NVIDIA UFM Enterprise Appliance Software User Manual v1.6.1

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1 Overview

NVIDIA® UFM® Enterprise Appliance is a powerful platform for managing InfiniBand scale-out computing environments. It is based on Ubuntu 18.04 OS, where the UFM Enterprise software is deployed and running as a Docker container. UFM enables data center operators to efficiently monitor and operate the entire fabric, boost application performance and maximize fabric resource utilization.

2 Software Download

To download the UFM software, please visit NVIDIA's Licensing Portal.

If you do not have a valid license, please fill out the NVIDIA Enterprise Account Registration form to get a UFM evaluation license.

3 Document Revision History

For the list of changes made to this document, refer to Document Revision History.

4 Technical Support

Customers who purchased NVIDIA products directly from NVIDIA are invited to contact us through the following methods:

- E-mail: Enterprisesupport@nvidia.com
- Enterprise Support page: https://www.nvidia.com/en-us/support/enterprise

5 Release Notes

NVIDIA UFM Enterprise Appliance is a powerful platform for managing InfiniBand scale-out computing environments. UFM enables data center operators to efficiently monitor and operate the entire fabric, boost application performance and maximize fabric resource utilization.

5.1 Changes and New Features

Feature	Description
AAA TACACS+ Support	Added support for AAA TACACS+ For more information, please refer to Authentication, Authorization and Accounting (AAA).
	Added support for three TACACS+ servers for AAA - with fallback or weighted priority.
	Added per command authorization AAA TACACS+ support
	Added IPv6 TACACS server support
	Added TACACS+ CLI command to allow the TACACS+ functionality. For more information, refer to TACACAS+.

Feature	Description

CLI Commands	Added the following CLI commands:
	• In Routing:
	  • show {ip | ipv6} route
	  • show {ip | ipv6} default-gateway
	• In AAA Methods:
	  • aaa authentication login default
	  • show aaa
	• In TACACAS+:
	  • tacacs-server
	  • tacacs-server host
	  • show tacacs
	• In Chassis Management:
	  • show files system
	  • show resources
	• In UFM License:
	  • ufm license install
	  • ufm license delete
	  • show ufm license
	  • show files ufm-license
	• In UFM Configuration Management:
	  • ufm configuration delete
	  • ufm configuration export
	  • ufm configuration fetch
	  • ufm configuration import
	  • ufm configuration upload
	  • show files ufm-configuration
	• High-Availability
	  • ufm ha configure
	• In UFM Multi-Port SM:
	  • ufm multi-port-sm
	  • show ufm multi-port-sm
	  • ufm additional-fabric-interfaces
	  • show ufm additional-fabric-interfaces
	• HCA Commands
	  • ib hca-vl15-window
	  • show ib hca-vl15-window
	• In NVIDIA SHARP:
	  • ib sharp dump-files-generation enable
	  • ib sharp dynamic-tree-allocation enable
	  • ib sharp dynamic-tree-algorithm
	  • ib sharp ib-qpc-sl <0-15>
	  • ib sharp ib-sat-qpc-sl <0-15>
	  • ib sharp allocation enable

Client Certificate Authentication	Added support for pinning SAN with RegEx.
UFM Package	Integrated with UFM version 6.15.1-4
UFM HA Package	Integrated with UFM HA version 5.3.1-2
UFM OS	Integrated with UFM OS version 23.10.18-9
MFT Package	Integrated with MFT version mft-4.26.1-3
MLNX_OFED	Integrated with MLNX_OFED version 23.07-0.5.1
Firmware	Integrated with firmware version XX.38.2104 to resolve HCA overheating issue

For UFM Enterprise Changes and New Features, please refer to the UFM Enterprise User Manual.

5.2 Installation Notes

5.2.1 Supported NVIDIA Externally Managed Switches

Type	Model	Latest Tested Firmware Version
NDR switches	• MQM9790	31.2010.6102
HDR switches	• MQM8790	27.2010.6102
EDR switches	• SB7790 • SB7890	15.2010.5108
FDR switches	• SX6025 • SX6015 • SX6005	11.2000.1142

5.2.2 Supported NVIDIA Internally Managed Switches

Type	Model	Latest Tested OS Version
NDR switches	• MQM9700	MLNX-OS 3.11.1014
HDR switches	• MQ8700 • MCS8500 • TQ8100-HS2F • TQ8200-HS2F	MLNX-OS 3.11.1014
EDR switches	• SB7700 • SB7780 • SB7800 • CS7500 • CS7510 • CS7520	MLNX-OS 3.10.5002
FDR switches	• SX6012 • SX6018 • SX6036 • SX6506 • SX6512 • SX6518 • SX6536 • SX1012 • SX6710 • SX6720 • SX1700 • SX1710	MLNX-OS 3.8.1054

For supported HCAs per MLNX_OFED version, please refer to MLNX_OFED Release Notes.

5.2.3 UFM GUI Client Requirements

The platform and GUI requirements are detailed in the following tables:

Platform	Details
Browser	Edge, Internet Explorer, Firefox, Chrome, Opera or Safari
Memory	• Minimum: 6 GB • Recommended: 16 GB

5.2.3.1 MFT Package Version

Platform	Details
MFT	Integrated with MFT version mft-4.26.1-2

5.2.3.2 UFM SM Version

Platform	Type and Version
SM	UFM package includes SM version 5.17.0

5.2.3.3 UFM NVIDIA SHARP Software Version

Platform	Type and Version
NVIDIA® Scalable Hierarchical Aggregation and Reduction Protocol (SHARP)™	UFM package includes NVIDIA SHARP software version 3.5.1

5.3 Bug Fixes in This Release

Ref #	Description
3672810	**Description**: TACACS+ authorization encounter failure when attempting to execute a command with arguments that are exclusively allowed in the configuration file.
	Keywords: TACACS+; Per command Authorization
	Discovered in release: 1.6.0
3673626	**Description**: Accessing the CLI requires the entry of the sudo password.
	Keywords: CLI; Login; Sudo; Password
	Discovered in release: 1.6.0

Refer to UFM Enterprise Software Release Notes for further Bug Fixes.

5.4 Known Issues in This Release

Ref #	Issue
3699419	**Description:** After remanufacturing the UFM Enterprise Appliance from an ISO file as described in Appendix - Deploying UFM Appliance from an ISO File, rebooting or power cycling the host in High-Availability (HA) mode results in the unsuccessful start of the HA services.

	Workaround: Change the crontab option in UFM Enterprise Appliance via the OS shell #crontab -e:
	`@reboot /usr/sbin/netplan apply`
	to:
	`@reboot sleep 240 && /sbin/ip link set up dev idrac`

	Keywords: Reboot; HA; Power Cycle
	Discovered in Release: 1.6.0
3729822	**Description**: The Logs API consistently returns an empty response when logs from previous years are present in the log files.
	Keywords: Logs API, Empty response, Logs file
	Workaround: Include the year in each log line.
	Discovered in Release: v1.6.0

5.5 Changes and New Features History

Feature	Description
Rev 1.5.1	
UFM Package	Integrated with UFM version 6.14.1
MFT Package	Integrated with MFT version mft-4.25.0-200
Cable and Transceivers Burning	UFM supports second-source cable transceivers burn.
Rev 1.5.0	
Command Line Interface (CLI)	Enhanced CLI commands in the following chapters: • In-Service Upgrade • IP Management • UFM data reset • UFM HA nodes
In-Service Upgrade	Added support for in-service upgrade in HA configuration. For more information, refer to In-Service Upgrade.

UFM Factory Reset	Added support for UFM Factory Reset. For more information, refer to Appendix - UFM Factory Reset.
UFM Package	Integrated with UFM version 6.14.0
UFM HA Package	Integrated with UFM HA version 5.1.1-6
UFM OS Package	Integrated with UFM OS version 23.07.18-3
MFT Package	Integrated with MFT version mft-4.25.0-63
Rev 1.4.1	
Command Line Interface (CLI)	Enhanced CLI commands in the following chapters: • System Management • UFM Commands • InfiniBand Commands
UFM Package	Integrated with UFM version 6.13.2
UFM HA Package	Integrated with UFM HA version 5.1.1
	Added support for configuring high-availability with dual-link connectivity for improving the high availability robustness
UFM OS Package	Integrated with UFM OS version 2.1.11
MFT Package	Integrated with MFT version mft-4.24.0-72
Appliance OS License	Added appliance OS license mechanism to allow accessing the Shell with "root" permissions
Rev 1.3.1	
Command Line Interface (CLI)	Added support for Command Line Interface (CLI) for initial configuration of the appliance
UFM Initial Settings	Removed the requirement to set the IPoIB address to the main IB interface used by UFM/ SM (gv.cfg → fabric_interface). Refer to Configuring the Fabric Interface
UFM Package	Integrated with UFM version 6.12.1
UFM HA Package	Integrated with UFM HA version 5.0.1
	Improved UFM HA configuration by setting UFM HA nodes using IP addresses only (removed the need of using hostnames and sync interface names)

UFM Logical Elements	UFM Logical Elements (Environments, Logical Servers, Networks) views are no longer available
UFM OS Package	Integrated with UFM HA version 2.1.7
MFT Package	Integrated with MFT version 4.23.0-104
Rev 1.2.0	
NVIDIA SHARP Software	Updated NVIDIA SHARP software version to v3.1.1.
UFM Package	Integrated with UFM version 6.11.0
UFM HA Package	Integrated with UFM HA version 4.0.0
UFM Logical Elements	UFM Logical Elements (Environments, Logical Servers, Networks) views are deprecated and will no longer be available starting from UFM v1.3.0(January 2023 release)
Rev 1.1.0	
UFM Package	Integrated with UFM version 6.10.0
UFM HA Package	Integrated with UFM HA version 3.0.0
Chassis Health	Added support for chassis health monitoring
Rev 1.0.0	
UFM Package	Integrate with UFM version 6.9.0
UFM HA Package	Integrate with UFM HA version 2.0.0
UFM Plugins	Pluggable platform for advanced functionality and third-party plugins.

5.6 Bug Fixes History

Ref#	Description
3629287	**Description**: UFM3.x unstable HCA due to overheating of transceiver
	Keywords: HCA overheating
	Discovered in release: v1.5.0
3575882	**Description**: UFM event is not generated for a switch down
	Keywords: UFM Event, Switch Down
	Discovered in release: v1.4.1
3565820	**Description: The** UFM start command does not reflect fabric-related issues (such as "no IB interface is running")
	Keywords: UFM start
	Discovered in release: v1.4.3
3590777	**Description**: After upgrading UFM new telemetry data is not being collected and presented in UI Telemetry tab.
	Keywords: Telemetry, Coredump
	Discovered in release: 1.15.0
3549795	**Description:** Fixed ufm_ha_cluster status to show DRBD sync status.
	Keywords: ufm_ha_cluster, DRBD, Sync Status
	Discovered in Release: 1.4.1
3547517	**Description:** Fixed UFM logs REST API returning empty result when SM logs exist on the disk.
	Keywords: Logs, SM logs, Empty
	Discovered in Release: 1.2.0
3469639	**Description**: Fixed REST RDMA server failure every couple of days, causing inability to retrieve ibdiagnet data.
	Keywords: REST RDMA, ibdiagnet
	Discovered in Release: 1.3.1
3499668	**Description:** Fixed the replacement or overwriting of the IPv4 default gateway when specifying an IPv6 default gateway
	Keywords: IPv4. IPv6, Default Gateway, overwrite
	Discovered in Release: 1.4.2
3499983	**Description:** Fixed inability to fetch bootstap certificate when the user is set to "admin"
	Keywords: Bootstap certificate, "admin"
	Discovered in Release: 1.4.1

Ref#	Description
3486980	**Description**: Rectified inability to upload an image or certificate using user admin
	Keywords: Image, Certificate, SCP
	Discovered in Release: 1.4.0
3486981	**Description**: Rectified inability to add multiple NTP servers.
	Keywords: NTP Server
	Discovered in Release: 1.4.0
3468783	**Description**: Fixed UFM version update in /etc/ufm-release upon manual upgrade of UFM CLI
	Keywords: UFM CLI version, Update
	Discovered in Release: 1.4.0
3410826	**Description**: Rectified inability to modify UFM user password
	Keywords: User Password, Update, Fail
	Discovered in Release: 1.3.1
3461058	**Description:** When using the Dynamic Telemetry API to create a new telemetry instance, the log rotation mechanism will not be applied for the newly generated logs of the UFM Telemetry instance
	Keywords: Dynamic, Telemetry, Log-rotate
	Discovered in Release: 1.4.0
3383916	**Description**: Fixed Client CTRL+C server disruption
	Keywords: Client CTRL+C, Server functionality
	Discovered in Release: Rest Over RDMA Image 1.0.0-21
3375414	**Description:** Fixed improper functionality of UFM UI Dashboard
	Keywords: UI Dashboard
	Discovered in Release: 1.2.0
3342713	**Description:** Fixed UFM Health configuration for periodic restarts of the telemetry
	Keywords: UFM Health, Telemetry, Periodic restarts
	Discovered in Release: 1.2.1
3459431	**Description**: UFM System Dump cannot be extracted from UFM 3.0 Enterprise Appliance host when running in high-availability mode.
	Keywords: System Dump, High-Availability
	Discovered in Release: 1.3.1
3461658	**Description**: The network fast recovery configuration (`/opt/ufm/files/conf/opensm/fast_recovery.conf`) is missing when UFM is deployed in Docker Container mode.
	Keywords: Network Fast Recovery; Docket Container; Missing Configuration
	Discovered in Release: 1.4.0

Ref#	Description
3361160	**Description**: Resolved the prolonged UFM upgrade time caused by a large historical Telemetry database table
	Keywords: Long Upgrade Time, Historical Telemetry, Database File
	Discovered in Release: 1.2.0
3228547	**Description**: Client certificate authentication is not working on UFM Docker container after a Docker container restart
	Keywords: Client Certificate Authentication, Ubuntu, Docker
	Discovered in Release: 1.1.0
3143391	**Description**: UFM agent port 6306 is blocked
	Keywords: UFM Agent
	Discovered in Release: 1.0.0
3116018	**Description**: ufm-ha-watcher is not working
	Keywords: UFM-HA
	Discovered in Release: 1.0.0

5.7 Known Issue History

Ref #	Issue
N/A	**Description:** Execution of UFM Fabric Health Report (via UFM Web UI / REST API) will trigger ibdiagnet to use SLRG register, which might cause some of the Switch and HCA's firmware to get stuck and cause the HCA's ports to stay at "Init" state.
	Keywords: UFM Fabric Health Report; SLRG; Stuckness
	Discovered in Release: 1.5.0

Ref #	Issue
3511410	**Description**: Collect system dump for DGX host does not work due to missing sshpass utility.
	Workaround: Install sshpass utility on the DGX .
	Keywords: System Dump, DGX, sshpass utility
3432385	**Description**: UFM does not support HDR switch configured with hybrid split mode, where some of the ports are split and some are not.

Ref #	Issue
	Workaround: UFM can properly operate when **all** or **none** of the HDR switch ports are configured as split.
	Keywords: HDR Switch, Ports, Hybrid Split Mode

Ref #	Issue
3461658	**Description:** After the upgrade from UFM Enterprise Appliance v1.4.0 GA to UFM Enterprise Appliance v1.4.1 FUR, the network fast recovery path in `opensm.conf` is not automatically updated and remains with a null value (`fast_recovery_conf_file (null)`)

Ref #	Issue
	Workaround: If you wish to enable the network fast recovery feature in UFM, make sure to set the appropriate path for the current fast recovery configuration file (`/opt/ufm/files/conf/opensm/fast_recovery.conf`) in the opensm.conf file located at `/opt/ufm/files/conf/opensm` , before starting UFM.
	Keywords: Network fast recovery, Missing, Configuration

Ref #	Issue
N/A	Description: Upgrading the UFM Enterprise Appliance SW while upgrading the UFM Enterprise Appliance OS is not supported.
	Workaround: Do not use the `--appliance-sw-upgrade` flag while upgrading the UFM Enterprise Appliance OS. Alternatively, upgrade the UFM Enterprise Appliance SW as described in Software Upgrade

Ref #	Issue
	Keywords: SW Upgrade; OS Upgrade, `--appliance-sw-upgrade`
3473600	Description: The UFM Enterprise service is enabled while upgrading the UFM Enterprise Appliance SW on HA mode.
	Workaround: Disable the UFM Enterprise service after the upgrade in HA mode by running the following command: `systemctl disable ufm-enterprise.service`

Ref #	Issue
	Keywords: SW Upgrade, HA Mode
3361160	**Description**: Upgrading UFM Enterprise Appliance from versions 1.3.0, 1.2.0 and 1.1.0 results in cleanup of UFM historical telemetry database (due to schema change). This means that the new telemetry data will be stored based on the new schema.

Ref #	Issue
	Workaround: To preserve the historical telemetry database data while upgrading from UFM Enterprise Appliance version 1.3.0, 1.2.0 and 1.1.0, perform the upgrade in two phases. First, upgrade to UFM Enterprise Appliance v1.2.0, and then upgrade to the latest UFM version (UFM v1.3.0 or newer). It is important to note that the upgrade process may take longer depending on the size of the historical telemetry database.

Ref #	Issue
	Keywords: UFM Historical Telemetry Database, Cleanup, Upgrade
3346321	**Description:** In some cases, when multiport SM is configured in UFM, a failover to the secondary node might be triggered instead of failover to the local available port
	Workaround: N/A
	Keywords: Multiport SM, Failover, Secondary port

Ref #	Issue
N/A	**Description:** Enabling a port for a managed switch fails in case that port is not disabled in a persistent way (this may occur in ports that were disabled in previous versions of UFM Enterprise Appliance v1.3.0)
	Workaround: Set "persistent_port_operation=false" in `gv.cfg` to use non-persistent (legacy) disabling or enabling of the port. UFM restart is required.

Ref #	Issue
	Keywords: Disable, Enable, Port, Persistent
3346321	**Description**: Failover to another port (multi-port SM) will not work as expected in case UFM was deployed as a docker container
	Workaround: Failover to another port (multi-port SM) works properly on UFM Bare-metal deployments
	Keywords: Failover to another port, Multi-port SM

Ref #	Issue
3485 87	**Description:** Replacement of defected nodes in the HA cluster does not work when PCS version is 0.9.x
	Workaround: N/A
	Keywords: Defected Node, HA Cluster, pcs version
3336769	**Description:** UFM-HA: If the back-to-back interface is disabled or disconnected, the HA cluster will enter a split-brain state, and the "ufm_ha_cluster status" command will stop functioning properly.

Ref #	Issue
	Workaround: To resolve the issue: 1. Connect or enable the back-to-back interface 2. Run `pcsclusterstart--all` 3. Follow instructions in Split-Brain Recovery in HA Installation.
	Keywords: HA, Back-to-back Interface

Ref #	Issue
N/A	**Description:** Running UFM software with external UFM-SM is no longer supported
	Workaround: N/A
	Keywords: External UFM-SM

6 Introduction

This manual is intended for system administrators responsible for the installation, configuration, management and maintenance of the software and hardware of UFM Enterprise Appliance. NVIDIA® UFM® Enterprise Appliance is a powerful platform for managing InfiniBand scale-out computing environments.

6.1 Key Features

UFM provides a central management console, including the following main features:

- Pluggable platform for advanced functionality and third-party plugins
- Fabric dashboard including congestion detection and analysis
- Advanced real-time health and performance monitoring
- Fabric health reports
- Threshold-based alerts
- Fabric segmentation/isolation
- Quality of Service (QoS)
- Routing optimizations
- Central device management
- Task automation
- Logging
- High availability
- Daily Report: Statistical information of the fabric during the last 24 hours
- Event management
- Client certificate authentication
- Chassis health monitoring

7 Getting Started

The procedures described on this section assume that you have already installed and powered on your UFM Enterprise appliance according to the instructions in the Hardware Installation Guide.

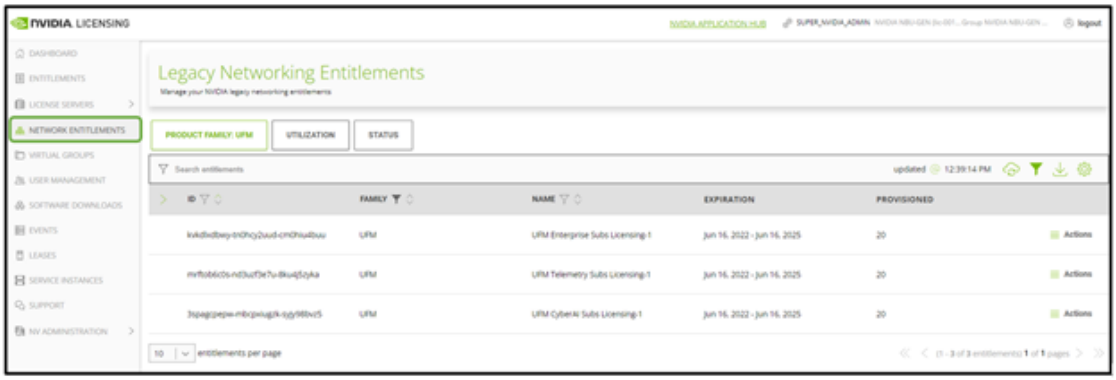
7.1 Obtaining the License

UFM Enterprise Appliance is licensed per managed servers according to the UFM license agreement. When you purchase UFM Enterprise Appliance, you will receive an email with instructions on obtaining your product license. A valid license is a prerequisite for the installation and operation of UFM Enterprise Appliance.

UFM licenses are per managed node and are aggregative. If you install an additional license, the system adds the previous node number and the new node number and manages the sum of the nodes. For example, if you install a license for 10 managed nodes and an additional license for 15 nodes, UFM will be licensed for up to 25 managed nodes.

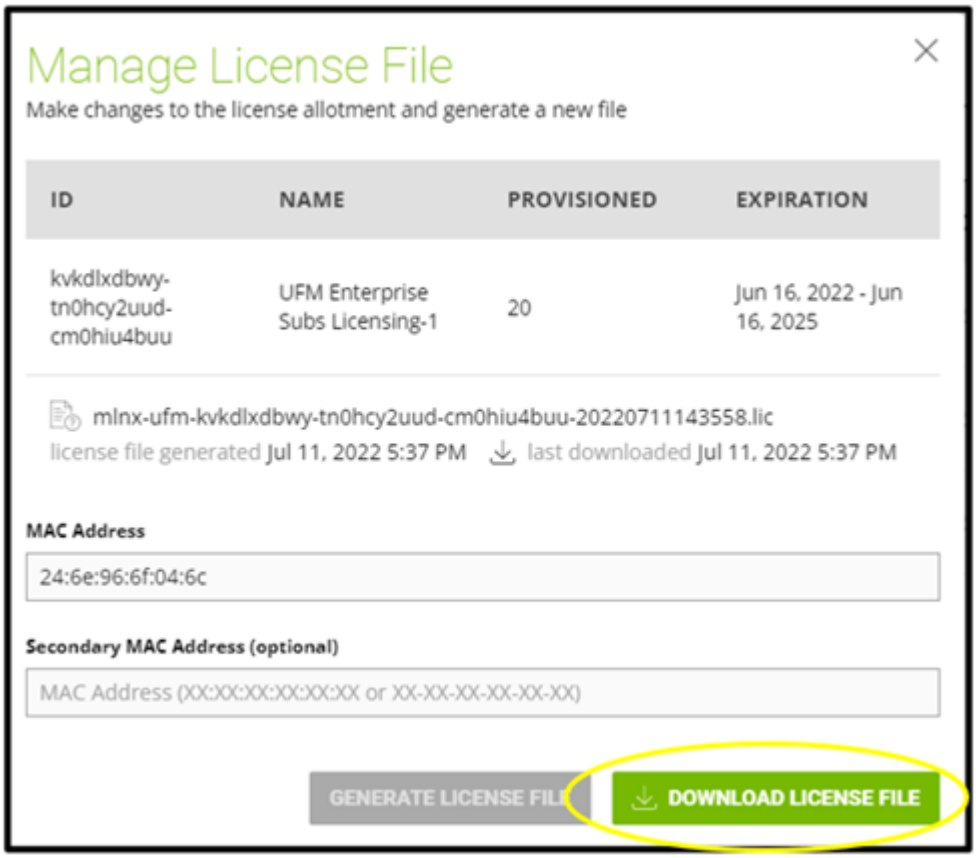
To obtain the license:

1. Go to NVIDIA's Licensing and Download Portal and log in as specified in the licensing email you received.
    - If you did not receive your NVIDIA Licensing and Download Portal login information, contact your product reseller.
2. If you purchased UFM directly from NVIDIA and you did not receive the login information, contact enterprisesupport@nvidia.com. Click on the Network Entitlements tab. You'll see a list with the serial licenses of all your software products and software product license information and status.



3. Select the license you want to activate and click on the "Actions" button.
4. In the MAC Address field, enter the MAC address of the delegated license-registered host. If applicable, in the HA MAC Address field, enter your High Availability (HA) server MAC address. If you have more than one NIC installed on a UFM Server, use any of the MAC

addresses.



5. Click on Generate License File to create the license key file for the software.
6. Click on Download License File and save it on your local computer.

If you replace your NIC or UFM server, repeat the process of generating the license to set new MAC addresses. You can only regenerate a license two times. To regenerate the license after that, contact NVIDIA Sales Administration at enterprisesupport@nvidia.com.

7.2 Activating the License

Before starting the UFM software, copy your license file downloaded from NVIDIA's Licensing and Download Portal to the */opt/ufm/files/licenses* directory.

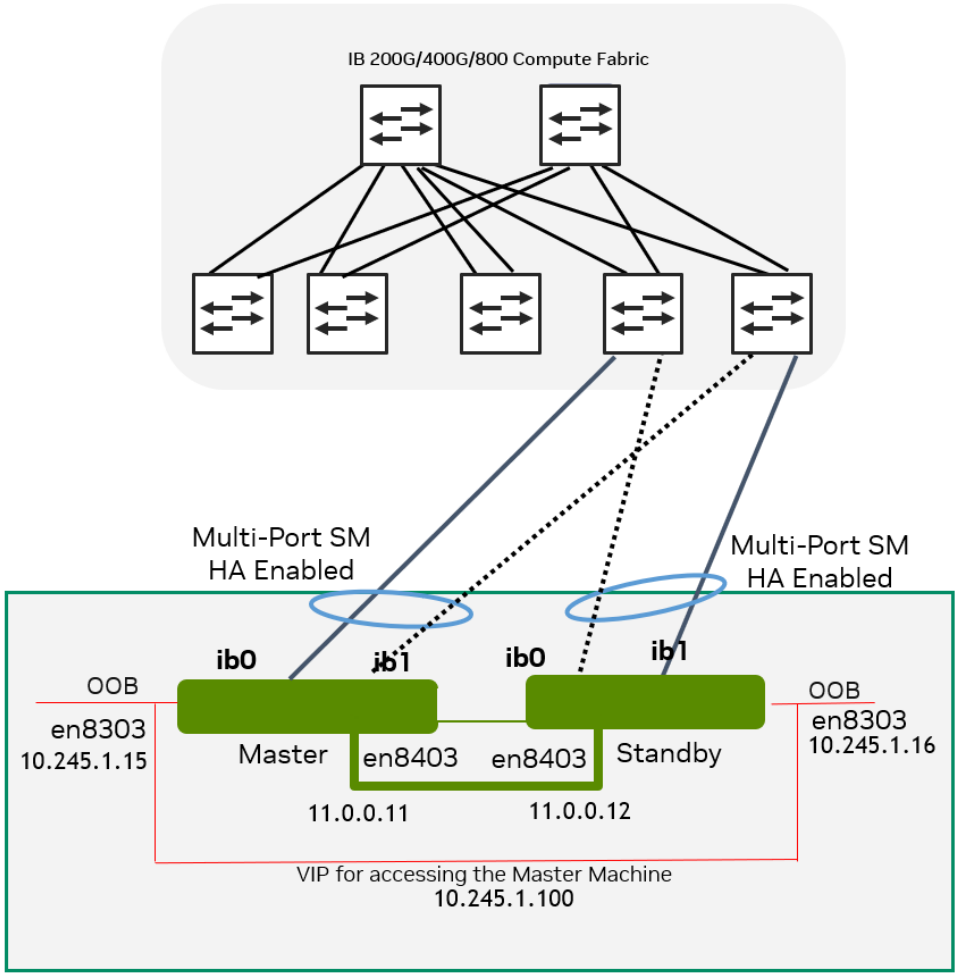
We recommend that you back up the license file.

Your software is now activated.

> In a High Availability configuration, the license files are replicated to the standby machine automatically.

7.3 Configuring the Appliance for the First Time

The diagram below describes the connectivity scheme of the UFM High-Availability cluster.



The following are instructions on how to configure the management and fabric (InfiniBand) interfaces in the UFM cluster.

7.3.1 Configuring the Management Interface

The NVIDIA UFM Enterprise Appliance has multiple Ethernet management interfaces. The primary management interface is eno8303. The MAC address for eno8303 is available on the pull tab and can be configured in the DHCP server. To use the remote management controller with DHCP, the free-range IP allocation must be enabled on the DHCP server.

The appliance supports a direct connection via a serial port.

For instructions on how to configure the management interface, please refer to Configuring the Appliance.

7.3.2 Configuring the Back-to-Back Interface

This interface should be used as the primary interface when configuring HA.

When operating in HA configuration, directly connect (back-to-back - without a management switch in the middle) the Master node to the Standby node. To do so, utilize the Ethernet management interface eno8403, as shown in the above diagram.

For your convenience, you may use the CLI command interface to set a static IP address for eno8403.

Example:

```
interface eno8403 ip address 11.0.0.11 /24
```

7.3.3 Configuring the Fabric Interface

> As of UFM Enterprise Appliance v1.3.0 (UFM Enterprise v6.12.0), configuring the fabric interface is optional.

The NVIDIA UFM Enterprise Appliance has multiple InfiniBand interfaces. The primary interface is ib0.

Configure a static IPoIB with Network service (create the file /etc/network/interfaces.d/ifcfg-ib0 and run ifup ib0).

Example of ifcfg-ib0 file definition:

```
auto ib0
iface ib0 inet static
address 10.0.0.12
netmask 255.255.255.0
broadcast 10.0.0.255
```

For your convenience, you may use the CLI command interface to set a static IP address for ib0.

Example:

```
interface ib0 ip address 192.168.1.11 /24
```

For more details on how to configure the UFM Enterprise, please refer to UFM Enterprise Initial Configuration.

7.4 Starting UFM

7.4.1 Starting UFM Procedure

1. Start the UFM Enterprise service. Run:

   ```
   # systemctl start ufm-enterprise.service
   ```

2. Wait 1 minute for the service to come up.
3. Ensure the service health. Run:

   ```
   # ufm_enterprise_sanity.sh
   Checking Service...
   ```

```
Done
Checking Images...
Done
Checking Containers...
Done
Checking ufm REST server...
Done
Sanity tests completed successfully!
```

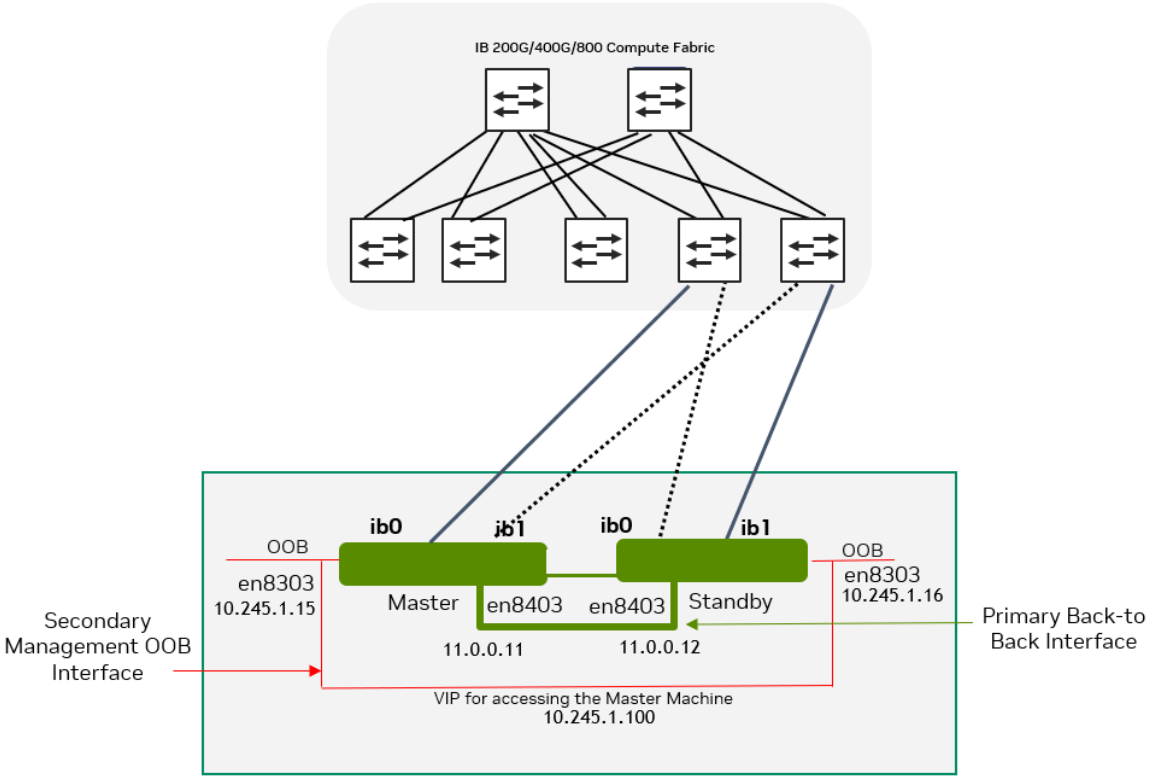
7.4.2 Logging Into UFM Web UI

To open UFM WEB UI, open the following URL in your browser: https://[SERVER_IP]/ufm/ and type the default credentials.

8 High Availability

UFM HA supports High-Availability on the host level for UFM Enterprise appliances. The solution is based on a pacemaker to monitor services, and on DRBD to sync file-system states.

The diagram below describes the connectivity scheme of the UFM High-Availability cluster.



8.1 High-Availability Configuration

UFM HA should be configured on two appliances, master and standby.

> High-availability should be configured first on on the standby node. When completed, it should be configured on the master node.

Command Usage:

```
# ufm_ha_cluster config --help
Usage: ufm_ha_cluster config [<options>]

The config command configures ha add-on for ufm server.
```

Options:

Option	Description
-r | --role <node role>	Node role (master or standby) - Mandatory
-e | --peer-primary-ip <ip address>	Peer node primary ip address - Mandatory

Option	Description
-l | --local-primary-ip <ip address>	Local node primary ip address - Mandatory
-E | --peer-secondary-ip <ip address>	Peer node secondary ip address - Mandatory
-L | --local-secondary-ip <ip address>	Local node secondary ip address - Mandatory
-i | --virtual-ip <virtual-ip> OR -N | --no-vip	Cluster virtual IP OR Do not create virtual IP resource - Mutual exclusive with virtual-IP option One of the two options is mandatory
-p | --hacluster-pwd <pwd>	hacluster user password - Mandatory
-f | --ha-config-file <file path>	HA configuration file - The default is ufm-ha.conf

8.1.1 Configure HA with VIP (Virtual IP)

1. [On Standby Server] Run the following command to configure Standby Server:

```
ufm_ha_cluster config -r standby \
--local-primary-ip <local back-to-back IP> \
--peer-primary-ip <peer back-to-back IP> \
--local-secondary-ip <local management IP> \
--peer-secondary-ip <peer management IP> \
--virtual-ip <virtual management IP used for accessing the master node> \
--hacluster-pwd <password>
```

2. [On Master Server] Run the following command to configure Master Server:

```
ufm_ha_cluster config -r master \
--local-primary-ip <local back-to-back IP> \
--peer-primary-ip <peer back-to-back IP> \
--local-secondary-ip <local management IP> \
--peer-secondary-ip <peer management IP> \
--virtual-ip <virtual management IP used for accessing the master node> \
--hacluster-pwd <password>
```

Alternatively, you can run the CLI command ufm ha configure.

You must wait until after configuration for DRBD sync to finish before starting the UFM cluster. To check the DRBD sync status, run:

```
ufm_ha_cluster status
```

8.1.2 Configure HA without VIP (on a Dual Subnet)

Please change the variables in the commands below based on your setup.

1. [On Standby Server] Run the following command to configure Standby Server:

```
ufm_ha_cluster config -r standby \
--local-primary-ip <local back-to-back IP> \
```

```
--peer-primary-ip <peer back-to-back IP> \
--local-secondary-ip <local management IP> \
--peer-secondary-ip <peer management IP> \
--hacluster-pwd <password> \
--no-vip
```

2. [On Master Server] Run the following command to configure Master Server:

```
ufm_ha_cluster config -r master \
--local-primary-ip <local back-to-back IP> \
--peer-primary-ip <peer back-to-back IP> \
--local-secondary-ip <local management IP> \
--peer-secondary-ip <peer management IP> \
--hacluster-pwd <password> \
--no-vip
```

Alternatively, you can run the CLI command ufm ha configure dual-subnet.

