

SUSE Multi-Linux Manager 5.1

Installation and Upgrade Guide

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Installation, Deployment and Upgrade Guide Overview

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This book provides guidance on deploying and upgrading SUSE Multi-Linux Manager Server and Proxy.

It is split into the following sections:

Requirements

Describes hardware, software, and networking requirements before you begin.

Deployment and Installation

Describes tasks for deploying SUSE Multi-Linux Manager as a container and initial setup.

Upgrade and Migration

Describes upgrade and migration of SUSE Multi-Linux Manager.

Basic Server Management

Describes basic operations to start using the SUSE Multi-Linux Manager.

Chapter 1. Requirements

1.1. General Requirements

Before you begin installation, ensure that you have:

1. A SUSE Customer Center account. This account gives you access to organization credentials and registration keys for SUSE Multi-Linux Manager Server, Proxy and Retail Branch Server.
2. Supported Browsers for SUSE Multi-Linux Manager Web UI.
3. SSL certificates for your environment. By default SUSE Multi-Linux Manager 5.1 uses a self-signed certificate.



The SL Micro 6.1 entitlement is included within the SUSE Multi-Linux Manager entitlement, so it does not require a separate registration key.

The following section contains more information on these requirements.

1.1.1. SUSE Customer Center Account and Credentials

Create an account with SUSE Customer Center prior to deployment of SUSE Multi-Linux Manager 5.1.

Procedure: Obtain Your Organization Credentials

1. Navigate to <https://scc.suse.com/login> in your web browser.
2. Log in to your SCC account, or follow the prompts to create a new account.
3. If you have not yet done so, click **[Connect to an Organization]** and type or search for your organization.
4. Click **[Manage my Organizations]** and select your organization from the list by clicking the organization name.
5. Click the **[Users]** tab, and then select the **[Organization Credentials]** sub-tab.
6. Record your login information for use during SUSE Multi-Linux Manager setup.

Depending on your organization's setup, you might also need to activate your subscription, using the **[Activate Subscriptions]** menu from the left navigation bar.

For more information about using SCC, see <https://scc.suse.com/docs/help>.

1.1.2. Supported Browsers for SUSE Multi-Linux Manager Web UI

To use the Web UI to manage your SUSE Multi-Linux Manager environment, you must run an up to date web browser.

SUSE Multi-Linux Manager is supported on:

- Latest Firefox browser shipped with SUSE Linux Enterprise Server
- Latest Chrome browser on all operating systems
- Latest Edge browser shipped with Windows

Windows Internet Explorer is not supported. The SUSE Multi-Linux Manager Web UI will not render correctly under Windows Internet Explorer.

1.1.3. SSL Certificates

SUSE Multi-Linux Manager uses SSL certificates to ensure that clients are registered to the correct server. By default, SUSE Multi-Linux Manager uses a self-signed certificate. If you have certificates signed by a third-party CA, you can import them to your SUSE Multi-Linux Manager installation.

- For more on self-signed certificates, see **Administration › Ssl-certs-selfsigned**.
- For more on imported certificates, see **Administration › Ssl-certs-imported**.

1.2. Hardware Requirements

This table outlines hardware and software requirements for the SUSE Multi-Linux Manager Server and Proxy, on x86-64, ARM, ppc64le and s390x architecture.



SUSE Multi-Linux Manager installations based on ppc64le or s390x architecture cannot use secure boot for network booting clients. This limitation exists because the shim bootloader is not available for both these architectures.

For SUSE Multi-Linux Manager for Retail hardware requirements, see **Retail › Retail-requirements**.

1.2.1. Server Requirements

SL Micro 6.1 is the operating system of the container host and requires as free disk space:

- Minimum for base installation 100 GB
- Plus a minimum of 130 GB for repository data

By default the SUSE Multi-Linux Manager Server container stores mirrored repository (packages or products), database, and other data in subdirectories of the `/var/lib/containers/storage/volumes/` directory. Repository synchronization fails if this directory runs out of disk space. Estimate how much space the `/var/lib/containers/storage/volumes/` directory requires based on the number and kind of clients and repositories you plan to mirror.

For more information about filesystem and partitioning details, see [installation-and-upgrade:hardware-requirements.pdf](#) and the detailed installation instructions in the Installation and Deployment sections of this guide.

Table 1. Server Hardware Requirements

Hardware	Details	Recommendation
CPU	x86-64, ARM, ppc64le or s390x	Minimum 4 dedicated 64-bit CPU cores
RAM	Minimum	16 GB
	Recommended	32 GB
Disk Space	<code>/</code> (root directory)	20 GB
	<code>/var/lib/containers/storage/volumes</code>	Minimum 150 GB (depending on the number of products)
	<code>/var/lib/containers/storage/volumes/var-pgsql</code>	Minimum 50 GB

The images by default have a 20 GB `/` partition. The cloud image of SL Micro 6.1 has just a 5 GB `/` partition. Both work flawlessly with SUSE Multi-Linux Manager. As long as external storage is mounted to `/var/lib/containers/storage/volumes`, SUSE Multi-Linux Manager does not need or use storage on the `/` partition, but leaves that to the management of the container host itself.

SUSE Multi-Linux Manager performance depends on hardware resources, network bandwidth, latency between clients and server, etc.



Based on the experience and different deployments that are in use, the advice for optimal performance of SUSE Multi-Linux Manager Server with an adequate number of proxies is to not exceed 10,000 clients per single server. It is highly recommended to move to the Hub setup and involve consultancy when you have more than 10,000 clients. Even with fine-tuning and an adequate number of proxies, such a large number of clients can lead to performance issues.

For more information about managing a large number of clients, see [Specialized-guides › Large-deployments](#).

1.2.2. Proxy Requirements

Table 2. Proxy Hardware Requirements

Hardware	Details	Recommendation
CPU	x86-64, ARM	Minimum 2 dedicated 64-bit CPU cores
RAM	Minimum	2 GB
	Recommended	8 GB
Disk Space	/ (root directory)	Minimum 40 GB
	<code>/var/lib/containers/storage/volumes</code>	Minimum 100 GB

By default the SUSE Multi-Linux Manager Proxy container caches packages in the `/var/lib/containers/storage/volumes/uyuni-proxy-squid-cache/` directory. If there is not enough space available, the proxy will remove old, unused packages and replace them with newer packages.

As a result of this behavior:

- The larger `/var/lib/containers/storage/volumes/uyuni-proxy-squid-cache/` directory is on the proxy, the less traffic will be between the proxy and the SUSE Multi-Linux Manager Server.
- By making the `/var/lib/containers/storage/volumes/uyuni-proxy-squid-cache/` directory on the proxy the same size as `/var/lib/containers/storage/volumes/var-spacewalk/` on the SUSE Multi-

Linux Manager Server, you avoid a large amount of traffic after the first synchronization.

- The `/var/lib/containers/storage/volumes/uyuni-proxy-squid-cache/` directory can be small on the SUSE Multi-Linux Manager Server compared to the proxy. For a guide to size estimation, see the [Server Requirements](#) section.



In general, SUSE recommends to adjust the value for the cache directory to about 80 % of available free space. The `cache_dir` value is set when generating proxy configuration on the server. You cannot set the option directly in `squid.conf`.

1.2.3. Database Requirement

PostgreSQL is the only supported database. Using a remote PostgreSQL database or remote file systems (such as NFS) with the PostgreSQL database is not supported. In other words, PostgreSQL should be on the fastest available storage device for SUSE Multi-Linux Manager.



Because of potential performance issues, running a PostgreSQL database remotely from SUSE Multi-Linux Manager is discouraged. While such an environment is possible and even stable in many cases, there is always a risk of data loss if something goes wrong.

SUSE might not be able to provide assistance in such cases.

1.2.4. Persistent Storage and Permissions

Persistent volumes are created by default when deploying the container.

However, it is recommended that the volumes are stored on one or more separate storage devices. Such a setup helps avoid data loss in production environments. This can be done after container deployment.

Storage devices best should be set up after first deploying the container. For more details, see [Installation-and-upgrade › Container-management](#).

We recommend you use XFS as the filesystem type for all volumes. The size of the disk for repositories storage is dependent on the number of distributions and channels you intend to manage with SUSE Multi-Linux Manager. See the tables in this section for guides to estimate the size required.



Do not use NFS for storage because it does not support SELinux file labeling.

On the SUSE Multi-Linux Manager Server, use this command to find all available storage devices:

```
hwinfo --disk | grep -E "Device File:"
```

Use the `lsblk` command to see the name and size of each device.

Use the `mgr-storage-server` command with the device names to set up the external disks as the locations for the storage and, optionally on a disk of its own, for the database:

```
mgr-storage-server <storage-disk-device> [<database-disk-device>]
```

The external storage volumes are set up as XFS partitions mounted at `/manager_storage` and `/pgsql_storage`.

It is possible to use the same storage device for both channel data and the database. This is not recommended, as growing channel repositories might fill up the storage, which poses a risk to database integrity. Using separate storage devices may also increase performance. If you want to use a single storage device, run `mgr-storage-server` with a single device name parameter.

If you are installing a proxy, the `mgr-storage-proxy` command takes only one device name parameter and will set up the external storage location as the Squid cache.

1.2.5. Logical Volume Management (LVM)

For all kind of virtual machines (VM), LVM is generally not needed and not recommended. The disk setup is virtual and separate disks for volumes are possible and recommended.

For other deployments, separate disks for volumes are also recommended.

