicator on the management station does not necessarily coincide with the state of the Num Lock on the remote server. The state of the Num Lock depends the setting on the remote server when the remote session is connected, regardless of the state of the Num Lock on the management station.

Why do multiple Session Viewer windows appear when a Virtual Console session is established from the local host?

You are configuring a Virtual Console session from the local system. This is not supported.

If a Virtual Console session is in-progress and a local user accesses the managed server, does the first user receive a warning message?

No. If a local user accesses the system, both have control of the system.

How much bandwidth is required to run a Virtual Console session?

It is recommended to have a 5 MBPS connection for good performance. A 1 MBPS connection is required for minimal performance.

What is the minimum system requirements for the management station to run Virtual Console?

The management station requires an Intel Pentium III 500 MHz processor with at least 256 MB of RAM.

Why does Virtual Console Viewer window sometimes displays No Signal message?

You may see this message because the iDRAC Virtual Console plug-in is not receiving the remote server desktop video. Generally, this behavior may occur when the remote server is turned off. Occasionally, the message may be displayed due to a remote server desktop video reception malfunction.

Why does Virtual Console Viewer window sometimes display an Out of Range message?

You may see this message because a parameter necessary to capture video is beyond the range for which the iDRAC can capture the video. Parameters such as display resolution or refresh rate too high causes an out of range condition. Normally, physical limitations such as video memory size or bandwidth sets the maximum range of parameters.

When starting a Virtual Console session from iDRAC web interface, why is an ActiveX security popup displayed?

iDRAC may not be in the trusted site list. To prevent the security popup from appearing every time you begin a Virtual Console session, add iDRAC to the trusted site list in the client browser:

1 Click **Tools** > **Internet Options** > **Security** > **Trusted sites**.
2 Click **Sites** and enter the IP address or the DNS name of iDRAC
3 Click **Add**.
4 Click **Custom Level**.
5 In the **Security Settings** window, select **Prompt** under **Download unsigned ActiveX Controls**.

Why is the Virtual Console Viewer window blank?

If you have Virtual Media privilege, but not Virtual Console privilege, you can start the viewer to access the virtual media feature, but the managed server's console is not displayed.

Why doesn't the mouse synchronize in DOS when using Virtual Console?

The Dell BIOS is emulating the mouse driver as a PS/2 mouse. By design, the PS/2 mouse uses relative position for the mouse pointer, which causes the lag in syncing. iDRAC has a USB mouse driver that allows absolute position and closer tracking of the mouse pointer. Even if iDRAC passes the USB absolute mouse position to the Dell BIOS, the BIOS emulation converts it back to relative position and the behavior remains. To fix this problem, set the mouse mode to USC/Diags in the Configuration screen.

After launching the Virtual Console, the mouse cursor is active on the Virtual Console, but not on the local system. Why does this occur and how to resolve this?

This occurs if the **Mouse Mode** is set to **USC/Diags**. Press **Alt + M** hot key to use the mouse on the local system. Press **Alt + M** again to use the mouse on the Virtual Console.

Why does Linux SysRq key not work with Internet Explorer?

The Linux SysRq key behavior is different when using Virtual Console from Internet Explorer. To send the SysRq key, press the **Print Screen** key and release while holding the **Ctrl** and **Alt** keys. To send the SysRq key to a remote Linux server though iDRAC, while using Internet Explorer:

1 Activate the magic key function on the remote Linux server. You can use the following command to activate it on the Linux terminal:
```
echo 1 > /proc/sys/kernel/sysrq
```
2 Activate the keyboard pass-through mode of Active X Viewer.
3 Press **Ctrl+Alt+Print Screen**.
4 Release only **Print Screen**.
5 Press **Print Screen+Ctrl+Alt**.

NOTE: The SysRq feature is currently not supported with Internet Explorer and Java.

Why is the "Link Interrupted" message displayed at the bottom of the Virtual Console?

When using the shared network port during a server reboot, iDRAC is disconnected while BIOS is resetting the network card. This duration is longer on 10 Gb cards, and is also exceptionally long if the connected network switch has Spanning Tree Protocol (STP) enabled. In this case, it is recommended to enable "portfast" for the switch port connected to the server. In most cases, the Virtual Console restores itself.