> You must wait until after configuration for DRBD sync to finish before starting the UFM cluster. To check the DRBD sync status, run:
>
> ```
> ufm_ha_cluster status
> ```

8.2 High-Availability Cluster Management

- To manage the HA cluster, use the *ufm_ha_cluster* tool.
  ufm_ha_cluster Usage

```
# ufm_ha_cluster --help
================================================================
 UFM-HA version:  5.3.0-17
----------------------------------------------------------------
Usage: ufm_ha_cluster [-h|--help] <command> [<options>]
This script manages UFM HA cluster.
```

Options:

```
OPTIONS:
   -h|--help                      Show this message

COMMANDS:
    version           HA cluster version
    config            Configure HA cluster
    cleanup           Remove HA configurations
    status            Check HA cluster status
    failover          Master node failover
    takeover          Standby node takeover
    start             Start HA services
    stop              Stop HA services
    detach            etach the standby from cluster
    attach            Attach a new standby to cluster
    enable-maintain   Enable maintenance to cluster
    disable-maintain  Disable maintenance to cluster
    reset             Reset DRBD connectivity from split-brain
    is-master         check if the current node is a master
    is-running        check if ufm services are running
    is-ha             Check if running in HA mode
```

- For further information on each command, run:

```
ufm_ha_cluster <command> --help
```

- To check UFM HA cluster status, run:

```
ufm_ha_cluster status
```

- To start the UFM HA cluster, run:

```
ufm_ha_cluster start
```

- To stop the UFM HA cluster, run:

```
ufm_ha_cluster stop
```

- Execute the failover command on the master appliance to become the standby appliance. Run:

```
ufm_ha_cluster failover
```

- Execute the takeover command on the standby machine to become the master appliance. Run:

```
ufm_ha_cluster takeover
```

For additional information on configuring UFM HA, please refer to Installing UFM Server Software for High Availability. Since the UFM HA package and related components (i.e. pacemaker and DRBD) are already deployed, follow instructions from step 6 (Configure HA from the main server) and onward.

9 Authentication, Authorization and Accounting (AAA)

AAA is a term describing a framework for intelligently controlling access to computer resources, enforcing policies, auditing usage, and providing the information necessary to bill for services. These combined processes are considered important for effective network management and security. The AAA feature allows you to verify the identity of, grant access to, and track the actions of users managing the system. The UFM Enterprise Appliance switch supports Terminal Access Controller Access Control device Plus (TACACS+) protocol.

- Authentication – authentication provides the initial method of identifying each individual user, typically by entering a valid username and password before access is granted. The AAA server compares a user's authentication credentials with the user credentials stored in a database. If the credentials match, the user is granted access to the network or devices. If the credentials do not match, authentication fails and network access is denied.
- Authorization – following the authentication, a user must gain authorization for performing certain tasks. After logging into a system, for instance, the user may try to issue commands. The authorization process determines whether the user has the authority to issue such commands. Simply put, authorization is the process of enforcing policies: determining what types or qualities of activities, resources, or services a user is permitted. Usually, authorization occurs within the context of authentication. Once you have authenticated a user, they may be authorized for different types of access or activity.
- Accounting – the last level is accounting, which measures the resources a user consumes during access. This includes the amount of system time or the amount of data a user has sent and/or received during a session. Accounting is carried out by logging of session statistics and usage information, and is used for authorization control, billing, trend analysis, resource utilization, and capacity planning activities.

Authentication, authorization, and accounting services are often provided by a dedicated AAA server, a program that performs these functions.

9.1 TACACS+

TACACS (Terminal Access Controller Access Control System), widely used in network environments, is a client/server protocol that enables remote access servers to communicate with a central server to authenticate dial-in users and authorize their access to the requested system or service. TACACS implements the TACACS Client and provides the AAA (Authentication, Authorization and Accounting) functionalities.

TACACS is used for several reasons:

- Facilitates centralized user administration
- Uses TCP for transport to ensure reliable delivery
- Supports inbound authentication, outbound authentication and change password request for the authentication service
- Provides some level of protection against an active attacker

For the list of TACACAS+ CLI commands, please refer to TACACAS+.

9.2 Configuring TACACS+ and Performing AAA

> Note: TACACS+ should be configured on two appliances, master and standby.

9.2.1 Configuring TACACS+ on UFM Servers

- Add TACACS server with a key. Run:

```
ufmapl (config) # tacacs-server host 10.209.102.86 key testkey123
```

- [Optional] Review the added server configuration. Run:

```
ufmapl (config) # show tacacs
```

Example:

```
swx-ufm3-06 (config) # show tacacs

TACACS+ defaults:
 Timeout      :1
TACACS+ servers:
 10.209.102.86:49:
   Key        : *********
```

- Enable TACACS authentication. Run:

```
ufmapl (config) # aaa authentication login default local tacacs+
```

- [Optional] Review the Authentication and Accounting methods. Run:

```
ufmapl (config) # show aaa
```

Example:

```
swx-ufm3-06 (config) # show aaa
AAA authorization:
    Map Order: remote-only

Authentication method(s)L
    local
    tacacs+

Accounting method(s)L
    tacacs+
```

9.2.2 Adding TACACS Users on the Server Side

> The predefined "root" and "admin" users are local users, therefore, they can not be defined as remote TACACS+ users.

A simple configuration file is provided below:

```
accounting file = /var/log/tac_plus.acct
key = testkey123
user = testuser1 {
```

```
        global = cleartext testpass1
        service = exec { priv-lvl=15 }
        cmd = help { permit .* }
        cmd = enable { permit .* }
        cmd = configure { permit terminal }
        cmd = show {
                permit ufm.*
                deny .*
        }
}

user = testuser2 {
        global = cleartext testpass2
        service = exec { priv-lvl=15 }
        cmd = help { permit .* }
        cmd = enable { permit .* }
        cmd = configure { permit terminal }
        cmd = ufm {
                permit "logging .*"
                deny .*
        }
        cmd = no {
                permit "ufm logging .*"
                deny .*
        }
        cmd = show { permit .* }
}

user = testuser3 {
        default service = permit
        global = cleartext testpass3
        service = exec { priv-lvl=15 }
}
```

From the above configuration example

- There are 3 TACACS users named `testuser1`, `testuser2` and `testuser3` with respective passwords of `testuser1`, `testuser2` and `testuser3.`
- The secret of the tacacs server is `testkey123`, assuming that this server is running at an IP address of 10.209.102.86. This information is used to register a TACACS server using the `tacacs-host` command in UFMCLI.
- `testuser1` can only execute the `show ufm` commands. Executing any other command is not allowed.
- `testuser2` can execute all show commands and can configure only the [no] `ufm logging` commands.
- `testuser3` can execute all commands since the default service is permit.

10 Command Line Interface (CLI)

UFM Enterprise Appliance is equipped with an industry-standard command line interface (CLI). The CLI is accessed through SSH session or directly through the console port, following login with username (admin) and credentials (admin). Following the initial login, the user is asked to set a new password.

This section explains how to use the CLI of UFM Enterprise Appliance.

Ignored Commands

To support backward compatibility with automation for initial configuration, the following commands are being ignored (they do not output error):

1. `cli default auto-logout 1`
2. `no cli default paging enable`
3. `no cli default progress enable`
4. `no cli default prompt confirm-reload`
5. `no telnet-server enable`
6. `no interface <ifname> dhcp`
7. `no interface <ifname> ipv6 enable`
8. `no interface <ifname> shutdown`
9. `write memory`

10.1 CLI Modes

The CLI has the following modes, and each mode makes available a different set of commands for execution. The different CLI configuration modes are:

Mode/Context	Description
standard	When the CLI is launched, it begins in Standard mode. This is the most restrictive mode and only has commands to query a restricted set of state information. Users cannot take any actions that directly affect the system, nor can they change any configuration.
enable	The "enable" command moves the user to Enable mode. This mode offers commands to view all state information and take actions like rebooting the system, but it does not allow any configuration to be changed. Its commands are a superset of those in Standard mode. To return to Standard mode, enter "exit".
config	The "configure terminal" command moves the user from Enable mode to Config mode. This mode has a full unrestricted set of commands to view anything, take any action, or change any configuration. Its commands are a superset of those in Enable mode. To return to Enable mode, enter "exit". Note that moving directly from/to Standard mode to/from Config mode is impossible.
config interface management	Configuration mode for management interfaces

10.2 Prompt and Response Conventions

The prompt always begins with the hostname of the system. What follows depends on what command mode the user is in. To demonstrate by example, assuming the machine name is "ufm-enterprise-app", the prompts for each of the modes are:

```
ufm-enterprise-app >              (Standard mode)
ufm-enterprise-app #              (Enable mode)
ufm-enterprise-app (config) #     (Config mode)
```

The following session shows how to move between command modes:

```
ufm-enterprise-app >                        (You start in Standard mode)
ufm-enterprise-app > enable                 (Move to Enable mode)
ufm-enterprise-app #                        (You are in Enable mode)
ufm-enterprise-app # configure terminal     (Move to Config mode)
ufm-enterprise-app (config) #               (You are in Config mode)
ufm-enterprise-app (config) # exit          (Exit Config mode)
ufm-enterprise-app #                        (You are back in Enable mode)
ufm-enterprise-app # exit                   (Exit Enable mode)
ufm-enterprise-app >                        (You are back in Standard mode)
```

Commands entered do not print any response and simply show the command prompt after you press <Enter>.

10.3 Using "no" Command Form

Several config commands feature a "no" form whose purpose is to reset a parameter value to its inherited or default value, or to disable a configuration.

10.4 System Management

10.4.1 Network Interfaces

This section describes the commands that configure and monitor the network interface.

10.4.1.1 Interface

10.4.1.1.1 interface

	interface <eno8303 | eno8403 | eno12399np0 | eno12409np1 | ib0 | ib1 | ib2 | ib3> Enters a network interface context.	
Syntax Description	eno8303	Management port 0 (out of band)
	eno8403	Management port 1 (out of band)
	eno12399np0	Management port 2 (out of band)
	eno12409np1	Management port 3 (out of band)
	ib0	InfiniBand interface 0
	ib1	InfiniBand interface 1
	ib2	InfiniBand interface 2 (UFM 3.0 only)

	ib3	InfiniBand interface 3 (UFM 3.0 only)
Default	N/A	
Configuration Mode	config	
History	1.3.0	
Example	ufmapl (config) # interface eno8303 ufmapl (config interface eno8303) #	
Related Commands	N/A	
Notes	N/A	

10.4.1.1.2 show interfaces

	show interfaces [eno8303 | eno8403 | eno12399np0 | eno12409np1 | ib0 | ib1 | ib2 | ib3] Displays information about the network interfaces.	
Syntax Description	eno8303	Management port 0 (out of band)
	eno8403	Management port 1 (out of band)
	eno12399np0	Management port 2 (out of band)
	eno12409np1	Management port 3 (out of band)
	ib0	InfiniBand interface 0
	ib1	InfiniBand interface 1
	ib2	InfiniBand interface 2 (UFM 3.0 only)
	ib3	InfiniBand interface 3 (UFM 3.0 only)
Default	N/A	
Configuration Mode	enable	
History	1.6.0	Updated example and added command syntax
	1.4.1	First release

Example	<pre>swx-ufm3-06 # show interfaces eno8303
	Interface eno8303 status:
	  Comment :
	  Admin up : yes
	  Link up : yes
	  DHCP running : yes
	  IP address : 10.209.36.101
	  Netmask : 255.255.252.0
	  IPv6 enabled : yes
	  Autoconf enabled : N/A
	  Autoconf route : N/A
	  Autoconf privacy : N/A
	  DHCPv6 running : yes
	  IPv6 addresses : 2
	
	IPv6 address:
	    fcfc:fcfc:209:36:b27b:25ff:fee9:30c8/64
	    fe80::b27b:25ff:fee9:30c8/64
	
	  Speed : 1000Mb/s (auto)
	  Duplex : Full (auto)
	  Interface type : ethernet
	  Interface source : physical
	  MTU : 1500
	  HW address : b0:7b:25:e9:30:c8
	
	  Rx:
	   6109552397 bytes
	     45457113 packets
	     36881549 mcast packets
	          295 discards
	            0 errors
	            0 overruns
	            0 frame
	  Tx:
	    242521186 bytes
	      1211397 packets
	            0 discards
	            0 errors
	          N/A overruns
	            0 carrier
	      1211397 collisions
	         1000 queue len</pre>

Related Commands	interface <ifname> ip address <IP address> <netmask>
Notes	

10.4.1.1.3 ip address

	ip address <IP address> <netmask> Sets the IP address and netmask of this interface.	
Syntax Description	IP address	IPv4 address
	netmask	Subnet mask of IP address
Default	N/A	
Configuration Mode	config interface	
History	1.3.0	

Example	<pre>ufmapl (config interface eno8303) # ip address 10.10.10.10
	255.255.255.0</pre>	

Related Commands	interface	
Notes	The command sequence is important. The `ip address` command should be used first during automation since it clears both default-gateway and name-server settings	

10.4.1.1.4 ipv6 address

	ipv6 address <IPv6 address>/<netmask> Configures static IPv6 address and netmask to this interface, static option is possible.	
Syntax Description	IPv6 address/netmask	Configures a static IPv6 address and netmask. Format example: 2001:db8:1234::5678/64.
Default	N/A	
Configuration Mode	config interface management	
History	1.3.0	
Example	`ufmapl (config interface eno8303)# ipv6 address fe80::202:c9ff:fe5e:a5d8/6`	
Related Commands	N/A	
Notes	N/A	

10.4.1.2 Hostname

10.4.1.2.1 hostname

	hostname <hostname> Sets a static system hostname.	
Syntax Description	hostname	String
Default		
Configuration Mode	config	
History	1.3.0	
Example	`ufmapl(config) # hostname ufmapl-hostname`	
Related Commands	N/A	
Notes	N/A	

10.4.1.2.2 ip name-server

	ip name-server <no ip name-server> no ip name-server Configures DNS servers to be used. The no form of the command clears the name server.	
Syntax Description	IPv4 address	IPv4 address
	IPv6 address	IPv6 address
Default	No server name	
Configuration Mode	config	

History	1.4.2	Updated command description and added the a no form of the command
	1.3.0	First release
Example	`ufmapl (config)# ip name-server 9.9.9.9`	
Related Commands	N/A	
Notes	The command sequence is important. The `ip name-server` command should be used during automation, after running the `ip address` and the `ip default-gateway` commands	

10.4.1.2.3 {ip | ipv6} host

	{ip | ipv6} host <hostname> <ip-address> no {ip | ipv6} host <hostname> <ip-address> Sets the static domain name. The no form of the command clears the domain name.	
Syntax Description	hostname	String
	ip-address	IPv4 or IPv6 address
Default	N/A	
Configuration Mode	config	
History	1.5.0	
Example	`ufmapl (config)# ip host test-host 1.2.3.4` `ufmapl (config)# ipv6 host my-ipv6-host 2001::8f9`	
Related Commands	show hosts	
Notes		

10.4.1.2.4 show hosts

	show hosts Displays hostname, DNS configuration, and static host mappings.
Syntax Description	N/A
Default	N/A
Configuration Mode	Any configuration mode
History	1.4.0

Example	ufmapl (config) # show hosts Hostname: swx-ufm3-02 Name servers: 10.211.0.124 (on eno8303) 10.211.0.121 (on eno8303) 10.7.77.135 (on eno8303) Domain names: mtr.labs.mlnx (on eno8303) Static IPv4 host mappings: 127.0.0.1 --> localhost Static IPv6 host mappings: ::1 --> localhost ::1 --> ip6-localhost ::1 --> ip6-loopback ff02::1 --> ip6-allnodes ff02::2 --> ip6-allrouters
Related Commands	N/A
Noes	N/A

10.4.1.3 Routing

10.4.1.3.1 ip default-gateway

	ip default-gateway <address> no ip default-gateway <address> Configures a static default route. The no form of the command removes the static route.	
Syntax Description	address	gateway IPv4 or IPv6 address
Default	N/A	
Configuration Mode	config	
History	1.4.2	Updated syntax description and added a no form of the command
	1.3.0	First release
Example	ufmapl (config)# ip default-gateway 10.209.36.1	
Related Commands	N/A	
Notes	The command sequence is important. The `ip default-gateway` command should be used during automation, **after** running the `ip address` command as it requires a static IP setting	

10.4.1.3.2 ipv6 default-gateway

	ipv6 default-gateway <address> no ipv6 default-gateway <address> Configures a static default route. The no form of the command removes the static route.	
Syntax Description	address	gateway IPv6 address

Default	N/A
Configuration Mode	config
History	1.4.2
Example	`ufmapl (config)# ip default-gateway ::1`
Related Commands	N/A
Notes	The command sequence is important. The `ip default-gateway` command should be used during automation, **after** running the `ip address` command as it requires a static IP setting

10.4.1.3.3 show {ip | ipv6} route

	show {ip | ipv6} route [static] Displays the routing table in the system.	
Syntax Description	static	Filters the table with the static route entries
Default	N/A	
Configuration Mode	Enable	
History	1.6.0	

Example	`ufmapl (config) # show ip route`
	`Destination Mask Gateway Interface Source`
	`default 0.0.0.0 10.209.36.1 eno8303 dhcp`
	`10.209.36.0 255.255.252.0 0.0.0.0 eno8303`
	`interface`
	`10.209.36.1 255.255.255.255 0.0.0.0 eno8303 dhcp`
	`169.254.1.0 255.255.255.0 0.0.0.0 idrac`
	`interface`
	`172.17.0.0 255.255.0.0 0.0.0.0 docker0`
	`interface`	

Related Commands	{ip | ipv6} route	
Notes		

10.4.1.3.4 show {ip | ipv6} default-gateway

	show {ip | ipv6} default-gateway [static] Displays the default gateway.	
Syntax Description	static	Displays the static configuration of the default gateway
Default	N/A	
Configuration Mode	Enable	
History	1.6.0	

Example	`ufmapl (config) # show ip default-gateway`
	`Active default gateways:`
	`10.209.36.1 (interface: eno8303)`	

Related Commands	{ip | ipv6} default-gateway	

Notes	

10.4.2 NTP

10.4.2.1 ntp enable

	ntp enable Enables NTP.
Syntax Description	N/A
Default	N/A
Configuration Mode	config
History	1.3.0
Example	`ufmapl (config) # ntp enable`
Related Commands	N/A
Notes	N/A

10.4.2.2 ntp server

	ntp server <address> no ntp server <address> Configures an NTP server The no form of the command removes NTP server	
Syntax Description	address	IPv4 or IPv6 address
Default	N/A	
Configuration Mode	config	
History	1.4.2	Updated the command description and added a no form of the command
	1.3.0	First release
Example	`ufmapl (config) # ntp server 10.10.10.10`	
Related Commands	N/A	
Notes	N/A	

10.4.2.3 ntp peer

	ntp peer <address> no ntp peer <address> Configures an NTP peer The no form of the command removes the NTP peer	
Syntax Description	address	IPv4 or IPv6 address

Default	N/A	
Configuration Mode	config	
History	1.4.2	Added the no form of the command
	1.3.0	First release
Example	`ufmapl (config) # ntp peer 11.11.11.11`	
Related Commands	N/A	
Notes	N/A	

10.4.3 Software Management

10.4.3.1 image fetch

	image fetch <URL> Downloads a system image from a remote host.	
Syntax Description	URL	HTTPS, SCP and SFTP are supported Example: scp://username[:password]@hostname/path/filename
Default	N/A	
Configuration Mode	config	
History	1.5.0	

Example	`ufmapl (config) # image fetch scp://root:123456@192.168.10.125/tmp/ufm-appliance-1.5.0-6-omu.tar`
	`100.0%`
	`[##########################################################################################]`	

Related Commands	show images	
Notes	• The image format must be as follows: ufm-appliance-<version>-omu.tar • Please delete the previously available image, prior to fetching the new image • See section UFM Enterprise Appliance In-Service Upgrade	

10.4.3.2 image install

	image install <image-name> Installs an image file.	
Syntax Description	image name	Specifies the image name
Default	N/A	
Configuration Mode	config	
History	1.5.0	

Example	ufmapl (config) # image install ufm-appliance-1.5.0-6-omu.tar Verifying image... Extracting image... Installing image... 20230809-07_24_52: UFM-OS UPGRADE to version 23.07.18-3 STARTED 20230809-07_24_52: UFM_OS_UPGRADE [STARTED] WARNING!!! /tmp/ufm_os_upgrade_ml2ah98f/ufm-appliance-1.5.0-4-omu/ufm-os-upgrade.sh will require a restart upon completion. OFED drivers, kernel and kernel models will not work properly until the server is rebooted!!! In case of a change to the secureboot certificate , a message will be prompted to the screen to indicate that an action is needed when restarting. 20230809-07_24_52: HighAvailability is detected, node role is: stand-by 20230809-07_24_53: Check if ufm-enterprise.service is running 20230809-07_24_53: ufm-enterprise.service is not running, continue with the upgrade 20230809-07_24_53: Extracting ISO... 20230809-07_24_53: CERTIFICATE-VALIDATION [PASSED] 20230809-07_24_54: HA-STANDBY-MODE-ACTIVATE [PASSED] 20230809-07_24_54: Backup HA cluster config to /var/tmp/ufm_os_upgrade_23_07_18-3/pcs_config_backup_23.07.18-3.tar.bz2 20230809-07_24_55: HA-PREPARATION [PASSED] 20230809-07_24_55: A newer kernel version is detected: 4.15.0-213-generic, installing 20230809-07_25_22: KERNEL-UPGRADE [PASSED] 20230809-07_25_22: Preparing MOFED repo 20230809-07_25_24: MOFED-PREPARATION [PASSED] 20230809-07_25_24: Upgrading UFM-APPLIANCE SW 20230809-07_27_01: Upgrading UFM-APPLIANCE SW finished 20230809-07_27_01: APPLIANCE-UPGRADE [PASSED] 20230809-07_27_01: HA-PACKAGES-UPGRADE [SKIPPED] 20230809-07_27_01: Upgrading telemetry packages... 20230809-07_27_01: TELEMETRY-REQUIREMENTS-UPGRADE [PASSED] 20230809-07_27_06: updating firmware 20230809-07_27_19: FW-UPGRADE [PASSED] 20230809-07_27_19: Upgrading packages... 20230809-07_28_15: PACKAGES-UPGRADE [PASSED] 20230809-07_28_15: Upgrading collection tools... 20230809-07_28_15: Updating FW rules 20230809-07_28_20: FIREWALL-PORTS [PASSED] 20230809-07_28_20: UFMCLI tar is copied to /opt/ufm-os-firstboot to run on next-boot. 20230809-07_28_20: UFMCLI-PREPERATION [PASSED] 20230809-07_28_20: HA-STANDBY-MODE-DEACTIVATE [PASSED] 20230809-07_28_20: UFM-OS-UPGRADE [PASSED] 20230809-07_28_20: UPGRADE finished, kernel modules, OFED and new kernel wont function properly until reboot is performed. 20230809-07_28_20: Please reboot the server. Please check log file for more details: /var/log/ufm_os_upgrade_23.07.18-3.log Upgrade steps status information: /var/log/ufm_os_upgrade_23.07.18-3_status.log.
Related Commands	show images
Notes	• The image should be installed on the standby node only. Installation on the master node is not allowed. • Once the installation is complete, perform system reboot using the command: `reload`

10.4.3.3 image delete

	image delete <image-name> Deletes the specified image file from the hard drive.	
Syntax Description	image-name	Specifies the image name
Default	N/A	
Configuration Mode	config	

History	1.5.0
Example	`ufmapl (config) # image delete ufm-appliance-1.5.0-6-omu.tar`
Related Commands	show images
Notes	

10.4.3.4 show images

	show image Displays information about the system images and boot parameters.
Syntax Description	N/A
Default	N/A
Configuration Mode	Any configuration mode
History	1.5.0

Example	`ufmapl (config) # show images`
	`Installed images:`
	`  Partition 1:`
	`  version: ufm_appliance UFMAPL_1.4.3.1_UFM_6.13.2.5 2023-06-13 08:42:27 x86_64`
	`Images available to be installed:`
	`  1:`
	`  Image  : ufm-appliance-1.5.0-6-omu.tar`

Related Commands	image delete image fetch image install
Notes	

10.4.4 User Management and AAA

10.4.4.1 User Accounts

10.4.4.1.1 username

	username root disable no username root disable Disable logging into root account The no form of the command reenable login into root account
Syntax Description	N/A
Default	N/A
Configuration Mode	config
History	1.4.1
Example	`ufmapl (config) # username root disable`

Related Commands	N/A
Notes	N/A

10.4.4.1.2 username admin password

	username admin password <password> Changes the "admin" user password.	
Syntax Description	password	Specifies a password for the user in string form.
Default	N/A	
Configuration Mode	config	
History	1.4.2	
Example	`ufmapl (config) #` `username admin password 123456`	
Related Commands	N/A	
Notes	N/A	

10.4.4.2 AAA Methods

10.4.4.2.1 aaa authentication login default

	aaa authentication login default <auth method> [<auth method>] Sets a sequence of authentication methods. Up to two methods can be configured.	
Syntax Description	auth-method	Possible values: • local • tacacs+
Default	N/A	
Configuration Mode	config	
History	1.6.0	
Example	`ufmapl (config) # aaa authentication login default local tacacs+`	
Related Commands	show aaa	
Notes	Setting tacacs+ as one of the authentication methods enables tacacs. Setting no taccas+ and only local in the authentication methods disables tacacs.	

10.4.4.2.2 show aaa

	show aaa Displays the AAA configuration.
Syntax Description	N/A
Default	N/A
Configuration Mode	Enable
History	1.6.0

Example	<pre>ufmapl [mgmt-sa] (config) # show aaa
	AAA authorization:
	    Map Order: remote-only
	
	Authentication method(s):
	    local
	    tacacs+
	
	Accounting method(s):
	    tacacs+</pre>

Related Commands	aaa authentication login default
Notes	

10.4.4.3 TACACS+

10.4.4.3.1 tacacs-server

	tacacs-server {key <secret> | timeout <seconds>} no tacacs-server {key | timeout} Sets global TACACS+ server attributes. The no form of the command resets the attributes to default values.	
Syntax Description	key	Set a secret key (shared hidden text string) known to the system and to the TACACS+ server
	timeout	Timeout in seconds (1-60)
Default	1 second	
Configuration Mode	config	
History	1.6.0	
Example	<pre>ufmapl (config) # tacacs-server key testkey</pre>	
Related Commands	show tacacs tacacs-server host	
Notes	Each TACACS+ server can override the global secret parameter using the command "tacacs-server host"	

10.4.4.3.2 tacacs-server host

	tacacs-server host <ip-address> {auth-port <port> | key <secret>} no tacacs-server host <ip-address> {auth-port <port>} Configures TACACS+ server attributes. The no form of the command removes the TACACS+ server.	
Syntax Description	ip-address	TACACS+ server IP address
	auth-port	TACACS+ server UDP port number
	key	Set a secret key (shared hidden text string) known to the system and to the TACACS+ server
Default	Default TCP port is 49	
Configuration Mode	config	
History	1.6.0	
Example	`ufmapl (config) # tacacs-server key testkey`	
Related Commands	show tacacs tacacs-server	
Notes	• TACACS+ servers are tried in the order they are configured • If the user does not specify a parameter for this configured TACACS+ server, the configuration will be taken from the global TACACS+ server configuration. Refer to "tacacs-server" command.	

10.4.4.3.3 show tacacs

	show tacacs Displays TACACS+ configurations.
Syntax Description	N/A
Default	N/A
Configuration Mode	Enable
History	1.6.0

Example	`ufmapl (config) # show tacacs`
	`TACACS+ defaults:`
	`  Timeout     : 1`
	
	`TACACS+ servers:`
	`  10.209.36.156:49:`
	`     Key         : ********`
	
	`  1.2.3.4:49:`
	`     Key         : ********`

Related Commands	tacacs-server tacacs-server host
Notes	

10.4.5 Chassis Management

10.4.5.1 show resources

	show resources Displays system resources.
Syntax Description	N/A
Default	N/A
Configuration Mode	Any configuration mode
History	1.6.0
Example	ufmapl (config) # show resources Total Used Free Physical 65400 MB 2719 MB 60585 MB Swap 16252 MB 0 MB 16252 MB Number of CPUs: 64 CPU load averages: 0.16 / 0.08 / 0.04 CPU 1 Utilization: 0% Peak Utilization Last Hour: 0% at 2023-11-05 09:45:01 Avg. Utilization Last Hour: 0% CPU 2 Utilization: 5% Peak Utilization Last Hour: 19% at 2023-11-05 09:45:01 Avg. Utilization Last Hour: 7% ... CPU 64 Utilization: 0% Peak Utilization Last Hour: 1% at 2023-11-05 09:45:01 Avg. Utilization Last Hour: 1%
Related Commands	
Notes	

10.4.5.2 show version

	show version Displays version information for the currently running system image.	
Syntax Description	N/A	
Default	N/A	
Configuration Mode	Any configuration mode	
History	1.4.2	Updated command output
	1.4.0	First release

Example	<pre>ufmapl (config) # show version
	Product name: ufm_appliance
	Product release: UFMAPL_1.4.2.2_UFM_6.13.1.1
	Build date: 2023-06-04 10:31:42
	Version summary: ufm_appliance UFMAPL_1.4.2.2_UFM_6.13.1.1 2023-06-04 10:31:42 x86_64
	UFM OS: 2.1.11
	UFM CHASSIS HEALTH: 1.0.0-3
	UFM HA: 5.1.1-4
	UFM CLI: 1.2.0-8
	Uptime: 3h 54m
	CPU load averages: 0.21 / 0.14 / 0.06
	Number of CPUs: 64
	System memory: 2463 MB used / 58693 MB free / 65400 MB total
	Swap: 0 MB used / 16252 MB free / 16252 MB total</pre>

Related Commands	N/A
Notes	N/A

10.4.5.3 show files system

	show files system [detail] Displays usage information of the file systems on the system.	
Syntax Description	detail	Displays more detailed information on file-system
Default	N/A	
Configuration Mode	Any configuration mode	
History	1.6.0	

Example	<pre>ufmapl (config) # show files system
	Statistics for /var filesystem:
	  Space Total 1649517 MB
	  Space Used 23438 MB
	  Space Free 1626079 MB
	  Space Available 1542216 MB
	  Space Percent Free 98%
	  Inodes Percent Free 99%
	
	Statistics for /opt/ufm/files filesystem:
	  Space Total 150105 MB
	  Space Used 294 MB
	  Space Free 149811 MB
	  Space Available 142116 MB
	  Space Percent Free 99%
	  Inodes Percent Free 99%</pre>	

Related Commands		
Notes		

10.4.6 Operating System License

The following CLI commands relate to the operating system license. For UFM License CLI commands, please refer to UFM License.

license install

	license install <url> Installs a UFM appliance OS license file from a remote host.	
Syntax Description	url	https, sftp are supported. Example: sftp://username:password@hostname/path/filename

Default	N/A	
Configuration Mode	config	
History	1.4.1	First release
	1.4.3	Added the first note in the "Notes" row.
Example	`ufmapl (config) # license install sftp://root:root/tmp/nvidia-ufm-os-restricted-3922145848058.lic`	
Related Commands	license delete show license	
Notes	• The license installation is used to access the SHELL in cases where the root account is disabled. For UFM Enterprise license installation, please refer to Activating the UFM Enterprise License. • The license format must be as follow: *.lic • The license installation overrides the existing license, if present. • To generate UFM appliance OS license, the management interface MAC address (eno8303) should be provided to NVIDIA by running the "`show interfaces`" command.	

10.4.6.1 license delete

	license delete Deletes a UFM appliance OS license file from the hard drive.
Syntax Description	N/A
Default	N/A
Configuration Mode	config
History	1.4.1
Example	`ufmapl (config) # license delete`
Related Commands	license install show license
Notes	N/A

10.4.6.2 show license

	show license Displays UFM appliance OS license information.
Syntax Description	N/A
Default	N/A
Configuration Mode	config
History	1.4.1

Example	ufmapl (config) # show license Customer ID: NVIDIA RND TESTING SN: 194042963524002 Type: Subscription Status: Valid MAC address: b0:7b:25:e9:79:a2
Related Commands	license install license delete
Notes	N/A

10.4.6.3 _shell

	_shell Runs a UNIX command shell such as bash. This shell command replaces the CLI; when the user exits the shell, they will be returned to the CLI.
Syntax Description	N/A
Default	N/A
Configuration Mode	enable
History	1.4.1
Example	ufmapl # _shell root@ufmapl:~#
Related Commands	license install license delete show license
Notes	N/A

10.5 UFM Commands

10.5.1 General

10.5.1.1 ufm start

	ufm start no ufm start Starts UFM. The no form of the command stops UFM.
Syntax Description	N/A
Default	N/A
Configuration Mode	config
History	1.4.1

Example	ufmapl (config) # ufm start
Related Commands	show ufm status
Notes	

10.5.1.2 show ufm status

	show ufm status Displays the status of UFM. The outcome of the command varies according to the working mode.	
Syntax Description	N/A	
Default	N/A	
Configuration Mode	config	
History	1.4.2	Updated command output
	1.4.0	First release

Example	<pre>ufmapl (config) # show ufm status
	
	Cluster name: ufmcluster
	WARNING: corosync and pacemaker node names do not match (IPs used in setup?)
	Stack: corosync
	Current DC: swx-ufm3-02 (version 1.1.18-2b07d5c5a9) - partition with quorum
	Last updated: Thu Jun 1 19:06:57 2023
	Last change: Thu Jun 1 19:06:11 2023 by root via crm_resource on swx-ufm3-02
	
	2 nodes configured
	5 resources configured
	
	Online: [swx-ufm3-01 swx-ufm3-02]
	Full list of resources:
	
	Master/Slave Set: ha_data_drbd_master [ha_data_drbd]
	     Masters: [swx-ufm3-01]
	     Slaves: [swx-ufm3-02]
	Resource Group: ufmcluster-grp
	     ha_data_file_system (ocf::heartbeat:Filesystem): Started swx-
	ufm3-01
	     ufm-ha-watcher (systemd:ufm-ha-watcher): Started swx-ufm3-01
	     ufm-enterprise (systemd:ufm-enterprise): Started swx-ufm3-01
	
	Daemon Status:
	  corosync: active/enabled
	  pacemaker: active/enabled
	  pcsd: active/enabled
	DRBD_RESOURCE: ha_data
	DRBD_CONNECTIVITY: Connected
	DISK_STATE: UpToDate
	DRBD_ROLE: Primary
	PEER_DISK_STATE: UpToDate
	PEER_DRBD_ROLE: Secondary
	DRBD Sync Status:
	version: 8.4.10 (api:1/proto:86-101)
	srcversion: 7C5B8378BE913D722F67EFD
	0: cs:Connected ro:Primary/Secondary ds:UpToDate/UpToDate C r-----
	    ns:9044 nr:159762612 dw:159771656 dr:2813 al:48 bm:0 lo:0 pe:0 ua:0 ap:0
	 ep:1 wo:d oos:0
	
	==
	=============
	                                    UFM Main Processes
	==
	=============
	ModelMain Process is : [Running]
	Opensm Process is : [Running]
	Unhealthy Ports Process is : [Running]
	Daily Report Process is : [Running]
	UFM Health Process is : [Running]
	UFM Telemetry Process is : [Running]
	UFM Running
	==
	HA Summary
	==
	Local
	==
	Primary IP 11.0.0.11
	Secondary IP 10.209.44.115
	DRBD Running Primary
	DRBD State ConnectionState = Connected - DiskState = UpToDate
	==
	Peer
	==
	Primary IP 11.0.0.12
	Secondary IP 10.209.44.116
	DRBD Running Secondary
	DRBD State ConnectionState = Connected - DiskState = UpToDate
	==
	swx-ufm3-01 (config) #</pre>

Related Commands	N/A
Notes	• The output example above is taken from a high-availability setup • If working in HA mode, you will receive information on the HA status The process status can be one of the below: • Running - the process is running • Stopped - the process is not running

10.5.2 UFM License

10.5.2.1 ufm license install

	ufm license install <url> Installs a UFM license file from a remote host.	
Syntax Description	url	https, scp and sftp are supported. Example: scp://username[:password]@hostname/path/filename, usb:/path/filename.
Default	N/A	
Configuration Mode	config	
History	1.6.0	
Example	`ufmapl (config) # ufm license install scp://root:123456@10.209.1.21/tmp/volt-ufm-advanced.lic`	
Related Commands	ufm license delete show ufm license	
Notes	• The license format must be as follow: volt-ufm-*.lic, mlnx-ufm-*.lic or nvidia-ufm-*.lic • Duplicate license are not permitted. You must delete the previous license before installing the new one.	