On the SUSE Multi-Linux Manager Server, the `mgr-storage-server` command moves the complete content of the `/var/lib/containers/storage/volumes` directory to a separate disk and remounts it to `/var/lib/containers/storage/volumes`. Optionally, if a second device name is specified, `mgr-storage-server` moves the content of the `/var/lib/containers/storage/volumes/var-pgsql` database directory to a second separate disk and remounts it to `/var/lib/containers/storage/volumes/var-pgsql`.

Similarly on the SUSE Multi-Linux Manager Proxy, the `mgr-storage-proxy` command moves the complete content of the `/var/lib/containers/storage/volumes` directory to a separate disk and

remounts it to `/var/lib/containers/storage/volumes`.

1.3. Network Requirements

This section details the networking and port requirements for SUSE Multi-Linux Manager.



IP forwarding will be enabled by containerized installation. This means SUSE Multi-Linux Manager Server and Proxies will behave as a router. This behavior is done by podman directly. podman containers do not run if IP forwarding is disabled.

Consider achieving network isolation of the SUSE Multi-Linux Manager environment according to your policies.

For more information, see <https://www.suse.com/support/kb/doc/?id=000020166>.

1.3.1. Fully Qualified Domain Name (FQDN)

The SUSE Multi-Linux Manager server must resolve its FQDN correctly. If the FQDN cannot be resolved, it can cause serious problems in a number of different components.

For more information about configuring the hostname and DNS, see <https://documentation.suse.com/sles/15-SP4/html/SLES-all/cha-network.html#sec-network-yast-change-host>.

1.3.2. Hostname and IP Address

To ensure that the SUSE Multi-Linux Manager domain name can be resolved by its clients, both server and client machines must be connected to a working DNS server. You also need to ensure that reverse lookups are correctly configured.

For more information about setting up a DNS server, see <https://documentation.suse.com/sles/15-SP4/html/SLES-all/cha-dns.html>.

1.3.3. Air-gapped Deployment

If you are on an internal network and do not have access to SUSE Customer Center, you can use an [Installation-and-upgrade › Container-deployment](#).

In a production environment, the SUSE Multi-Linux Manager Server and clients should always use a firewall. For a comprehensive list of the required ports, see [installation-and-upgrade:network-requirements.pdf](#).

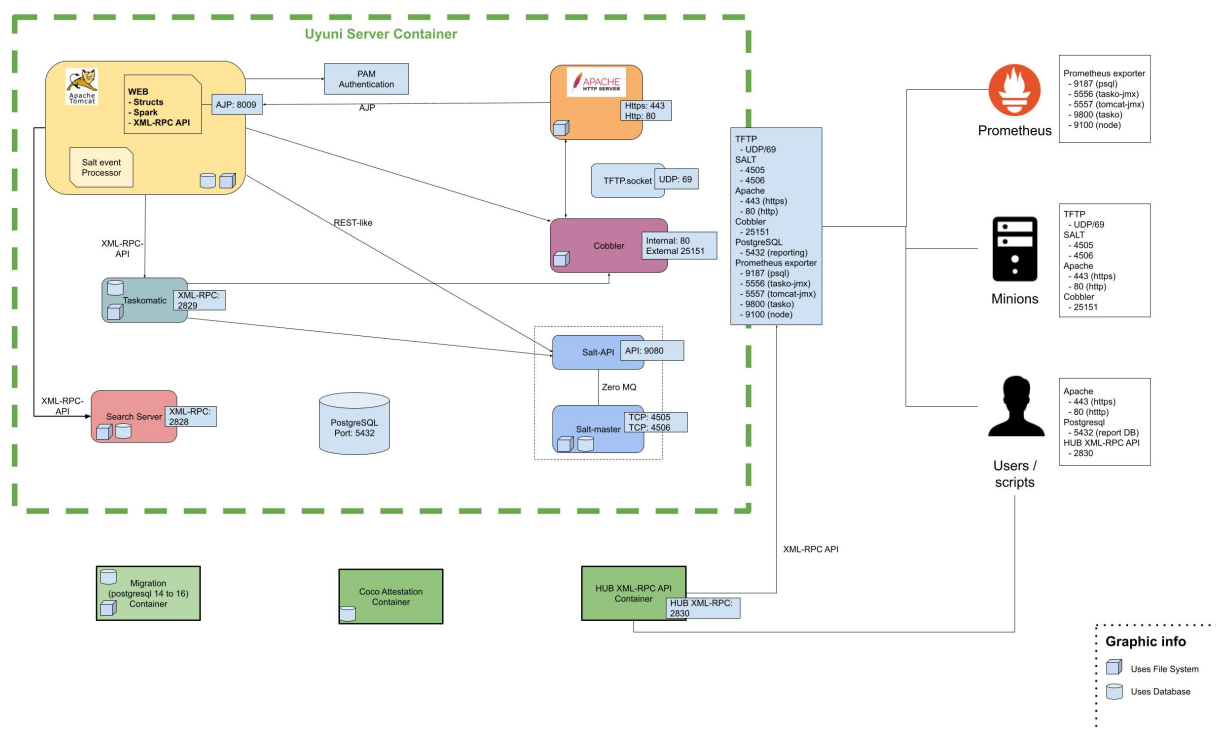
1.3.4. Required Network Ports

This section contains a comprehensive list of ports that are used for various communications within SUSE Multi-Linux Manager.

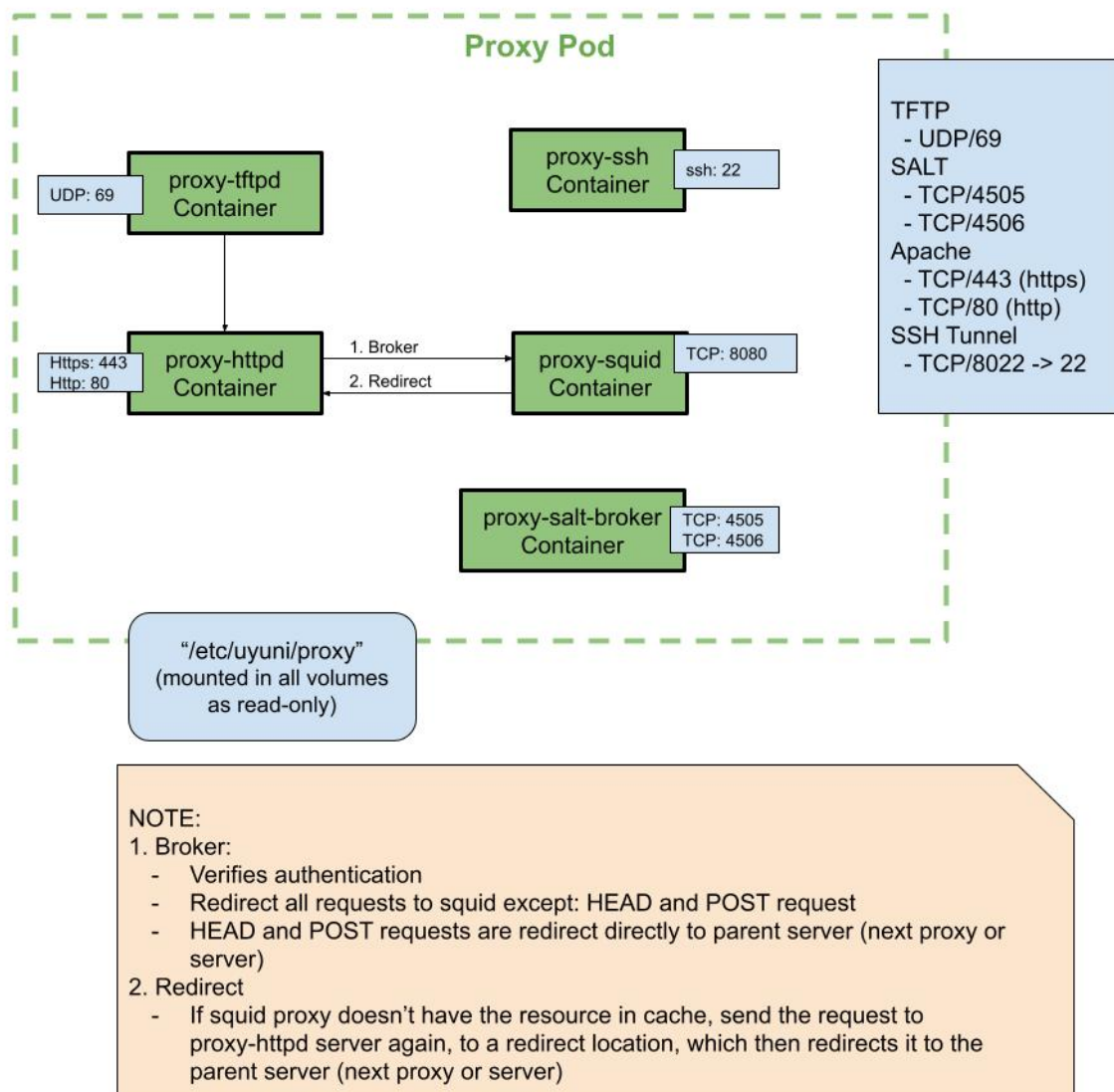
You will not need to open all of these ports. Some ports only need to be opened if you are using the service that requires them.

1.3.4.1. Overview

1.3.4.1.1. Server



1.3.4.1.2. Proxy



1.3.4.2. External Inbound Server Ports

External inbound ports must be opened to configure a firewall on the SUSE Multi-Linux Manager Server to protect the server from unauthorized access.