Launching Virtual Console with HTML5 fails when browser is set to use only TLS 1.0.

Ensure that the browser is set to use TLS 1.1 or higher.

Launching Virtual Console with Java plug-in fails after the iDRAC firmware was updated.

Delete the Java cache and then launch the virtual console.

Virtual media

Why does the Virtual Media client connection sometimes drop?

When a network time-out occurs, iDRAC firmware drops the connection, disconnecting the link between the server and the virtual drive.

If you change the CD in the client system, the new CD may have an autostart feature. In this case, the firmware can time out and the connection is lost if the client system takes too long to read the CD. If a connection is lost, reconnect from the GUI and continue the previous operation.

If the Virtual Media configuration settings are changed in the iDRAC web interface or through local RACADM commands, any connected media is disconnected when the configuration change is applied.

To reconnect to the Virtual Drive, use the Virtual Media **Client View** window.

Why does a Windows operating system installation through Virtual Media take an extended amount of time?

If you are installing the Windows operating system using the *Dell Systems Management Tools and Documentation DVD* and the network connection is slow, the installation procedure may require an extended amount of time to access iDRAC web interface due to network latency. The installation window does not indicate the installation progress.

How to configure the virtual device as a bootable device?

On the managed system, access BIOS Setup and go to the boot menu. Locate the virtual CD, virtual floppy, or vFlash and change the device boot order as required. Also, press the "spacebar" key in the boot sequence in the CMOS setup to make the virtual device bootable. For example, to boot from a CD drive, configure the CD drive as the first device in the boot order.

What are the types of media that can be set as a bootable device?

iDRAC allows you to boot from the following bootable media:

- CDROM/DVD Data media
- ISO 9660 image
- 1.44 Floppy disk or floppy image
- A USB key that is recognized by the operating system as a removable disk
- A USB key image

How to make the USB key a bootable device?

You can also boot with a Windows 98 startup disk and copy system files from the startup disk to the USB key. For example, from the DOS prompt, type the following command:

```
sys a: x: /s
```

where, x: is the USB key that is required to be set as a bootable device.

The Virtual Media is attached and connected to the remote floppy. But, cannot locate the Virtual Floppy/Virtual CD device on a system running Red Hat Enterprise Linux or the SUSE Linux operating system. How to resolve this?

Some Linux versions do not auto-mount the virtual floppy drive and the virtual CD drive in the same method. To mount the virtual floppy drive, locate the device node that Linux assigns to the virtual floppy drive. To mount the virtual floppy drive:

1 Open a Linux command prompt and run the following command:

```
grep "Virtual Floppy" /var/log/messages
```

2 Locate the last entry to that message and note the time.
3 At the Linux prompt, run the following command:
```
grep "hh:mm:ss" /var/log/messages
```
where, hh:mm:ss is the time stamp of the message returned by grep in step 1.
4 In step 3, read the result of the grep command and locate the device name that is given to the Virtual Floppy.
5 Make sure that you are attached and connected to the virtual floppy drive.
6 At the Linux prompt, run the following command:
```
mount /dev/sdx /mnt/floppy
```
where, `/dev/sdx` is the device name found in step 4 and `/mnt/floppy` is the mount point.

To mount the virtual CD drive, locate the device node that Linux assigns to the virtual CD drive. To mount the virtual CD drive:

1 Open a Linux command prompt and run the following command:
```
grep "Virtual CD" /var/log/messages
```
2 Locate the last entry to that message and note the time.
3 At the Linux prompt, run the following command:
```
grep "hh:mm:ss" /var/log/messages
```
where, hh:mm:ss is the timestamp of the message returned by grep in step 1.
4 In step 3, read the result of the grep command and locate the device name that is given to the *Dell Virtual* CD.
5 Make sure that the Virtual CD Drive is attached and connected.
6 At the Linux prompt, run the following command:
```
mount /dev/sdx /mnt/CD
```
where: `/dev/sdx` is the device name found in step 4 and `/mnt/floppy` is the mount point.

Why are the virtual drives attached to the server removed after performing a remote firmware update using the iDRAC web interface?