10.5.2.2 ufm license delete

	ufm license delete <filename> Deletes a UFM license file from the hard drive.	
Syntax Description	filename	UFM license filename
Default	N/A	
Configuration Mode	config	
History	1.6.0	
Example	`ufmapl (config) # ufm license delete volt-ufm-advanced.lic`	
Related Commands	ufm license install show ufm license	
Notes		

10.5.2.3 show ufm license

	show ufm license Displays UFM license information.
Syntax Description	N/A

Default	N/A
Configuration Mode	Enable
History	1.6.0

Example	`ufmapl (config) # show ufm license`
	`|----------|---|---|---|---|---|---|---|---|`
	`|Customer ID |SN | swName | Type | MAC Address | Exp. Date |Limit| Functionality | Status |`
	`|----------|---|---|---|---|---|---|---|---|`
	`|495760397 |123456778 |UFM |Evaluation |NA |2090-11-21 |1024 |Advanced |Valid |`
	`|----------|---|---|---|---|---|---|---|---|`

Related Commands	ufm license install ufm license delete
Notes	

10.5.2.4 show files ufm-license

	show files ufm-license Displays a list of UFM license files
Syntax Description	N/A
Default	N/A
Configuration Mode	Enable
History	1.6.0
Example	`ufmapl (config) # show files ufm-license` `nvidia-ufm-advanced.lic`
Related Commands	ufm license delete
Notes	

10.5.3 UFM Configuration Management

10.5.3.1 ufm configuration delete

	ufm configuration delete <zip-file> Deletes a configuration zip file from the hard drive.	
Syntax Description	zip-file	Zip filename to delete
Default	N/A	
Configuration Mode	config	
History	1.6.0	
Example	`ufmapl (config) # ufm configuration delete ufm-config-20121128-180857.` `zip`	

Related Commands	ufm configuration upload ufm configuration import ufm configuration export ufm configuration fetch
Notes	

10.5.3.2 ufm configuration export

	ufm configuration export [<zip-file>] Exports UFM configuration to a file (a zip archive).	
Syntax Description	zip-file	UFM configuration of exporting the zip file
Default	N/A	
Configuration Mode	config	
History	1.6.0	
Example	`ufmapl (config) # ufm configuration export`	
Related Commands	ufm configuration upload ufm configuration import ufm configuration delete ufm configuration fetch	
Notes	If no zip file is provided, a zip archive is created with the name: ufm-config-<date>-<time>.zip (e.g. ufm-config-20130327-153314.zip)	

10.5.3.3 ufm configuration fetch

	ufm configuration fetch <url> Downloads UFM configuration files from a remote host or a USB device.	
Syntax Description	url	The URL path from where the configuration file can be downloaded. https, scp and sftp are supported. Example: scp://username[:password]@hostname/path/filename
Default	N/A	
Configuration Mode	config	
History	1.6.0	
Example	`ufmapl (config) # ufm configuration fetch usb:/ufmapp/ufmconf1.zip`	
Related Commands	ufm configuration upload ufm configuration import ufm configuration export ufm configuration delete	
Notes		

10.5.3.4 ufm configuration import

	ufm configuration import <zip-file> [upgrade] Imports UFM configuration from a file (a zip archive).	
Syntax Description	zip-file	Zip filename from which to import
	upgrade	Imports UFM-SDN Appliance configuration from a previous version and upgrades it to the latest one
Default	N/A	
Configuration Mode	config	
History	1.6.0	
Example	`ufmapl (config) # ufm configuration import ufm-config-20121128-180857.zip`	
Related Commands	ufm configuration upload ufm configuration export ufm configuration delete ufm configuration fetch	
Notes		

10.5.3.5 ufm configuration upload

	ufm configuration upload <filename> <url> Uploads UFM configuration to a remote host or a USB device (a zip archive).	
Syntax Description	filename	The UFM configuration of uploading the file name
	url	The URL path from where the configuration file can be uploaded. Supported formats: https, scp and sftp. Example: scp://username[:password]@hostname/path/filename
Default	N/A	
Configuration Mode	config	
History	1.6.0	
Example	`ufmapl (config) # ufm configuration upload ufm-config-20121128-180857.zip scp://mlnx:123456@172.30.3.201/tmp`	
Related Commands	ufm configuration export ufm configuration import ufm configuration delete	
Notes		

10.5.3.6 show files ufm-configuration

	show files ufm-configuration Displays a list of UFM configuration zip archives.
Syntax Description	N/A
Default	N/A
Configuration Mode	Enable
History	1.6.0
Example	`ufmapl (config) # show files ufm-configuration` `ufm-config-20231105-102019.zip`
Related Commands	
Notes	

10.5.4 Data Management

10.5.4.1 ufm data reset

	ufm data reset Resets the UFM data (both the configuration and the database data).
Syntax Description	N/A
Default	N/A
Configuration Mode	config
History	1.5.0

Example	`ufmapl (config) # ufm data reset`
	`This command resets UFM data (configuration and database) and consequently deletes installed web client related certificates.`
	`Are you sure you wish to proceed? [yes/no] yes`
	
	`UFM reset to factory defaults finished successfully.`

Related Commands	N/A
Notes	This command is available in standalone mode only. For resetting UFM in HA mode, refer to no ufm ha.

10.5.5 Management Interface Monitoring

10.5.5.1 ufm mgmt-interface monitor enable

	ufm mgmt-interface monitor enable no ufm mgmt-interface monitor enable Enables monitoring of the management interface. The no form of the command disables monitoring of the management interface.
Syntax Description	N/A
Default	Disabled
Configuration Mode	config
History	1.4.0
Example	`ufmapl (config) # ufm mgmt-interface monitor enable`
Related Commands	ufm mgmt-interface monitor interval ufm mgmt-interface show ufm mgmt-interface
Notes	

10.5.5.2 ufm mgmt-interface monitor interval

	ufm mgmt-interface monitor interval <time> Configures the management interface monitoring interval.	
Syntax Description	time	The management interface monitoring interval. Range: 5-180 seconds.
Default	10 seconds	
Configuration Mode	config	
History	1.4.0	
Example	`ufmapl (config) # ufm mgmt-interface monitor interval 15`	
Related Commands	ufm mgmt-interface monitor enable ufm mgmt-interface show ufm mgmt-interface	
Notes		

10.5.5.3 ufm mgmt-interface

	ufm mgmt-interface <interface> Configures the management interface to be monitored.	
Syntax Description	interface	Management interface to be monitored (e.g. eno8303, eno8403)
Default	eno8303	

Configuration Mode	config
History	1.4.0
Example	`ufmapl (config) # ufm mgmt-interface eth0`
Related Commands	ufm mgmt-interface monitor enable ufm mgmt-interface monitor interval show ufm mgmt-interface
Notes	N/A

10.5.5.4 show ufm mgmt-interface

	show ufm mgmt-interface Displays the management interface settings.
Syntax Description	N/A
Default	N/A
Configuration Mode	Enable
History	1.4.0

Example	`ufmapl (config) # show ufm mgmt-interface`
	
	`Management interface monitoring:`
	`Interface name: eno8303`
	`Enabled: Yes`
	`Monitoring interval: 10 seconds`

Related Commands	ufm mgmt-interface monitor enable ufm mgmt-interface monitor interval ufm mgmt-interface
Notes	

10.5.6 UFM Logs

10.5.6.1 show ufm logging

	show ufm logging Displays logging configuration.
Syntax Description	N/A
Default	N/A
Configuration Mode	Enable
History	1.4.0

Example	ufmapl (config) # show ufm logging Number of archived log files to keep: 15 Log rotation size threshold: 100M Ufm-log level: WARNING Syslog: Enabled: No Server: Local Level: WARNING Ufm-log enabled: No Ufm-events enabled: No swx-ufm3-01 (config) #
Related Commands	
Notes	

10.5.6.2 ufm logging syslog enable

	ufm logging syslog enable no ufm logging syslog enable Enable sending UFM logs to syslog. The no form of the command disables sending UFM logs to syslog.
Syntax Description	N/A
Default	Disabled
Configuration Mode	config
History	1.4.0
Example	ufmapl (config) # ufm logging syslog enable
Related Commands	
Notes	This change takes effect after UFM restart.

10.5.6.3 ufm logging syslog

	ufm logging syslog <host:port> no ufm logging syslog Sends UFM logs to a remote syslog server. The no form of the command sends UFM logs to the local syslog server.	
Syntax Description	port	Remote syslog hostname and port
Default	N/A	
Configuration Mode	config	
History	1.4.0	
Example	ufmapl (config) # ufm logging syslog 172.30.36.120:514	
Related Commands		
Notes	This change takes effect after UFM restart.	

10.5.6.4 ufm logging syslog ufm-log enable

	ufm logging syslog ufm-log enable no ufm logging syslog ufm-log enable Send UFM log messages to a syslog server The no form of the command disables sending UFM log messages to a syslog server
Syntax Description	N/A
Default	Disabled
Configuration Mode	config
History	1.4.0
Example	`ufmapl (config) # ufm logging syslog enable`
Related Commands	
Notes	This change takes effect after UFM restart.

10.5.6.5 ufm logging syslog ufm-events enable

	ufm logging syslog ufm-events enable no ufm logging syslog ufm-events enable Send UFM event log messages to a syslog server. The no form disables the ability to log UFM event messages to syslog server
Syntax Description	N/A
Default	N/A
Configuration Mode	config
History	1.4.0
Example	`ufmapl (config) # ufm logging syslog ufm-events enable`
Related Commands	
Notes	This change takes effect after UFM restart.

10.5.6.6 ufm logging level

	ufm logging level <log-level> Sets the severity level of certain log messages.	
Syntax Description	log-level	• CRITICAL - critical conditions • DEBUG - debug-level messages • ERROR - error conditions • INFO - informational messages • WARNING - warning conditions
Default	WARNING	
Configuration Mode	config	
History	1.6	

Example	`ufmapl (config) # ufm logging level WARNING`
Related Commands	
Notes	

10.5.7 UFM Web Client

10.5.7.1 ufm web-client mode

	ufm web-client mode <http | https-client-authentication> Configures Access mode to the UFM web clients.	
Syntax Description	https	HTTPS access
	https-client-authentication	HTTPS access with client authentication
Default	https	
Configuration Mode	config	
History	1.4.0	
Example	`ufmapl (config) # ufm web-client mode https-client-authen`	
Related Commands	show ufm web-client ufm web-client client-authentication ufm web-client associate-user	
Notes		

10.5.7.2 ufm web-client associate-user

	ufm web-client associate-user <san> <username> no ufm web-client associate-user <san> <username> Associates client certificate subject alternative name with a UFM user. The no form of the command disassociates client certificate subject alternative name from a UFM user.	
Syntax Description	san	Client certificate subject alternative name
	username	UFM username
Default	N/A	
Configuration Mode	config	
History	1.4.0	
Example	`ufmapl (config) # ufm web-client associate-user ufm.mellanoxhpc.net admin`	

Related Commands	show ufm web-client ufm web-client mode ufm web-client client-authentication
Notes	

10.5.7.3 show ufm web-client

	show ufm web-client Displays UFM web client settings.
Syntax Description	N/A
Default	N/A
Configuration Mode	enable
History	1.4.0
Example	ufmapl (config) # show ufm web-client Mode: HTTPS Client authentication: Yes Bootstrap certificate file: Present CA certificate file: Present Server certificate file: Present Server certificate hostname: ufm.mellanoxhpc.net User Associations: SAN: ufm.mellanoxhpc.net User: ufmsysadmin Certificate Auto-refresh: Enabled: Yes CA certificate URL: https://mellanox.com/cacert Server certificate URL: https://mellanox.com/servercerts Server certificate thumbprint: 2268BDD79DF7FD9C818EB97F315AE0F35D223A15 Last checked: 2019-04-20 20:57:21 Last update: 2019-04-20 20:57:21
Related Commands	ufm web-client mode ufm web-client client-authentication ufm web-client associate-user
Notes	

10.5.7.4 ufm web-client client-authentication cert-refresh enable

	ufm web-client client-authentication cert-refresh enable no ufm web-client client-authentication cert-refresh enable Enables UFM web client certificates auto-refresh. The no form of the command disables the feature.
Syntax Description	N/A
Default	Disabled
Configuration Mode	config
History	1.4.0
Example	ufmapl (config) # ufm web-client client-authentication cert-refresh enable
Related Commands	show ufm web-client

Notes	

10.5.7.5 ufm web-client client-authentication cert-refresh ca-cert

	ufm web-client client-authentication cert-refresh ca-cert <download-url> no ufm web-client client-authentication cert-refresh ca-cert <download-url> Sets the download URL for root/intermediate certificate. The no form of the command clears the root/intermediate certificate auto-refresh settings.	
Syntax Description	download-url	Download URL for root/intermediate certificate
Default	N/A	
Configuration Mode	config	
History	1.5	
Example	`ufmapl (config) # ufm web-client client-authentication cert-refresh ca-cert "https://mellanox.com/cacerts"`	
Related Commands	show ufm web-client	
Notes		

10.5.7.6 ufm web-client client-authentication cert-refresh server-cert

	ufm web-client client-authentication cert-refresh server-cert <url> <thumbprint> no ufm web-client client-authentication cert-refresh server-cert <url> <thumbprint> Sets the download URL for server and bootstrap certificates. The no form of the command clears the server and bootstrap certificates auto-refresh settings.	
Syntax Description	url	https and sftp are supported. Example: sftp://username[:password]@hostname/path/filename.
	thumbprint	Server certificate thumbprint
Default	N/A	
Configuration Mode	config	
History	1.4.0	
Example	`ufmapl (config) # ufm web-client client-authentication cert-refresh server-cert "https://mellanox.com/servercerts" 2268BDD79DF7FD9C818EB97F315AE0F35D223A15`	
Related Commands	show ufm web-client	
Notes		

10.5.7.7 ufm web-client client-authentication cert-refresh run-now

	ufm web-client client-authentication cert-refresh run-now Refreshes the server and root/intermediate certificates manually.
Syntax Description	N/A
Default	N/A
Configuration Mode	config
History	1.4.0
Example	`ufmapl (config) # ufm web-client client-authentication cert-refresh run-now`
Related Commands	show ufm web-client
Notes	

10.5.8 UFM Audit

10.5.8.1 ufm track-conf-changes enable

	ufm track-conf-changes enable no ufm track-conf-changes enable Enables UFM configuration changes tracking The no form of the command disables UFM configuration changes tracking
Syntax Description	N/A
Default	Enabled
Configuration Mode	config
History	1.4.0
Example	`ufmapl (config) # ufm track-conf-changes enable`
Related Commands	show ufm track-conf-changes
Notes	

10.5.8.2 show ufm track-conf-changes

	show ufm track-conf-changes Displays UFM configuration changes tracking settings
Syntax Description	N/A
Default	N/A
Configuration Mode	config
History	1.4.0

Example	ufmapl (config) # show ufm Track UFM configuration changes: No
Related Commands	ufm track-conf-changes enable no ufm track-conf-changes enable
Notes	

10.5.9 High-Availability

10.5.9.1 ufm ha

	ufm ha [failover | takeover] Performs High Availability failover/takeover operations.	
Syntax Description	failover	Failover can be performed only on master (active) machine
	takeover	Takeover can be performed only on slave (standby) machine
Default	N/A	
Configuration Mode	config	
History	1.4.1	
Example	ufmapl (config) # ufm ha takeover	
Related Commands		
Notes		

10.5.9.2 ufm ha configure

	ufm ha configure <standby|master> <local primary IP> <peer primary IP> <local secondary IP> <peer secondary IP> <virtual ip> <hacluster-pwd> no ufm ha Applies HA configuration. The no form of the command reverts the appliance to a standalone configuration.	
Syntax Description	node-role	Master or standby
	local-primary-ip	Local node primary IP address
	peer-primary-ip	Peer node primary IP address
	local-secondary-ip	Local node secondary IP address
	peer-secondary-ip	Peer node secondary IP address
	virtual ip	Virtual IP used for accessing the active (master) machine
	hacluster-pwd	hacluster user password

Default	N/A
Configuration Mode	config
History	1.6.0
Example	`swx-ufm3-01 (config) # ufm ha configure standby 11.0.0.12 11.0.0.11 10.209.44.12 10.209.44.11 10.209.44.111 123456`
Related Commands	
Notes	1. The local and peer primary interfaces should be connected directly back-to-back 2. The command must be ran first on standby node and only then on the master node

10.5.9.3 ufm ha configure dual-subnet

	ufm ha configure dual-subnet <standby|master> <local primary IP> <peer primary IP> <local secondary IP> <peer secondary IP> <hacluster-pwd> no ufm ha Applies HA configuration for dual-subnet. The no form of the command reverts the appliance to a standalone configuration.	
Syntax Description	node-role	Master or standby
	local-primary-ip	Local node primary IP address
	peer-primary-ip	Peer node primary IP address
	local-secondary-ip	Local node secondary IP address
	peer-secondary-ip	Peer node secondary IP address
	hacluster-pwd	hacluster user password
Default	N/A	
Configuration Mode	config	
History	1.4.0	
Example	`swx-ufm3-01 (config) # ufm ha configure dual-subnet standby 11.0.0.12 11.0.0.11 10.209.44.12 10.209.44.11 123456`	
Related Commands		
Notes	1. The local and peer primary interfaces should be connected directly back-to-back 2. The command must be ran first on standby node and only then on the master node	

10.5.9.4 ufm ha-nodes

	ufm ha-nodes <master hostname> <standby hostname> no ufm ha-nodes Sets the HA nodes information in UFM configuration. The no form of the commands clears the HA nodes information from the UFM configuration.	
Syntax Description	master hostname	The originally set master node hostname.
	standby hostname	The originally set standby node hostname.
Default	N/A	
Configuration Mode	config	
History	1.5.0	
Example	`ufmapl (config) # ufm ha-nodes ufm-host-01 ufm-host-02`	
Related Commands	show ufm ha-nodes	
Notes		

10.5.9.5 show ufm ha-nodes

	show ufm ha-nodes Shows the UFM HA configuration that is set in UFM.
Syntax Description	N/A
Default	N/A
Configuration Mode	config
History	1.5.0
Example	`ufmapl (config) # show ufm ha-nodes` `08c0eb030098609a:11.0.0.12:1,08c0eb0300986042:11.0.0.11:2`
Related Commands	ufm ha-nodes
Notes	N/A

10.5.10 UFM Multi-Port SM

10.5.10.1 ufm multi-port-sm

	ufm multi-port-sm enable ufm multi-port-sm ha-enable no ufm multi-port-sm enable Enables configuring OpenSM with multiple GUIDs. The no form of the command disables configuring OpenSM with multiple GUIDs.
Syntax Description	enable - enables configuring OpenSM with multiple GUIDs ha-enable - enables multi-port SM with high availability

Default	Disabled
Configuration Mode	config
History	1.6.0
Example	`ufm (config) # ufm multi-port-sm enable`
Related Commands	show ufm multi-port-sm
Notes	

10.5.10.2 show ufm multi-port-sm

	show ufm multi-port-sm Displays whether configuring OpenSM with multiple GUIDs is enabled.
Syntax Description	N/A
Default	N/A
Configuration Mode	config
History	1.6.0
Example	`ufm (config) # show ufm multi-port-sm` `Enable`
Related Commands	ufm multi-port-sm enable
Notes	

10.5.10.3 ufm additional-fabric-interfaces

	ufm additional-fabric-interfaces no ufm additional-fabric-interfaces Sets additional fabric interfaces for OpenSM. Clears the additional fabric interfaces list.
Syntax Description	N/A
Default	N/A
Configuration Mode	config
History	1.6.0
Example	`ufm (config) #ufmapl (config) # ufm additional-fabric-interfaces ib1`
Related Commands	ufm multi-port-sm enable
Notes	

10.5.10.4 show ufm additional-fabric-interfaces

	show ufm additional-fabric-interfaces Displays the additional fabric interfaces list used by OpenSM.
Syntax Description	N/A
Default	N/A
Configuration Mode	config
History	1.6.0
Example	`ufm (config) # show ufm additional-fabric-interfaces ib1`
Related Commands	ufm multi-port-sm enable
Notes	

10.6 InfiniBand Commands

10.6.1 OpenSM

10.6.1.1 ib sm configuration import

	ib sm configuration import [partition-conf-user-ext] <url> Imports the Subnet Manager configuration.
Syntax Description	N/A
Default	N/A
Configuration Mode	config
History	1.4.1

Example	`ufmapl (config) #`
	`ib sm configuration import partition-config-user-ext`
	`sftp://admin:123456@192.168.1.12/tmp/partitions.conf.user_ext`

Related Commands	show ib sm configuration import
Notes	N/A

10.6.1.2 show ib sm allow-both-pkeys

	show ib sm allow-both-pkeys Displays if both full and limited memberships on the same partition are enabled or not.
Syntax Description	N/A
Default	N/A
Configuration Mode	Enable
History	1.4.0

Example	ufmapl (config) # show ib sm allow-both-pkeys disable
Related Commands	ib sm allow-both-pkeys
Notes	N/A

10.6.1.3 ib sm allow-both-pkeys

	ib sm allow-both-pkeys no ib sm allow-both-pkeys Enables having both a full and limited membership on the same partition. The no form of the command disables having both full and limited memberships on the same partition.
Syntax Description	N/A
Default	Disabled
Configuration Mode	config
History	1.4.0
Example	ufmapl (config) # ib sm allow-both-pkeys
Related Commands	show ib sm allow-both-pkey ib partition management defmember
Notes	N/A

10.6.1.4 show ib sm keep-pkey-indexes

	show ib sm keep-pkey-indexes Displays whether PKey indexes belonging to the historical PKeys configured on the port are preserved or not.
Syntax Description	N/A
Default	N/A
Configuration Mode	Enable
History	1.4.0
Example	ufmapl (config) # show ib sm keep-pkey-indexes enable
Related Commands	ib sm keep-pkey-indexes
Notes	N/A

10.6.1.5 ib sm keep-pkey-indexes

	ib sm keep-pkey-indexes no ib sm keep-pkey-indexes Preserves PKey indexes belonging to the historical PKeys configured on the port when generating PKey tables for a certain port. The no form of the command calculates PKey indexes belonging to the historical PKeys configured on the port.
Syntax Description	N/A
Default	Enabled
Configuration Mode	config
History	1.4.0
Example	`ufmapl (config) # no ib sm keep-pkey-indexes`
Related Commands	show ib sm keep-pkey-indexes ib sm allow-both-pkeys
Notes	N/A

10.6.1.6 show ib sm virtualization

	show ib sm virtualization Displays virtualization support.
Syntax Description	N/A
Default	N/A
Configuration Mode	enable
History	1.4.0
Example	`ufmapl (config) # show ib sm virtualization` `enable`
Related Commands	ib sm virtualization enable ib sm virtualization ignore
Notes	N/A

10.6.1.7 ib sm virtualization enable

	ib sm virtualization enable no ib sm virtualization enable Enables virtualization on all supported ports (default). The no form of the command disables virtualization on all supporting ports.
Syntax Description	N/A
Default	Enabled

Configuration Mode	config
History	1.4.0
Example	`ufmapl (config) # ib sm virtualization enable`
Related Commands	show ib sm virtualization
Notes	It is not possible to modify the virtualization support in case OpenSM or UFM are running.

10.6.1.8 ib sm virtualization ignore

	ib sm virtualization ignore No virtualization support.
Syntax Description	N/A
Default	N/A
Configuration Mode	config
History	1.4.0
Example	`ufmapl (config) # ib sm virtualization ignore`
Related Commands	show ib sm virtualization
Notes	It is not possible to modify the virtualization support in case OpenSM or UFM are running.

10.6.1.9 show ib sm root-guid

	show ib sm root-guid Displays all configured root GUIDs for the SM.
Syntax Description	N/A
Default	N/A
Configuration Mode	enable
History	1.4.0

Example	`ufmapl (config) # show ib sm root-guid`
	`0x0002c903006ad830`
	`0x0002c903006ae120`
	`0x0002c903006af520`

Related Commands	ib sm root-guid
Notes	N/A

10.6.1.10 ib sm root-guid

	ib sm root-guid <guid> no ib sm root-guid <guid> Adds a root GUID for the SM. The no form of the command removes the GUID from the SM.	
Syntax Description	guid	The root GUID number in hexadecimal notation For example: 0x0002c903006ad830
Default	N/A	
Configuration Mode	config	
History	1.4.0	
Example	`ufmapl (config) # ib sm root-guid 0x0002c903006ad830`	
Related Commands	show ib sm root-guid	
Notes	The list of root GUIDs are relevant when the routing algorithm is up-down or fat-tree.	

10.6.1.11 show ib sm routing-engines

	show ib sm routing-engines Displays number of CPUs configured to use for parallel calculations.
Syntax Description	N/A
Default	N/A
Configuration Mode	enable
History	1.4.0
Example	`ufmapl (config) # show ib sm routing-engines ar_updn`
Related Commands	ib sm routing-engines
Notes	N/A

10.6.1.12 ib sm routing-engines

	ib sm routing-engines <engine> Configures number of CPUs to use for parallel calculations.	
Syntax Description	engine	Multiple routing engines can be specified separated by space. Supported engines: ar-dor, ar-ftree, ar-torus, ar-updn, chain, dfp, dfp2, dor, file, ftree, minhop, pqft, torus-2QoS, updn)
Default	1	
Configuration Mode	config	
History	1.4.0	

Example	`ufmapl (config) # ib sm routing-engines ar-updn`
Related Commands	show ib sm routing-engines
Notes	N/A

10.6.1.13 show ib sm ar-sl-mask

	show ib sm ar-sl-mask Displays the adaptive routing SL mask.
Syntax Description	N/A
Default	N/A
Configuration Mode	enable
History	1.4.0
Example	`ufmapl (config) # show ib sm ar-sl-mask` `0xffff`
Related Commands	ib sm ar-sl-mask
Notes	N/A

10.6.1.14 ib sm ar-sl-mask

	ib sm ar-sl-mask <mask> no ib sm ar-sl-mask Configures the adaptive routing SL mask. The no form of the command rests the mask value to default.	
Syntax Description	mask	Range: 0x0000-0xffff
Default	0xffff	
Configuration Mode	config	
History	1.4.0	
Example	`ufmapl (config) # ib sm ar-sl-mask 0xfffe`	
Related Commands	show ib sm ar-sl-mask	
Notes	N/A	

10.6.1.15 show ib sm configuration import

	show ib sm configuration import Displays imported subnet manager configuration files.
Syntax Description	N/A
Default	N/A

Configuration Mode	enable
History	1.4.0
Example	ufmapl (config) # show ib sm configuration import partitions.conf.user_ext ----
Related Commands	ib sm configuration import
Notes	N/A

10.6.1.16 ib sm partition-config-merge

	ib sm partition-config-merge Merges the partitions.conf.user_ext into the partitions.conf and starts the heavy sweep on the SM. To use after importing the specific file or importing all configuration files.
Syntax Description	N/A
Default	N/A
Configuration Mode	config
History	1.4.0
Example	ufmapl (config) # ib sm partition-config-merge
Related Commands	ib sm configuration import partition-config-user-ext
Notes	The SM must be running for this command to work.

10.6.1.17 ib sm sharp enable

	ib sm sharp enable no ib sm sharp enable Enables NVIDIA® Scalable Hierarchical Aggregation and Reduction Protocol (SHARP)™ on all supporting switches. The no form disables NVIDIA SHARP on all supporting switches.
Syntax Description	N/A
Default	N/A
Configuration Mode	config
History	1.4.0
Example	ufmapl (config) # ib sm sharp enable

Related Commands	show ib sm sharp
Notes	It is not possible to modify the NVIDIA SHARP support parameter in case OpenSM is running.

10.6.1.18 ib sm sharp ignore

	ib sm sharp ignore No NVIDIA SHARP support. This command does not change the current switch configuration. If NVIDIA SHARP is enabled on the switch, it will remain enabled. If it is disabled on the switch, it will remain disabled.
Syntax Description	N/A
Default	N/A
Configuration Mode	config
History	1.4.0
Example	`ufmapl (config) # ib sm sharp ignore`
Related Commands	show ib sm sharp
Notes	It is not possible to modify the NVIDIA SHARP support parameter in case OpenSM is running.

10.6.1.19 show ib sm sharp

	show ib sm sharp Displays NVIDIA SHARP support.
Syntax Description	N/A
Default	N/A
Configuration Mode	Enable
History	1.4.0
Example	`ufmapl (config) # show ib sm sharp ignore`
Related Commands	ib sm sharp enable ib sm sharp ignore
Notes	N/A

10.6.2 HCA Commands

10.6.2.1 ib hca-vl15-window

	ib hca-vl15-window <value> no ib hca-vl15-window Sets the HCA VL15 port receive buffer size. The no form of the command resets this parameter to its default.	
Syntax Description	value	1,2,4,8,16,32,64,128
Default	1	
Configuration Mode	config	
History	1.6.0	
Example	`UFM-APL (config) # ib hca-vl15-window 6`	
Related Commands	show ib hca-vl15-window	
Notes	UFM system must be rebooted to apply the new configuration	

10.6.2.2 show ib hca-vl15-window

	show ib hca-vl15-window Displays the configured HCA VL15 port receive buffer size.
Syntax Description	N/A
Default	N/A
Configuration Mode	Enable
History	1.6.0

Example	`ufmapl (config) # show ib hca-vl15-window`
	`/dev/mst/mt4123_pciconf0:`
	`  Running configuration: default`
	
	`/dev/mst/mt4123_pciconf1:`
	`  Running configuration: default`

Related Commands	ib hca-vl15-window
Notes	The example shows an instance where the system has not been rebooted after implementing new configuration

10.6.3 Partition

10.6.3.1 ib partition management defmember

	ib partition management defmember <type> no ib partition management defmember Sets the default membership for the management IB partition (default PKEY). The no form of the command resets the parameter to its default value.	
Syntax Description	type	• full – full membership • limited – limited membership
Default	Full membership	
Configuration Mode	config	
History	1.4.0	
Example	`ufmapl (config) # ib partition management defmember limited`	
Related Commands	show ib partition	
Notes	• The defmember setting controls the ability of end nodes to communicate over the management partition • It is not possible to modify the defmember in case OpenSM or UFM are running	

10.6.3.2 show ib partition

	show ib partition Displays partition information.
Syntax Description	N/A
Default	N/A
Configuration Mode	enable
History	1.4.0

Example	`ufmapl (config) # show ib partition`
	
	`management:`
	`Default membership: full`

Related Commands	ib partition management defmember
Notes	N/A

10.6.4 NVIDIA SHARP

10.6.4.1 ib sharp enable

	ib sharp enable no ib sharp enable Enables NVIDIA® Scalable Hierarchical Aggregation and Reduction Protocol (SHARP)™. The no form of the command disables NVIDIA SHARP.
Syntax Description	N/A
Default	N/A
Configuration Mode	config
History	1.4.0
Example	`ufmapl (config) # ib sharp enable`
Related Commands	show ib sharp
Notes	N/A

10.6.4.2 ib sharp allocation enable

	ib sharp allocation enable no ib sharp allocation enable Enables NVIDIA SHARP allocation reservation. The no form of the command disables NVIDIA SHARP allocation reservation.
Syntax Description	N/A
Default	N/A
Configuration Mode	config
History	1.6.0
Example	`ufmapl (config) # ib sharp allocation enable`
Related Commands	show ib sharp
Notes	

10.6.4.3 ib sharp smx-protocol

	ib sharp smx-protocol {sockets | ucx} no ib sharp smx-protocol Configures network protocol to be used by SMX. The no form of the command restores the network protocol to default.
Syntax Description	N/A
Default	sockets
Configuration Mode	config

History	1.4.0
Example	`ufmapl (config) # ib sharp smx-protocol ucx`
Related Commands	show ib sharp
Notes	N/A

10.6.4.4 ib sharp topology-api enable

	ib sharp topology-api enable no ib sharp topology-api enable Enables the SHARP topology API. The no form of the command disables the SHARP topology API.
Syntax Description	N/A
Default	Disabled
Configuration Mode	config
History	1.4.0
Example	`ufmapl (config) # ib sharp topology-api enable`
Related Commands	show ib sharp
Notes	N/A

10.6.4.5 show ib sharp

	show ib sharp Displays the configuration of NVIDIA SHARP Aggregation Manager.	
Syntax Description	N/A	
Default	N/A	
Configuration Mode	config	
History	1.6.0	Updated the output to reflect the new settings
	1.4.0	First release

Example	`ufmapl (config) # show ib sharp`
	`Enabled: No`
	`Allocation: No`
	`SMX protocol: sockets`
	`Topology API: No`
	`Dump files generation: Yes`
	`Dynamic tree allocation: No`
	`Dynamic tree algorithm: 0`
	`IB QPC SL: 0`
	`IB SAT QPC SL: 1`	

Related Commands	N/A	
Notes	N/A	

10.6.4.6 ib sharp dump-files-generation enable

	ib sharp dump-files-generation enable no ib sharp dump-files-generation enable Enables dumping SHARP's internal state to files The no form of the command disables dumping SHARP's internal state to files
Syntax Description	N/A
Default	Disable
Configuration Mode	config
History	1.6.0
Example	`ufmapl (config) # ib sharp dump-files-generation enable`
Related Commands	show ib sharp
Notes	N/A

10.6.4.7 ib sharp dynamic-tree-allocation enable

	ib sharp dynamic-tree-allocation enable no ib sharp dynamic-tree-allocation enable Enables dynamically allocated trees for each SHARP job The no form of the command disables dynamically allocated trees for each SHARP job
Syntax Description	N/A
Default	Enable
Configuration Mode	config
History	1.6.0
Example	`ufmapl (config) # ib sharp dynamic-tree-allocation enable`
Related Commands	show ib sharp
Notes	N/A

10.6.4.8 ib sharp dynamic-tree-algorithm

	ib sharp dynamic-tree-algorithm <0-1> no ib sharp dynamic-tree-algorithm Sets which algorithm should be used by the dynamic tree mechanism The no form of the command restores the algorithm used by the dynamic tree mechanism to default
Syntax Description	N/A
Default	0
Configuration Mode	config

History	1.6.0
Example	`ufmapl (config) # ib sharp dynamic-tree-algorithm`
Related Commands	show ib sharp
Notes	N/A

10.6.4.9 ib sharp ib-qpc-sl <0-15>

	ib sharp ib-qpc-sl <0-15> no ib sharp ib-qpc-sl Set the IB QP context SL for SHARP data path communication The no form of the command restores the IB QP context SL for SHARP data path communication to default
Syntax Description	N/A
Default	0
Configuration Mode	config
History	1.6.0
Example	`ufmapl (config) # ib sharp ib-qpc-sl 1`
Related Commands	show ib sharp
Notes	N/A

10.6.4.10 ib sharp ib-sat-qpc-sl <0-15>

	ib sharp ib-sat-qpc-sl <0-15> no ib sharp ib-sat-qpc-sl Sets the IB QP context SL for SHARP streaming data path communication The no form of the command restores the IB QP context SL for SHARP streaming data path communication to default
Syntax Description	N/A
Default	1
Configuration Mode	config
History	1.6.0
Example	`ufmapl (config) # ib sharp ib-sat-qpc-sl 1`
Related Commands	show ib sharp

Notes	N/A

11 UFM Enterprise Appliance Upgrade

> This is the recommended upgrade procedure, which involves upgrading all UFM Enterprise appliance software components and operating system. For additional upgrade procedures of specific software components, please refer to Appendix - Software Components Upgrade.
>
> As of UFM Enterprise Appliance version 1.5.0, upgrading the appliance on HA supports an in-service upgrade, meaning UFM can continue running during the steps of the upgrade, and there is no need to stop UFM before the upgrade.

The upgrade is performed on both Master and Standby nodes.

To upgrade the UFM Enterprise Appliance software:

1. On the standby server, extract the OMU image to the /tmp folder:

   ```
   tar -xzf ufm-appliance-<version>-omu.tar -C /tmp
   ```

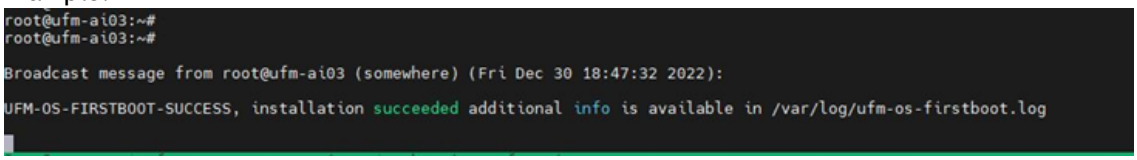
2. On the standby server, access the installation folder and upgrade script:

   ```
   standby# cd /tmp/ufm-appliance-<version>-omu
   ```

3. Run the UFM upgrade script on the standby server:

   ```
   ./ufm-os-upgrade.sh --appliance-sw-upgrade --yes --reboot
   ```

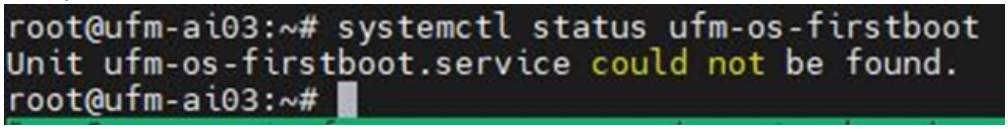
4. After the reboot procedure is complete, a systemd service (`ufm-os-firstboot.service`) runs the remainder of the upgrade procedure. Once completed, a message is prompted to all open terminals including the status:
   " `UFM-OS-FIRSTBOOT-FAILURE` " - if installation is failed.
   " `UFM-OS-FIRSTBOOT-SUCCESS` " - if installation succeeded.
   Example:

   To manually check the status, run `systemctl status ufm-os-firstboot.service.` If it is already finished, an error message is prompted stating that there is no such service. In that case, the log /var/log/ufm-os-firstboot.log can be checked instead.

   ```
   systemctl status ufm-os-firstboot.service
   ```

   Example:

Do NOT proceed to the next step before ensuring that the `systemctl status ufm-os-firstboot.service` service has been completed.