Opening these ports allows external network traffic to access the SUSE Multi-Linux Manager Server.

Table 3. External Port Requirements for SUSE Multi-Linux Manager Server

Port number	Protocol	Used By	Notes
22			Required for ssh-push and ssh-push-tunnel contact methods.
67	TCP/UDP	DHCP	Required only if clients are requesting IP addresses from the server.
69	TCP/UDP	TFTP	Required if server is used as a PXE server for automated client installation.
80	TCP	HTTP	Required temporarily for some bootstrap repositories and automated installations.
443	TCP	HTTPS	Serves the Web UI, client, and server and proxy (tftpsync) requests.
4505	TCP	salt	Required to accept communication requests from clients. The client initiates the connection, and it stays open to receive commands from the Salt master.
4506	TCP	salt	Required to accept communication requests from clients. The client initiates the connection, and it stays open to report results back to the Salt master.
5556	TCP	Prometheus	Required for scraping Taskomatic JMX metrics.
5557	TCP	Prometheus	Required for scraping Tomcat JMX metrics.
9100	TCP	Prometheus	Required for scraping Node exporter metrics.
9187	TCP	Prometheus	Required for scraping PostgreSQL metrics.
9800	TCP	Prometheus	Required for scraping Taskomatic metrics.
25151	TCP	Cobbler	

1.3.4.3. External Outbound Server Ports

External outbound ports must be opened to configure a firewall on the SUSE Multi-Linux Manager Server to restrict what the server can access.

Opening these ports allows network traffic from the SUSE Multi-Linux Manager Server to communicate with external services.

Table 4. External Port Requirements for SUSE Multi-Linux Manager Server

Port number	Protocol	Used By	Notes
80	TCP	HTTP	Required for SUSE Customer Center. Port 80 is not used to serve the Web UI.
443	TCP	HTTPS	Required for SUSE Customer Center.
25151	TCP	Cobbler	

1.3.4.4. Internal Server Ports

Internal ports are used internally by the SUSE Multi-Linux Manager Server. Internal ports are only accessible from `localhost`.

In most cases, you will not need to adjust these ports.

Table 5. Internal Port Requirements for SUSE Multi-Linux Manager Server

Port number	Notes
2828	Satellite-search API, used by the RHN application in Tomcat and Taskomatic.
2829	Taskomatic API, used by the RHN application in Tomcat.
8005	Tomcat shutdown port.
8009	Tomcat to Apache HTTPD (AJP).
8080	Tomcat to Apache HTTPD (HTTP).
9080	Salt-API, used by the RHN application in Tomcat and Taskomatic.
25151	Cobbler's XMLRPC API
32000	Port for a TCP connection to the Java Virtual Machine (JVM) that runs Taskomatic and satellite-search.

Port 32768 and higher are used as ephemeral ports. These are most often used to receive TCP

connections. When a TCP connection request is received, the sender will choose one of these ephemeral port numbers to match the destination port.

You can use this command to find out which ports are ephemeral ports:

```
cat /proc/sys/net/ipv4/ip_local_port_range
```

1.3.4.5. External Inbound Proxy Ports

External inbound ports must be opened to configure a firewall on the SUSE Multi-Linux Manager Proxy to protect the proxy from unauthorized access.

Opening these ports allows external network traffic to access the SUSE Multi-Linux Manager proxy.

Table 6. External Port Requirements for SUSE Multi-Linux Manager Proxy

Port number	Protocol	Used By	Notes
22			Required for ssh-push and ssh-push-tunnel contact methods. Clients connected to the proxy initiate check in on the server and hop through to clients.
67	TCP/UDP	DHCP	Required only if clients are requesting IP addresses from the server.
69	TCP/UDP	TFTP	Required if the server is used as a PXE server for automated client installation.
443	TCP	HTTPS	Web UI, client, and server and proxy (tftpsync) requests.
4505	TCP	salt	Required to accept communication requests from clients. The client initiates the connection, and it stays open to receive commands from the Salt master.
4506	TCP	salt	Required to accept communication requests from clients. The client initiates the connection, and it stays open to report results back to the Salt master.

1.3.4.6. External Outbound Proxy Ports

External outbound ports must be opened to configure a firewall on the SUSE Multi-Linux Manager Proxy to restrict what the proxy can access.

Opening these ports allows network traffic from the SUSE Multi-Linux Manager Proxy to communicate with external services.

Table 7. External Port Requirements for SUSE Multi-Linux Manager Proxy

Port number	Protocol	Used By	Notes
80			Used to reach the server.
443	TCP	HTTPS	Required for SUSE Customer Center.

1.3.4.7. External Client Ports

External client ports must be opened to configure a firewall between the SUSE Multi-Linux Manager Server and its clients.

In most cases, you will not need to adjust these ports.

Table 8. External Port Requirements for SUSE Multi-Linux Manager Clients

Port number	Direction	Protocol	Notes
22	Inbound	SSH	Required for ssh-push and ssh-push-tunnel contact methods.
80	Outbound		Used to reach the server or proxy.
443	Outbound		Used to reach the server or proxy.
9090	Outbound	TCP	Required for Prometheus user interface.
9093	Outbound	TCP	Required for Prometheus alert manager.
9100	Outbound	TCP	Required for Prometheus node exporter.
9117	Outbound	TCP	Required for Prometheus Apache exporter.
9187	Outbound	TCP	Required for Prometheus PostgreSQL.

1.3.4.8. Required URLs

There are some URLs that SUSE Multi-Linux Manager must be able to access to register clients and perform updates. In most cases, allowing access to these URLs is sufficient:

- `scc.suse.com`
- `updates.suse.com`
- `installer-updates.suse.com`
- `registry.suse.com`

You can find additional details on whitelisting the specified URLs and their associated IP addresses in this article: [Accessing SUSE Customer Center and SUSE registry behind a firewall and/or through a proxy](#).

If you are using non-SUSE clients you might also need to allow access to other servers that provide specific packages for those operating systems. For example, if you have Ubuntu clients, you will need to be able to access the Ubuntu server.

For more information about troubleshooting firewall access for non-SUSE clients, see [Administration › Troubleshooting](#).

1.4. Public Cloud Requirements

This section provides the requirements for installing SUSE Multi-Linux Manager on public cloud infrastructure. We have tested these instructions on Amazon EC2, Google Compute Engine, and Microsoft Azure, but they should work on other providers as well, with some variation.

Before you begin, here are some considerations:

- The SUSE Multi-Linux Manager setup procedure performs a forward-confirmed reverse DNS lookup. This must succeed in order for the setup procedure to complete and for SUSE Multi-Linux Manager to operate as expected. It is important to perform hostname and IP configuration before you set up SUSE Multi-Linux Manager.
- SUSE Multi-Linux Manager Server and Proxy instances need to run in a network configuration that provides you control over DNS entries, but cannot be accessed from the internet at large.
- Within this network configuration DNS resolution must be provided: `hostname -f` must return the fully qualified domain name (FQDN).
- DNS resolution is also important for connecting clients.

- DNS is dependent on the cloud framework you choose. Refer to the cloud provider documentation for detailed instructions.
- We recommend that you locate software repositories, the server database, and the proxy squid cache on an external virtual disk. This prevents data loss if the instance is unexpectedly terminated. This section includes instructions for setting up an external virtual disk.

1.4.1. Network Requirements

When you use SUSE Multi-Linux Manager on a public cloud, you must use a restricted network. We recommend using a VPC private subnet with an appropriate firewall setting. Only machines in your specified IP ranges must be able to access the instance.



Running SUSE Multi-Linux Manager on the public cloud means implementing robust security measures. It is essential to limit, filter, monitor, and audit access to the instance. SUSE strongly advises against a globally accessible SUSE Multi-Linux Manager instance that lacks adequate perimeter security.

To access the SUSE Multi-Linux Manager Web UI, allow HTTPS when configuring the network access controls. This allows you to access the SUSE Multi-Linux Manager Web UI.

In EC2 and Azure, create a new security group, and add inbound and outbound rules for HTTPS. In GCE, check the **Allow HTTPS traffic** box under the **Firewall** section.

1.4.2. Prepare Storage Volumes

We recommend that the repositories and the database for SUSE Multi-Linux Manager are stored on separate storage devices from the root volume. This will help to avoid data loss and possibly increase performance.

The SUSE Multi-Linux Manager container utilizes default storage locations. These locations should be configured prior to deployment for custom storage. For more information see **Installation-and-upgrade › Container-management**



Do not use logical volume management (LVM) for public cloud installations.

The size of the disk for repositories storage is dependent on the number of distributions and channels you intend to manage with SUSE Multi-Linux Manager. When you attach the virtual disks, they will appear in your instance as Unix device nodes. The names of the device nodes will

vary depending on your provider, and the instance type selected.

Ensure the root volume of the SUSE Multi-Linux Manager Server is 100 GB or larger. Add an additional storage disk of 500 GB or more, and choose SSD storage if you can. The cloud images for SUSE Multi-Linux Manager Server use a script to assign this separate volume when your instance is launched.

When you launch your instance, you can log in to the SUSE Multi-Linux Manager Server and use this command to find all available storage devices:

```
hwinfo --disk | grep -E "Device File:"
```

If you are not sure which device to choose, use the `lsblk` command to see the name and size of each device. Choose the name that matches with the size of the virtual disk you are looking for.

You can set up the external disk with the `mgr-storage-server` command. This creates an XFS partition mounted at `/manager_storage` and uses it as the location for the database and repositories:

```
/usr/bin/mgr-storage-server <devicename>
```

For more information about setting up storage volumes and partitions, including recommended minimum sizes, see [Installation-and-upgrade › Hardware-requirements](#).