Firmware updates cause the iDRAC to reset, drop the remote connection, and unmount the virtual drives. The drives reappear when iDRAC reset is complete.

Why are all the USB devices detached after connecting a USB device?

Virtual media devices and vFlash devices are connected as a composite USB device to the Host USB BUS, and they share a common USB port. Whenever any virtual media or vFlash USB device is connected to or disconnected from the host USB bus, all the Virtual Media and vFlash devices are disconnected momentarily from the host USB bus, and then they are reconnected. If the host operating system uses a virtual media device, do not attach or detach one or more virtual media or vFlash devices. It is recommended that you connect all the required USB devices first before using them.

What does the USB Reset do?

It resets the remote and local USB devices connected to the server.

How to maximize Virtual Media performance?

To maximize Virtual Media performance, launch the Virtual Media with the Virtual Console disabled or do one of the following:

- Change the performance slider to Maximum Speed.
- Disable encryption for both Virtual Media and Virtual Console.

  NOTE: In this case, the data transfer between managed server and iDRAC for Virtual Media and Virtual Console will not be secured.
- If you are using any Windows server operating systems, stop the Windows service named Windows Event Collector. To do this, go to **Start** > **Administrative Tools** > **Services**. Right-click **Windows Event Collector** and click **Stop**.

While viewing the contents of a floppy drive or USB key, a connection failure message is displayed if the same drive is attached through the virtual media?

Simultaneous access to virtual floppy drives is not allowed. Close the application used to view the drive contents before attempting to virtualize the drive.

What file system types are supported on the Virtual Floppy Drive?

The virtual floppy drive supports FAT16 or FAT32 file systems.

Why is an error message displayed when trying to connect a DVD/USB through virtual media even though the virtual media is currently not in use?

The error message is displayed if Remote File Share (RFS) feature is also in use. At a time, you can use RFS or Virtual Media and not both.

Launching virtual media with HTML5 fails when browser is set to use only TLS 1.0.

Ensure that the browser is set to use TLS 1.1 or higher.

Virtual Media inaccessible even though iDRAC shows Virtual Media *Connection Status* as *Connected*.

If you try to access Virtual Media using ActiveX or Java plug-in while **Attach Mode** is set to **Detach** in iDRAC, then the connection status may show as **Connected**. Change the **Attach Mode** to either **Auto-attach** or **Attach** to access the Virtual Media.

vFlash SD card

When is the vFlash SD card locked?

The vFlash SD card is locked when an operation is in-progress. For example, during an initialize operation.

SNMP authentication

Why is the message 'Remote Access: SNMP Authentication Failure' displayed?

As part of discovery, IT Assistant attempts to verify the get and set community names of the device. In IT Assistant, you have the get community name = public and the set community name = private. By default, the SNMP agent community name for iDRAC agent is public. When IT Assistant sends out a set request, the iDRAC agent generates the SNMP authentication error because it accepts requests only from community = public.

To prevent SNMP authentication errors from being generated, you must enter community names that are accepted by the agent. Since the iDRAC only allows one community name, you must use the same get and set community name for IT Assistant discovery setup.

Storage devices

Information for all the storage devices connected to the system are not displayed and OpenManage Storage Management displays more storage devices than iDRAC. Why?

iDRAC displays information for only the Comprehensive Embedded Management (CEM) supported devices.

In MX platforms with HBA 330MMZ and two IOMs, EEMI message for the IOM removal is generated with the id ENC42, however, EEMI message (ENC41) for IOM restoration is not generated.

To confirm restoration of the IOM in iDRAC web interface:

1 Go to **Storage** > **Overview** > **Enclosures**

2 Select the enclosure.

3 Under **Advanced Properties**, see the value for **Redundant Path**.

If the **Redundant Path** value is **Present**, then IOM restoration is confirmed.

iDRAC Service Module

Before installing or running the iDRAC Service Module, should the OpenManage Server Administrator be uninstalled?

No you do not have to uninstall Server Administrator. Before you install or run the iDRAC Service Module, make sure that you have stopped the features of Server Administrator that the iDRAC Service Module provides.

How to check whether iDRAC Service Module is installed in the host operating system?