5. After the completion of the upgrade script, the UFM code is upgraded, while the UFM data remains unchanged. The automatic upgrade of UFM data will take place during the next UFM startup. To initiate this process, execute a failover from the Master node (or perform a takeover from the Standby node).

```
master# ufm_ha_cluster failover
```

The upgrade script logs the data to `/var/log/ufm_os_upgrade_<UFM-OS version>.log` and outputs simultaneously it to the screen. In case of an issue, UFM data can be restored to factory default. For more information, refer to Appendix - UFM Factory Reset.

6. Once UFM is operational on the upgraded node (formerly the standby node), proceed to replicate steps 1 to 3 on the non-upgraded node (previously the master node).

11.1 In-Service Upgrade via CLI

Alternatively, in-service upgrade can be performed via the CLI. The upgrade is performed on both Master and Standby nodes.

Follow the below instructions:

1. On the Standby node, fetch the new image from a remote server. Run:

```
ufmapl (config) # image fetch <download URL>
```

2. On the Standby node, install the new image. Run:

```
ufmapl (config) # image install <image name>
```

3. Reload the Standby UFM Enterprise Appliance. Run:

```
ufmapl (config) # reload
```

4. After the completion of the upgrade on the Standby node, the UFM code is upgraded, while the UFM data remains unchanged. The automatic upgrade of UFM data will take place during the next UFM startup. To initiate this process, execute a failover from the Master node. Once the Standby node is up and running, perform a failover on the Master node. Run:

```
ufmapl (config) # ufm ha failover
```

5. Once UFM is operational on the upgraded node (formerly the standby node), proceed to replicate steps 1 to 3 on the non-upgraded node (previously the Master node).

12 Troubleshooting

12.1 Split-Brain Recovery in HA Installation

The split-brain problem is a DRBD synchronization issue (HA status shows `DUnknown` in the DRBD disk state), which occurs when both HA nodes are rebooted. For example, in cases of electricity shut-down. To recover, please follow the below steps:

- Step 1: Run the following command to clear the cluster failure.

  ```
  pcs resource cleanup
  ```

  If the split-brain issue is not resolved, perform the below steps.
- Step 2: Manually choose a node where data modifications will be discarded.
  It is called the split-brain victim. Choose wisely; all modifications will be lost! When in doubt, run a backup of the victim's data before you continue.
  When running a Pacemaker cluster, you can enable maintenance mode. If the split-brain victim is in the Primary role, bring down all applications using this resource. Now switch the victim to the Secondary role:

  ```
  victim# drbdadm secondary ha_data
  ```
- Step 3: Disconnect the resource if it's in connection state WFConnection:

  ```
  victim# drbdadm disconnect ha_data
  ```
- Step 4: Force discard of all modifications on the split-brain victim:

  ```
  victim# drbdadm connect --discard-my-data ha_data
  ```
- Step 5: Resync starts automatically if the survivor is in a WFConnection network state. If the split-brain survivor is still in a Standalone connection state, reconnect it:

  ```
  survivor# drbdadm connect ha_data
  ```

  Now the resynchronization from the survivor (SyncSource) to the victim (SyncTarget) starts immediately. There is no full sync initiated, but all modifications on the victim will be overwritten by the survivor's data, and modifications on the survivor will be applied to the victim.

13 Appendixes

13.1 Appendix - Chassis Health Monitoring

13.1.1 Overview

Chassis Health Monitoring enables monitoring hardware alerts via `rsyslog` and generating external events in UFM. The alerts are written to `/var/log/syslog.`

Monitoring hardware health status is essential for failure prevention and maintenance. The Chassis Health Monitoring service is run as a Docker container.

13.1.2 Configuration

1. Generate UFM token authentication. Run:

   ```
   POST https://<UFM server IP>/ufmRest/app/tokens
   ```

2. Set the UFM server hostname and authentication token in `/opt/ufm/chassis_health/chassis_health.conf`:

   ```
   [connection]
   # UFM server hostname. In case of HA, it should be the VIP
   hostname =

   [authentication]
   # UFM server user credentials
   token =
   ```

3. Restart the Chassis Health Monitoring service for changes to take effect. Run:

   ```
   systemctl restart ufm-chassis-health.service
   ```

Once the service runs, the status can be viewed via `systemctl` (`systemctl status ufm-chassis-health.service`) and `/var/log/chassis_health_fluentd_console.log` file.

13.2 Appendix - Secure Boot Activation and Deactivation

This section provides instructions on how to enable/disable the Secure Boot feature in UFM Enterprise Appliance.

13.2.1 Enabling Secure Boot

The NVIDIA public certificate needs to be imported to the Machine Owner Key DB (MOK DB) before enabling secure boot. To do so, follow the below steps:

13.2.1.1 Add NVIDIA Certificate to MOK DB

1. Download NVIDIA certificate mlnx_signing_key_pub.der to a temporary folder.
   checksums:
   MD5: c3ce3dcad0f38b02a9cbb991ce1bc7f4
   sha256: ff7fe8c650e936079a8add2900b190f9e7f3806e5ad42e48c2b88408a6ce70aa

   ```
   cd /tmp
   wget http://www.mellanox.com/downloads/ofed/mlnx_signing_key_pub.der
   ls -ltrh ./mlnx_signing_key_pub.der
   ```

   Example:

   ```
   root@ubuntu:/tmp# ls -ltrh mlnx_signing_key_pub.der
   -rw-r--r-- 1 root root 1.5K Feb 23  2017 mlnx_signing_key_pub.der
   ```

2. Import the mlnx_signing_key_pub.der to MOK DB using mok-util:

   ```
   cd /tmp
   mokutil --import ./mlnx_signing_key_pub.der --root-pw
   ```

   > The certificate is in the enrolled queue at this point. Upon the next server reboot, a 10 second prompt appears at the start of the boot process to confirm the certificate addition. It is important to confirm the certificate addition at this stage. Failure to do so requires you to repeat the procedure.
   > To be able to interact with the prompt, a console connection is needed either from the serial port or from the web console available via Remote Management.

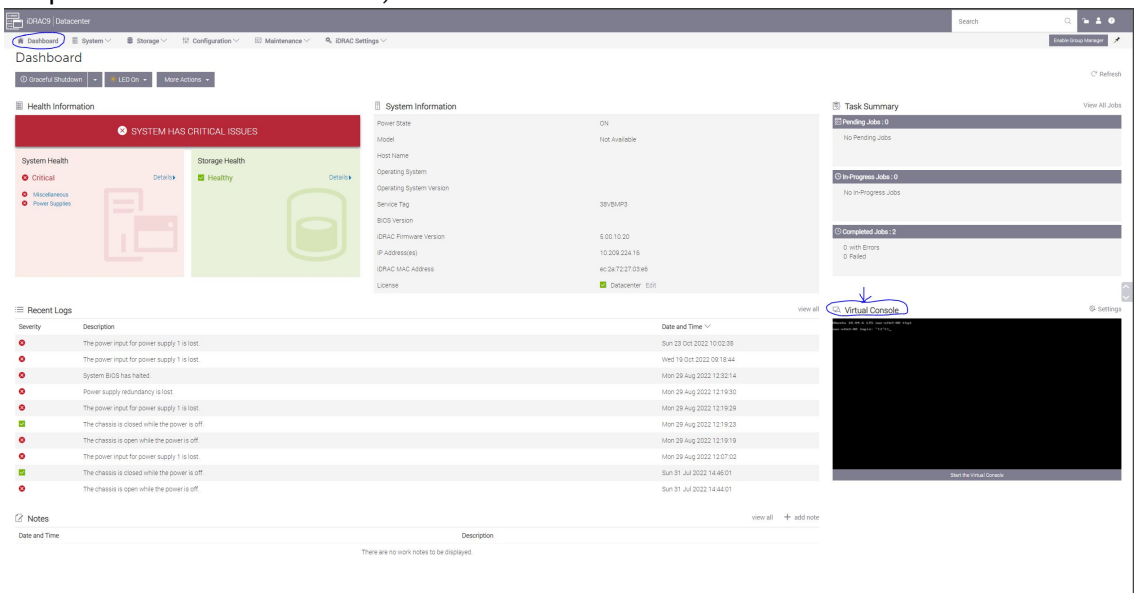
   Verify the certificate in the enrolled queue:

   ```
   mokutil --list-new
   ```

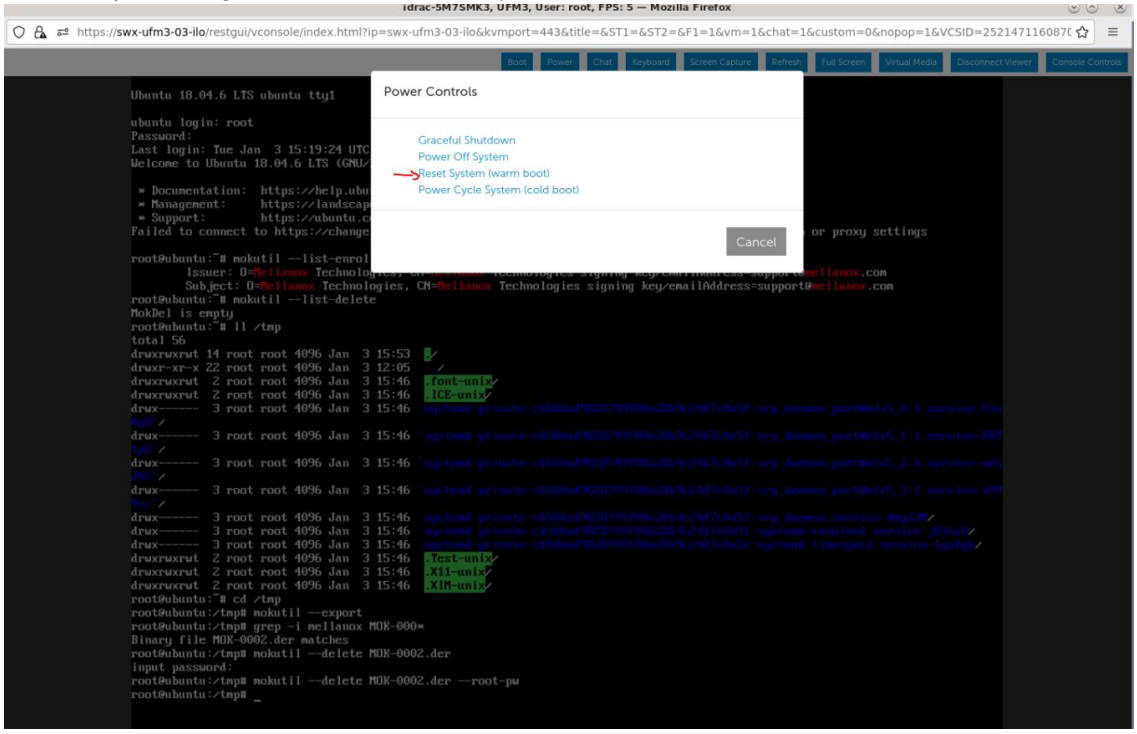
   ```
   root@ubuntu:~# mokutil --list-new
   [key 1]
   SHA1 Fingerprint: dc:cd:44:95:92:2f:95:9f:28:49:7b:64:94:41:d8:bd:64:60:6d:69
   Certificate:
       Data:
           Version: 3 (0x2)
           Serial Number:
               ba:b0:f5:cd:23:24:a0:ed
           Signature Algorithm: sha256WithRSAEncryption
           Issuer: O=Mellanox Technologies, CN=Mellanox Technologies signing key/emailAddress=support@mellanox.com
   ```

3. Login to Remote Management via https://<iDRAC-ip address>

4. To open the virtual web console, click on "Dashboard" → "Virtual Console"

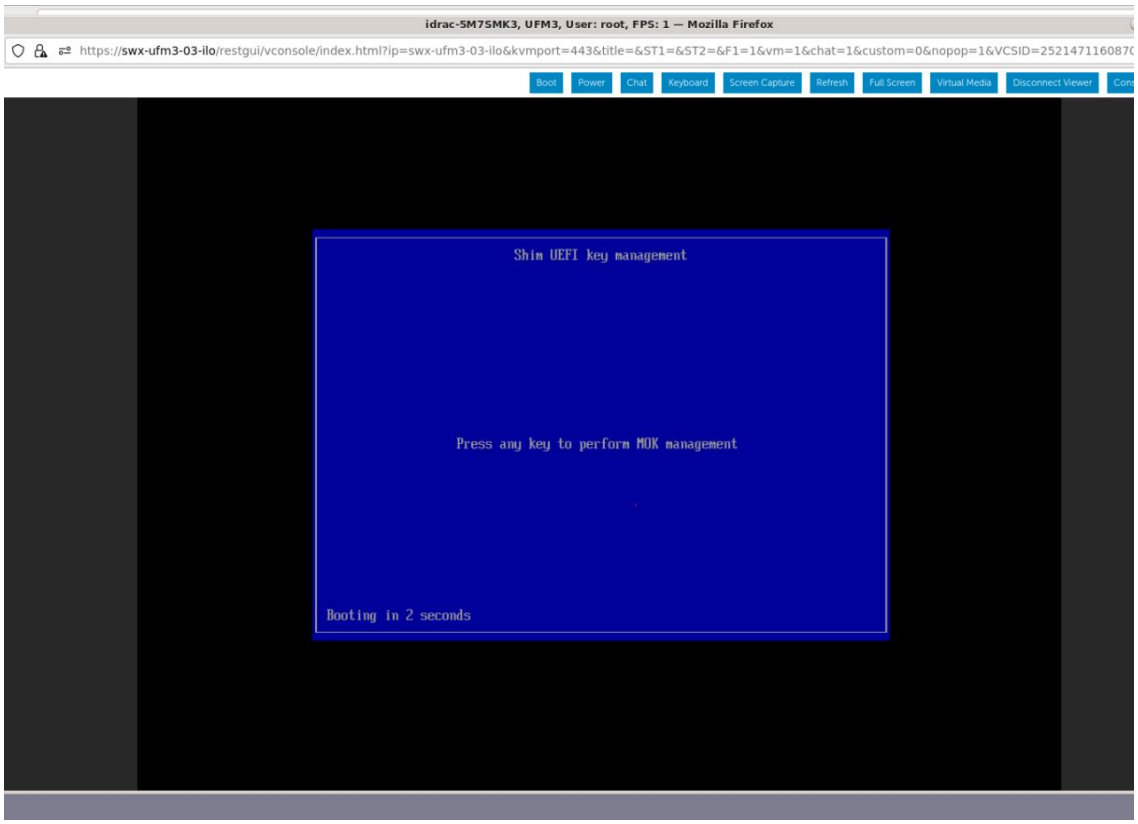


5. Power cycle the server (at boot startup a 10 second prompt appears to verify the certificate addition)
   On the top menu, go to "Power" → "Reset System (warm boot)"

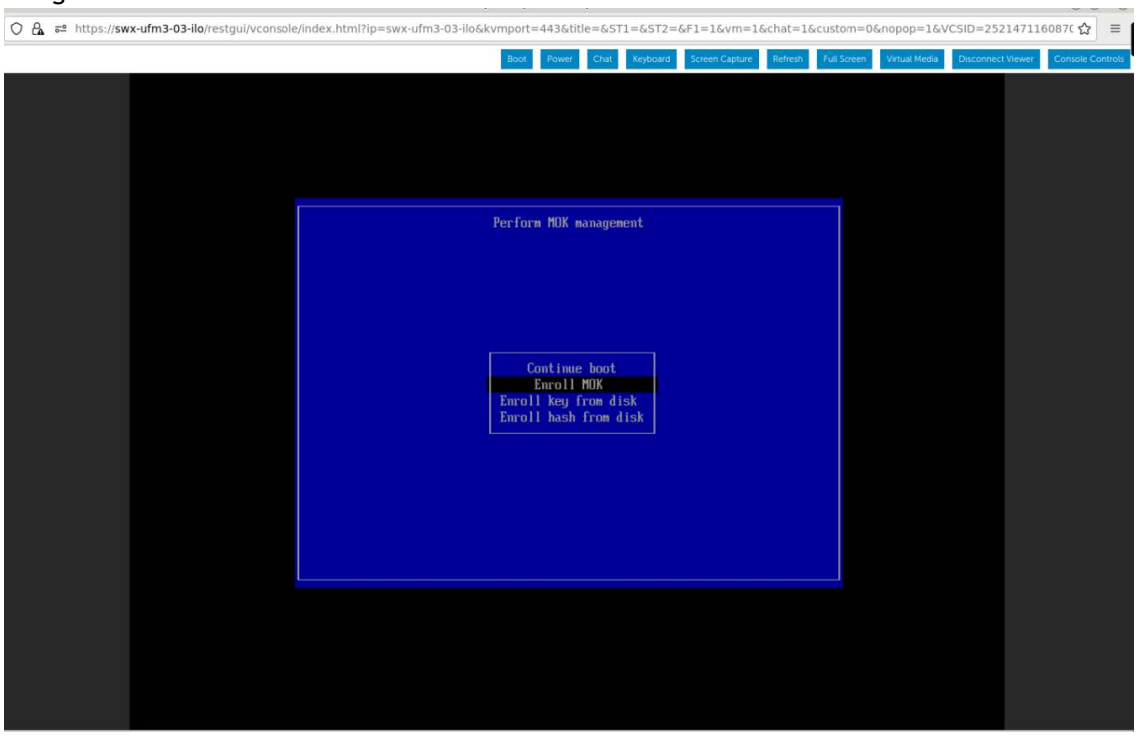


   The server will now reboot.

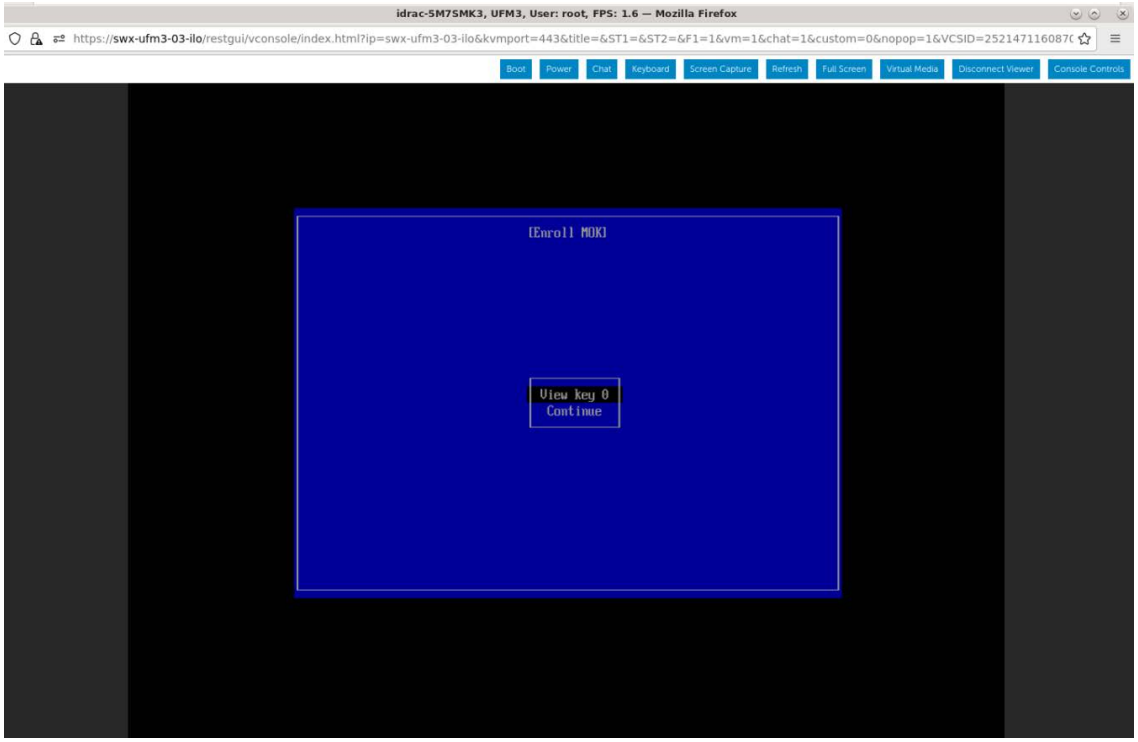
6. At boot startup, a confirmation prompt appears to verify certificate addition. The prompt closes after 10 seconds, so if missed, the certificate addition procedure needs to be done again.
   When the prompt appears, press any key to interact.

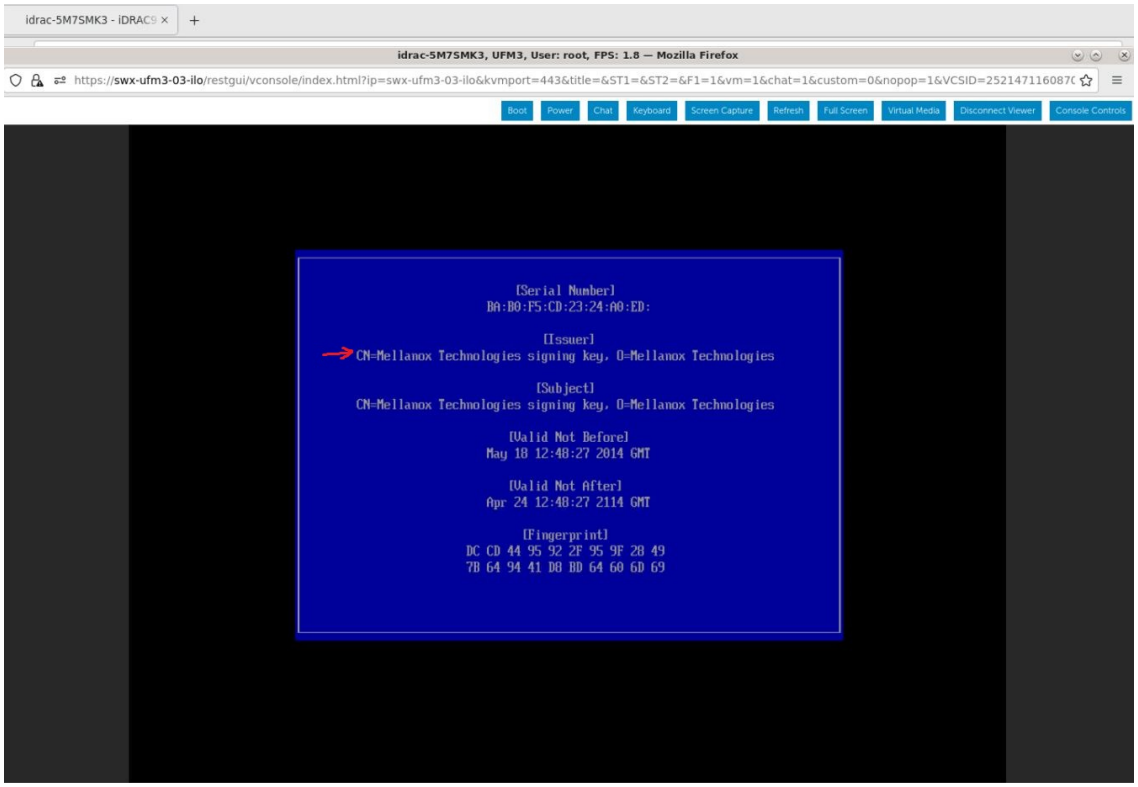


7. Navigate to "Delete MOK"



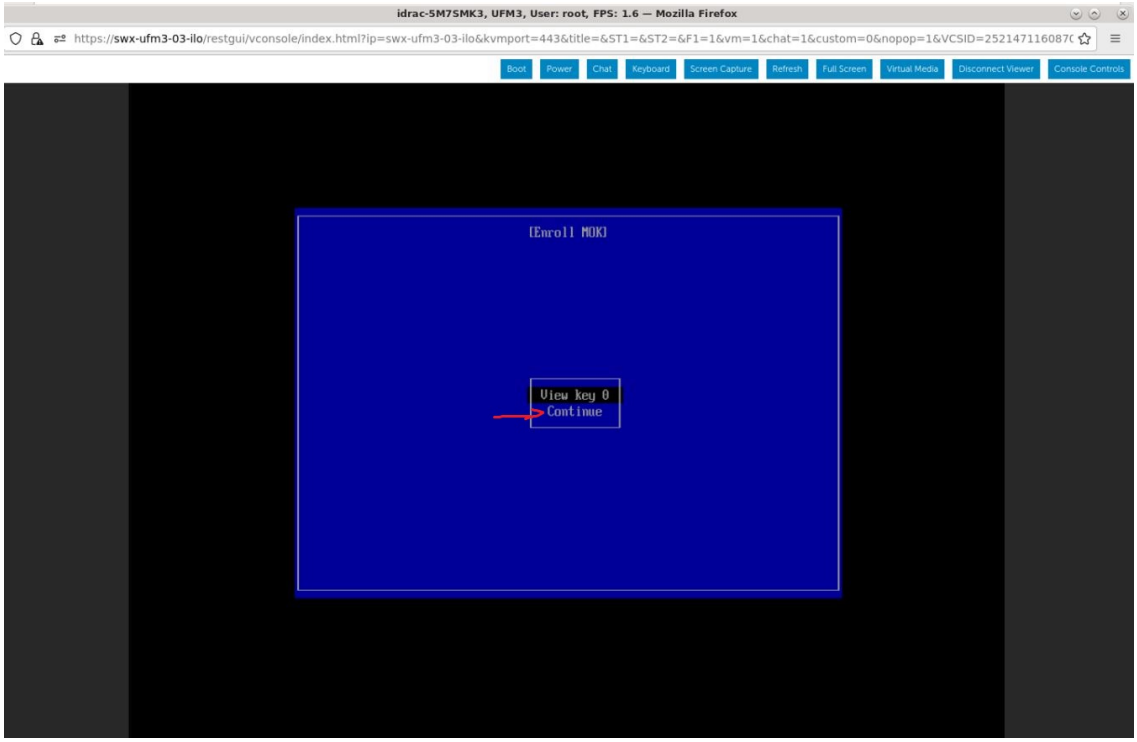
8. View the certificate to be enrolled. To verify, press "View key0".



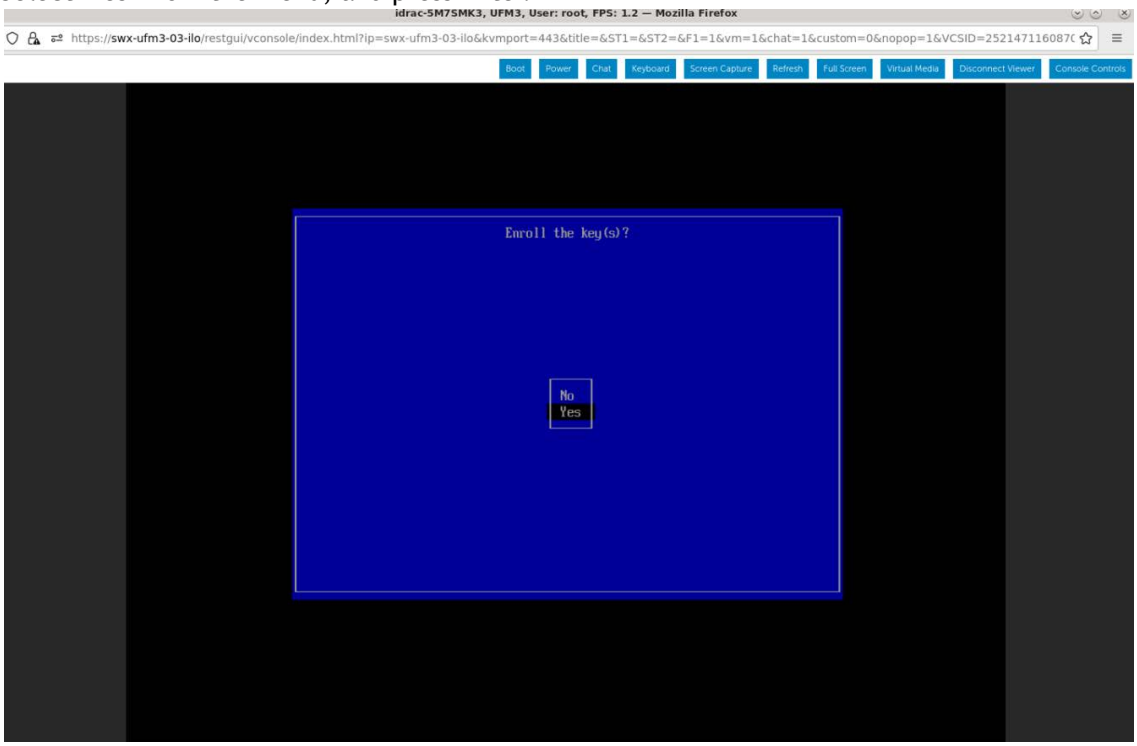


Press "Enter" to exit the view.

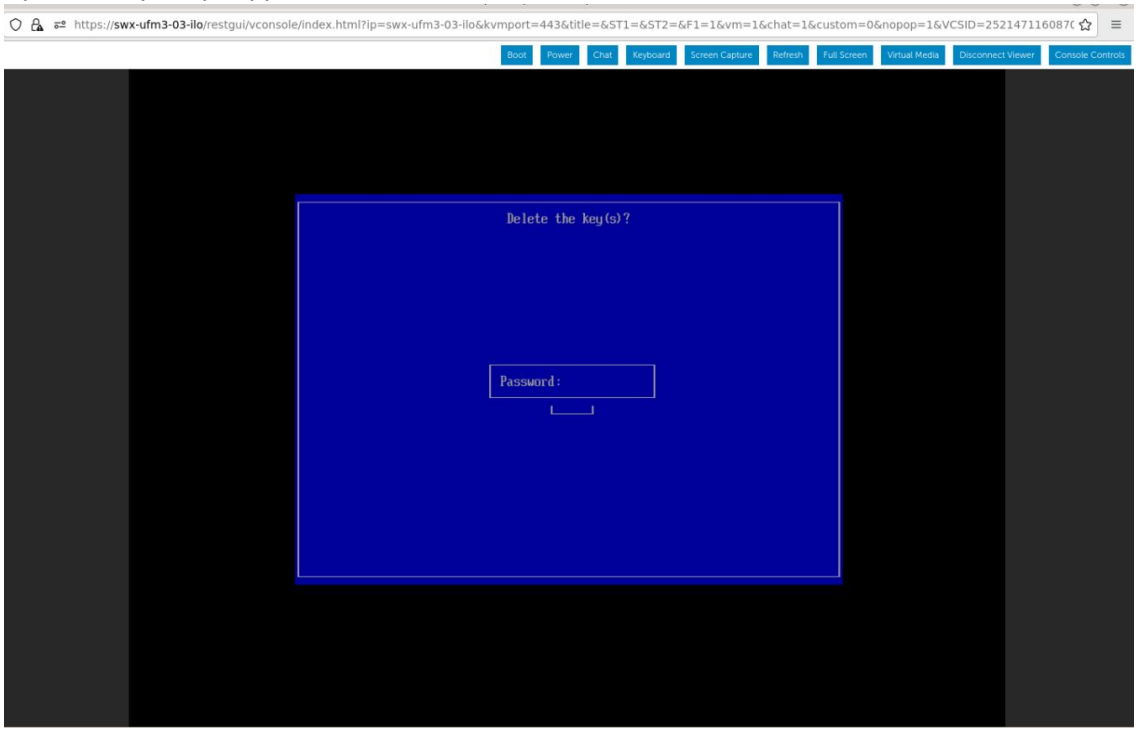
9. Select "Continue" from the menu and press Enter.



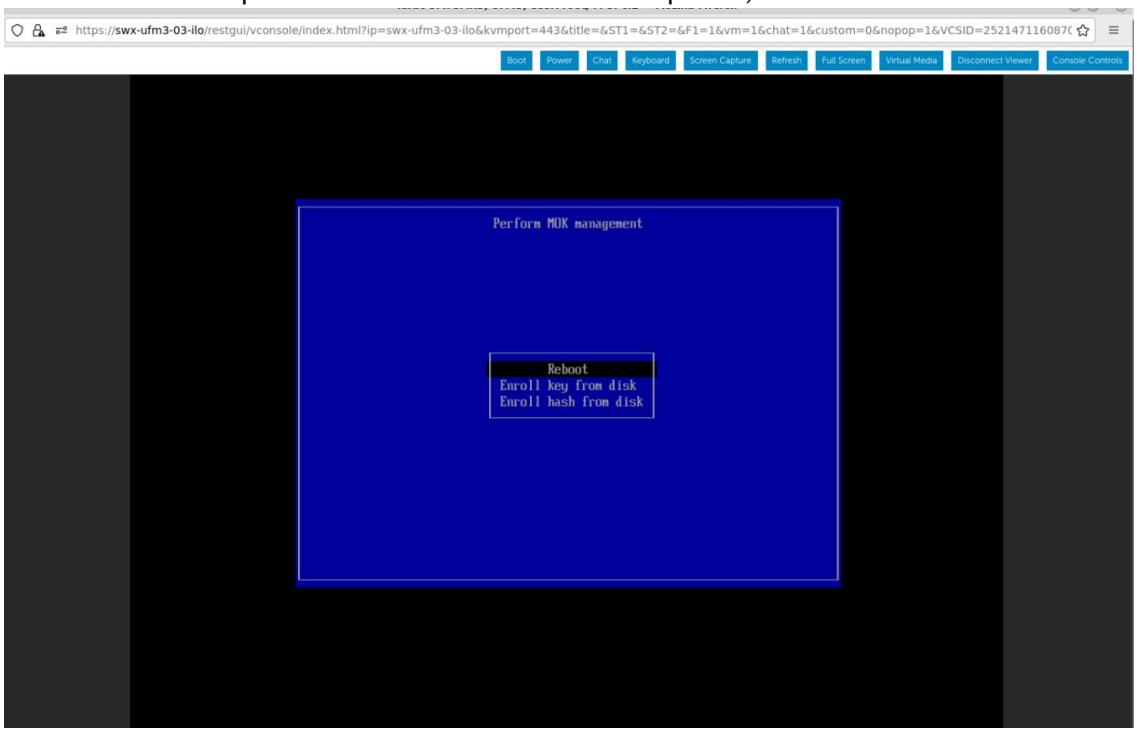
10. Select "Yes" from the menu, and press Enter.



11. A password prompt appears, then, enter the OS Root user credentials.



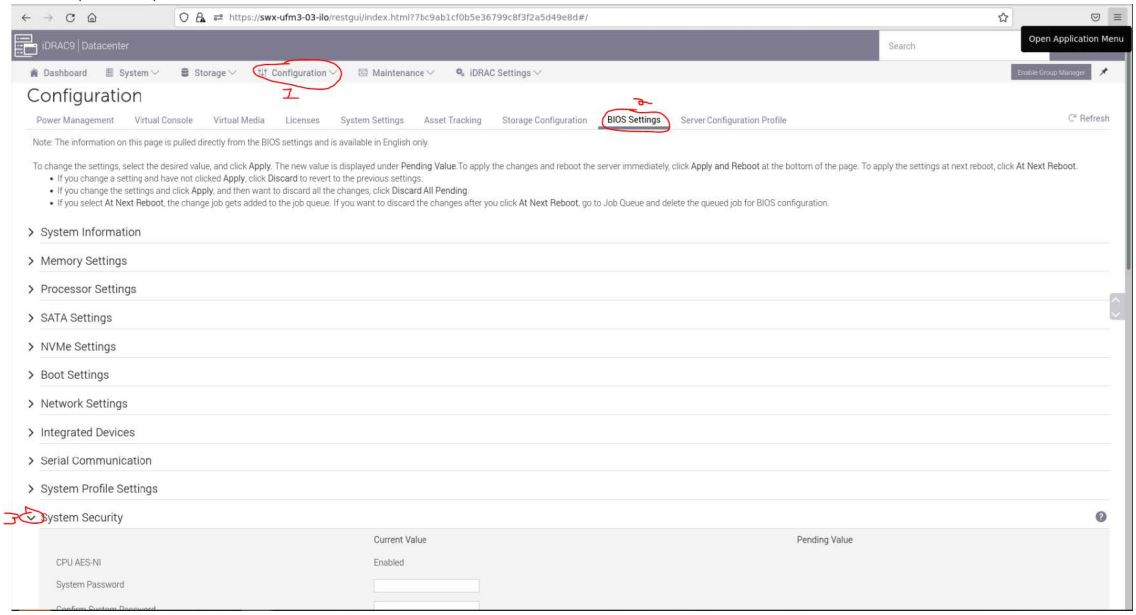
12. Select "Reboot" and press Enter. After the reboot is completed, the certificate is removed.