Chapter 2. Installation and Deployment

2.1. Install SUSE Multi-Linux Manager Server

There are various scenarios to deploy a SUSE Multi-Linux Manager Server.

2.1.1. SUSE Multi-Linux Manager 5.1 Server Deployment on SL Micro

This guide shows you how to install and configure a SUSE Multi-Linux Manager 5.1 container on SL Micro 6.1.

2.1.1.1. Hardware Requirements for SUSE Multi-Linux Manager

This table shows the software and hardware requirements for deploying SUSE Multi-Linux Manager Server on your bare metal machine. For the purposes of this guide your machine should have 16 GB of RAM, and at least 200 GB of disk space. For background information about disk space, see [Installation-and-upgrade › Hardware-requirements](#).

Table 9. Software and Hardware Requirements

Software and Hardware	Recommended
Operating System	SL Micro 6.1
Architecture	x86-64, ARM, s390x, ppc64le
Processor (CPU)	Minimum of four (4) 64-bit CPU cores
RAM	16 GB
Disk Space	200 GB
Channel Requirements	50 GB per SUSE or openSUSE product 360 GB per Red Hat product
Swap space:	3 GB

Supported operating system for the Server Container Host

The supported operating system for the container host is SL Micro 6.1.

Container host



A container host is a server equipped with a container engine like **Podman**, which lets it manage and deploy containers. These containers hold applications and their essential parts, such as libraries, but not a full operating system, making them lightweight. This setup ensures applications run the same way in different environments. The container host supplies the necessary resources such as CPU, memory, and storage for these containers.

Server deployment mandates the use of a fully qualified domain name (FQDN). In the absence of automatic DNS provision of an FQDN by your router or network, the deployment process will not proceed successfully. An FQDN typically follows the format <host>.<domain>.com.



For instance:

- **SUSE Multi-Linux Manager.example.com**
- **SUSE Multi-Linux Manager.container.lab**

For more information, see the section on network requirements in **Installation-and-upgrade › Network-requirements**.

2.1.1.2. Persistent Volumes

SUSE Multi-Linux Manager 5.1 defines the required persistent storage volumes by default. These are created during installation by the **mgradm** tool if they do not already exist.

These volumes are created in **/var/lib/containers/storage/volumes/**, where **Podman** stores its volumes by default.

Recommendations

You can leverage the simplicity of storage by mounting an external storage device to this directory. Because it will store the PostgreSQL database, binary packages for repositories, caches, operating system images, autoinstallation distributions, and configuration files, we have three recommendations:



Fast Storage

This mount point should ideally be NVMe or SSD-class devices. Slower storage will adversely affect SUSE Multi-Linux Manager performance.

Large Capacity

Recommended minimum size for this is at least 300 GB, and larger if there will be multiple Linux distributions or architectures to manage.

Recommended Filesystem

XFS (though any supported filesystem for SL Micro 6.1 could work).

Optional

You can provide custom storage for the volumes by mounting disks on the expected volume path inside it such as `/var/lib/containers/storage/volumes/var-spacewalk`. This adds to the complexity of a SUSE Multi-Linux Manager deployment, and may affect the resilience the default storage recommendation provides.

For a list of all persistent volumes in the container, see [Installation-and-upgrade › Container-management](#).

2.1.1.3. SL Micro 6.1 Installation

Procedure: Download the Installation Media

1. Locate the SL Micro 6.1 installation media at <https://www.suse.com/download/sle-micro/>.
2. Download `SL-Micro-6.1-DVD-x86_64-GM-Media1.iso`.
3. Prepare a DVD or USB flash drive with the downloaded `.iso` image for installation.
4. Insert the DVD or USB flash drive (USB disk or key) containing the installation image for SL Micro 6.1.
5. Boot or reboot your system.

For more information about preparing your machines (virtual or physical), see [SLE Micro 6.1 Deployment Guide](#).

Procedure: SL Micro 6.1 Installation

1. Use the arrow keys to select **Installation**.
2. Adjust keyboard and language.
3. Click the **checkbox** to accept the license agreement.
4. Click **Next** to continue.
5. Select the registration method. For this example, we will register the server with SUSE Customer Center.

Registering SUSE Multi-Linux Manager as an Extension during Installation



The SUSE Multi-Linux Manager 5.1 containers are installed as extensions. Depending on the specific extension needed from the list below, additional SUSE Customer Center registration codes will be required for each.

- SUSE Multi-Linux Manager 5.1 Server
- SUSE Multi-Linux Manager 5.1 Proxy
- Retail Branch Server



The SL Micro 6.1 entitlement is included within the SUSE Multi-Linux Manager entitlement, so it does not require a separate registration code.

6. Enter your SUSE Customer Center email address.
7. Enter your registration code for SL Micro 6.1.
8. Click **Next** to continue.
9. Select the SUSE Multi-Linux Manager 5.1 Server extension **Checkbox**.
10. Click **Next** to continue.
11. Enter your SUSE Multi-Linux Manager 5.1 Server extension registration code.
12. Click **[Next]** to continue.
13. On the **NTP Configuration** page click **[Next]**.

14. On the **Authentication for the System** page enter a password for the root user. Click **[Next]**.
15. On the **Installation Settings** page click **[Install]**.

This concludes installation of SL Micro 6.1 and SUSE Multi-Linux Manager 5.1 as an extension.

2.1.1.3.1. Registration from the Command Line (Optional)

If you added SUSE Multi-Linux Manager 5.1 as an extension during SL Micro 6.1 installation then you can skip this step. However, optionally you may skip registration during SL Micro 6.1 installation by selecting the **[Skip Registration]** button. This section provides steps on registering your products after SL Micro 6.1 installation.

Procedure: Post Installation Product Registration

1. Register SL Micro 6.1 to SUSE Customer Center from the command line run the following commands on the container host:

```
transactional-update register -r <reg_code> -e <your_email>
```

2. Use the registration code you obtained from your SUSE Customer Center account for SL Micro 6.1.



The following steps register a server with the x86-64 architecture and thus require a registration code for the x86-64 architecture. To register ARM or s390x architectures use the correct registration code.

3. Next add the **SUSE Multi-Linux Manager Server Extension 5.1 x86_64** Extension. List available extensions with the following command:

```
transactional-update --quiet register --list-extensions
```

4. Use your **SUSE Multi-Linux Manager Server Extension 5.1 x86_64** registration code with the following command:

```
transactional-update register -p SUSE-Manager-Server/5.1/x86_64 -r <reg_code>
```

5. Reboot.

2.1.1.3.2. Update the System

Procedure

1. Log in as root.
2. Run `transactional-update`:

```
transactional-update
```

3. Reboot.

2.1.1.3.3. Configure Custom Persistent Storage

Configuring persistent storage is optional, but it is the only way to avoid serious trouble with container full disk conditions. It is highly recommended to configure custom persistent storage with the `mgr-storage-server` tool.

- For more information, see `mgr-storage-server --help`. This tool simplifies creating the container storage and database volumes.

Use the command in the following manner:

```
mgr-storage-server <storage-disk-device> [<database-disk-device>]
```

For example:

```
mgr-storage-server /dev/nvme1n1 /dev/nvme2n1
```



This command will create the persistent storage volumes at `/var/lib/containers/storage/volumes`.

For more information, see

- [Installation-and-upgrade › Container-management](#)
- [Administration › Troubleshooting](#)

2.1.1.4. Deploy with `mgradm`

Procedure: Deploying SUSE Multi-Linux Manager 5.1 Using `mgradm`

1. Log in as root.
2. Execute the following command, replacing `<multi-linux-manager.example.com>` with your fully qualified domain name:

```
mgradm install podman <{productname}.example.com>
```



If the above command fails ensure that you have registered SUSE Multi-Linux Manager 5.1. If you skipped registration during installation and now need to register from the command line, follow the steps below to log in to the registry:

```
podman login -u <EMAIL> -p <REGISTRATION-CODE> registry.suse.com
```

Use the SUSE Multi-Linux Manager 5.1 registration key when prompted.

3. Enter a certificate and administrator account password when prompted.



The administrator account password must be at least 5 characters and less than 48 characters in length.

4. Press `[Enter]`.
5. Enter the email address of the administration account. Press `[Enter]`.
6. Wait for deployment to complete.
7. Open a browser and proceed to your servers FQDN.
8. Enter your username (default is `admin`) and the password you set during the deployment process.



SL Micro is designed to update itself automatically by default and will reboot after applying updates. However, this behavior is not desirable for the SUSE Multi-Linux Manager environment. To prevent automatic updates on your server, SUSE Multi-Linux Manager disables the transactional-update timer during the bootstrap process.

If you prefer the SL Micro default behavior, enable the timer by running the following command:

```
systemctl enable --now transactional-update.timer
```

In this guide you deployed SUSE Multi-Linux Manager 5.1 Server as a container. Proceed to the next section to add your organization credentials for syncing with SUSE Customer Center.

2.1.1.5. Connect SUSE Multi-Linux Manager 5.1 to SUSE Customer Center

This section covers synchronizing with SCC from the Web UI and adding your first client channel.