To know if the iDRAC Service Module is installed on the system,

- On systems running Windows:
  Open the **Control Panel**, verify if iDRAC Service Module is listed in the list of installed programs displayed.
- On systems running Linux:
  Run the command `rpm –qi dcism`. If the iDRAC Service Module is installed, the status displayed is **installed**.

NOTE: To check if the iDRAC Service Module is installed on Red Hat Enterprise Linux 7, use the `systemctl status dcismeng.service` command instead of the `init.d` command.

How to check the version number of the iDRAC Service Module installed in the system?

To check the version of the iDRAC Service Module in the system, do any of the following:

- Click **Start** > **Control Panel** > **Programs and Features**. The version of the installed iDRAC Service Module is listed in the **Version** tab.
- Go to **My Computer** > **Uninstall or change a program**.

What is the minimum permission level required to install the iDRAC Service Module?

To install the iDRAC Service Module, you must have administrator level privileges.

On iDRAC Service Module version 2.0 and earlier, while installing the iDRAC Service Module, an error message is displayed stating this is not a supported server. Consult the User Guide for additional information about the supported servers. How to resolve this error?

Before installing the iDRAC Service Module, make sure that the server is a 12th generation PowerEdge server or later. Also, make sure that you have a 64-bit system.

The following message is displayed in the OS log, even when the OS to iDRAC Pass-through over USBNIC is configured properly. Why?

The iDRAC Service Module is unable to communicate with iDRAC using the OS to iDRAC Pass-through channel

iDRAC Service Module uses the OS to iDRAC pass-through over USB NIC feature to establish the communication with iDRAC. Sometimes, the communication is not established though the USB NIC interface is configured with the correct IP endpoints. This may happen when the host operating system routing table has multiple entries for the same destination mask and the USB NIC destination is not listed as the first one in routing order.

Table 63. Example of a routing order

Destination	Gateway	Genmask	Flags	Metric	Ref	Use Iface
default	10.94.148.1	0.0.0.0	UG	1024	0	0 em1
10.94.148.0	0.0.0.0	255.255.255.0	U	0	0	0 em1

Destination	Gateway	Genmask	Flags	Metric	Ref	Use Iface
link-local	0.0.0.0	255.255.255.0	U	0	0	0 em1
link-local	0.0.0.0	255.255.255.0	U	0	0	0 enp0s20u12u3

In the example **enp0s20u12u3** is the USB NIC interface. The link-local destination mask is repeated and the USB NIC is not the first one in the order. This results in the connectivity issue between iDRAC Service Module and iDRAC over the OS to iDRAC Pass-through. To troubleshoot the connectivity issue, make sure that the iDRAC USBNIC IPv4 address (by default it is 169.254.1.1) is reachable from the host operating system.

If not:

- Change the iDRAC USBNIC address on a unique destination mask.
- Delete the entries that are not required from the routing table to make sure that USB NIC is chosen by route when the host wants to reach the iDRAC USB NIC IPv4 address.

On iDRAC Service Module version 2.0 and earlier, when uninstalling iDRAC Service Module from a VMware ESXi server, the virtual switch is named as vSwitchiDRACvusb and port group as iDRAC Network on the vSphere client. How to delete them?

While installing iDRAC Service Module VIB on a VMware ESXi server, iDRAC Service Module creates the vSwtich and Portgroup to communicate with iDRAC over the OS to iDRAC Pass-through in USB NIC mode. After the uninstallation, the virtual switch **vSwitchiDRACvusb** and the port group **iDRAC Network** are not deleted. To delete it manually, perform one of the following steps:

- Go to vSphere Client Configuration wizard and delete the entries.
- Go to the Esxcli and type the following commands:
  - To remove port group: `esxcfg-vmknic -d -p "iDRAC Network"`
  - To remove vSwitch: `esxcfg-vswitch -d vSwitchiDRACvusb`

NOTE: You can reinstall iDRAC Service Module on the VMware ESXi server as this is not a functional issue for the server.

Where is the Replicated Lifecycle log available on the operating system?