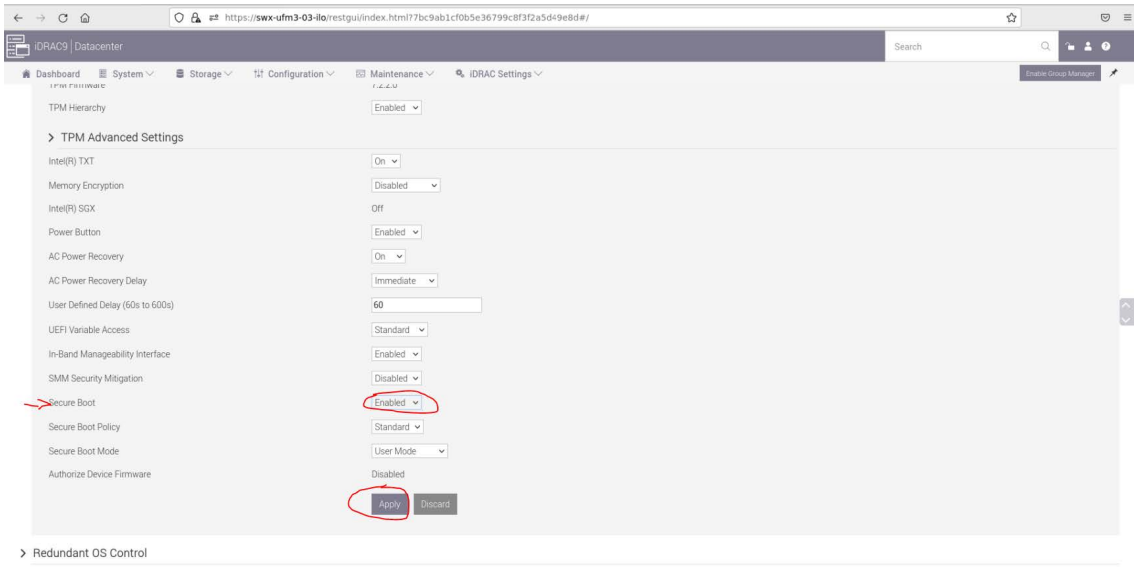
13.2.1.2 Enable Secure Boot

1. Login to Remote Management available via https://<iDRAC-ip address>

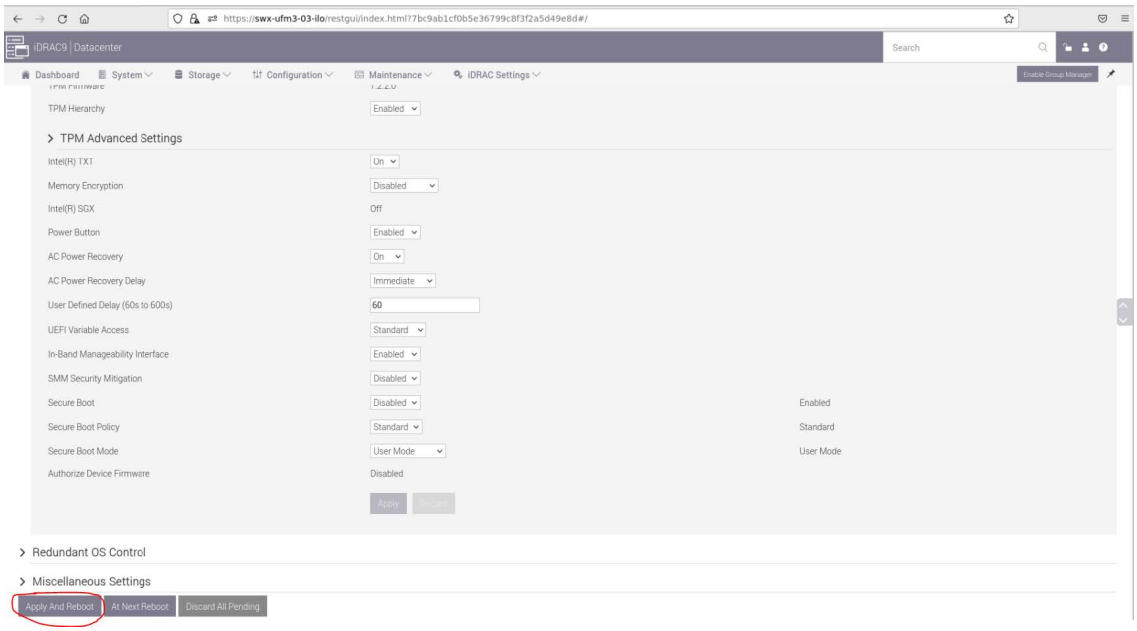
2. Navigate to "Configuration" → "BIOS Settings" → "System Security" and press the drop down menu (arrow).



3. Scroll down to "Secure Boot" and select "Enabled" from the drop menu. Click the "Apply" button.

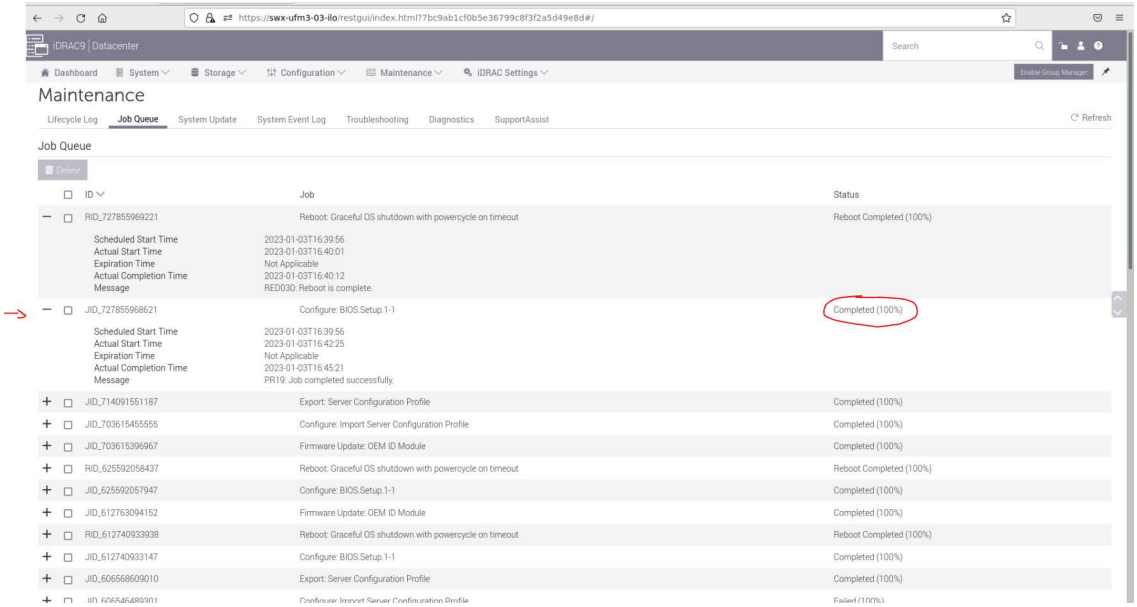


4. Scroll to the bottom of the page and click on "Apply And Reboot" button, this will reboot the server and perform the configuration



5. An Information Popup is prompted. Click on the "Job Queue" button (can also be navigated from "Maintenance" → "Job Queue").

6. Wait for the Jobs to finish and reach 100%



7. Validate that secure boot is enabled and active (from the terminal).

```
mokutil --sb-state
```

```
root@ubuntu:~# mokutil --sb-state
SecureBoot enabled
```

```
mokutil --list-enrolled | grep -i mellanox
```

```
root@ubuntu:~# mokutil --list-enrolled | grep -i mellanox
        Issuer: O=Mellanox Technologies, CN=Mellanox Technologies signing key/emailAddress=support@mellanox.com
        Subject: O=Mellanox Technologies, CN=Mellanox Technologies signing key/emailAddress=support@mellanox.com
```

13.2.2 Disable Secure Boot

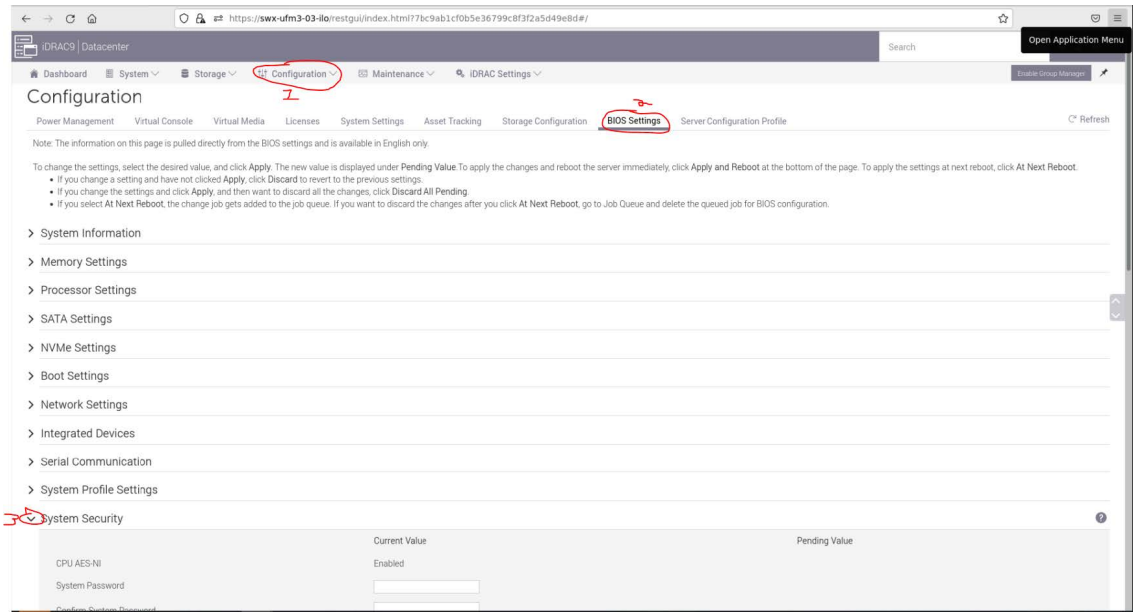
> Disabling secure boot is not recommended and may cause security issues.

Secure Boot needs to be disabled prior to removing the NVIDIA public certificate.

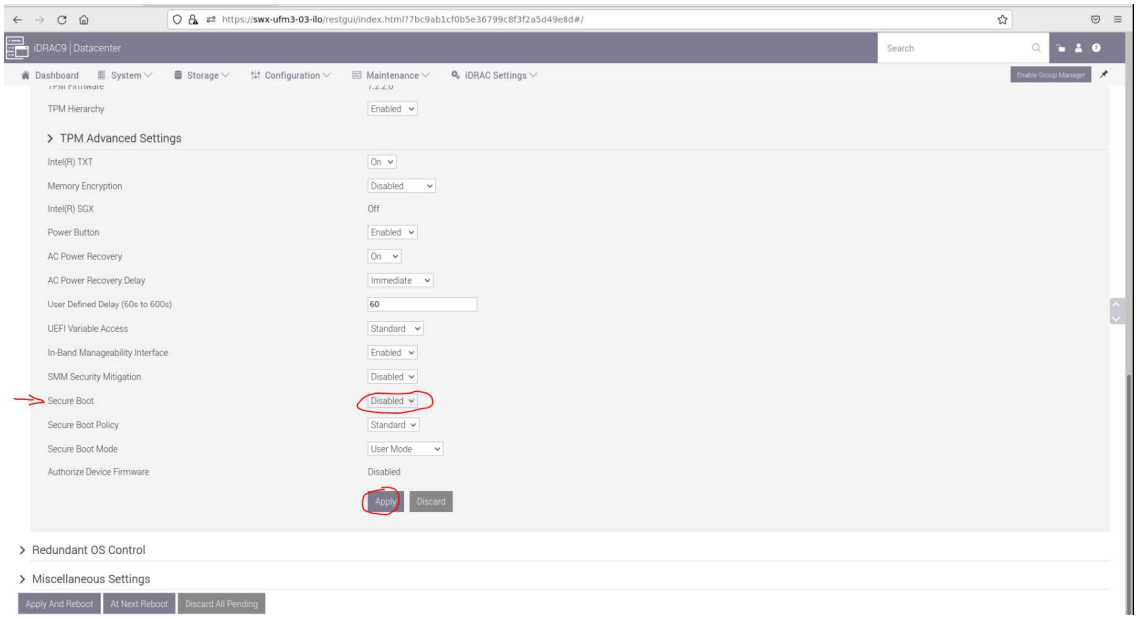
The removal of the certificate is optional and can be skipped if secure boot should be re-enabled at some point in the future.

13.2.2.1 Disable Secure Boot in the BIOS

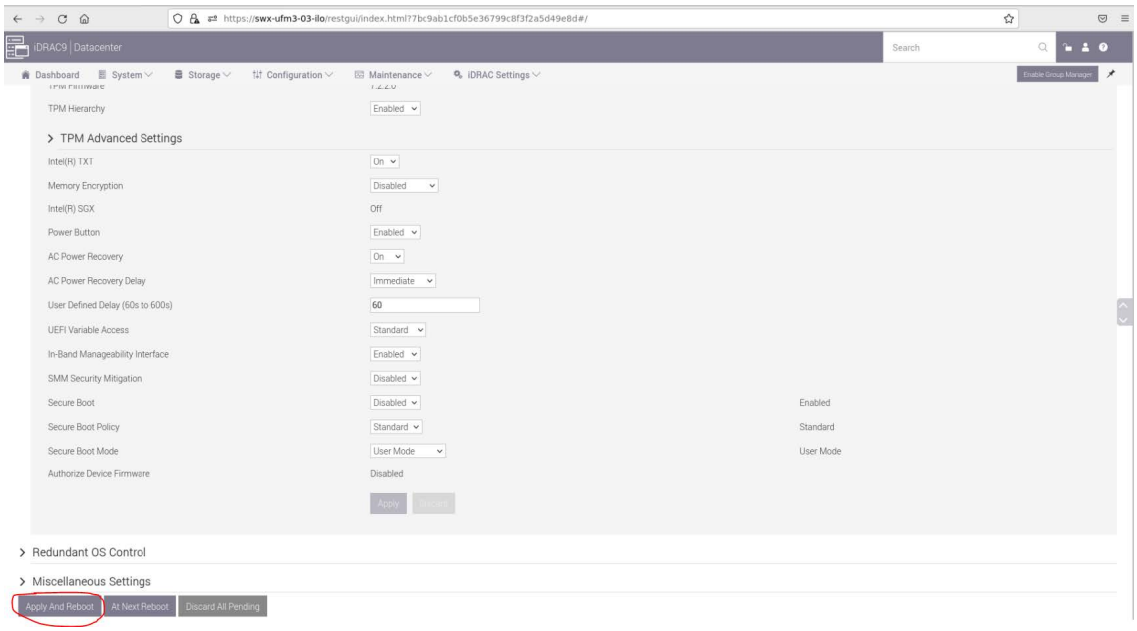
1. Login to Remote Management (https://<iDRAC-ip address>
2. Navigate to "Configuration" → "BIOS Settings" → "System Security" and press the drop menu (arrow).



3. Scroll down to "Secure Boot" and select "Disabled" from the drop menu, and click the "Apply" button.

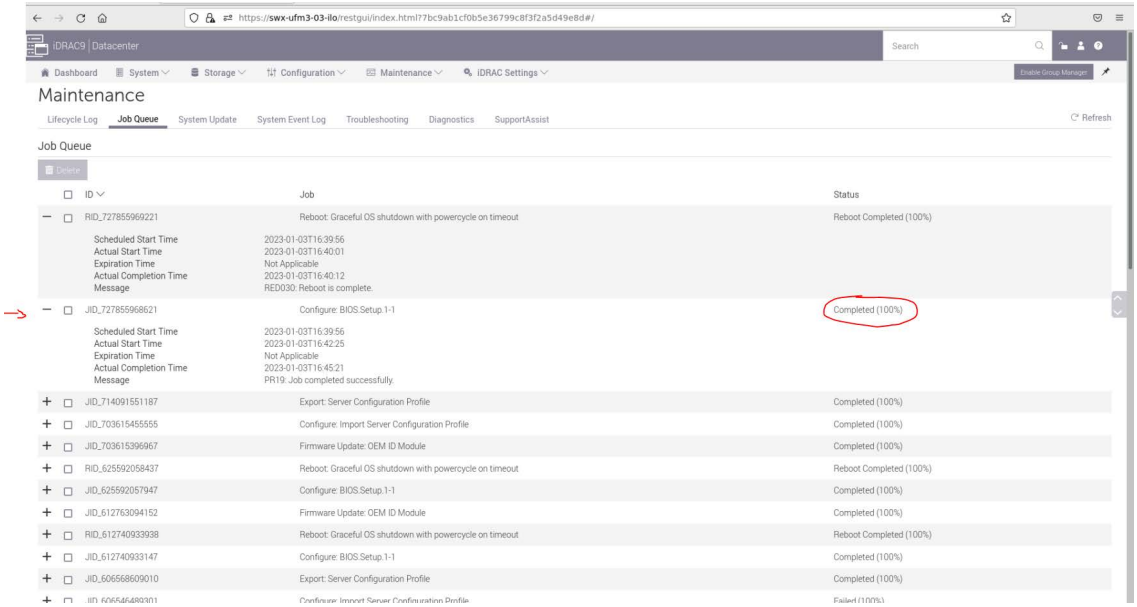


4. Scroll to the bottom of the page and click on the "Apply And Reboot" button; this will reboot the server and perform the configuration.



5. An Information Popup is prompted. Click on the "Job Queue" button (can also be navigated from "Maintenance" → "Job Queue").

6. Wait for the completion of the jobs (reach 100%).



7. Validate that secure boot is Disabled (from the terminal).

```
mokutil --sb-state
```

```
root@ubuntu:/tmp# ls -ltrh mlnx_signing_key_pub.der
-rw-r--r-- 1 root root 1.5K Feb 23  2017 mlnx_signing_key_pub.der
```

13.2.2.2 Remove the NVIDIA Certificate from MOK db

Perform this step if you want to entirely remove NVIDIA's certificate from MOK DB. This step is optional and is not required to disable secure boot. Skip this if you wish to enable secure boot at a later time.

1. Login as root to the UFM server.
2. Check current enrolled certificates.

```
mokutil --list-enrolled
```

Search for "Issuer: O=Mellanox Technologies.." and note the key ID above the start of this certificate:

```
root@ubuntu:~# mokutil --sb-state
SecureBoot enabled
```

3. Download the mlnx_signing_key_pub.der to a temporary folder (the DER certificate file must be present to be deleted). If the certificate is not available, it can be exported.

```
ct /tmp
wget http://www.mellanox.com/downloads/ofed/mlnx_signing_key_pub.der
```

Or export from current keys (all the keys are named MOK-000X.der) and search the NVIDIA certificate.

```
cd /tmp
mokutil --export
grep "Mellanox" MOK-0*
```

```
root@ubuntu:~# mokutil --list-enrolled | grep -i mellanox
        Issuer: O=Mellanox Technologies, CN=Mellanox Technologies signing key/emailAddress=support@mellanox.com
        Subject: O=Mellanox Technologies, CN=Mellanox Technologies signing key/emailAddress=support@mellanox.com
```

Validate the certificate:

```
openssl x509 -inform der -in MOK-0002.der -noout -issuer
```

```
root@ubuntu:/tmp# openssl x509 -inform der -in MOK-0002.der -noout -issuer
issuer=O = Mellanox Technologies, CN = Mellanox Technologies signing key, emailAddress = support@mellanox.com
```

4. Remove the certificate from the MOK db. The below example lists MOK-0002.der, the naming convention might be different.

```
mokutil --delete ./MOK-0002.der --root-pw
```

The above can be validated by running

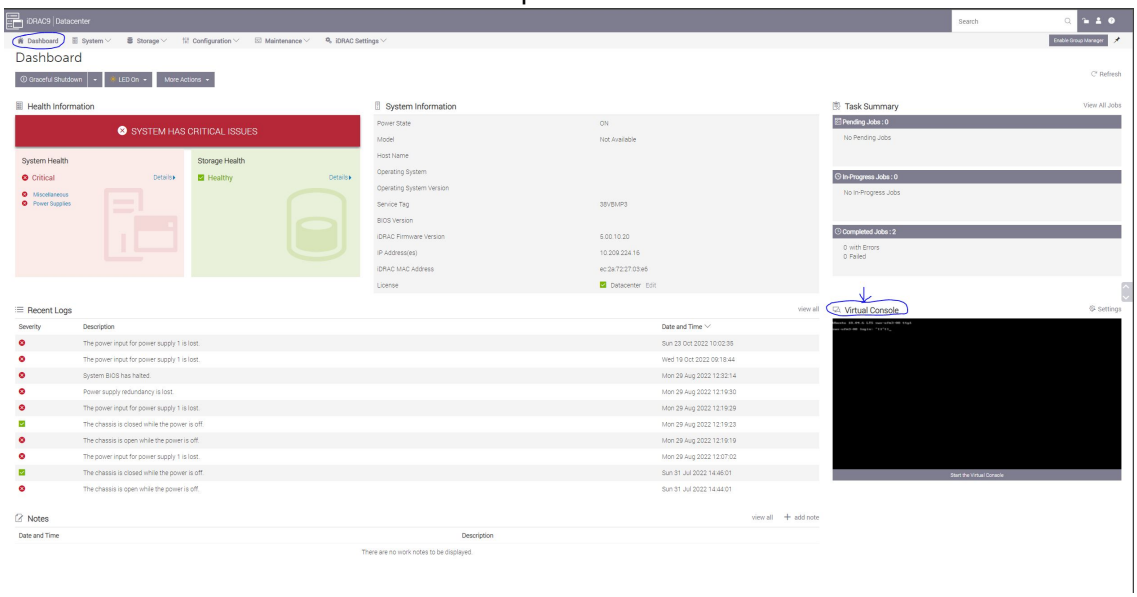
```
mokutil --list-delete
```

```
root@ubuntu:/tmp# mokutil --list-delete
[key 1]
SHA1 Fingerprint: dc:cd:44:95:92:2f:95:9f:28:49:7b:64:94:41:d8:bd:64:60:6d:69
Certificate:
    Data:
        Version: 3 (0x2)
        Serial Number:
            ba:b0:f5:cd:23:24:a0:ed
        Signature Algorithm: sha256WithRSAEncryption
        Issuer: O=Mellanox Technologies, CN=Mellanox Technologies signing key/emailAddress=support@mellanox.com
        Validity
```

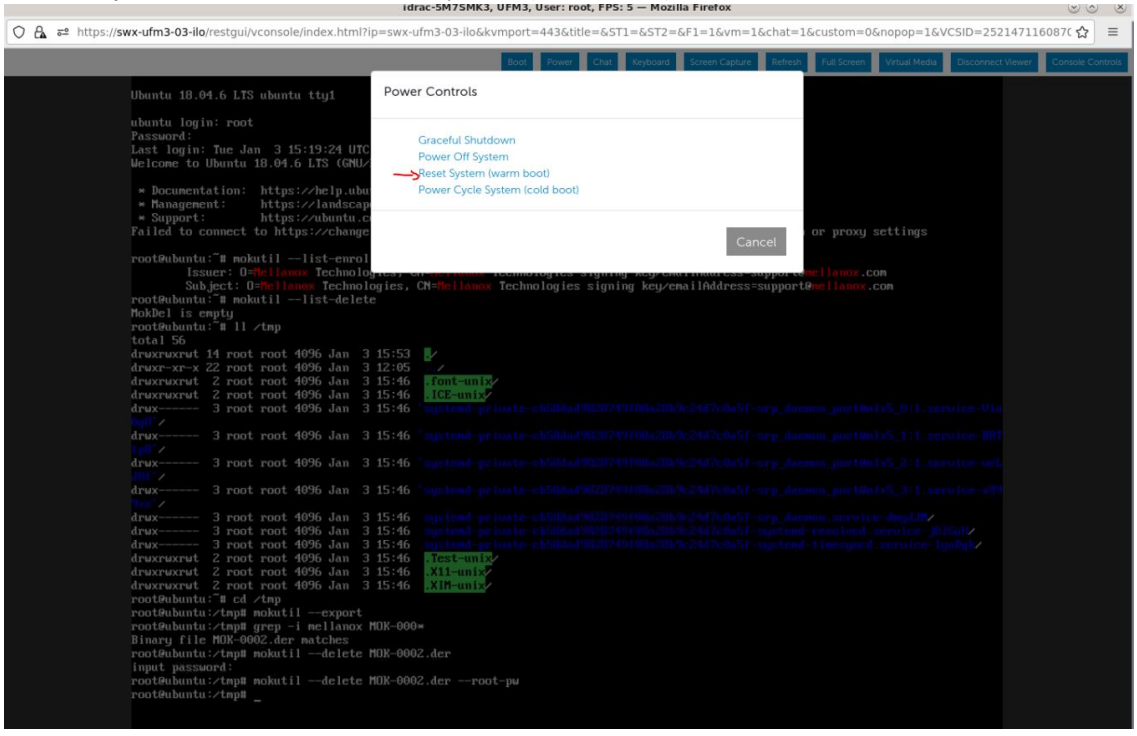
> The certificate is in the enrolled queue at this point. Upon the next server reboot, a 10 second prompt appears at the start of the boot process to confirm the certificate addition. It is important to confirm the certificate addition at this stage. Failure to do so requires you to repeat the procedure.
> To be able to interact with the prompt, a console connection is needed either from the serial port or from the web console available via Remote Management.

5. Login to Remote Management (https://<iDRAC-ip address>

6. click on "Dashboard"→"Virtual Console" to open the virtual web console.

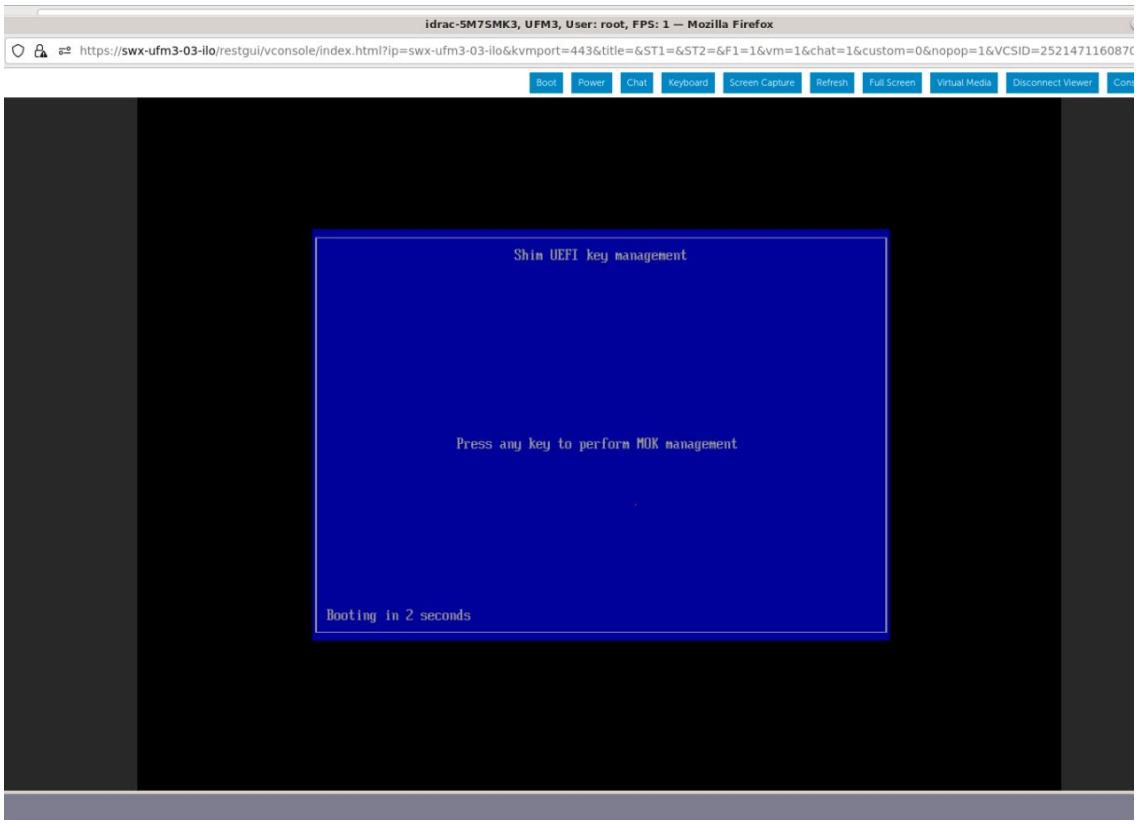


7. Power cycle the server (at boot startup, a 10 second prompt appears to verify the certificate deletion).
   On the top menu: "Power" → "Reset System (warm boot)".

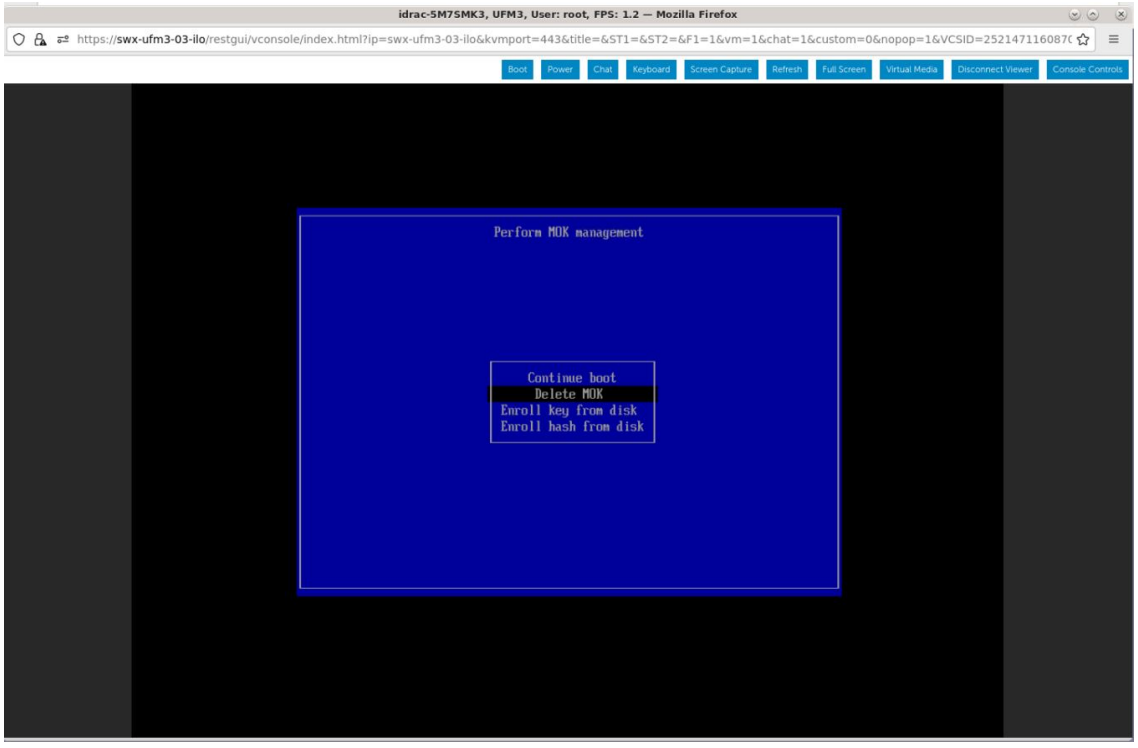


   The server now performs reboot.

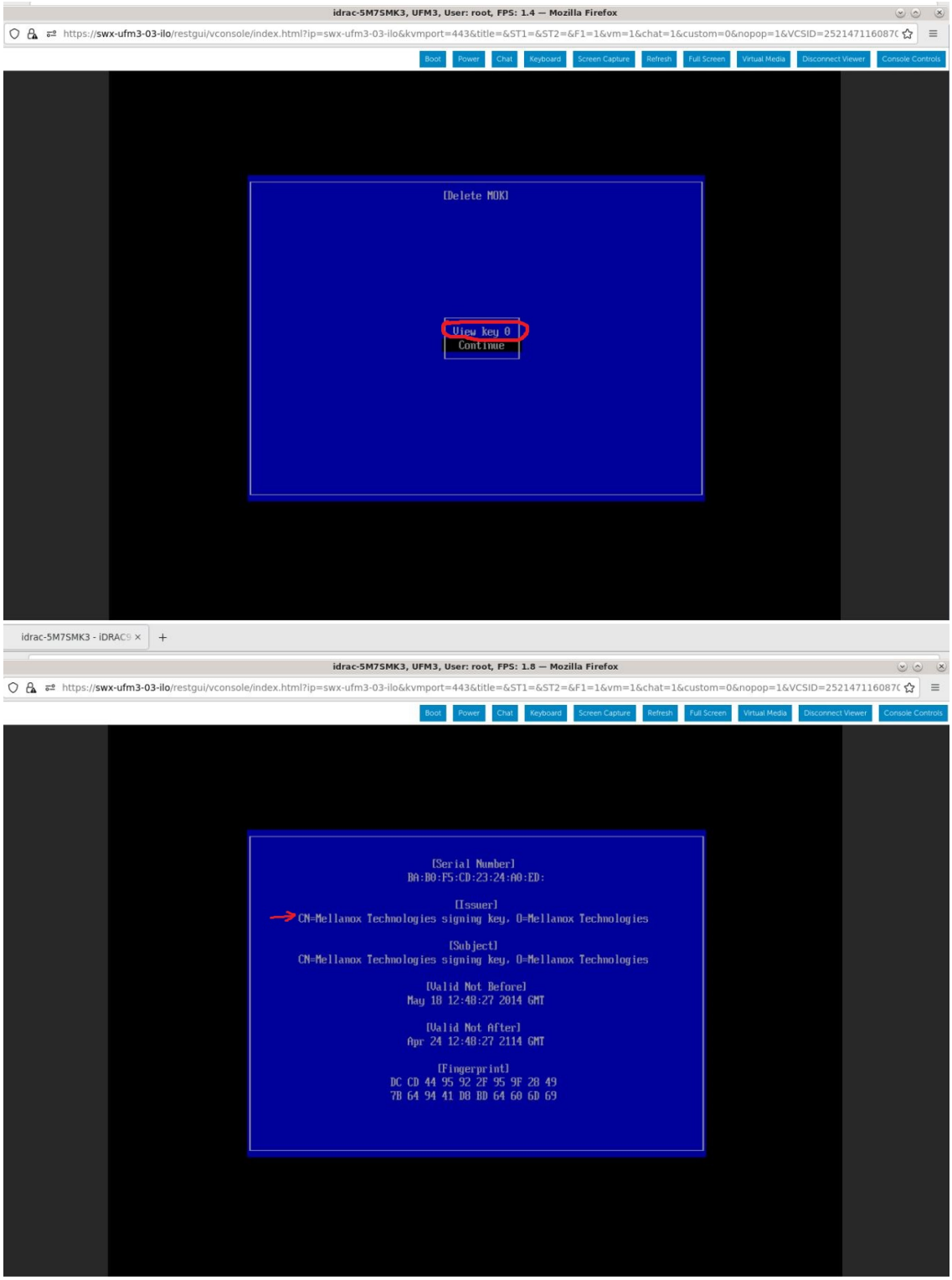
8. Once the startup procedure begins, a confirmation prompt appears to verify certificate deletion. The prompt closes after 10 seconds, if missed, the certificate deletion procedure needs to be repeated.
   Once the prompt appears, press any key to interact.



9. Navigate to "Delete MOK".

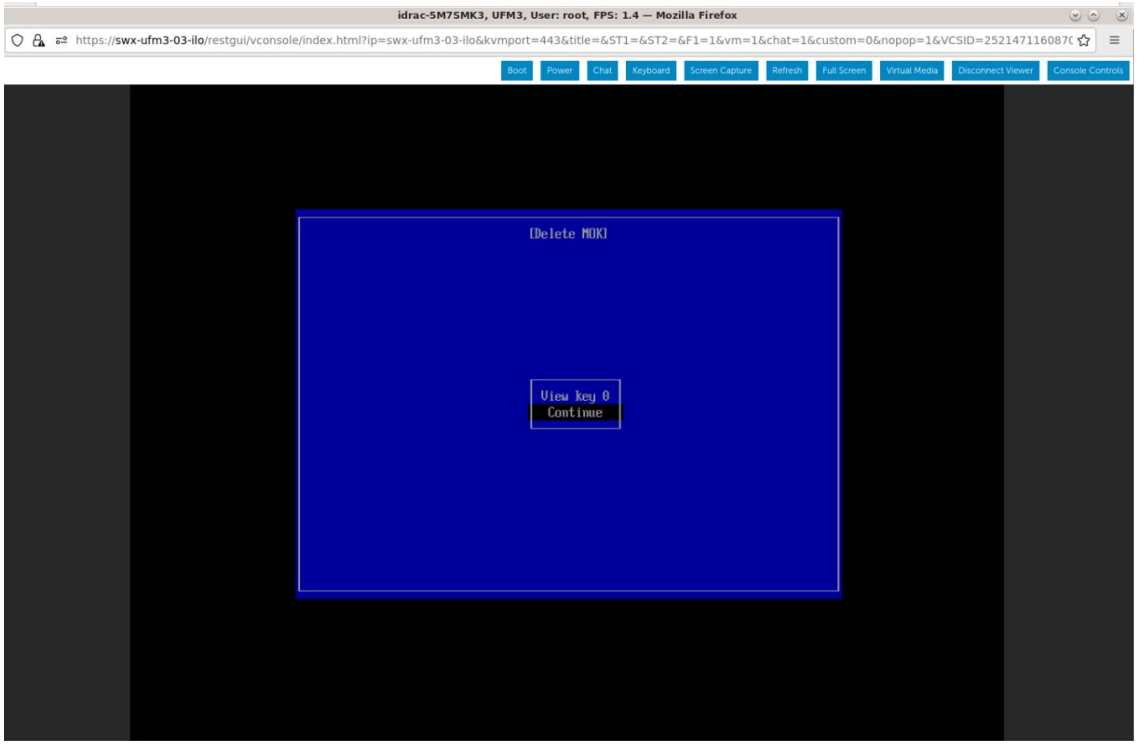


10. View the certificate to be deleted. To verify, press "View key0".

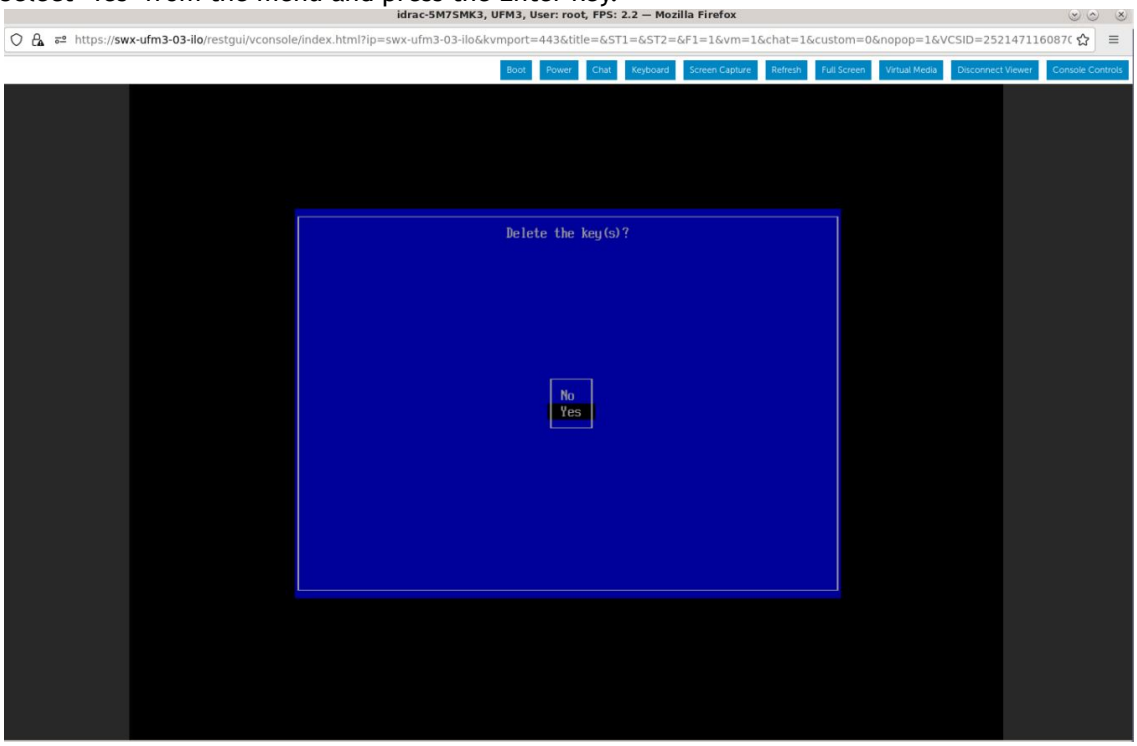


Press "Enter" to exit the view.