Procedure: Entering Organization Credentials

1. Open a browser and proceed to your servers FQDN.
2. Enter your username (default is `admin`) and the password you set during the deployment process.
3. In the SUSE Multi-Linux Manager Web UI, select **Admin** › **Setup Wizard**.
4. From the **Setup Wizard** page select the **[Organization Credentials]** tab.
5. Click **[Add a new credential]**.
6. Point your browser to the SUSE Customer Center.
7. Select your organization from the left navigation.
8. Select the users tab from the top of the page then **[Organization Credentials]**.
9. Make a note of your **Mirroring credentials**.
10. Back in the SUSE Multi-Linux Manager Web UI enter your `Username` and `Password`, and confirm with **[Save]**.

When the credentials are confirmed with a green check-mark icon, proceed with [Procedure: Synchronizing with SUSE Customer Center](#).

Procedure: Synchronizing with SUSE Customer Center

1. In the Web UI, navigate to **Admin › Setup Wizard**.
2. From the **Setup Wizard** page select the **SUSE Products** tab. If you recently registered with SUSE Customer Center a list of products will begin populating the table. This operation could take up to a few minutes. You can monitor the progress of the operation in section on the right **Refresh the product catalog from SUSE Customer Center**. The table of products lists architecture, channels, and status information. For more information, see **Reference › Admin**.

Setup Wizard

HTTP Proxy Organization Credentials **SUSE Products**

Clear + Add products

Filter by product Description Filter by architecture 25 items per page

Items 1 - 25 of 94

Product Description	Arch	Channels
<input type="checkbox"/> Open Enterprise Server 2018	x86_64	
<input type="checkbox"/> RHEL Expanded Support 5	i386	
<input type="checkbox"/> RHEL Expanded Support 5	x86_64	
<input type="checkbox"/> > RHEL Expanded Support 6	i386	
<input type="checkbox"/> > RHEL Expanded Support 6	x86_64	
<input type="checkbox"/> > RHEL Expanded Support 7	x86_64	
<input type="checkbox"/> SUSE Container as a Service Platform 1.0	x86_64	
<input type="checkbox"/> SUSE Container as a Service Platform 2.0	x86_64	
<input type="checkbox"/> > SUSE Linux Enterprise Desktop 11 SP2	i586	
<input type="checkbox"/> > SUSE Linux Enterprise Desktop 11 SP2	x86_64	
<input type="checkbox"/> > SUSE Linux Enterprise Desktop 11 SP3	i586	
<input type="checkbox"/> > SUSE Linux Enterprise Desktop 11 SP3	x86_64	
<input type="checkbox"/> > SUSE Linux Enterprise Desktop 11 SP4	i586	
<input type="checkbox"/> > SUSE Linux Enterprise Desktop 11 SP4	x86_64	
<input type="checkbox"/> > SUSE Linux Enterprise Desktop 12	x86_64	
<input type="checkbox"/> > SUSE Linux Enterprise Desktop 12 SP1	x86_64	
<input type="checkbox"/> > SUSE Linux Enterprise Desktop 12 SP2	x86_64	
<input type="checkbox"/> > SUSE Linux Enterprise Desktop 12 SP3	x86_64	
<input checked="" type="checkbox"/> > SUSE Linux Enterprise Desktop 15	x86_64	100%
<input type="checkbox"/> > SUSE Linux Enterprise High Performance Computing 15	aarch64	include recommended
<input type="checkbox"/> > SUSE Linux Enterprise High Performance Computing 15	x86_64	include recommended
<input type="checkbox"/> > SUSE Linux Enterprise Server 10 SP3	i586	
<input type="checkbox"/> > SUSE Linux Enterprise Server 10 SP3	ia64	
<input type="checkbox"/> > SUSE Linux Enterprise Server 10 SP3	ppc	
<input type="checkbox"/> > SUSE Linux Enterprise Server 10 SP3	s390x	

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First Prev Next Last

Prev 3 of 3

Refresh the product catalog from SUSE Customer Center

Channels
Channel Families
Products
Product Channels
Subscriptions

Refresh

Why aren't all SUSE products displayed in the list?

The products displayed on this list are directly linked to your Organization credentials (Mirror credentials) as well as your SUSE subscriptions.

If you believe there are products missing, make sure you have added the correct Organization credentials in the previous wizard step.

3. Use the **Filter by product description** and **Filter by architecture** to filter the list of displayed products. The channels listed on the **[Products]** page provide repositories for clients.

- Add channels to SUSE Multi-Linux Manager by selecting the check box to the left of each channel. Click the arrow symbol to the left of the description to unfold a product and list available modules.
- Click **[Add Products]** at the top of the page to start product synchronization.

After adding the channel, SUSE Multi-Linux Manager will schedule the channel to be synchronized. This can take a long time as SUSE Multi-Linux Manager will copy channel software sources from the SUSE repositories located at SUSE Customer Center to the local `/var/lib/containers/storage/volumes/var-spacewalk/` directory of your server.

When the channel is fully synchronized, a bootstrap repository for it will be automatically generated. This step is crucial for successfully bootstrapping clients, ensuring that the channel synchronization and distribution are operational on the client side. This completes the installation and configuration of SUSE Multi-Linux Manager, along with preparing the channels necessary for bootstrapping clients.

When the channel synchronization process is complete, you can proceed with registering the SUSE Multi-Linux Manager 5.1 Proxy or additional clients.

For more instructions, see [Client-configuration › Registration-overview](#).

2.1.1.6. Entering the Container for Management

To get to a shell inside the container, run on the container host:

```
mgrctl term
```

2.1.2. SUSE Multi-Linux Manager 5.1 Server Deployment as a Virtual Machine – KVM

This chapter provides the required Virtual Machine settings for deployment of SUSE Multi-Linux Manager 5.1 as an image. KVM will be combined with Virtual Machine Manager (virt-manager) as a sandbox for this installation.

2.1.2.1. Available Images



The preferred method for deploying SUSE Multi-Linux Manager 5.1 Server is to use one of the following available images. All tools are included in these images greatly simplifying deployment.

Images for SUSE Multi-Linux Manager 5.1 are available at [SUSE Multi-Linux Manager 5.1 VM images](#).

Table 10. Available Server Images

Architecture	Image Format
aarch64	qcow2, vmdk
x86_64	qcow2, vmdk, raw, Self Installer
ppc64le	raw, Self Installer
s390x *	qcow2, raw

* Two storage options are available for s390x: CDL DASD and FBA.

2.1.2.2. Virtual Machine Manager (virt-manager) Settings

Enter the following settings when creating a new virtual machine using **virt-manager**.



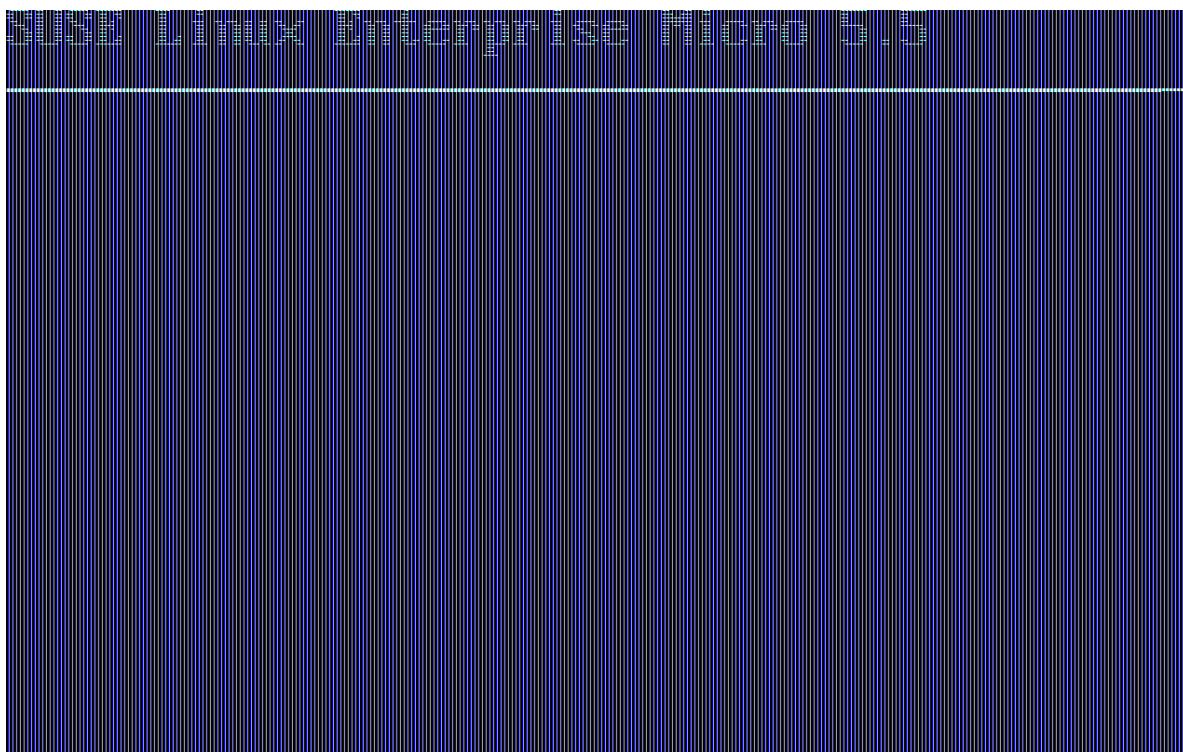
This table specifies the minimum requirements. These are suitable for a quick test installation, such as a server with one client. If you want to use a production environment and need background information about disk space, see [Installation-and-upgrade › Hardware-requirements](#).