To view the replicated Lifecycle logs:

Table 64. Lifecycle logs location

Operating System	Location
Microsoft Windows	**Event viewer** > **Windows Logs** > **System**. All the iDRAC Service Module Lifecycle logs are replicated under the source name **iDRAC Service Module**. **NOTE: In iSM version 2.1 and later, Lifecycle logs are replicated under the Lifecycle Controller Log source name. In iSM version 2.0 and earlier, the logs are replicated under iDRAC Service Module source name.** **NOTE: The location of the Lifecycle log can be configured using the iDRAC Service Module installer. You can configure the location while installing iDRAC Service Module or modifying the installer.**
Red Hat Enterprise Linux, SUSE Linux, CentOS, and Citrix XenServer	/var/log/messages
VMware ESXi	/var/log/syslog.log

What are the Linux-dependent packages or executables available for installation while completing the Linux installation?

To see the list of Linux-dependent packages, see the *Linux Dependencies* section in the iDRAC Service Module User's Guide available at www.dell.com/esmmanuals.

RACADM

After performing an iDRAC reset (using the racadm racreset command), if any command is issued, the following message is displayed. What does this indicate?

```
ERROR: Unable to connect to RAC at specified IP address
```

The message indicates that you must wait until the iDRAC completes the reset before issuing another command.

When using RACADM commands and subcommands, some errors are not clear.

You may see one or more of the following errors when using the RACADM commands:

- Local RACADM error messages — Problems such as syntax, typographical errors, and incorrect names.
- Remote RACADM error messages — Problems such as incorrect IP Address, incorrect user name, or incorrect password.

During a ping test to iDRAC, if the network mode is switched between Dedicated and Shared modes, there is no ping response.

Clear the ARP table on your system.

Remote RACADM fails to connect to iDRAC from SUSE Linux Enterprise Server (SLES) 11 SP1.

Make sure that the official openssl and libopenssl versions are installed. Run the following command to install the RPM packages:

```
rpm -ivh --force < filename >
```

where, `filename` is the openssl or libopenssl rpm package file.

For example:

```
rpm -ivh --force openssl-0.9.8h-30.22.21.1.x86_64.rpm
rpm -ivh --force libopenssl0_9_8-0.9.8h-30.22.21.1.x86_64.rpm
```

Why are the remote RACADM and web-based services unavailable after a property change?

It may take a while for the remote RACADM services and the Web-based interface to become available after the iDRAC web server resets.

The iDRAC Web server is reset when:

- The network configuration or network security properties are changed using the iDRAC web user interface.
- The iDRAC.Webserver.HttpsPort property is changed, including when a `racadm set -f <config file>` changes it.
- The **racresetcfg** command is used.
- iDRAC is reset.
- A new SSL server certificate is uploaded.

Why is an error message displayed if you try to delete a partition after creating it using local RACADM?

This occurs because the create partition operation is in-progress. However, the partition is deleted after sometime and a message that the partition is deleted is displayed. If not, wait until the create partition operation is completed and then delete the partition.

Permanently setting the default password to calvin

If your system shipped with a unique default iDRAC password but you want to set *calvin* as the default password, you must use the jumpers available on the system board.

CAUTION: Changing the jumper settings permanently changes the default password to *calvin.* You cannot revert to the unique password even if you reset iDRAC to factory settings.

For information about the jumper location and the procedure, see the documentation for your server at www.dell.com/support.

Miscellaneous

When an OS is installed, hostname may or may not appear/ change automatically.

There are two scenarios:

- Scenario 1: iDRAC is not showing the latest hostname once you install an OS. You need to install OMSA or iSM along with the iDRAC to get the hostname reflected.
- Scenario 2: iDRAC had a hostname for a specific OS and another different OS has been installed and still the hostname is appearing as the old hostname without overwriting the hostname. The reason behind, hostname is an information which is coming from the OS, iDRAC only saves the information. If there is a new OS has been installed, iDRAC does not reset the value of the hostname. However, newer versions of the OSs are capable to update the hostname in iDRAC during the 1st OS startup.

How to find an iDRAC IP address for a blade server?

- **Using OME-Modular web interface**:
  Go to **Devices** > **Compute**. Select the computer sled and iDRAC IP is displayed as **Management IP**.
- **Using OMM Application**: see the Dell EMC OpenManage Mobile User's Guide available at www.dell.com/openmanagemanuals
- **Using Serial Connection**
- **Using LCD**:
  On the main menu, highlight the server, press the check button, select the required server, and press the check button.