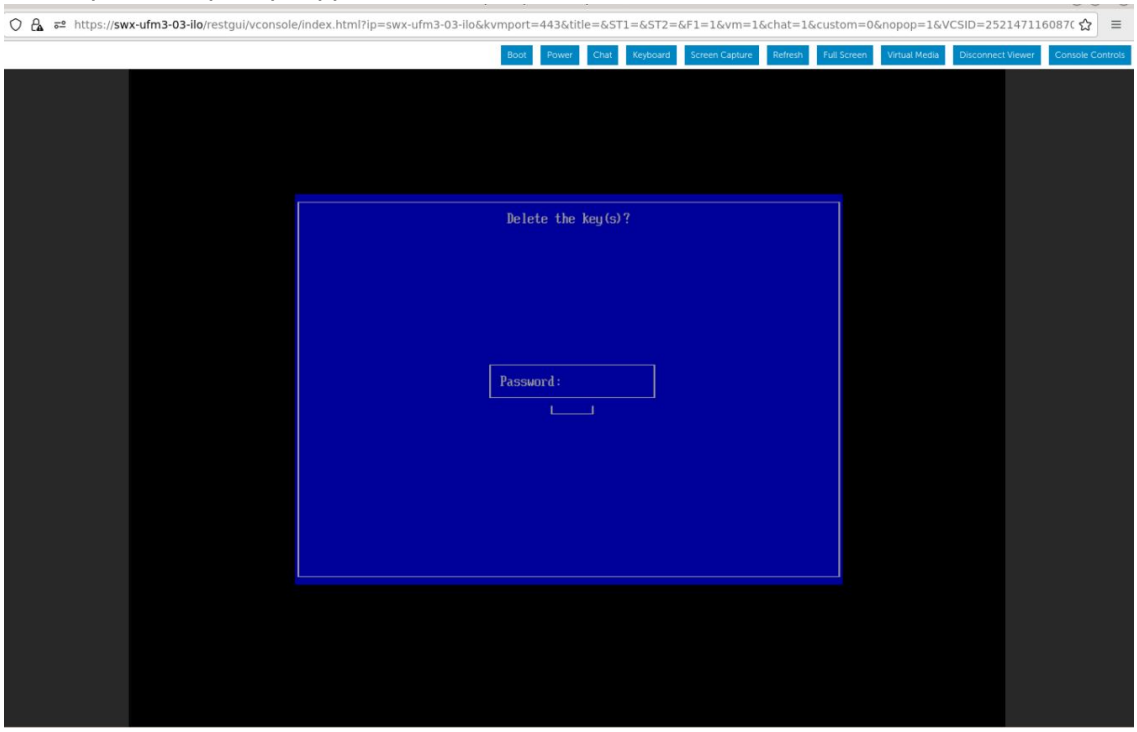
11. Select "Continue" from the menu and press the Enter key.



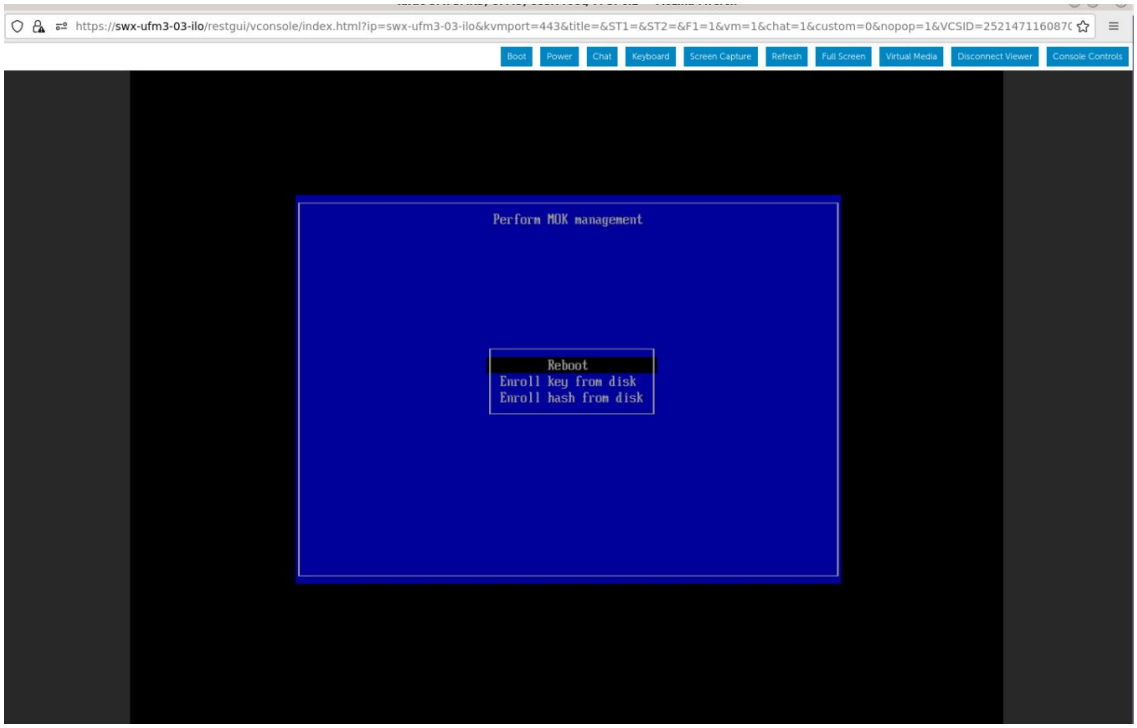
12. Select "Yes" from the menu and press the Enter key.



13. Once a password prompt appears, enter the OS root user credential.



14. Select "Reboot" from the menu and press Enter. Upon reboot completion, the certificate is removed.



13.3 Appendix - Deploying UFM Appliance from an ISO File

This section provides a step-by-step guide for deploying UFM Enterprise Appliance from an ISO file.

The ISO installation is set to use interface "eno8303" via a DHCP as default; if DHCP is unavailable, the installer will request manual intervention to set the IP address manually on "eno8303" or to skip the IP settings altogether.

If IP settings are skipped, they can be set manually after the installation. Refer to Getting Started.

If a different interface should be used, skip the IP settings when prompted.

13.3.1 Deploying UFM Appliance from an ISO File

Extract the `ufm-appliance-<version>-omu.tar` to a temporary directory.

Extract TAR file

```
tar xzf /path/to/tar.tar -C /tmp
```

An ISO file and an upgrade script will be present inside the directory.

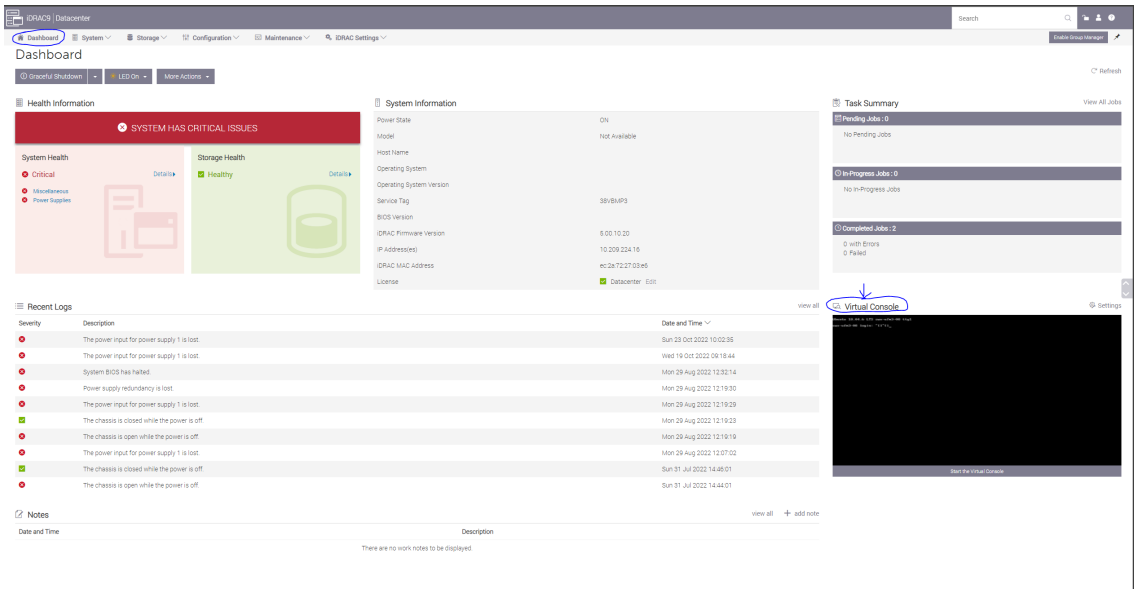
Extract TAR file

```
ls -ltrh /tmp/ufm-appliance-<version>/
```

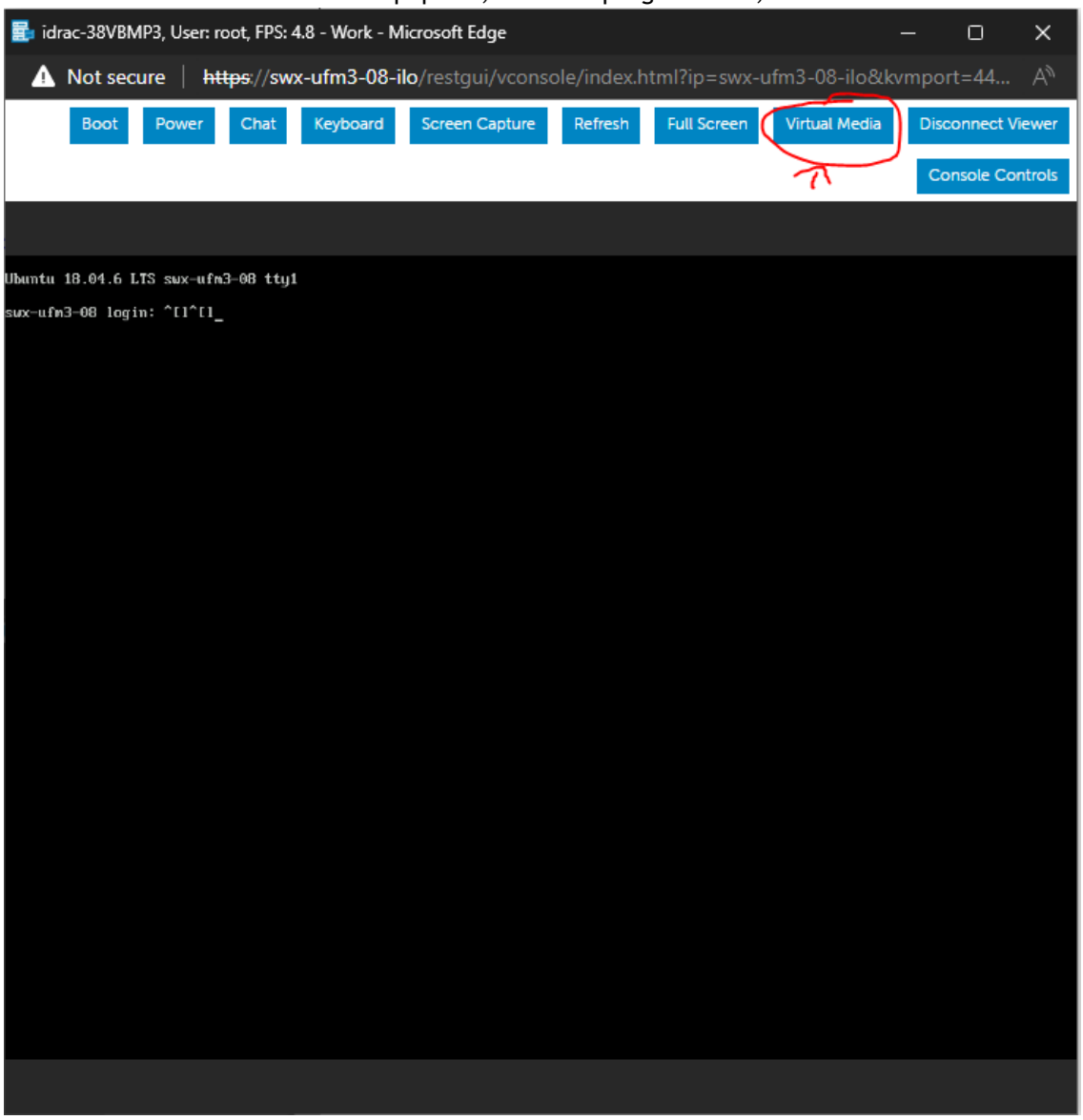
Follow the following steps based on the desired method of installation.

13.3.1.1 Virtual Media via Management Port

1. Open a web browser and navigate to https://<IDRAC-ILO-address>
2. On the Dashboard pane, click on the virtual console icon on the bottom right corner of the screen.

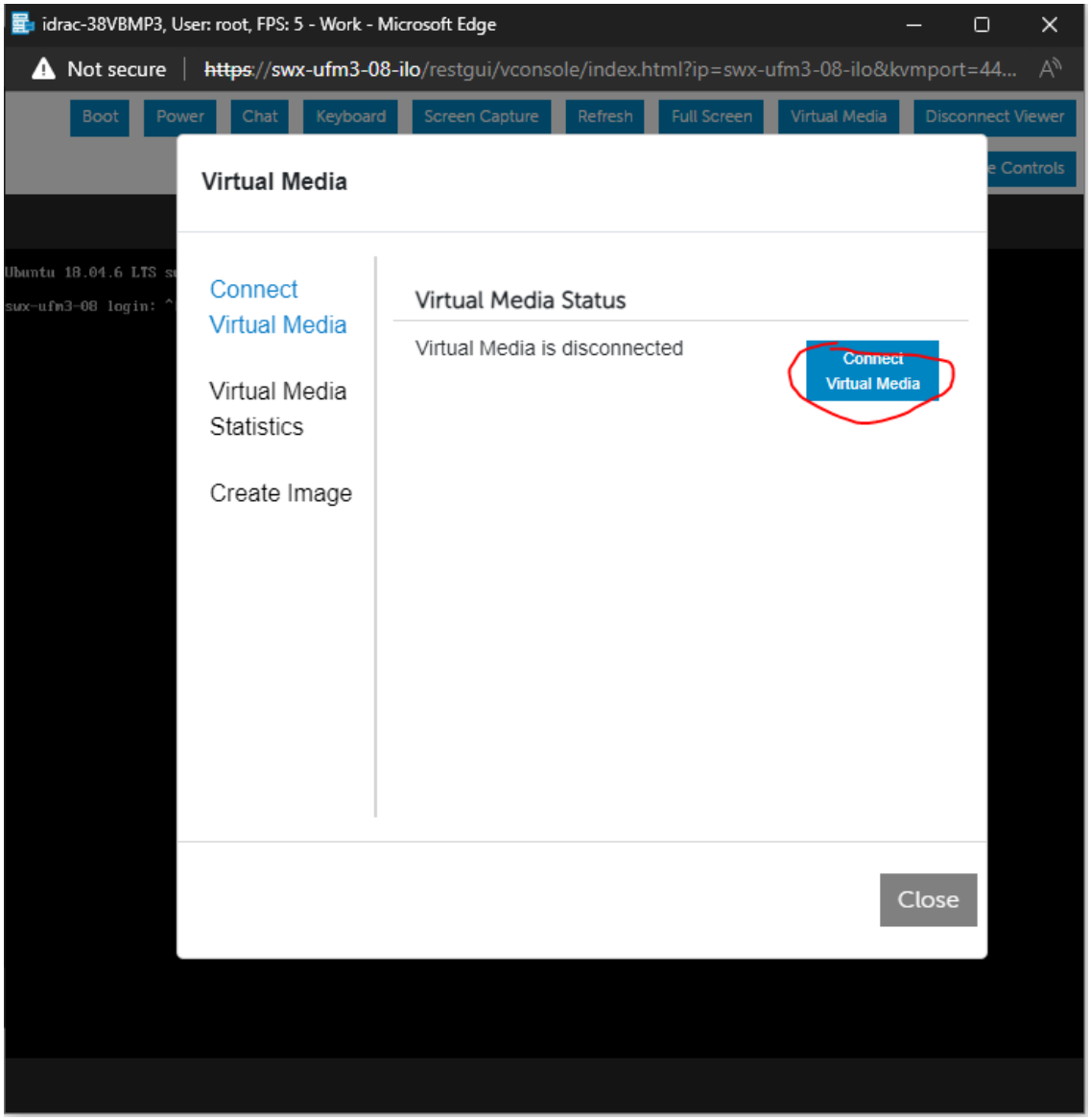

iDRAC9 | Datacenter
Search
Dashboard
System
Storage
Configuration
Maintenance
iDRAC Settings
Enable Group Manager
Dashboard
Graceful Shutdown
LED On
More Actions
Refresh
Health Information
SYSTEM HAS CRITICAL ISSUES
System Health
Critical
Details
Miscellaneous
Power Supplies
Storage Health
Healthy
Details
System Information
Power State
ON
Model
Not Available
Host Name
Operating System
Operating System Version
Service Tag
38VBMP3
BIOS Version
iDRAC Firmware Version
5.00.10.20
IP Address(es)
10.209.224.16
iDRAC MAC Address
ec:2a:72:27:03:e6
License
Datacenter
Edit
Task Summary
View All Jobs
Pending Jobs : 0
No Pending Jobs
In-Progress Jobs : 0
No In-Progress Jobs
Completed Jobs : 2
0 with Errors
0 Failed
Recent Logs
view all
Severity
Description
Date and Time
The power input for power supply 1 is lost.
Sun 23 Oct 2022 10:02:35
The power input for power supply 1 is lost.
Wed 19 Oct 2022 09:18:44
System BIOS has halted.
Mon 29 Aug 2022 12:32:14
Power supply redundancy is lost.
Mon 29 Aug 2022 12:19:30
The power input for power supply 1 is lost.
Mon 29 Aug 2022 12:19:29
The chassis is closed while the power is off.
Mon 29 Aug 2022 12:19:23
The chassis is open while the power is off.
Mon 29 Aug 2022 12:19:19
The power input for power supply 1 is lost.
Mon 29 Aug 2022 12:07:02
The chassis is closed while the power is off.
Sun 31 Jul 2022 14:46:01
The chassis is open while the power is off.
Sun 31 Jul 2022 14:44:01
Virtual Console
Settings
Start the Virtual Console
Notes
view all
add note
Date and Time
Description
There are no work notes to be displayed.

3. A new virtual console window will pop out, on the top right corner, click on the virtual media.



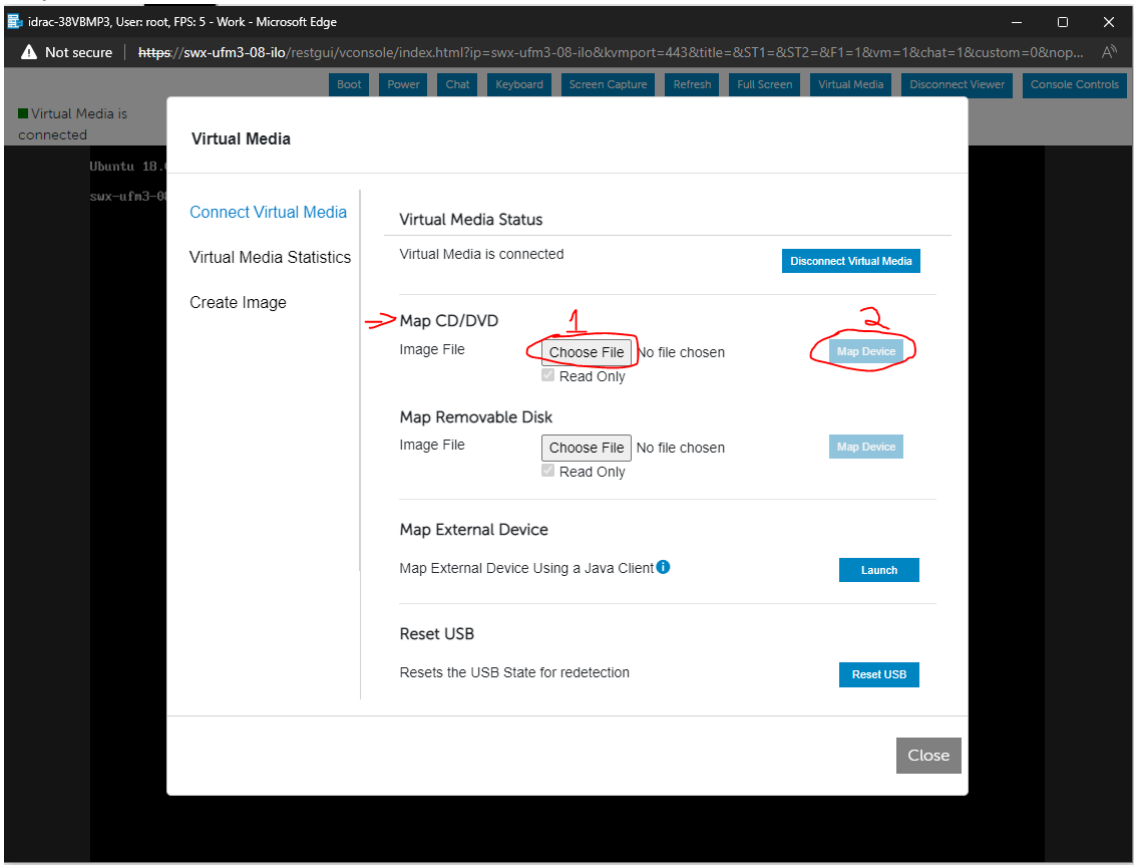
A new console window will appear

4. Click on the "Connect Media" button.

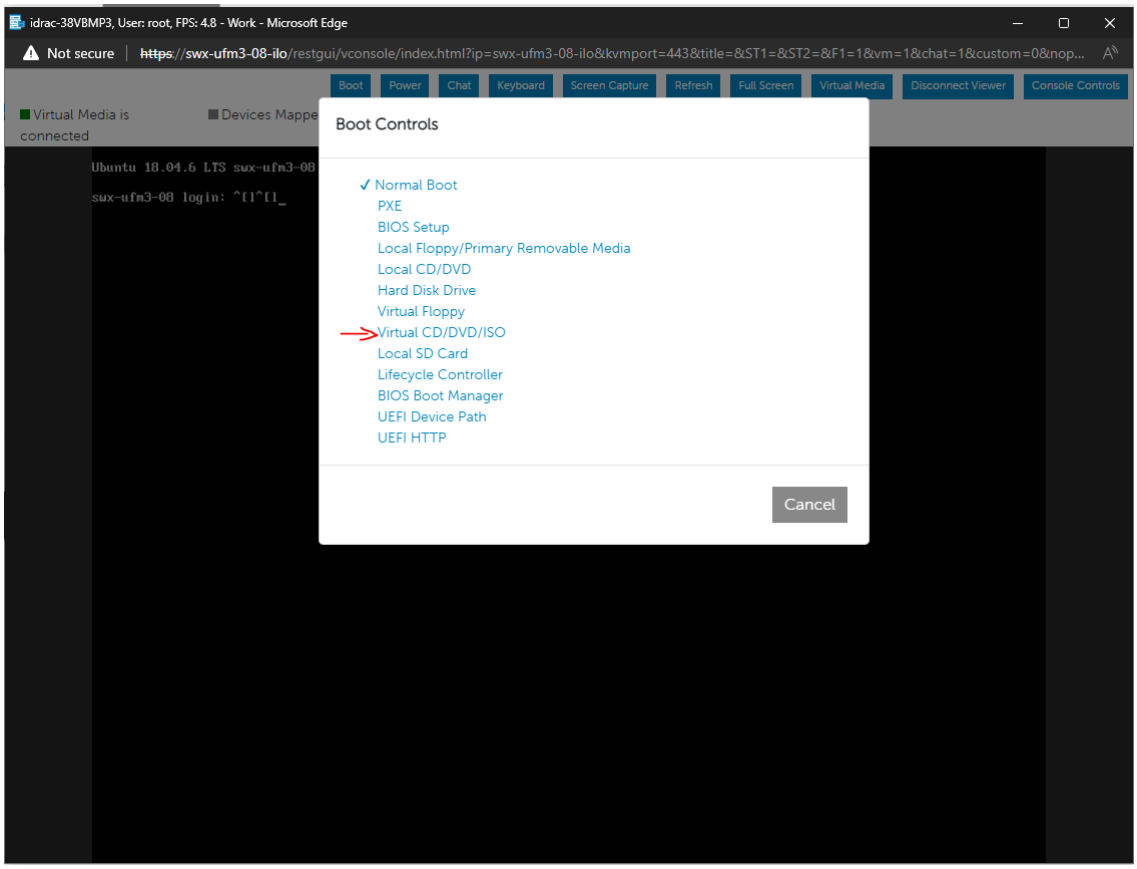


5. Under the "Map CD/DVD" section, click on "Choose file" and select the `ufm-appliance-<version>.iso` file extracted from the tar archive previously extracted and click on the

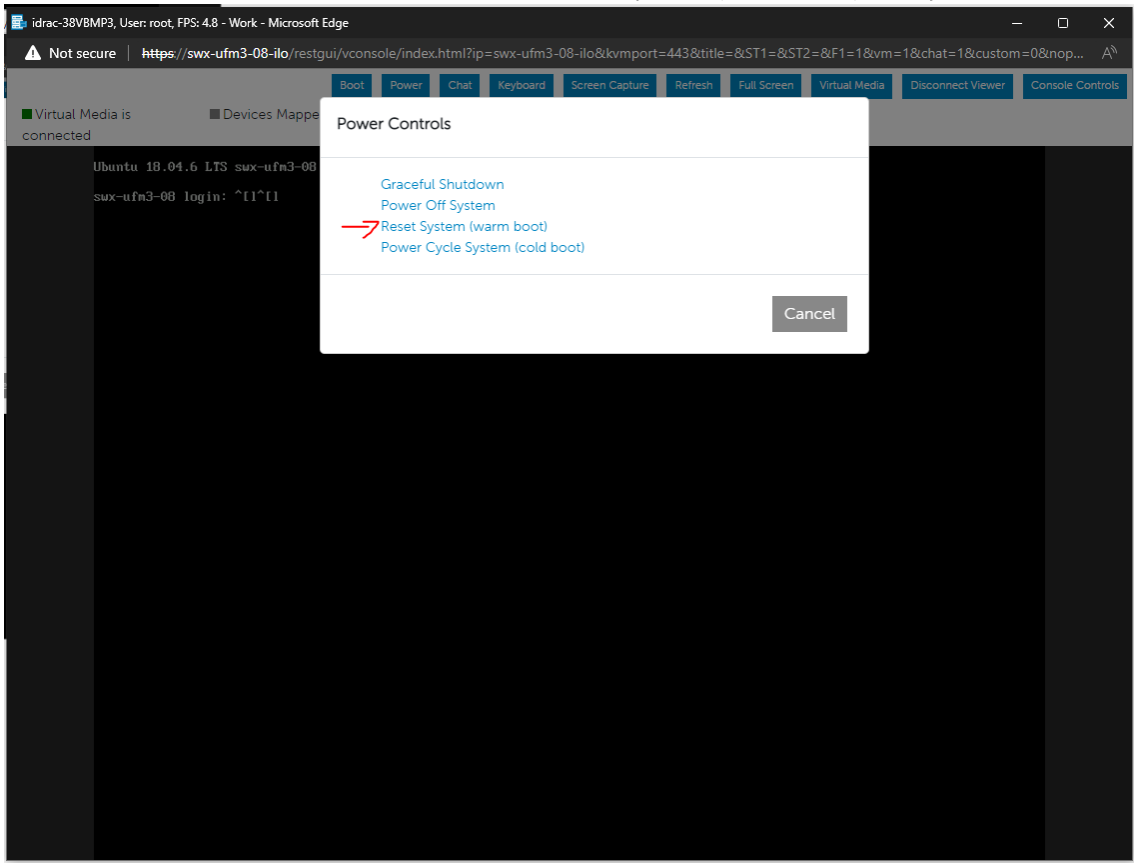
"Map Device" button. Then, "Close".



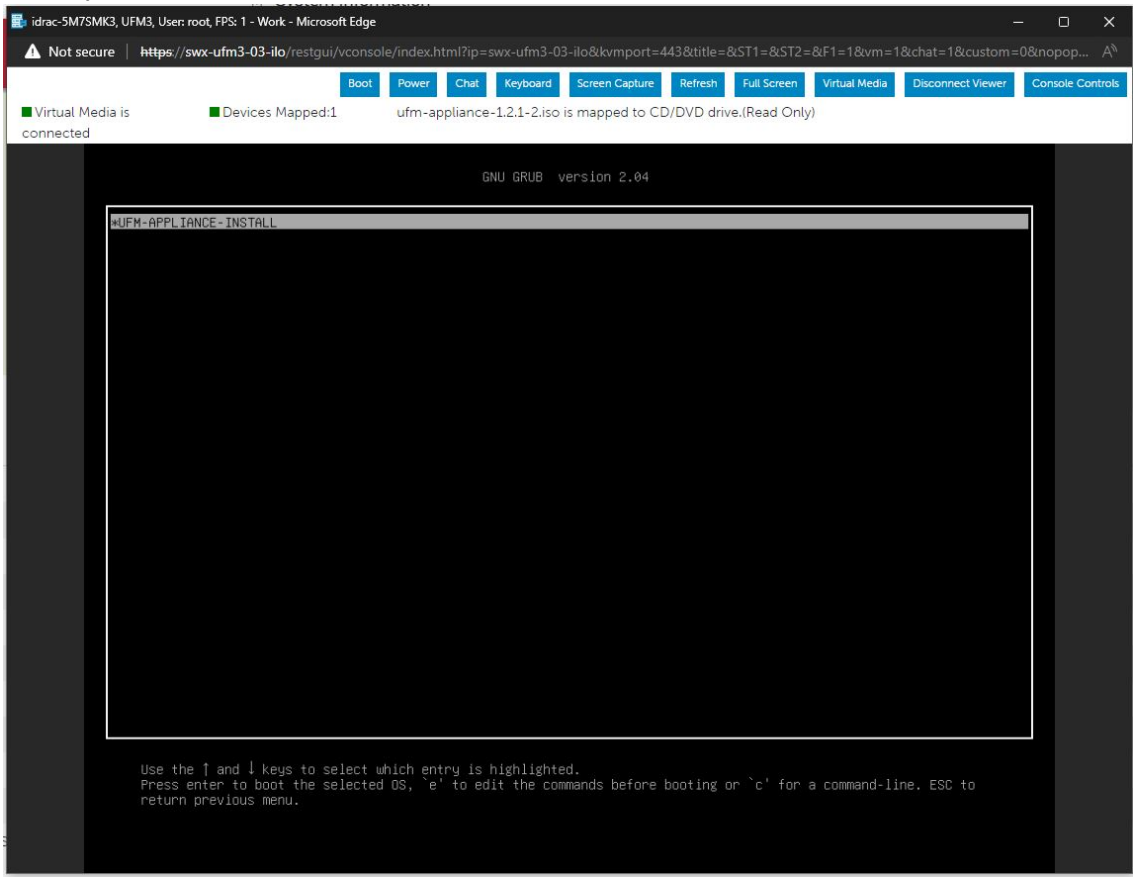
6. Click on the "Boot" menu button on the top left, on the opened menu choose "Virtual CD/DVD/ISO".



7. Click on the "Power" menu button and select "Reset System (warm boot)" entry.



8. At this point an automatic installation should start.



Installation will auto start after 30 seconds, press the enter key to start it immediately.

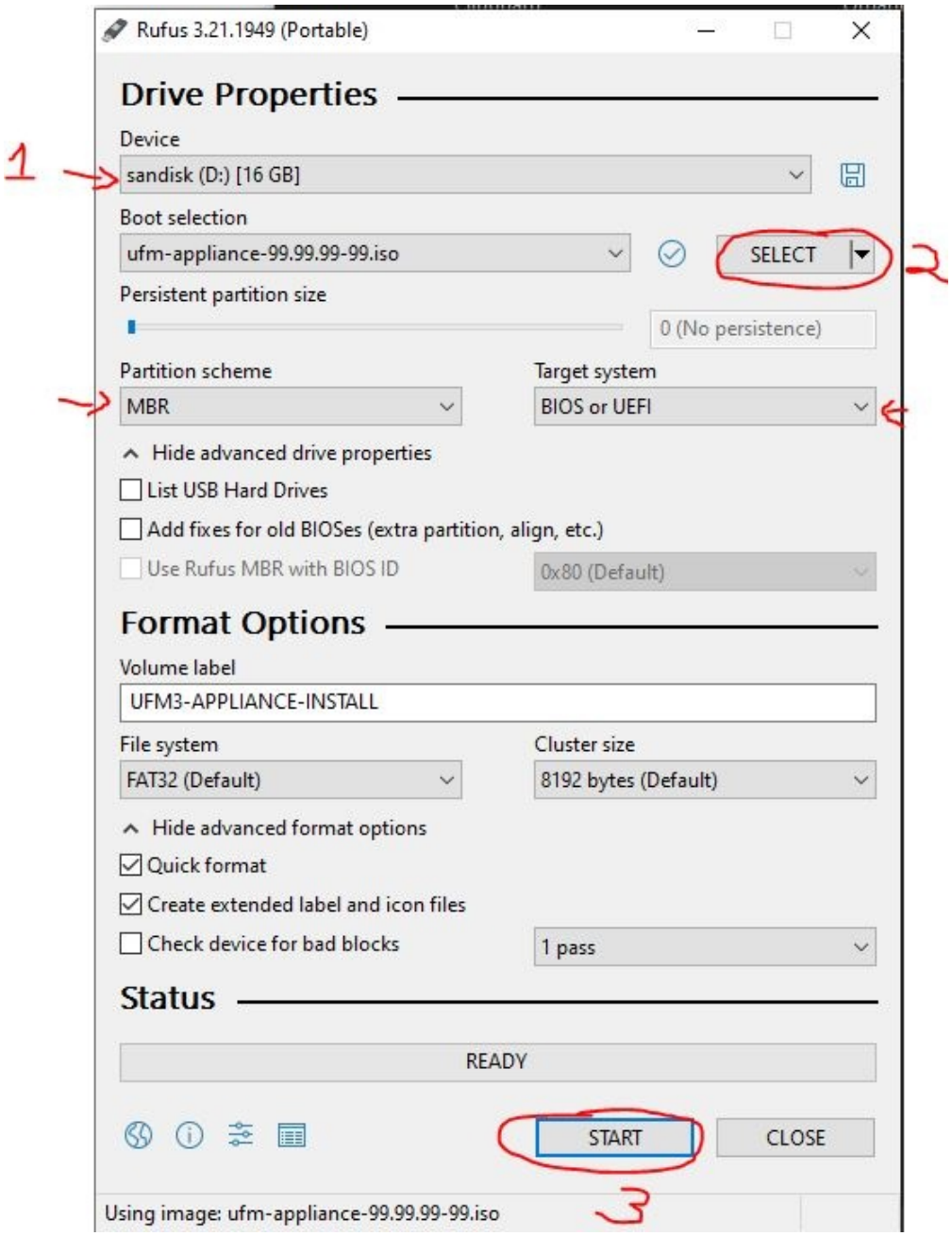
9. Proceed to Finalizing the Installation.