KVM Settings	
Installation Method	Import Existing Disk Image
OS:	Linux
Version:	SUSE Multi-Linux Manager-Server.x86_64-5.0.0-Build16.10.qcow2
Memory:	16 GB
CPU's:	4
Storage Format:	.qcow2 100 GB (Default) Root Partition
Name:	test-setup
Network	Bridge br0

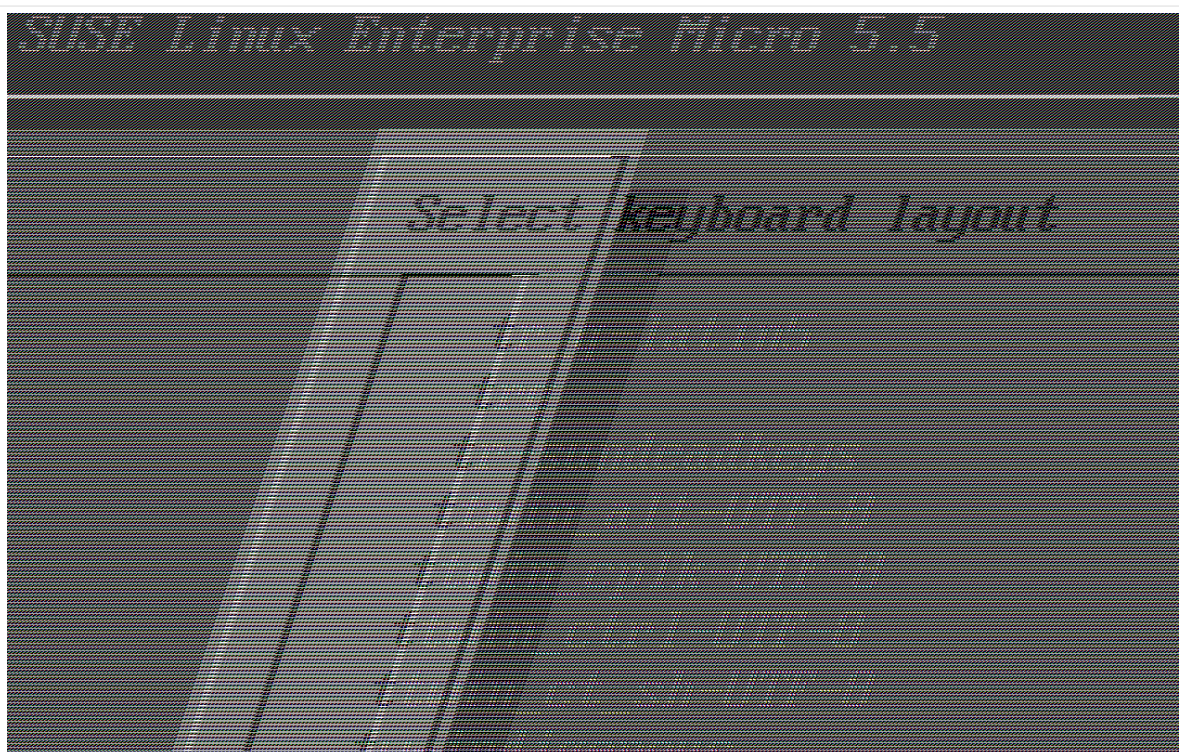
2.1.2.3. Initial KVM Setup

Procedure: Creating Initial Setup

1. Create a new virtual machine using the downloaded Minimal KVM image and select **Import existing disk image**.
2. Configure RAM and number of CPUs (at least 16 GB RAM and 4 CPUs).
3. Name your KVM machine.
4. Click **[Begin Installation]** to boot from the image.
5. At the JeOS Firstboot screen select start to continue.



6. Select keyboard layout.



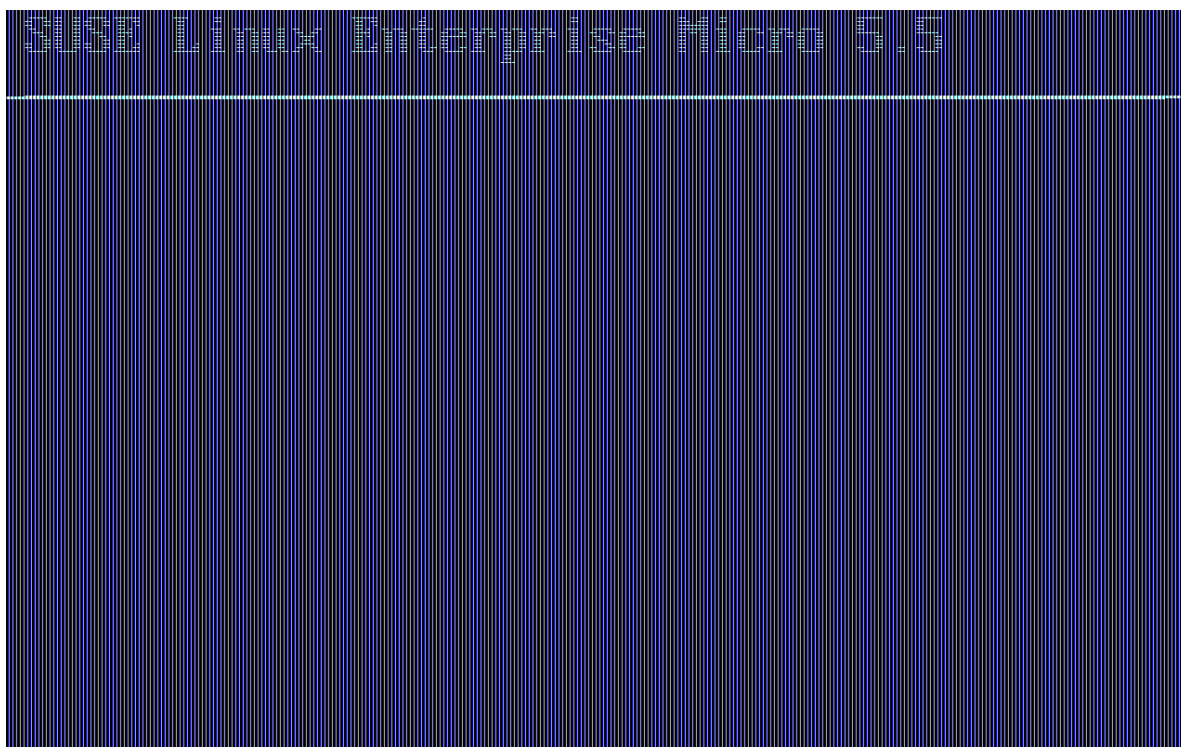
7. Accept the license agreement.



8. Select your time zone.



9. Enter a password for root.



10. When installation completes log in as root.
11. Proceed to the next section.

2.1.2.4. Register SL Micro and SUSE Multi-Linux Manager 5.1 Server



The SL Micro 6.1 entitlement is included within the SUSE Multi-Linux Manager entitlement, so it does not require a separate registration code.

Procedure: Registering SL Micro and SUSE Multi-Linux Manager 5.1

1. Boot the virtual machine.
2. Log in as **root**.
3. Register SL Micro with SCC.

```
transactional-update register -r <REGCODE> -e <your_email>
```

4. Reboot.
5. Register SUSE Multi-Linux Manager 5.1 with SUSE Customer Center.

```
transactional-update register -p SUSE-Manager-Server/5.0/x86_64 -r <REGCODE>
```

6. Reboot.
7. Update the system:

```
transactional-update
```

8. If updates were applied reboot.
9. This step is optional. However, if custom persistent storage is required for your infrastructure, use the **mgr-storage-server** tool.
 - For more information, see **mgr-storage-server --help**. This tool simplifies creating the container storage and database volumes.
 - Use the command in the following manner:

```
mgr-storage-server <storage-disk-device> [<database-disk-device>]
```

For example:

```
mgr-storage-server /dev/nvme1n1 /dev/nvme2n1
```

This command will move the persistent storage volumes at `/var/lib/containers/storage/volumes` to specified storage devices.



For more information, see

- [Installation-and-upgrade › Container-management](#)
- [Administration › Troubleshooting](#)

10. Run the following command to deploy SUSE Multi-Linux Manager:

```
mgradm install podman <FQDN>
```

2.1.3. SUSE Multi-Linux Manager 5.1 Server Deployment as a Virtual Machine – VMware

This chapter provides the required Virtual Machine settings for deployment of SUSE Multi-Linux Manager 5.1 as an Image. VMware will be used as a sandbox for this installation.

2.1.3.1. Available Images



The preferred method for deploying SUSE Multi-Linux Manager 5.1 Server is to use one of the following available images. All tools are included in these images greatly simplifying deployment.

Images for SUSE Multi-Linux Manager 5.1 are available at [SUSE Multi-Linux Manager 5.1 VM images](#).



For more information on preparing raw images, see <https://documentation.suse.com/sle-micro/6.1/html/Micro-deployment-raw-images-virtual-machines/index.html#deployment-preparing-configuration-device>.

For additional information on the self install images, see <https://documentation.suse.com/sle-micro/6.1/html/Micro-deployment-selfinstall-images/index.html>

Table 11. Available Server Images

Architecture	Image Format
aarch64	qcow2, vmdk
x86_64	qcow2, vmdk, raw, Self Installer
ppc64le	raw, Self Installer
s390x *	qcow2, raw

* Two storage options are available for s390x: CDL DASD and FBA.

2.1.3.2. SUSE Multi-Linux Manager Virtual Machine Settings – VMware

This sections describes VMware configurations, focusing on the creation of an extra virtual disk essential for the SUSE Multi-Linux Manager storage partition within VMware environments.