How to find the OME Modular IP address?

- **From iDRAC web interface**:
  Go to **iDRAC Settings** > **Management Module**. The **Managment Module** page displays the OME Modular IP address.
-

How to find iDRAC IP address for rack and tower server?

- **From Local RACADM**:
  Use the command **racadm getsysinfo**.
- **From LCD**:
  On the physical server, use the LCD panel navigation buttons to view the iDRAC IP address. Go to **Setup View** > **View** > **iDRAC IP** > **IPv4** or **IPv6** > **IP**.
- **From OpenManage Server Administrator**:
  In the Server Administrator web interface, go to **Modular Enclosure** > **System/Server Module** > **Main System Chassis/Main System** > **Remote Access**.

iDRAC network connection is not working.

For blade servers:

- Ensure that NIC settings, IPv4 or IPv6 settings, and either Static or DHCP is enabled for your network.

For rack and tower servers:

- In shared mode, ensure that the LAN cable is connected to the NIC port where the wrench symbol is present.
- In Dedicated mode, ensure that the LAN cable is connected to the iDRAC LAN port.
- Ensure that NIC settings, IPv4 and IPv6 settings and either Static or DHCP is enabled for your network.

Shared LOM not functional after enabling Link Aggregation Control Protocol (LACP).

The host OS driver for the network adapter must be loaded before LACP is enabled. However, if a passive LACP configuration is in use, the shared LOM may be functional before the host OS driver is loaded. See the switch documentation for LACP configuration.

NOTE: Shared LOM IP of iDRAC is not accessible in pre-boot state when the switch is configured with LACP.

Inserted the blade server into the chassis and pressed the power switch, but it did not power on.

- iDRAC requires up to two minutes to initialize before the server can power on.
- Check OME Modular power budget. The chassis power budget may have exceeded.

How to retrieve an iDRAC administrative user name and password?

You must restore iDRAC to its default settings. For more information, see Resetting iDRAC to factory default settings.

iDRAC on blade server is not responding during boot.

Remove and reinsert the server.

Check OME Modular web interface to see if iDRAC is displayed as an upgradable component. If it does, update the firmware.

If the problem persists, contact technical support.

When attempting to boot the managed server, the power indicator is green, but there is no POST or no video.

This happens due to any of the following conditions:

- Memory is not installed or is inaccessible.
- CPU is not installed or is inaccessible
- Video riser card is missing or not connected properly.

Also, see error messages in iDRAC log using iDRAC web interface or from the server LCD.

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Use case scenarios

This section helps you in navigating to specific sections in the guide to perform typical use case scenarios.

Topics:

- Troubleshooting an inaccessible managed system
- Obtaining system information and assess system health
- Setting up alerts and configuring email alerts
- Viewing and exporting System Event Log and Lifecycle Log
- Interfaces to update iDRAC firmware
- Performing graceful shutdown
- Creating new administrator user account
- Launching servers remote console and mounting a USB drive
- Installing bare metal OS using attached virtual media and remote file share
- Managing rack density
- Installing new electronic license
- Applying IO Identity configuration settings for multiple network cards in single host system reboot

Troubleshooting an inaccessible managed system

After receiving alerts from OpenManage Essentials, Dell Management Console, or a local trap collector, five servers in a data center are not accessible with issues such as hanging operating system or server. Need to identify the cause to troubleshoot and bring up the server using iDRAC.

Before troubleshooting the inaccessible system, make sure that the following prerequisites are met:

- Enable last crash screen
- Alerts are enabled on iDRAC

To identify the cause, check the following in the iDRAC web interface and re-establish the connection to the system:

NOTE: If you cannot access the iDRAC web interface, go to the server, access the LCD panel, write down the IP address or the host name, and then perform the following operations using iDRAC web interface from your management station:

- Server's LED status — Blinking amber or Solid amber.
- Front Panel LCD status or error message — Amber LCD or error message.
- Operating system image is seen in the Virtual Console. If you can see the image, reset the system (warm boot) and log in again. If you are able to log in, the issue is fixed.
- Last crash screen.
- Boot capture video.
- Crash capture video.
- Server Health status — Red *x* icons for the system components with issues.
- Storage array status — Possible array offline or failed
- Lifecycle log for critical events related to system hardware and firmware and the log entries that were logged at the time of system crash.
- Generate Tech Support report and view the collected data.