13.3.1.2 Physical USB

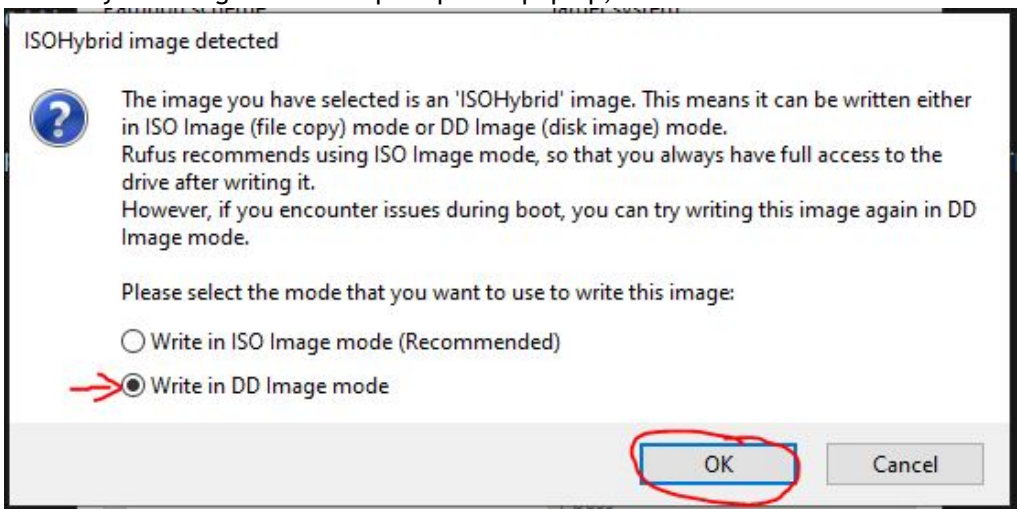
13.3.1.2.1 Burn ISO to USB

13.3.1.2.1.1 Windows

1. Download and open Rufus (Rufus).
2. Select the USB device from the drop down menu under "Devices".
   Click on "SELECT" and select `ufm-appliance-<version>.iso`
   Validate that the "Partition Scheme" is MBR and "Target System" is "BIOS or UEFI", as seen in the screenshot below.
   Click "START".


Rufus 3.21.1949 (Portable)
Drive Properties
1
Device
sandisk (D:) [16 GB]
Boot selection
ufm-appliance-99.99.99-99.iso
SELECT
2
Persistent partition size
0 (No persistence)
Partition scheme
MBR
Target system
BIOS or UEFI
Hide advanced drive properties
List USB Hard Drives
Add fixes for old BIOSes (extra partition, align, etc.)
Use Rufus MBR with BIOS ID
0x80 (Default)
Format Options
Volume label
UFM3-APPLIANCE-INSTALL
File system
FAT32 (Default)
Cluster size
8192 bytes (Default)
Hide advanced format options
Quick format
Create extended label and icon files
Check device for bad blocks
1 pass
Status
READY
START
CLOSE
3
Using image: ufm-appliance-99.99.99-99.iso

3. An "ISOHybrid image detected" prompt will pop up, choose "Write in DD mode" and click "OK".



4. Another message will appear stating that all data on the USB device will be lost, click "OK and continue".

5. Wait for Rufus to finish.

13.3.1.2.1.2 Linux

1. Identify the USB drive:

> Do not run the following commands on a hard drive device, but only on the USB. The USB drive in the below command is mapped to sdb.

```
root@ubuntu18:~# ls -ltrh /dev/disk/by-id/usb*
lrwxrwxrwx 1 root root  9 Jan  2 13:44 /dev/disk/by-id/usb-SanDisk_Cruzer_Glide_3.0_4C530000040724111091-0:
0 -> ../../sdb
lrwxrwxrwx 1 root root 10 Jan  2 13:44 /dev/disk/by-id/usb-SanDisk_Cruzer_Glide_3.0_4C530000040724111091-0:
0-part1 -> ../../sdb1
```

2. Copy the `ufm-appliance-<version>.iso` to the USB using the following dd command:

> Do NOT run the following commands on a hard drive device but only on the USB. The USB drive in the below command is mapped to /dev/sdb.

```
dd if=/path/to/ufm-appliance-<version>.iso of=/dev/sdb bs=4M status=progress oflag=sync
```

3. Verify that the USB is bootable:

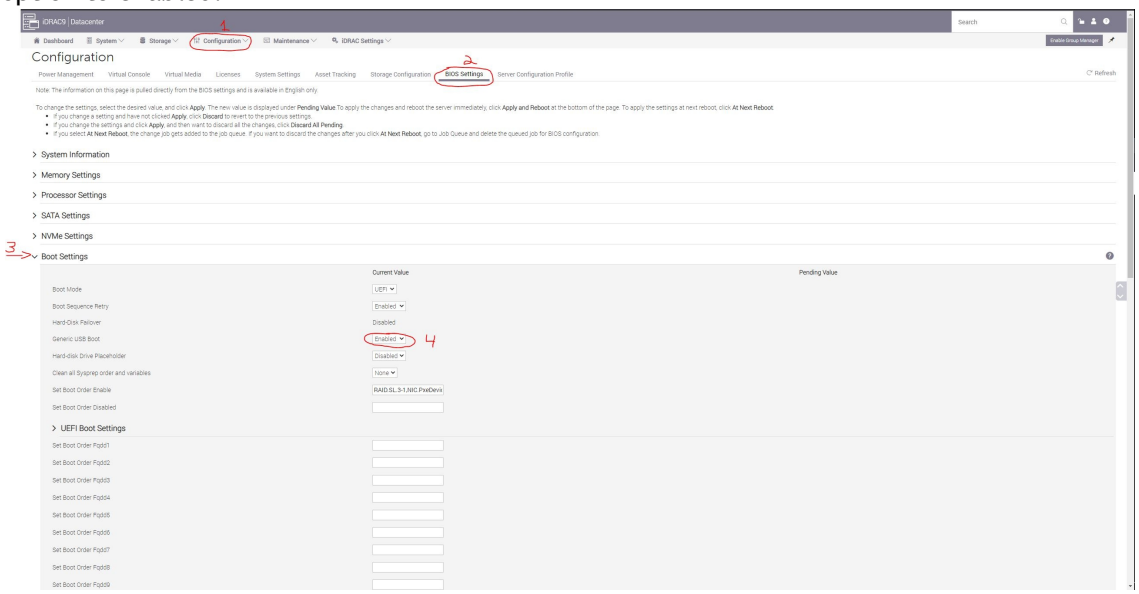
```
root@ubuntu18:~# fdisk -l /dev/sdb
Disk /dev/sdb: 14.9 GiB, 16005464064 bytes, 31260672 sectors
Units: sectors of 1 * 512 = 512 bytes
Sector size (logical/physical): 512 bytes / 512 bytes
I/O size (minimum/optimal): 512 bytes / 512 bytes
Disklabel type: dos
Disk identifier: 0x594ec03e

Device     Boot Start      End  Sectors  Size Id Type
/dev/sdb1  *       64 15679439 15679376  7.5G 17 Hidden HPFS/NTFS
```

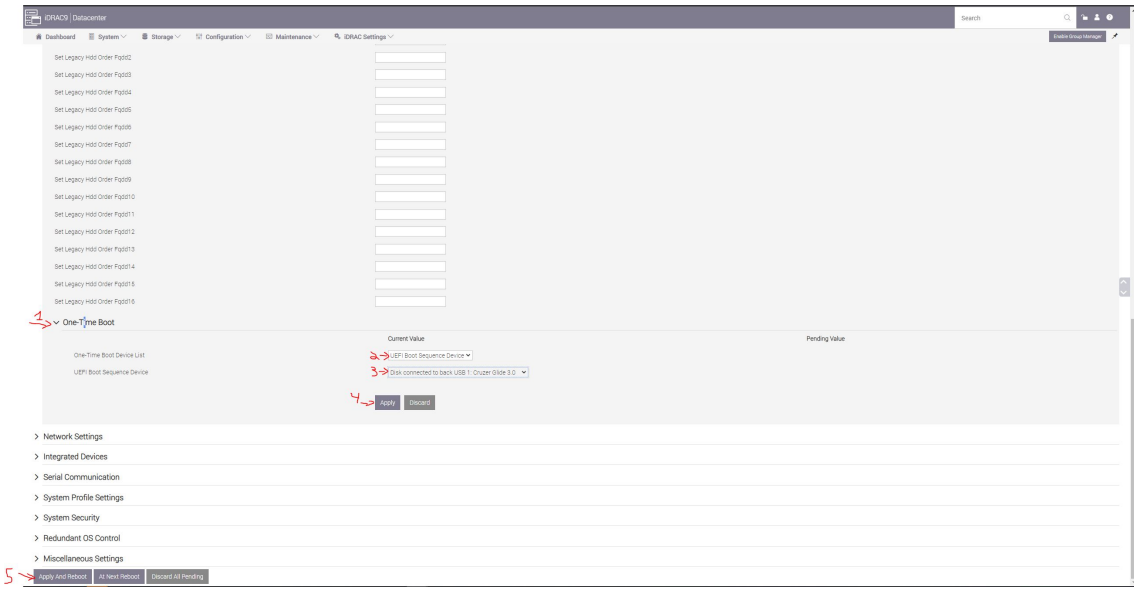
4. Unplug the USB.

13.3.1.2.2 Manufacture UFM Appliance via the USB

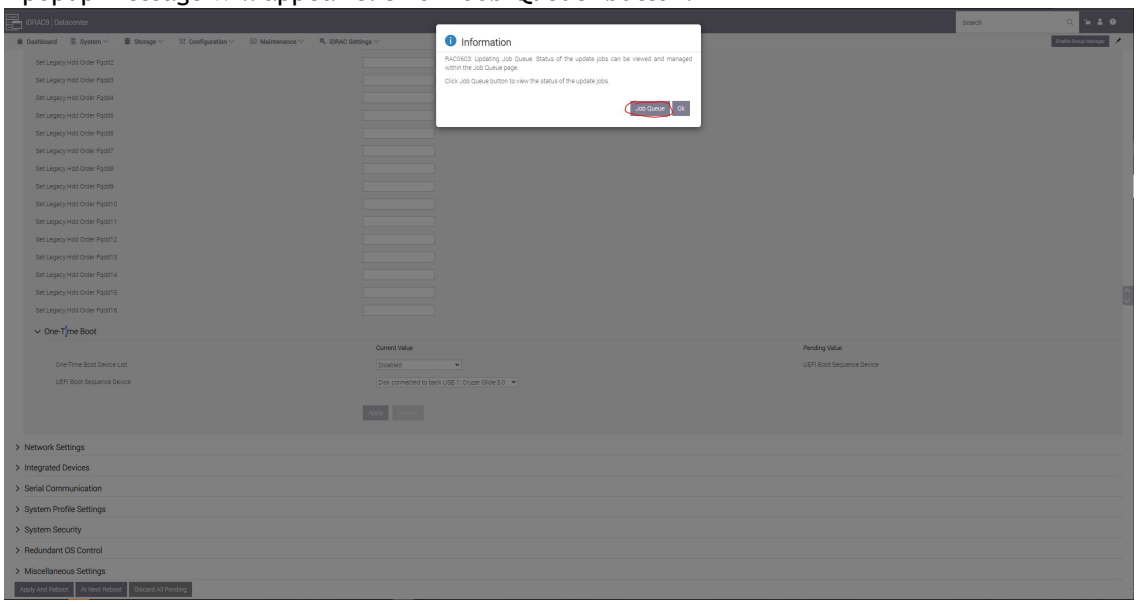
1. Plugin the USB device to the back panel (Front panel USB is disabled).
2. Open a web browser and navigate to https://<IDRAC-ILO-address>.
3. Navigate to "Configuration" → "BIOS Settings" → "Boot Settings" and set "Generic USB boot" option to enabled.



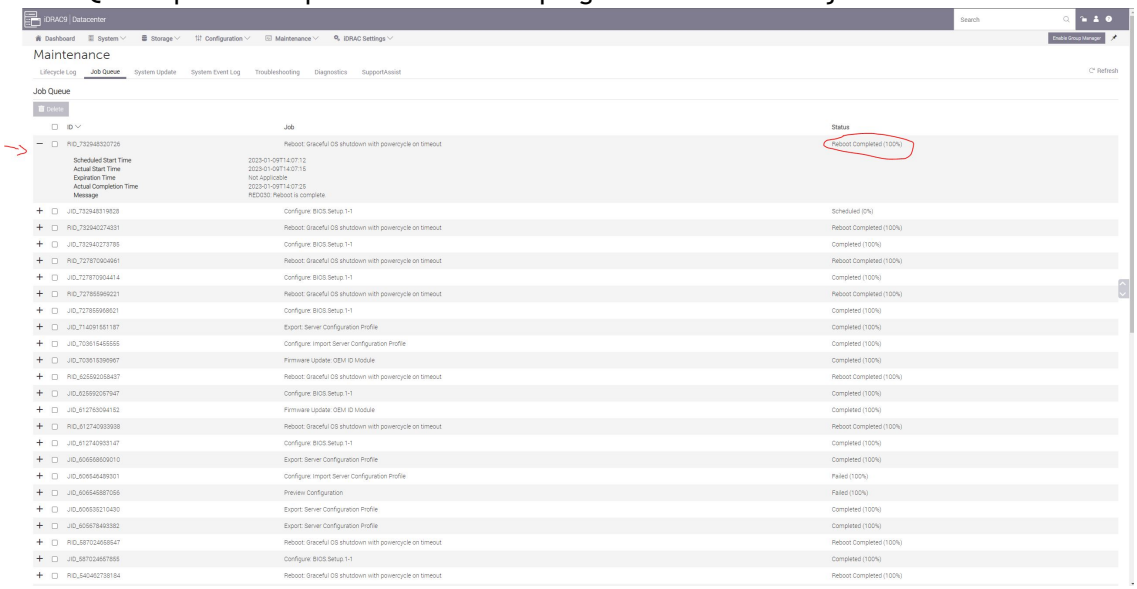
4. On the same pane, scroll down to "One-Time Boot" → "One-Tome Boot Device List" select "UEFI Boot Sequence Device".
   In "UEFI Boot Sequence Device", select the connected USB device and click apply.
   On the bottom of the page click on "Apply And Reboot" button.



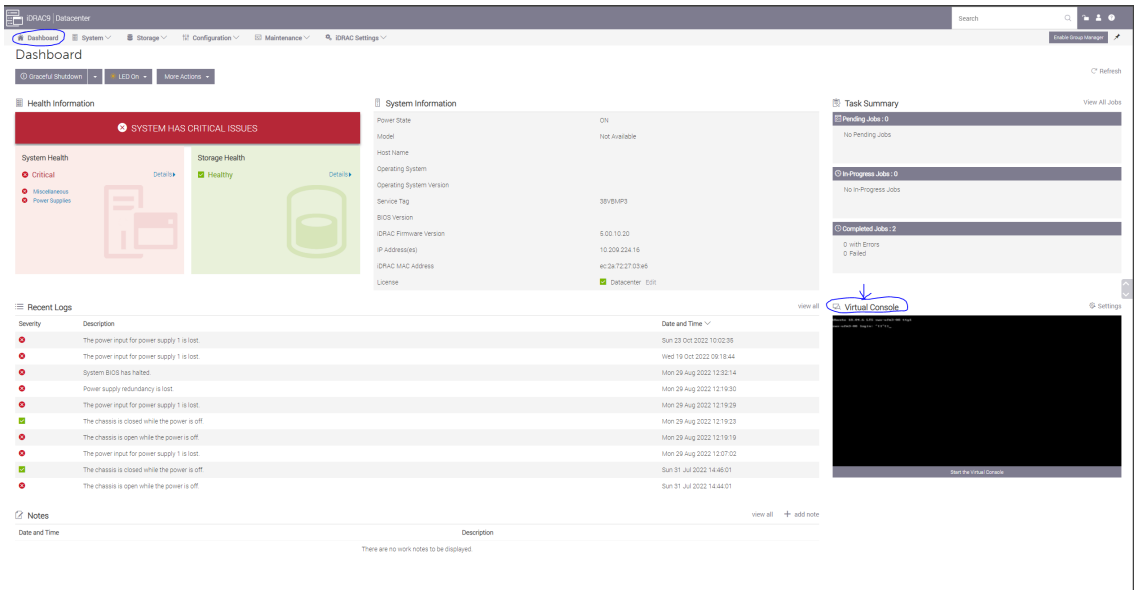
5. A popup message will appear click on "Job Queue" button.



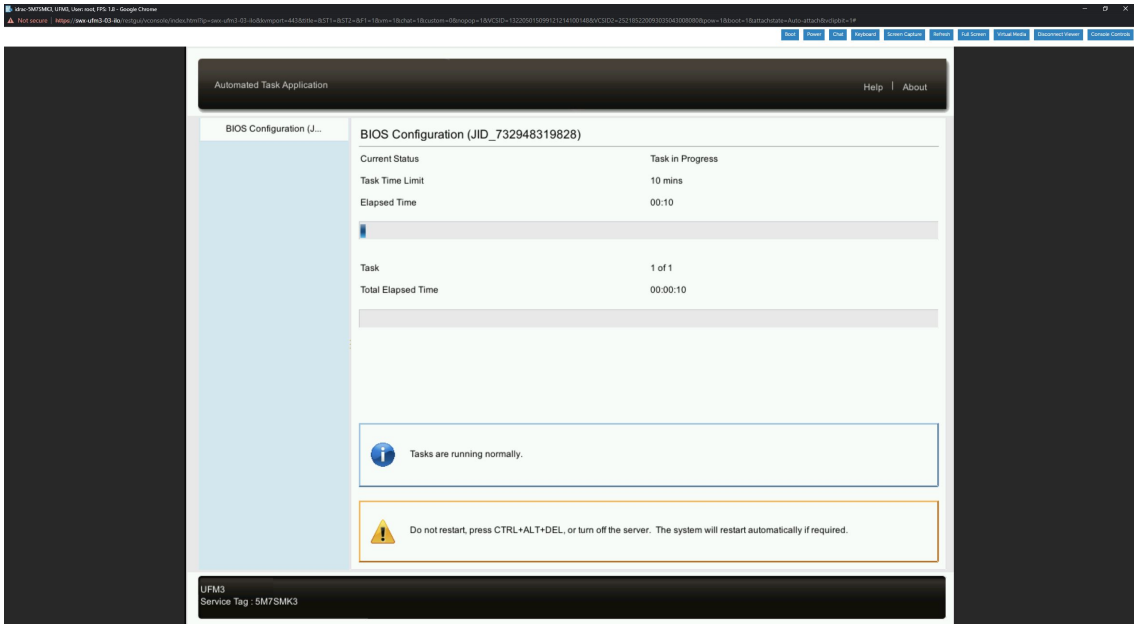
6. A "Job Queue" pane will open to monitor the progress of the created job.



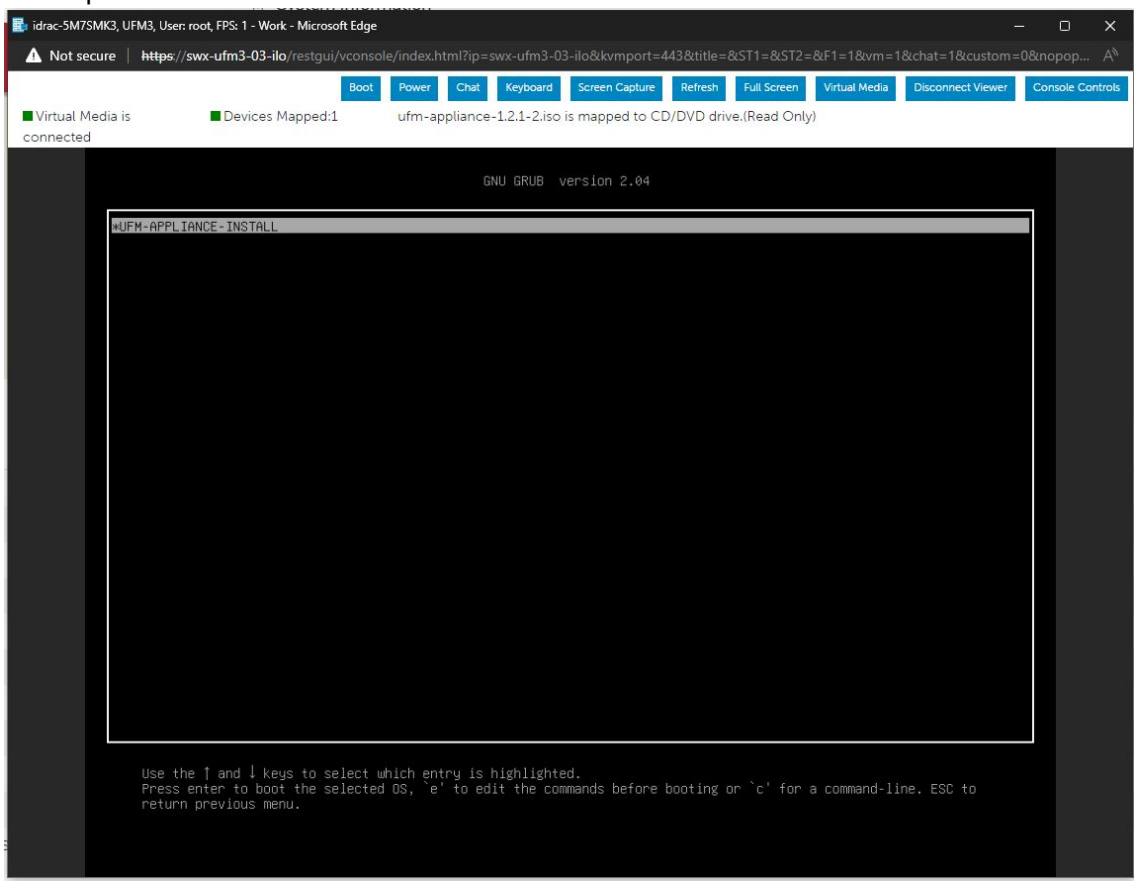
7. Navigate to the Dashboard pane, click on the virtual console icon on the bottom right corner of the screen.



A new console window will appear that shows the progress of restarting the node to USB.



8. At this point an automatic installation should start.



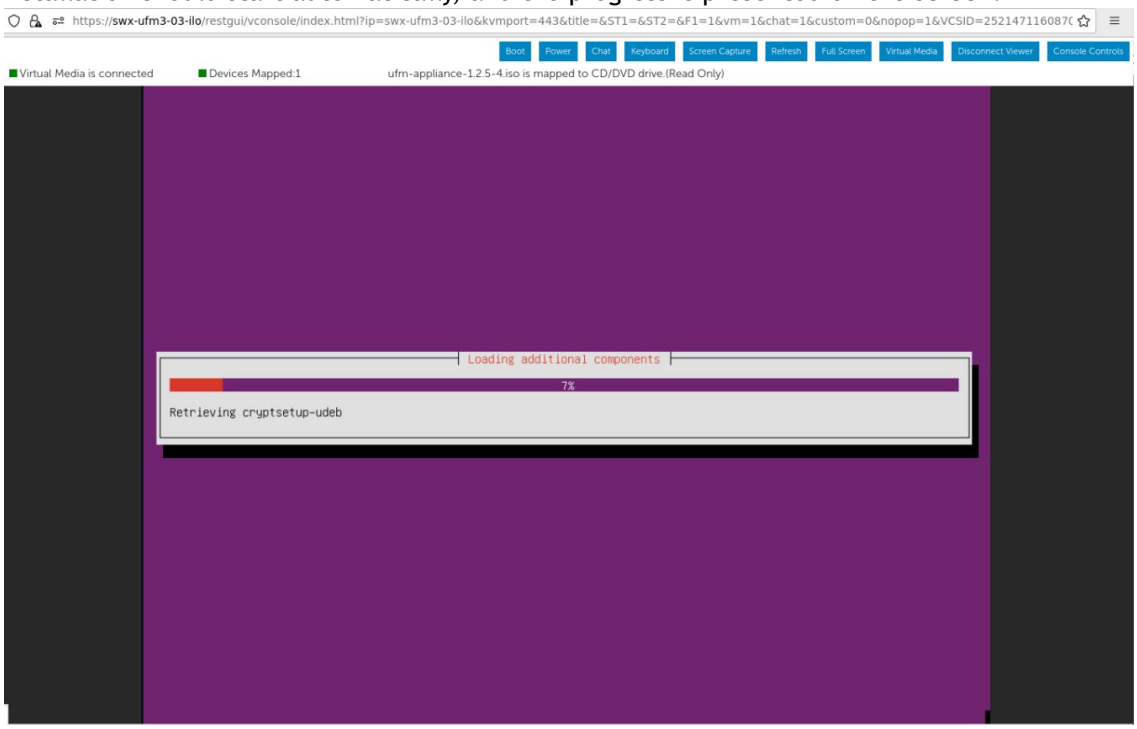
The installation will auto start after 30 seconds, press the enter key to start it immediately.

9. Proceed to the following section to proceed with the installation.

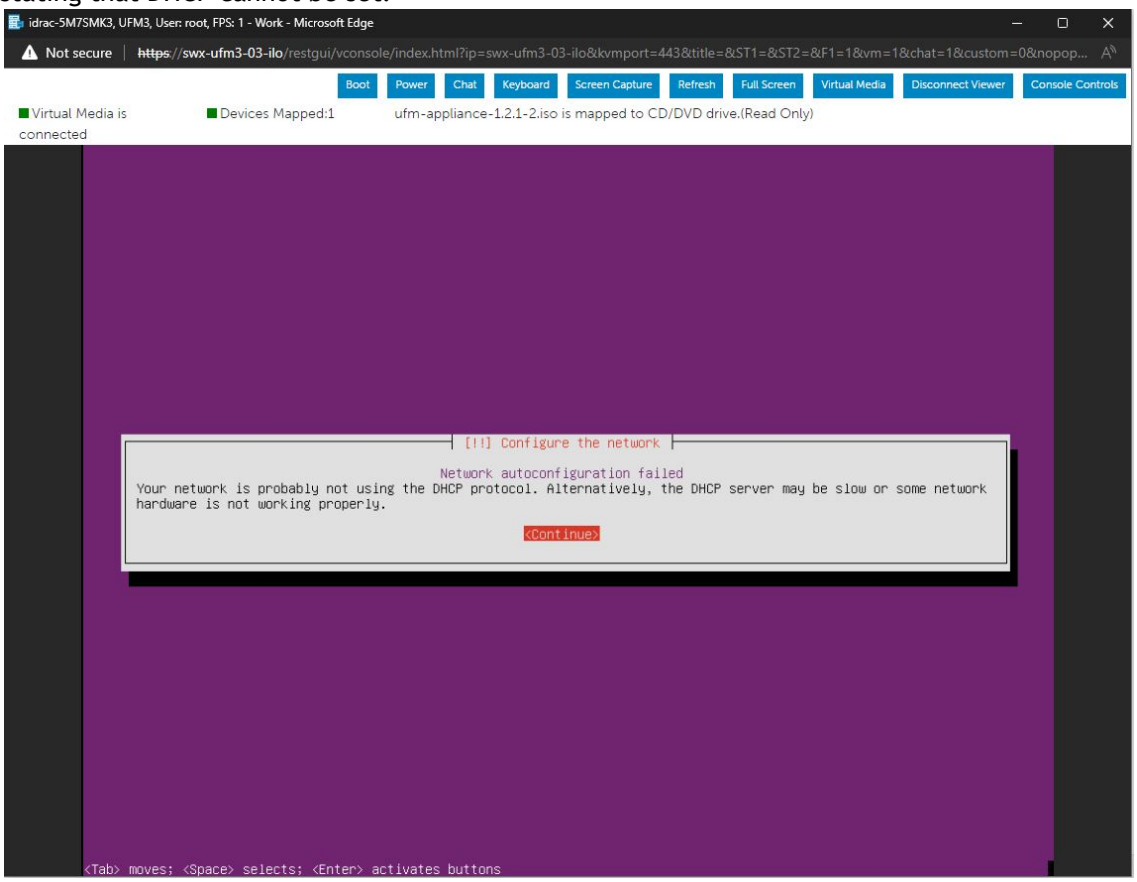
13.3.1.3 Finalizing the Installation

Installation may take 20-90 minutes and depends on the chosen media; with USB it takes around 20 minutes and via the virtual media take around 90 minutes (this may vary and depends on network speed).

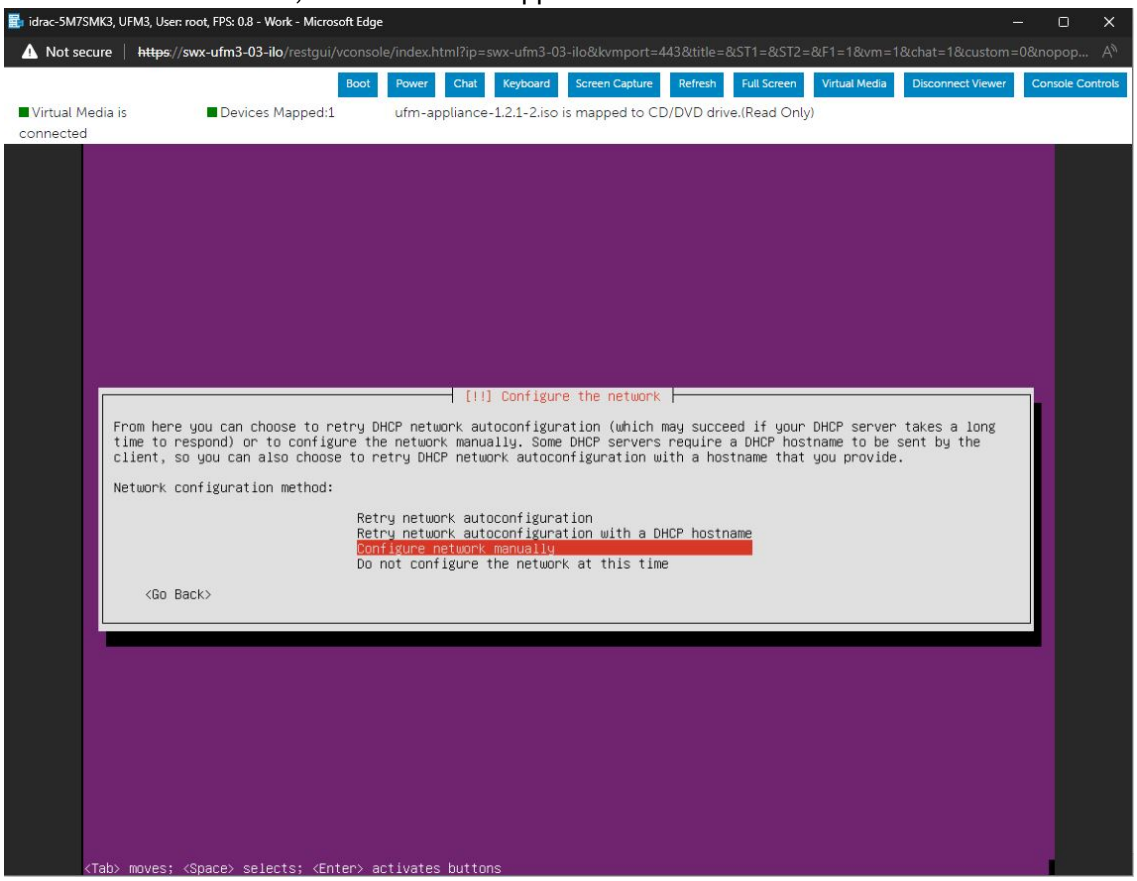
1. Installation should start automatically, and the progress is presented on the screen.



2. In case a DHCP is not available or not configured, a prompt will pop up with notification stating that DHCP cannot be set.

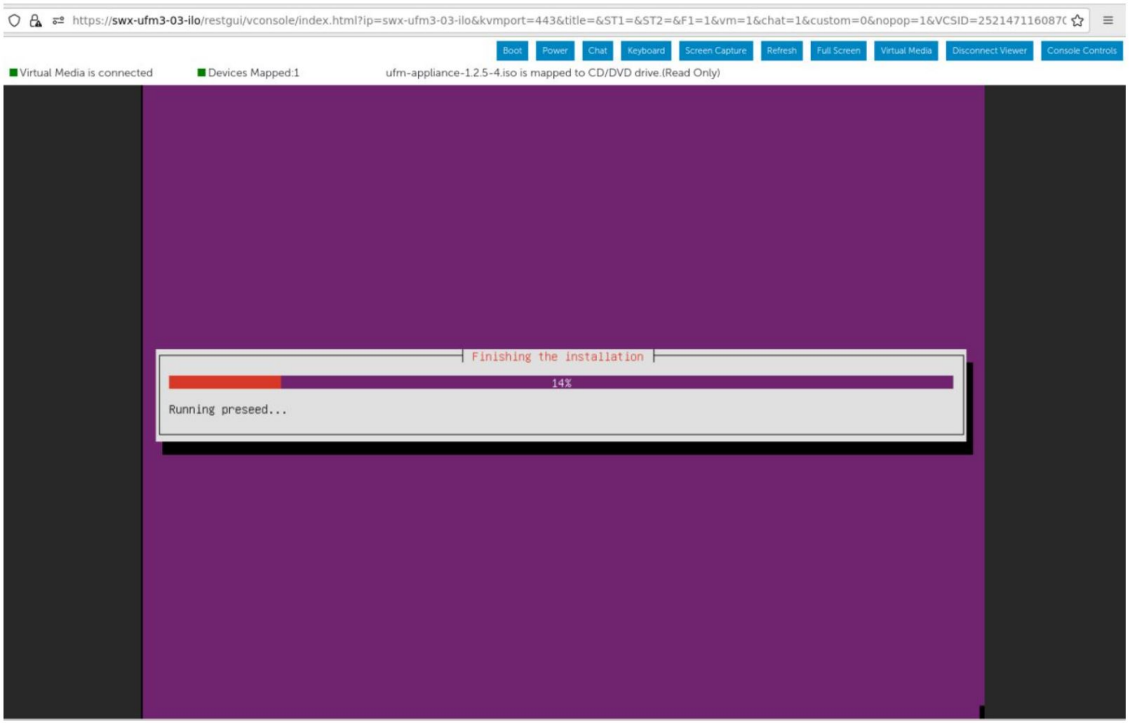


3. Press "Enter" to continue, a sub menu will appear.



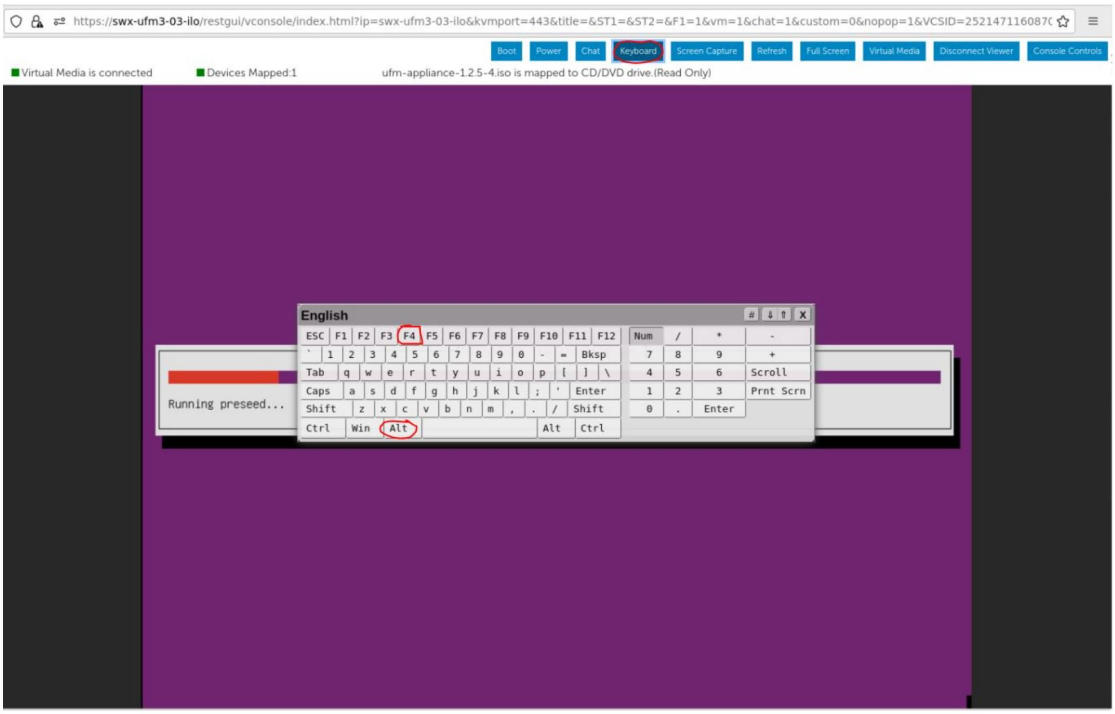
You can choose the preferred option and follow the instructions on the screen by configuring it manually, or skip network configuration and add them at a later point.