Procedure: Creating the VMware Virtual Machine

1. Download SUSE Multi-Linux Manager Server **.vmdk** file then transfer a copy to your VMware storage.
2. Make a copy of uploaded **.vmdk** file using VMware web interface. This will convert provided **.vmdk** file to the format suitable for vSphere hypervisor.
3. Create and name a new virtual machine based on the Guest OS Family **Linux** and Guest OS Version SUSE Linux Enterprise 15 (64-bit).
4. Add an additional **Hard Disk 2** of 500 GB (or more).
5. Configure RAM and number of CPUs (at least 16 GB RAM and 4 CPUs).
6. Set the network adapter as required.
7. Power on the VM, and follow firstboot dialogs (keyboard layout, license agreement, time zone, password for root).
8. When installation completes log in as root.
9. Proceed to the next section.

2.1.3.3. Register SL Micro and SUSE Multi-Linux Manager 5.1 Server

Before starting obtain your SUSE Multi-Linux Manager Registration Code from SUSE Customer Center – <https://scc.suse.com>.



The SL Micro 6.1 entitlement is included within the SUSE Multi-Linux Manager entitlement, so it does not require a separate registration code.

Procedure: Registering SL Micro and SUSE Multi-Linux Manager 5.1

1. Boot the virtual machine.
2. Log in as **root**.
3. Register SL Micro with SCC.

```
transactional-update register -r <REGCODE> -e <your_email>
```

4. Reboot.
5. Register SUSE Multi-Linux Manager 5.1 with SUSE Customer Center.

```
transactional-update register -p SUSE-Manager-Server/5.0/x86_64 -r <REGCODE>
```

6. Reboot
7. Update the system:

```
transactional-update
```

8. If updates were applied reboot.
9. This step is optional. However, if custom persistent storage is required for your infrastructure, use the **mgr-storage-server** tool.
 - For more information, see **mgr-storage-server --help**. This tool simplifies creating the container storage and database volumes.
 - Use the command in the following manner:

```
mgr-storage-server <storage-disk-device> [<database-disk-device>]
```

For example:

```
mgr-storage-server /dev/nvme1n1 /dev/nvme2n1
```



This command will create the persistent storage volumes at `/var/lib/containers/storage/volumes`.

For more information, see

- [Installation-and-upgrade › Container-management](#)
- [Administration › Troubleshooting](#)

10. Run the following command to deploy SUSE Multi-Linux Manager:

```
mgradm install podman <FQDN>
```

2.1.4. SUSE Multi-Linux Manager Server Air-gapped Deployment

2.1.4.1. What is Air-gapped Deployment?

Air-gapped deployment refers to the setup and operation of any networked system that is physically isolated from insecure networks, especially the internet. This type of deployment is commonly used in high-security environments such as military installations, financial systems, critical infrastructure, and anywhere sensitive data is handled and must be protected from external threats.

2.1.4.2. Deployments

SUSE Multi-Linux Manager supports two deployment variants.

2.1.4.2.1. Deploy with Virtual Machine

The recommended installation method is using the provided SUSE Multi-Linux Manager Virtual Machine Image option, since all the needed tools and container images are pre-loaded and will work out of the box.

For more information about installing SUSE Multi-Linux Manager Server Virtual Machine, see [Deploy Server as a Virtual Machine](#).

To upgrade SUSE Multi-Linux Manager Server, users should upgrade all packages in the system and follow the procedures defined in [Server Upgrade](#).

2.1.4.2.2. Deploy SUSE Multi-Linux Manager on SL Micro

SUSE Multi-Linux Manager also provides all the needed container images in RPM's that can be installed on the system.



User should make the needed RPM available on the internal network. That can be done by using a second SUSE Multi-Linux Manager Server or an RMT server.

Procedure: Install SUSE Multi-Linux Manager on SL Micro in Air-gapped

1. Install SL Micro
2. Update the system
3. Install tools packages and image packages (replace \$ARCH\$ with the correct architecture)

```
transactional-update pkg install mgradm* mgrctl* suse-manager-5.0-$ARCH$-server-*
```

4. Reboot.
5. Deploy SUSE Multi-Linux Manager with `mgradm`.

For more detailed information about installing SUSE Multi-Linux Manager Server on SL Micro, see [Deploy Server as a Virtual Machine](#).

To upgrade SUSE Multi-Linux Manager Server, users should upgrade all packages in the system and follow the procedures defined in [Server Upgrade](#).

2.1.5. Public Cloud Deployment

Public clouds provide SUSE Multi-Linux Manager under a Bring-your-own-subscription (BYOS) or Pay-as-you-go (PAYG) models.

For more information about using SUSE Multi-Linux Manager in the public cloud, see [Specialized-guides › Public-cloud-guide](#).

2.2. Install SUSE Multi-Linux Manager Proxy

There are various scenarios to deploy a SUSE Multi-Linux Manager Proxy. All these scenarios presume you have already successfully deployed a SUSE Multi-Linux Manager 5.1 Server.

2.2.1. SUSE Multi-Linux Manager Proxy Deployment on SL Micro

This guide outlines the deployment process for the SUSE Multi-Linux Manager 5.1 Proxy.



SL Micro is only supported as regular minion (**default** contact method) for the time being. We are working on managing it as Salt SSH client (**salt-ssh** contact method), too.

To successfully deploy, you will perform the following actions:

Procedure: Deploying Proxy

1. Review hardware requirements.
2. Synchronize the SL Micro 6.1 parent channel and the proxy extension child channel on the server.
3. Install SL Micro 6.1 on a bare-metal machine.
4. During the installation, register SL Micro 6.1 along with the SUSE Multi-Linux Manager Proxy extension.
5. Create a Salt activation key.
6. Bootstrap the proxy as a client with the **default** connection method.
7. Generate a proxy configuration.
8. Transfer the proxy configuration from server to proxy.
9. Use the proxy configuration to register the client as a proxy with SUSE Multi-Linux Manager.

Supported operating system for the Proxy Container Host

The supported operating system for the container host is SL Micro 6.1.

Container host



A container host is a server equipped with a container engine like Podman, which lets it manage and deploy containers. These containers hold applications and their essential parts, such as libraries, but not a full operating system, making them lightweight. This setup ensures applications run the same way in different environments. The container host supplies the necessary resources such as CPU, memory, and storage for these containers.

2.2.1.1. Hardware Requirements for the Proxy

For more information about hardware requirements for deploying SUSE Multi-Linux Manager Proxy, see [installation-and-upgrade:hardware-requirements.pdf](#).

2.2.1.2. Synchronize the Parent and Proxy Extension Child Channels

This section presumes that you have already entered your organization credentials under the **Admin › Setup Wizard → Organization Credentials** in the server's Web UI. Products are listed on the **Admin › Setup Wizard → Products** page. This channel must be fully synchronized on the server, with the child channel **Proxy** as an extension option selected.

Procedure: Synchronizing the Parent Channel and Proxy Extension

1. In the SUSE Multi-Linux Manager Web UI select **Admin › Products**.
2. From the products page enter SL Micro in the filter field.
3. Next use the drop-down to select the required architecture. For this example x86-64.
4. In the **Product Description** field select the SL Micro 6.1 checkbox then use the drop-down to select the **SUSE Multi-Linux Manager Proxy Extension 5.1 x86_64** extension.
5. Click the **[Add products]** button.
6. Wait for the synchronization to complete.

2.2.1.3. SL Micro 6.1 Installation

Procedure: Downloading the Installation Media

1. Locate the SL Micro 6.1 installation media at <https://www.suse.com/download/sl-micro/>.
2. You will need an account with SUSE Customer Center and must be logged in to download the ISO.
3. Download **SL-Micro-6.1-DVD-x86_64-GM-Media1.iso**.
4. Prepare a USB flash disk or DVD for installation.
5. Insert a DVD or a bootable USB stick containing the installation image for SL Micro 6.1.
6. Boot or reboot your system.

For detailed documentation on preparing your machines OS (virtual or physical), see [SL Micro 6.1 Deployment Guide](#).

Procedure: Installing SL Micro 6.1

1. Use the arrow keys to select **Installation**.
2. Adjust Keyboard and language. Click the **checkbox** to accept the license agreement.
3. Click **Next** to continue.
4. Select your registration method. For this example, we will register the proxy with SUSE Customer Center.



SUSE Multi-Linux Manager 5.1 Proxy as an extension

The SUSE Multi-Linux Manager 5.1 Proxy is registered as an extension. Therefore, in addition to acquiring an SUSE Customer Center registration key for SL Micro 6.1, you will also need an SUSE Customer Center registration code for the following extension:

- SUSE Multi-Linux Manager 5.1 Proxy

5. Enter your SUSE Customer Center Email address.
6. Enter your registration code for SL Micro 6.1.
7. Click **Next** to continue.
8. On the **Extension and Module Selection** page uncheck the **Hide Development Versions** checkbox.
9. Select the SUSE Multi-Linux Manager 5.1 Proxy extension **Checkbox**.
10. Click **Next** to continue.
11. Enter your SUSE Multi-Linux Manager 5.1 Proxy extension registration code.
12. Click **[Next]** to continue.
13. On the **NTP Configuration** page click **[Next]**.
14. On the **Authentication for the System** page enter a password for the root user. Click **[Next]**.
15. On the **Installation Settings** page click **[Install]**.

This finalizes installation of SL Micro 6.1 and SUSE Multi-Linux Manager 5.1 Proxy as an extension.