- Use the monitoring features provided by iDRAC Service Module

Obtaining system information and assess system health

To obtain system information and assess system health:

- In iDRAC Web interface, go to **Overview** > **Summary** to view the system information and access various links on this page to asses system health. For example, you can check the health of the chassis fan.
- You can also configure the chassis locator LED and based on the color, assess the system health.
- If iDRAC Service Module is installed, the operating system host information is displayed.

Setting up alerts and configuring email alerts

To set up alerts and configure email alerts:

1 Enable alerts.
2 Configure the email alert and check the ports.
3 Perform a reboot, power off, or power cycle the managed system.
4 Send test alert.

Viewing and exporting System Event Log and Lifecycle Log

To view and export lifecycle log and system event log (SEL):

1 In iDRAC Web interface, go to **Maintenance** > **System Event Logs** to view SEL and **Lifecycle Log** to view lifecycle log.

   NOTE: The SEL is also recorded in the lifecycle log. Using the filtering options to view the SEL.

2 Export the SEL or lifecycle log in the XML format to an external location (management station, USB, network share, and so on). Alternatively, you can enable remote system logging, so that all the logs written to the lifecycle log are also simultaneously written to the configured remote server(s).
3 If you are using the iDRAC Service Module, export the Lifecycle log to OS log.

Interfaces to update iDRAC firmware

Use the following interfaces to update the iDRAC firmware:

- iDRAC Web interface
- Redfish API
- RACADM CLI (iDRAC)
- Dell Update Package (DUP)
- OME Modular Web interface
- Lifecycle Controller–Remote Services
- Lifecycle Controller
- Dell Remote Access Configuration Tool (DRACT)

Performing graceful shutdown

To perform graceful shutdown, in iDRAC Web interface, go to one of the following locations:

- At **Dashboard** select **Graceful Shutdown** and click **Apply**.

For more information, see the *iDRAC Online Help*.

Creating new administrator user account

You can modify the default local administrator user account or create a new administrator user account. To modify the local administrator user account, see Modifying local administrator account settings.

To create a new administrator account, see the following sections:

- Configuring local users
- Configuring active directory users
- Configuring generic LDAP users

Launching servers remote console and mounting a USB drive

To launch the remote console and mount a USB drive:

1 Connect a USB flash drive (with the required image) to the management station.
2 Use the following method to launch virtual console through the iDRAC Web Interface:
   - Go to **Dashboard** > **Virtual Console** and click **Launch Virtual Console**.

   The **Virtual Console Viewer** is displayed.
3 From the **File** menu, click **Virtual Media** > **Launch Virtual Media**.
4 Click **Add Image** and select the image that is located on the USB flash drive.
   The image is added to the list of available drives.
5 Select the drive to map it. The image on the USB flash drive is mapped to the managed system.

Installing bare metal OS using attached virtual media and remote file share

See the Deploying operating system using remote file share section.

Managing rack density

Before you install additional servers in a rack, you must determine the remaining capacity in the rack.
To assess the capacity of a rack to add additional servers:

1 View the current power consumption data and historical power consumption data for the servers.
2 Based on the data, power infrastructure and cooling system limitations, enable the power cap policy and set the power cap values.

NOTE: It is recommended that you set a cap close to the peak, and then use that capped level to determine how much capacity is remaining in the rack for adding more servers.

Installing new electronic license

See License operations for more information.

Applying IO Identity configuration settings for multiple network cards in single host system reboot

If you have multiple network cards in a server that is part of a Storage Area Network (SAN) environment and you want to apply different virtual addresses, initiator and target configuration settings to those cards, use the I/O Identity Optimization feature to reduce the time in configuring the settings. To do this:

1 Make sure that BIOS, iDRAC, and the network cards are updated to the latest firmware version.
2 Enable IO Identity Optimization.
3 Export the Server Configuration Profile (SCP) file from iDRAC.
4 Edit the I/O Identity optimization settings in the SCP file.
5 Import the SCP file to iDRAC.