4. The installation procedure should continue.

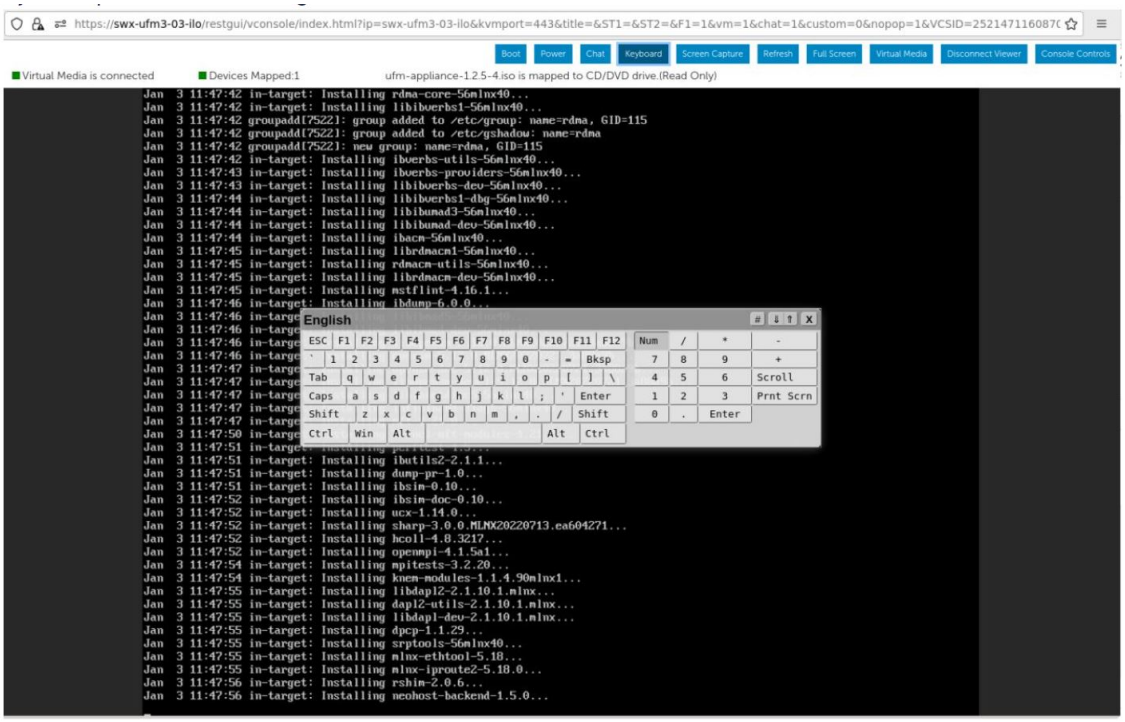


The installer may seem stuck when the status bar gets to "Running preseed" (14-16 %) - it takes a while to pass this, the script runs in the background and the progress can be seen by switching to tty4 (optional) by opening the virtual keyboard.

This should be done on the virtual keyboard, otherwise it will close the installation window. The installation window can be opened by pressing "ALT+F4" on the virtual keyboard.



tty4 will open and the install log will show current status.



To return to the progress screen, click on "ALT+F1" on the virtual keyboard.

5. The server will automatically reboot when the installation procedure is completed.
6. At this point, the login screen will appear

> The installation procedure is not finished yet. At this point, an automatic service will install additional SW (including the UFM Enterprise Appliance).

Upon installation completion, a message will appear on any attached terminal stating UFM-OS-FISTBOOT-SUCESS for successful installation, or UFM-OS-FISTBOOT-FAILED for failed installation.

A log can be checked in `/var/log/ufm-os-firstboot.log`.

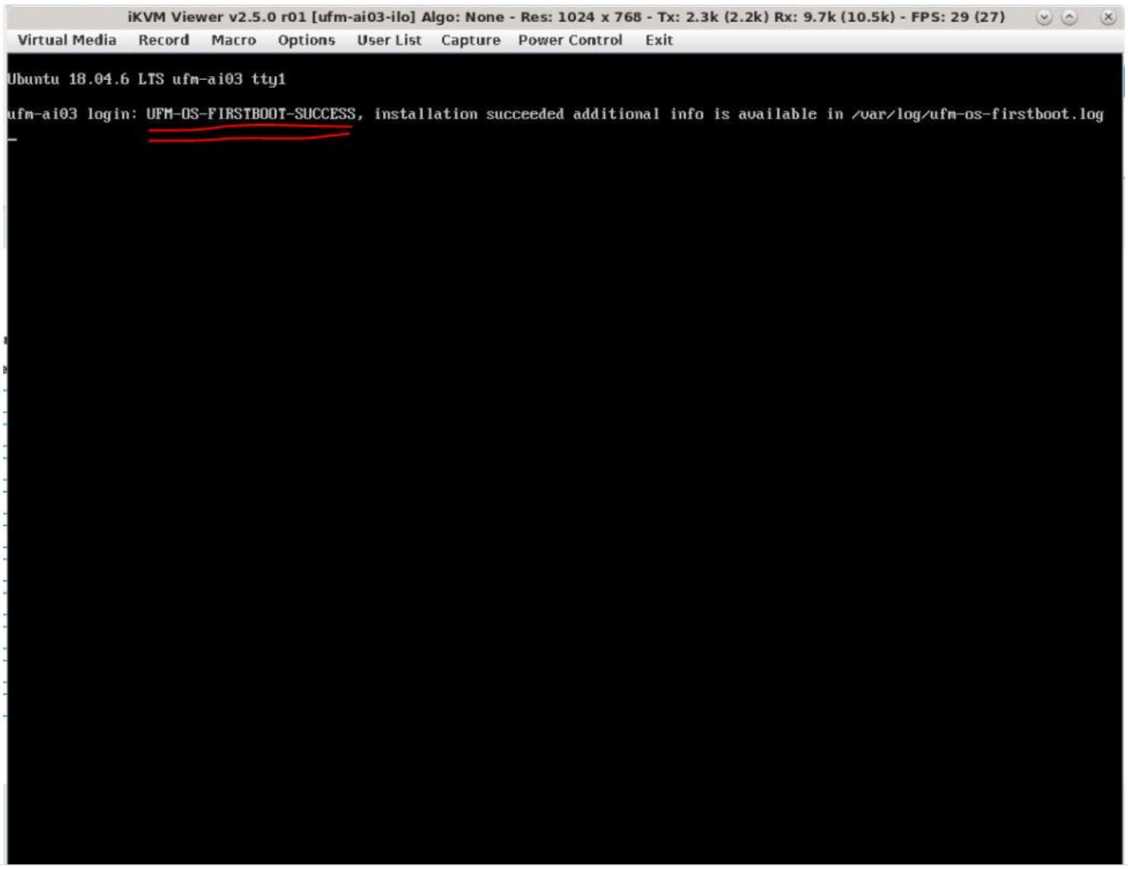
The below is an example from an attached ssh session:

```
root@ufm-ai03:~#
root@ufm-ai03:~#

Broadcast message from root@ufm-ai03 (somewhere) (Fri Dec 30 18:47:32 2022):

UFM-OS-FIRSTBOOT-SUCCESS, installation succeeded additional info is available in /var/log/ufm-os-firstboot.log
```

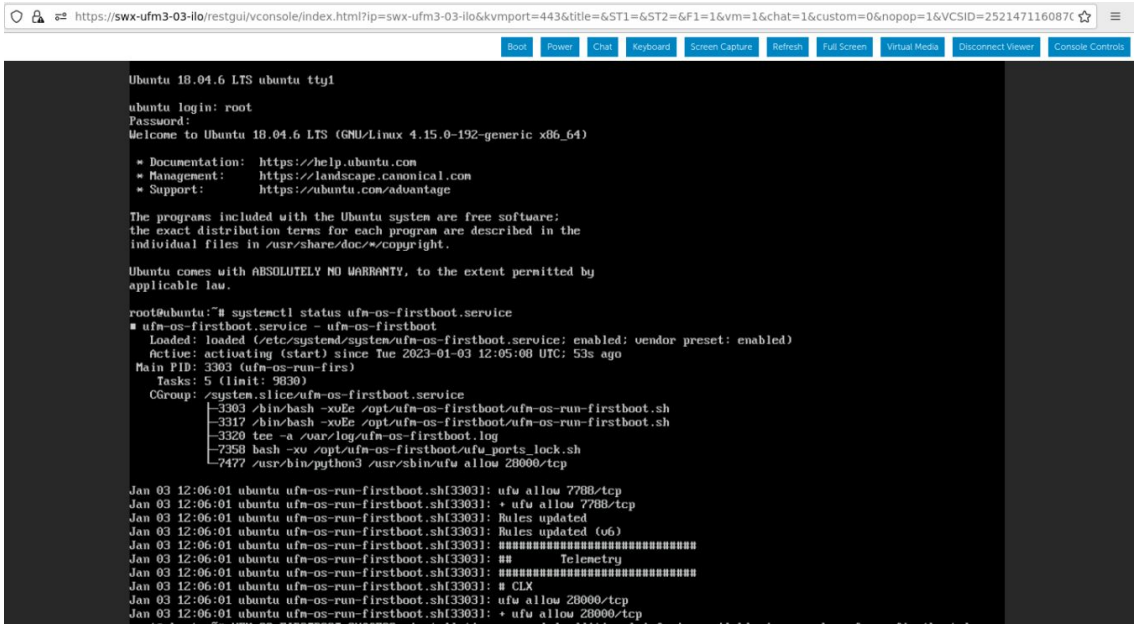
Example from the console web screen:



To manually check if the installation procedure has completed or is still running:

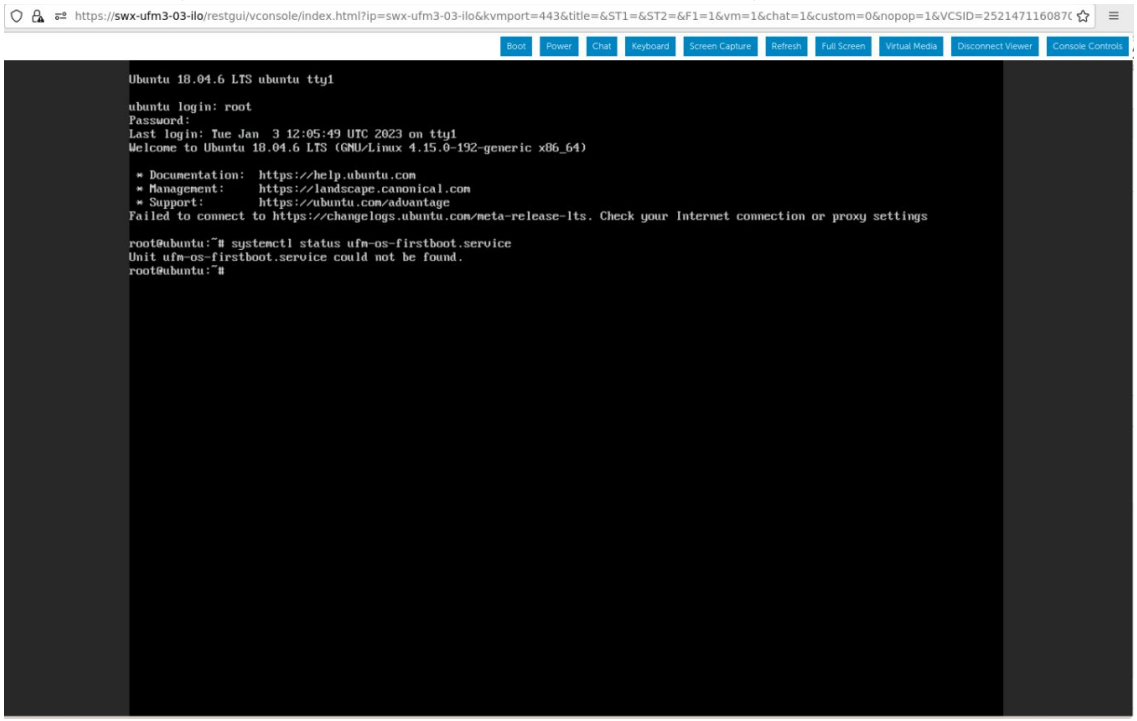
```
systemctl status ufm-os-firstboot.service
```

If the installation is still running, the below status will be presented:



If the installation is completed, an error message stating that `ufm-os-firstboot.service`

does not exist (as it is deleted when the installation is finished).



7. The installation is now finished and the UFM Enterprise Appliance can be started. If the network configuration step is skipped in previous steps, it can now be configured.

13.4 Appendix - UFM Factory Reset

This section provides a comprehensive guide on resetting UFM to its original factory settings.

> WARNING!!! this operation will remove all user data and configuration and will restore UFM to its factory defaults.

> The UFM Factory-Reset will exclusively revert UFM to its original factory settings, leaving HA configurations unaffected. To remove HA, it is essential to execute `ufm_ha_cluster cleanup` before initiating the factory reset.

13.4.1 UFM Docker Container Factory Reset

To reset UFM to its factory defaults when using UFM on a Docker container, follow these steps.

1. Ensure that UFM is not up and running. If UFM is running, stop it.
   For Stand-alone (SA) installations:

   ```
   systemctl stop ufm-enterprise
   # validate that ufm is not running
   systemctl status ufm-enterprise
   ```

   For High-Availability setups (perform the following on the master node only):

```
ufm_ha_cluster stop
# validate that ufm is not running
ufm_ha_cluster status
```

2. Run `mellanox/ufm-enterprise` Docker Container with the following flags:

> WARNING: This operation will erase all user data and configurations, resetting UFM to its factory defaults.
> CAUTION: This step does not require user confirmation, meaning UFM will be restored to factory defaults immediately once initiated.

```
docker run -it --name=ufm_installer --rm \
        -v /var/run/docker.sock:/var/run/docker.sock \
        -v /tmp:/tmp \
        -v /opt/ufm/files/:/opt/ufm/shared_config_files/ \
        mellanox/ufm-enterprise:latest \
        --factory-reset
```

Flag	Type	Description
`--name=ufm_installer`	Mandatory	The container name must be called ufm_installer.
`-v /var/run/docker.sock:/var/run/docker.sock`	Mandatory	The docker socket must be mounted on the docker container.
`-v /tmp:/tmp`	Optional	Logs of the operation can be viewed in `/tmp` on the host in case it is mounted.
`-v /opt/ufm/files/:/opt/ufm/shared_config_ufm/`	Mandatory	For the factory reset to persist, it is essential to have the /opt/ufm/files directory mounted from the host. TBD: eylon - naming convention of the `/opt/ufm/files/`
`mellanox/ufm-enterprise:latest`	Mandatory	The docker image name.
`--factory-reset`	Mandatory	This action will signal the UFM container to initiate the factory reset process.

13.4.2 UFM Factory Reset via CLI

13.4.2.1 UFM Factory Reset in HA Configuration

> The UFM Factory-Reset will exclusively revert UFM to its original factory settings, including the HA configurations.

1. On the Master node, stop the UFM cluster. Run:

```
ufmapl (config) # no ufm start
```

2. On both Master and Standby nodes, reset the UFM cluster configuration to factory settings. Run:

```
ufmapl (config) # no ufm ha
```

After the factory reset procedure is completed, both UFM nodes are configured as Standalone mode.

13.4.2.2 UFM Factory Reset in Standalone Configuration

The UFM Factory-Reset will exclusively revert UFM to its original factory settings.

1. Stop the UFM service. Run:

```
ufmapl (config) # no ufm start
```

2. Reset the UFM data to factory settings. Run:

```
ufmapl (config) # ufm data reset
```

13.5 Appendix - Software Components Upgrade

It is recommended to upgrade all UFM Enterprise appliance software components as listed in UFM Enterprise Appliance Upgrade.

This section includes optional instructions on how to upgrade specific software components.

- Upgrading UFM Enterprise Appliance Operating System: Involves UFM Enterprise appliance operating system upgrade only.
- Upgrading All UFM-Related Software Components: Involves all UFM-related software components, including UFM Enterprise, Docker Container and UFM HA. The upgrade is done on all software components at once.
- Upgrading Specific UFM-Related Software Component: Involves upgrading specific UFM-related software components separately.

13.5.1 Upgrading UFM Enterprise Appliance Operating System

This section provides a step-by-step guide for UFM Enterprise Appliance Operating System upgrade.

Each UFM Enterprise Appliance software has an additional tar file with a `-omu.tar` suffix (OMU stands for OS Manufacture and Upgrade). This tar file can be used to re-manufacture the server and to upgrade the operating system/software on the server.

13.5.1.1 Extracting the Software

1. Copy the OMU tar file to a temporary directory on the server.
   `UFM-APPLIANCE - ufm-appliance<version>-<revision>-omu.tar`

2. Extract the contents of the tar file to /tmp.

```
tar vxf ./ufm-appliance-<version>-<revision>-omu.tar -C /tmp/
```

3. Change to the extracted directory.

```
cd /tmp/ufm-appliance-<version>-<revision>-omu
```

4. An upgrade script and an ISO file are included in the extracted directory.

```
ls -1 ./# ls -1 ./
./ufm-os-upgrade.sh
ufm-appliance-<version>-<revision>.iso
```

The following flags are available in the upgrade script help.

```
# ufm-os-upgrade.sh --help
ufm-os-upgrade.sh will upgrade and install OS packages.

IMPORTANT!!! a reboot is mandatory after the finalization of this script,
kernel and kernel models will not work properly until the server is rebooted.

Additional SW installations will be automatically invoked after reboot,
a message will pop on all open terminals with the installation status:
"UFM-OS-FIRSTBOOT-FAILURE" - if installation is failed.
"UFM-OS-FIRSTBOOT-SUCCESS" - if installation succeeded.

Additional info will be available in "/var/log/ufm_os_upgrade_@@UFM-OS-VERSION@@.log" log file.
Upgrade steps status information can be viewed in "/var/log/ufm_os_upgrade_@@UFM-OS-VERSION@@_status.log"
 log file.

Syntax: ufm-os-upgrade.sh [options]

options
-d,--debug              debug info will be visible on the screen.

-r,--reboot             Automatically reboot the server when upgrade is finished.
                        P.S. if secure boot is enabled and a new certificate is enrolled
                        the server will not automatically reboot even if this flag is set.

-y,--yes                Will not prompt for user acknowledgements, use with CAUTION user prompts will be
assumed as answered yes.

-h,--help               print this help message.
```

> IMPORTANT!!! System reboot is mandatory once the upgrade procedure is completed. The `-r` flag can be used to automatically reboot the server at the end of the upgrade. Note that some kernel modules may not work properly until server reboot is performed.

13.5.1.2 Standalone Mode Upgrade

1. Stop UFM service by running the following command:

```
systemctl stop ufm-enterprise.service
```

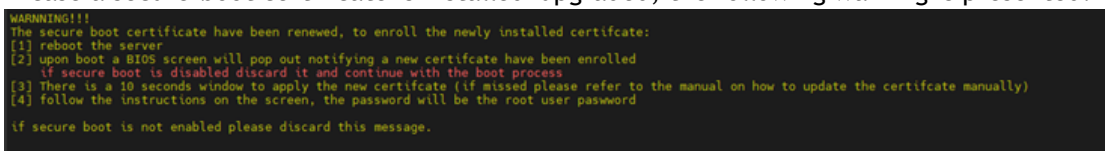
2. Run the upgrade script.

> System reboot is mandatory once the upgrade procedure is completed. The `-r` flag can be used to automatically reboot the server.
> The `--appliance-sw-upgrade` flag CAN NOT !!! be supplied to upgrade the UFM Enterprise Appliance SW.

The `-y` flag can be supplied to skip user questions (the flag does not automatically reboot the server on its own. For auto reboot, combine with the `-r` flag)
Once a secure boot certificate is updated/installed, the script will not auto reboot even if `-y` and `-r` flags are provided. That is because the addition of certificates require manual user intervention at boot (after the upgrade).
There is a 10 seconds window to press any button when prompted during the boot procedure and insert the server root password in order to import the certificate. Further details are available in Appendix - Secure Boot Activation and Deactivation.
In the following example the server will auto reboot when upgrade is finished.

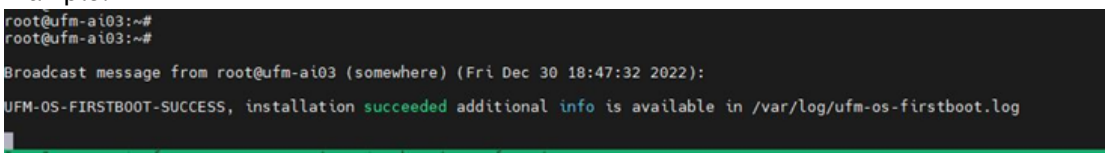
```
./ufm-os-upgrade.sh -y -r
```

3. In case a secure-boot certificate is installed/upgraded, the following warning is presented:



In that case the server does not reboot automatically, a manual configuration is required at boot (a 10 second prompt appears during the boot. For more information, refer to Appendix - Secure Boot Activation and Deactivation.
To continue with the upgrade procedure, manually reboot the server from as instructed in Appendix - Secure Boot Activation and Deactivation.

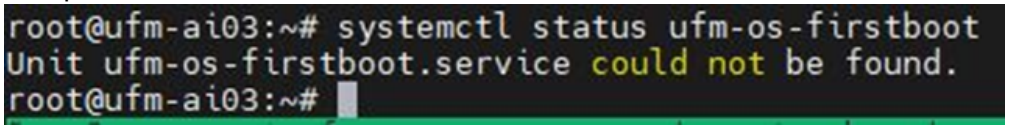
4. After the reboot procedure is complete, a systemd service (`ufm-os-firstboot.service`) runs the remainder of the upgrade procedure. Once completed, a message is prompted to all open terminals including the status:
" `UFM-OS-FIRSTBOOT-FAILURE` " - if installation is failed.
" `UFM-OS-FIRSTBOOT-SUCCESS` " - if installation succeeded.
Example:



To manually check the status, run `systemctl status ufm-os-firstboot.service.` If it is already finished, an error message is prompted stating that there is no such service. In that case, the log /var/log/ufm-os-firstboot.log can be checked instead.

```
systemctl status ufm-os-firstboot.service
```

Example:



13.5.1.3 High-Availability Mode Upgrade

Upgrade on HA should be done first on the stand-by node and after that on the master node, each node upgrade is similar to the SA instructions.

In case the Standby node is unavailable, the upgrade can be run on the Master node only, however, some additional steps will be required after the appliance is upgraded.

> In case a secure boot certificate needs to be updated/installed, the script will stop execution and request the user to install the secure-boot certificate, secure-boot does not have to be active (although it is highly recommended), but the certificate must be installed/updated by the user before proceeding to the upgrade.

The upgrade script will verify that the certificate is up to date and will stop execution if it needs to be installed/updated (this happens at the start of the script)

1. [On the stand-by Node]: Copy and extract the OMU tar file to a temporary directory.
2. [On the stand-by Node]: Run the upgrade script.

   > System reboot is mandatory once the upgrade procedure is completed. The `-r` flag can be used to automatically reboot the server.
   >
   > The `` flag CAN NOT !!! be supplied to upgrade the UFM Enterprise Appliance SW.

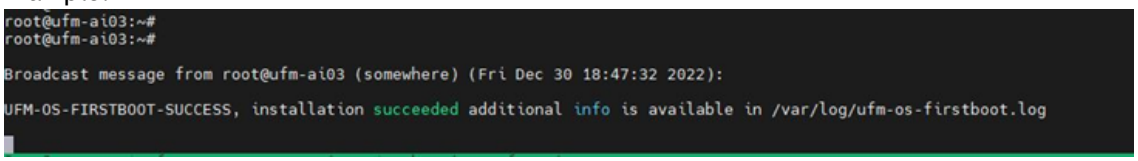
   The `-y` flag can be supplied to skip user questions (the flag does not automatically reboot the server on its own. For auto reboot, combine with the `-r` flag).
   In the following example the server auto reboots once the upgrade procedure is completed:

   ```
   cd /tmp/ufm-appliance-<version>-<revision>-omu
   ./ufm-os-upgrade.sh -y -r
   ```

3. If `-r` flag was not provided reboot the server when the script will finish (a question will show on the screen that will ask to reboot if No was answered a manual reboot is required)
   to manually reboot the server:

   ```
   reboot now
   ```

4. After the reboot procedure is complete, a systemd service (`ufm-os-firstboot.service`) runs the remainder of the upgrade procedure. Once completed, a message is prompted to all open terminals including the status:
   "UFM-OS-FIRSTBOOT-FAILURE" - if installation is failed.
   "UFM-OS-FIRSTBOOT-SUCCESS" - if installation succeeded.
   Example:

   To manually check the status, run `systemctl status ufm-os-firstboot.service.` If it is already finished, an error message is prompted stating that there is no such service. In that case, the log /var/log/ufm-os-firstboot.log can be checked instead.

   ```
   systemctl status ufm-os-firstboot.service
   ```

Example:

```
root@ufm-ai03:~# systemctl status ufm-os-firstboot
Unit ufm-os-firstboot.service could not be found.
root@ufm-ai03:~#
```

5. After the stand-by node have finished the upgrade check the HA cluster status

```
ufm_ha_cluster status
```

```
root@swx-ufm3-11:~# ufm_ha_cluster status
Cluster name: ufmcluster
WARNING: corosync and pacemaker node names do not match (IPs used in setup?)
Stack: corosync
Current DC: swx-ufm3-11 (version 1.1.18-2b07d5c5a9) - partition with quorum
Last updated: Thu Mar 16 18:45:19 2023
Last change: Mon Feb 27 12:40:22 2023 by root via crm_resource on swx-ufm3-11

2 nodes configured
5 resources configured

Online: [ swx-ufm3-09 swx-ufm3-11 ]

Full list of resources:

 Master/Slave Set: ha_data_drbd_master [ha_data_drbd]
     Masters: [ swx-ufm3-09 ]
     Slaves: [ swx-ufm3-11 ]
 Resource Group: ufmcluster-grp
     ha_data_file_system        (ocf::heartbeat:Filesystem):    Started swx-ufm3-09
     ufm-ha-watcher     (systemd:ufm-ha-watcher):       Started swx-ufm3-09
     ufm-enterprise     (systemd:ufm-enterprise):       Started swx-ufm3-09

Daemon Status:
  corosync: active/enabled
  pacemaker: active/enabled
  pcsd: active/enabled
DRBD_RESOURCE:     ha_data
DRBD_CONNECTIVITY: Connected
DISK_STATE:        UpToDate
DRBD_ROLE:         Secondary
PEER_DISK_STATE:   UpToDate
PEER_DRBD_ROLE:    Primary
```

All the nodes in the cluster should be online and the current node should remain a stand-by (Secondary in DRBD_ROLE)

6. [On the Master Node]: Fail-over the UFM to the stand-by node (upgraded node will become master and current node will become stand-by).

```
ufm_ha_cluster failover
```

wait for all the resource of UFM are up and running on the upgraded node.

7. repeat the procedure on the un-upgraded node (which is now acting as stand-by).

13.5.2 Upgrading All UFM-Related Software Components

The installation process consists of replacing the containers/packages with the new version and upgrading the UFM data.

1. Copy the tarball file of UFM Enterprise Appliance software to the /tmp folder.
2. Connect to the UFM Enterprise Appliance via SSH.
3. Stop the UFM service/cluster before upgrading.
   In SA mode, run:

```
#systemctl stop ufm-enterprise.service
```

In HA mode, run:

```
# ufm_ha_cluster stop
```

4. Extract the tarball file and run the installer for the upgrade. Run:

```
# cd /tmp
# tar xvf ufm-appliance-sw-<version>.tar
# cd ufm-appliance-sw-<version>
# ./install.sh
```

Installer Options:

```
-q|--quiet            Upgrade UFM without prompt
```

> In HA mode, this step should be performed on both servers.

5. After the upgrade, start the UFM service/cluster.
   In SA mode, run:

```
# systemctl start ufm-enterprise.service
```

In HA mode, run:

```
# ufm_ha_cluster start
```

6. Wait one minute for the service to come up.
7. Ensure the service health. Run:

```
# ufm_enterprise_sanity.sh
Checking Service...
Done
Checking Images...
Done
Checking Containers...
Done
Checking ufm REST server...
Done
Sanity tests completed successfully!
```

13.5.3 Upgrading Specific UFM-Related Software Component

13.5.3.1 Upgrading UFM Docker in SA Mode

Stop the UFM service before upgrading. Run:

```
systemctl stop ufm-enterprise.service
```

For detailed information on upgrading the UFM docker in standalone mode, please refer to Upgrading UFM on Docker Container.

13.5.3.2 Upgrading UFM Docker in HA Mode

Stop the UFM cluster before upgrading. Run:

```
ufm_ha_cluster stop
```

For detailed information on upgrading the UFM docker in high availability mode, please refer to Upgrading UFM on Docker Container.

13.5.3.3 Upgrading UFM HA Package

1. Stop the UFM cluster before upgrading. Run:

```
ufm_ha_cluster stop
```

2. Download the UFM-HA package on both servers using the following command:

```
https://www.mellanox.com/downloads/UFM/ufm_ha_5.3.0-17.tgz
```

3. On both servers, extract the downloaded UFM-HA package under /tmp/
4. On both servers, go to the extracted directory /tmp/ufm_ha_XXX and run the installation script:

```
./install.sh --upgrade
```

5. After the upgrade, start the UFM HA Cluster. Run:

```
ufm_ha_cluster start
```

13.5.3.4 Upgrading UFM Enterprise Appliance CLI Package

1. Copy the tarball of the UFM CLI package to the /tmp folder.
2. Extract the tarball file and run the installer. Example:

```
# cd /tmp
# tar xvf ufmcli_<version>.tgz
# cd ufmcli_<version>
# ./install.sh
Creating the UFM3 CLI repository file /etc/apt/sources.list.d/ufmcli.list
Refreshing the UFM3 CLI packages information...
Installing the UFM3 CLI package...
Removing the UFM3 CLI local repository /etc/apt/sources.list.d/ufmcli.list
Done.
```

3. Once the upgrade procedure is completed, connect to the UFM Enterprise Appliance via SSH with admin. Run:

```
ssh admin@<hostname>
```

14 Document Revision History

Revision	Date	Description
1.6.1	December 12, 2023	Updated the following sections: • Installation Notes • Bug Fixes in This Release • Known Issues in This Release
1.6.0	December 12, 2023	Updated Known Issues in This Release
	November 21, 2023	Added instructions on Configuring TACACS+ and Performing AAA and Adding TACACS Users on the Server Side

Revision	Date	Description

	November 5, 2023	Updated the following sections:
		• Changes and New Features
		• Bug Fixes in This Release
		• UFM Enterprise Appliance Upgrade - Added an important note
		• Configuring the Appliance for the First Time - Added a diagram to reflect the connectivity of the UFM High-Availability cluster and instructions on how to configure the back-to-back Interface
		• High Availability - Added the HA configuration instructions
		Added Appendix - Software Components Upgrade
		Updated the following CLI Commands:
		• show interfaces - Updated the output and added optional argument interface name
		• show ib sharp - Updated the output to reflect the new settings
		Added the following CLI commands:
		• In Routing:
		  • show {ip | ipv6} route
		  • show {ip | ipv6} default-gateway
		• In AAA Methods:
		  • aaa authentication login default
		  • show aaa
		• In TACACS+:
		  • tacacs-server
		  • tacacs-server host
		  • show tacacs
		• In Chassis Management:
		  • show files system
		  • show resources
		• In UFM License:
		  • ufm license install
		  • ufm license delete
		  • show ufm license
		  • show files ufm-license
		• In UFM Configuration Management:
		  • ufm configuration delete
		  • ufm configuration export
		  • ufm configuration fetch
		  • ufm configuration import
		  • ufm configuration upload
		  • show files ufm-configuration
		• High-Availability
		  • ufm ha configure
		• In UFM Multi-Port SM:
		  • ufm multi-port-sm
		  • show ufm multi-port-sm
		  • ufm additional-fabric-interfaces
		  • show ufm additional-fabric-interfaces
		• HCA Commands
		  • ib hca-vl15-window
		  • show ib hca-vl15-window
		• In NVIDIA SHARP:
		  • ib sharp dump-files-generation enable

Revision	Date	Description
		• ib sharp dynamic-tree-allocation enable • ib sharp dynamic-tree-algorithm • ib sharp ib-qpc-sl <0-15> • ib sharp ib-sat-qpc-sl <0-15> • ib sharp allocation enable
1.5.1	August 31, 2023	Updated the following sections: • Changes and New Features • Bug Fixes in This Release • license install - Added note #1
1.5.0	August 10, 2023	Updated the following sections: • Changes and New Features • Bug Fixes in This Release • Troubleshooting - Added step 1 and rearranged the remainder of the steps. Added the following sections: • UFM Enterprise Appliance In-Service Upgrade • Appendix - UFM Factory Reset Added the following CLI commands: • image fetch • image install • image delete • show images • ufm data reset • {ip | ipv6} host • ufm ha-nodes • show ufm ha-nodes
	August 24, 2023	Added step 4 to UFM Enterprise Appliance In-Service Upgrade
1.4.3	June 20, 2023	Updated the following sections: • Changes and New Features • Bug Fixes in This Release
1.4.2	June 5, 2023	Updated the following sections: • Changes and New Features • Bug Fixes in This Release Updated the following CLI commands: • ip name-server • show version • ntp server • ntp peer • ip default-gateway Added the following command: • ipv6 default-gateway • username admin password • ib sm configuration import

Revision	Date	Description

1.4.1	May 18, 2023	Updated the following sections:
		• Changes and New Features
		• Bug Fixes in This Release
		• Known Issues in This Release
		Added the following CLI Commands:
		• High-Availability
		  • ufm ha
		• General
		  • ufm start
		• Network Interfaces
		  • show interfaces
		• License
		  • license install
		  • license delete
		  • show license
		  • _shell
		• User Management
		  • username

Revision	Date	Description

1.4.0	May 5, 2023	Updated the following sections:
		• Changes and New Features
		• Installation Notes
		• Bug Fixes in This Release
		• Known Issues in This Release
		• High Availability
		• UFM Enterprise Appliance Upgrade
		Added the following sections:
		• Appendix - Software Components Upgrade
		Added the following CLI Commands:
		• General
		  • show ufm status
		• System Management
		  • show hosts
		  • show version
		• OpenSM:
		  • show ib sm allow-both-pkeys
		  • ib sm allow-both-pkeys
		  • show ib sm keep-pkey-indexes
		  • ib sm keep-pkey-indexes
		  • show ib sm virtualization
		  • ib sm virtualization enable
		  • ib sm virtualization ignore
		  • show ib sm root-guid
		  • ib sm root-guid
		  • show ib sm routing-engines
		  • ib sm routing-engines
		  • show ib sm ar-sl-mask
		  • ib sm ar-sl-mask
		  • show ib sm configuration import
		  • ib sm partition-config-merge
		• Partition:
		  • show ib partition
		  • ib partition management defmember
		• SHARP Aggregation Manager
		  • ib sharp enable
		  • ib sharp smx-protocol
		  • ib sharp topology-api enable
		  • show ib sharp
		• SHARP Configuration in OpenSM
		  • ib sm sharp enable
		  • ib sm sharp ignore
		  • show ib sm sharp
		• High-Availability
		  • ufm ha configure dual-subnet
		• Management Interface Monitoring
		  • show ufm mgmt-interface
		  • ufm mgmt-interface monitor interval
		  • ufm mgmt-interface
		  • ufm mgmt-interface monitor enable
		• UFM Logs:
		  • show ufm logging
		  • ufm logging syslog enable
		  • ufm logging syslog
		  • ufm logging syslog enable
		  • ufm logging syslog ufm-events enable
		  • ufm logging level
		• UFM Web Client:
		  • ufm web-client mode

Revision	Date	Description
		• ufm web-client associate-user • show ufm web-client • ufm web-client client-authentication cert-refresh enable • ufm web-client client-authentication cert-refresh ca-cert • ufm web-client client-authentication cert-refresh server-cert • ufm web-client client-authentication cert-refresh run-now • UFM Audit: • ufm track-conf-changes enable • show ufm track-conf-changes
	May 15, 2023	Added Upgrading UFM Enterprise Appliance CLI Package
1.3.1	Feb 19, 2023	Updated • Changes and New Features • Bug Fixes in This Release • Known Issues in This Release
	Mar 16, 2023	Updated Changes and New Features - Added MFT package integration details
1.3.0	Feb 6, 2023	Updated the following sections: • Installation Notes • Changes and New Features • Bug Fixes in This Release • Known Issues in This Release • Added a note under Configuring the Fabric Interface Added the following sections: • Command Line Interface (CLI) • Appendix - Secure Boot Activation and Deactivation • Appendix - Deploying UFM Appliance from an ISO File
	Feb 6, 2023	• Added Troubleshooting • Updated Known Issues in This Release
1.2.1	Dec 1, 2022	Updated the following sections: • Changes and New Features • Installation Notes
	Dec 19, 2022	Updated • Changes and New Features
1.2.0	Nov 21, 2022	Updated the following sections: • Release Notes • UFM Enterprise Appliance Upgrade Added the following section: • Appendix - Chassis Health Monitoring
1.1.0	Jul 31, 2022	Updated the following sections: • Release Notes Added the following section: • Introduction • Getting Started • High Availability • UFM Enterprise Appliance Upgrade

Revision	Date	Description
	Oct 23, 2022	Update the following sections: • UFM Enterprise Appliance Upgrade • Starting UFM

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