2.2.1.3.1. Update the System

Procedure: Updating the System

1. Log in as **root**.
2. Run **transactional-update**:

```
transactional-update
```

3. Reboot the system.
4. Log in as **root**.
5. Install the container utilities:

```
transactional-update pkg install mgrpxy mgrpxy-bash-completion
```

- Alternatively you may install **mgrpxy-zsh-completion** or **mgrpxy-fish-completion**.

6. Reboot the system.

2.2.1.3.2. Configure Custom Persistent Storage

This step is optional. However, if custom persistent storage is required for your infrastructure, use the **mgr-storage-proxy** tool. This tool simplifies creating the container storage and Squid cache volumes.

Use the command in the following manner:

```
mgr-storage-proxy <storage-disk-device>
```

For example:

```
mgr-storage-proxy /dev/nvme1n1
```

For more information, type:

```
mgr-storage-proxy --help
```



This command will create the persistent storage volumes at `/var/lib/containers/storage/volumes`.

For more information, see

- [Installation-and-upgrade › Container-management](#)
- [Administration › Troubleshooting](#)

2.2.1.4. Create an Activation Key for the Proxy

Procedure: Creating an Activation Key

1. Navigate to **Systems › Activation Keys**, and click **[Create key]**.
2. Create an activation key for the proxy host with SLE Micro 6.1 as the parent channel. This key should include all recommended channels and the proxy as an extension child channel.
3. Proceed to bootstrapping the proxy host as a **default** client.

2.2.1.5. Bootstrap the Proxy Host as a Client

Procedure: Bootstrapping the Proxy Host

1. Select **Systems › Bootstrapping**.
2. Fill in the fields for your proxy host.
3. Select the activation key created in the previous step from the drop-down.
4. Click **[Bootstrap]**.
5. Wait for the bootstrap process to complete successfully. Check the **Salt** menu and confirm the Salt key is listed and accepted.
6. Reboot the proxy host.
7. Select the host from the **System** list and trigger a second reboot after all events are finished to conclude the onboarding.

Procedure: Updating the Proxy Host

1. Select the host from the **Systems** list and apply all patches to update it.
2. Reboot the proxy host.

2.2.1.6. Generate Proxy Configuration

The configuration archive of the SUSE Multi-Linux Manager Proxy is generated by the SUSE Multi-Linux Manager Server. Each additional Proxy requires its own configuration archive.



For Podman deployment, the container host for the SUSE Multi-Linux Manager Proxy must be registered as a client to the SUSE Multi-Linux Manager Server prior to generating this proxy configuration.

If a proxy FQDN is used to generate a proxy container configuration that is not a registered client (as in the Kubernetes use case), a new system entry will appear in system list. This new entry will be shown under previously entered Proxy FQDN value and will be of **Foreign** system type.

2.2.1.6.1. Generate the Proxy Configuration with Web UI

Procedure: Generating a Proxy Container Configuration Using Web UI

1. In the Web UI, navigate to **Systems** › **Proxy Configuration** and fill the required data:
2. In the **Proxy FQDN** field type fully qualified domain name for the proxy.
3. In the **Parent FQDN** field type fully qualified domain name for the SUSE Multi-Linux Manager Server or another SUSE Multi-Linux Manager Proxy.
4. In the **Proxy SSH port** field type SSH port on which SSH service is listening on SUSE Multi-Linux Manager Proxy. Recommended is to keep default 8022.
5. In the **Max Squid cache size [MB]** field type maximal allowed size for Squid cache. Recommended is to use at most 60% of available storage for the containers.



2 GB represents the default proxy squid cache size. This will need to be adjusted for your environment.

6. In the **SSL certificate** selection list choose if new server certificate should be generated for SUSE Multi-Linux Manager Proxy or an existing one should be used. You can consider generated certificates as SUSE Multi-Linux Manager builtin (self signed) certificates.

Depending on the choice then provide either path to signing CA certificate to generate a new certificate or path to an existing certificate and its key to be used as proxy certificate.

The CA certificates generated by the server are stored in the `/var/lib/containers/storage/volumes/root/_data/ssl-build` directory.

For more information about existing or custom certificates and the concept of corporate and intermediate certificates, see [Administration › Ssl-certs-imported](#).

7. Click [**Generate**] to register a new proxy FQDN in the SUSE Multi-Linux Manager Server and generate a configuration archive (`config.tar.gz`) containing details for the container host.
8. After a few moments you are presented with file to download. Save this file locally.

2.2.1.6.2. Generate Proxy Configuration With `spacecmd` and Self-Signed Certificate

You can generate a Proxy configuration using `spacecmd`.

Procedure: Generating Proxy Configuration with `spacecmd` and Self-Signed Certificate

1. SSH into your container host.
2. Execute the following command replacing the Server and Proxy FQDN:

```
mgrctl exec -ti 'spacecmd proxy_container_config_generate_cert -- dev-pxy.example.com dev-srv.example.com 2048 email@example.com -o /tmp/config.tar.gz'
```

3. Copy the generated configuration from the server container:

```
mgrctl cp server:/tmp/config.tar.gz .
```

2.2.1.6.3. Generate Proxy Configuration With `spacecmd` and Custom Certificate

You can generate a Proxy configuration using `spacecmd` for a custom certificates rather than the default self-signed certificates.

Procedure: Generating Proxy Configuration with `spacecmd` and Custom Certificate

1. SSH into your Server container host.
2. Execute the following command replacing the Server and Proxy FQDN:


```
for f in ca.crt proxy.crt proxy.key; do
  mgrctl cp $f server:/tmp/$f
done
mgrctl exec -ti 'spacecmd proxy_container_config -- -p 8022 pxy.example.com
srv.example.com 2048 email@example.com /tmp/ca.crt /tmp/proxy.crt
/tmp/proxy.key -o /tmp/config.tar.gz'
```

3. Copy the generated configuration from the server container:

```
mgrctl cp server:/tmp/config.tar.gz .
```

2.2.1.7. Transfer the Proxy Configuration

The Web UI generates a configuration archive. This archive needs to be made available on the proxy container host.

Procedure: Copying the Proxy Configuration

1. If not already done, copy the configuration archive (`config.tar.gz`) generated in the previous step from the server container to the server host:

```
mgrctl cp server:/root/config.tar.gz .
```

2. If not already done, copy the files from the server host to the proxy host:

```
scp config.tar.gz <proxy-FQDN>:/root
```

3. On the proxy host, install the Proxy with:

```
mgrpxy install podman config.tar.gz
```

2.2.1.8. Start the SUSE Multi-Linux Manager Proxy

Container can now be started with the `mgrpxy` command:

Procedure: Starting and Checking Proxy Status

1. Start the proxy by calling:

```
mgrpky start
```

2. Check container status by calling:

```
mgrpky status
```

Five SUSE Multi-Linux Manager Proxy containers should be present and should be part of the `proxy-pod` container pod:

- `proxy-salt-broker`
- `proxy-httpd`
- `proxy-tftpd`
- `proxy-squid`
- `proxy-ssh`

2.2.1.8.1. Using a Custom Container Image for a Service

By default, the SUSE Multi-Linux Manager Proxy suite is configured to use the same image version and registry path for each of its services. However, it is possible to override the default values for a specific service using the install parameters ending with `-tag` and `-image`.

For example:

```
mgrpky install podman --httpd-tag 0.1.0 --httpd-image  
registry.opensuse.org/uyuni/proxy-httpd /path/to/config.tar.gz
```

It adjusts the configuration file for the `httpd` service, where `registry.opensuse.org/uyuni/proxy-httpds` is the image to use and `0.1.0` is the version tag, before restarting it.

To reset the values to defaults, run the install command again without those parameters:

```
mgrpky install podman /path/to/config.tar.gz
```

This command first resets the configuration of all services to the global defaults and then reloads it.

2.2.2. SUSE Multi-Linux Manager Proxy Deployment as a Virtual Machine – KVM

This chapter provides the Virtual Machine settings for deployment of SUSE Multi-Linux Manager 5.1 Proxy as an image. KVM will be combined with Virtual Machine Manager (virt-manager) as a sandbox for this installation.

2.2.2.1. Available Images



The preferred method for deploying 5.1 Proxy is to use one of the following available images. All tools are included in these images simplifying deployment.

Images for SUSE Multi-Linux Manager 5.1 Proxy are available at [SUSE Multi-Linux Manager 5.1 VM images](#).



For more information on preparing raw images, see <https://documentation.suse.com/sle-micro/6.1/html/Micro-deployment-raw-images-virtual-machines/index.html#deployment-preparing-configuration-device>.

For additional information on the self install images, see <https://documentation.suse.com/sle-micro/6.1/html/Micro-deployment-selfinstall-images/index.html>

Table 12. Available Proxy Images

Architecture	Image Format
aarch64	qcow2, vmdk
x86_64	qcow2, vmdk, raw, Self Installer

2.2.2.2. Virtual Machine Manager (virt-manager) Settings

Enter the following settings when creating a new virtual machine using **virt-manager**.



This table specifies the minimum requirements. These are suitable for a quick test installation, such as a server with one client. If you want to use a production environment and need background information about disk space, see [Installation-and-upgrade › Hardware-requirements](#).

KVM Settings	
Installation Method	Import Existing Disk Image
OS:	Linux
Version:	SUSE Multi-Linux Manager-Proxy.x86_64-5.1.*.qcow2
Memory:	2 GB (minimum)
CPU's:	2
Storage Format:	.qcow2 40 GB (Default) Root Partition
Name:	test-setup
Network	Bridge br0

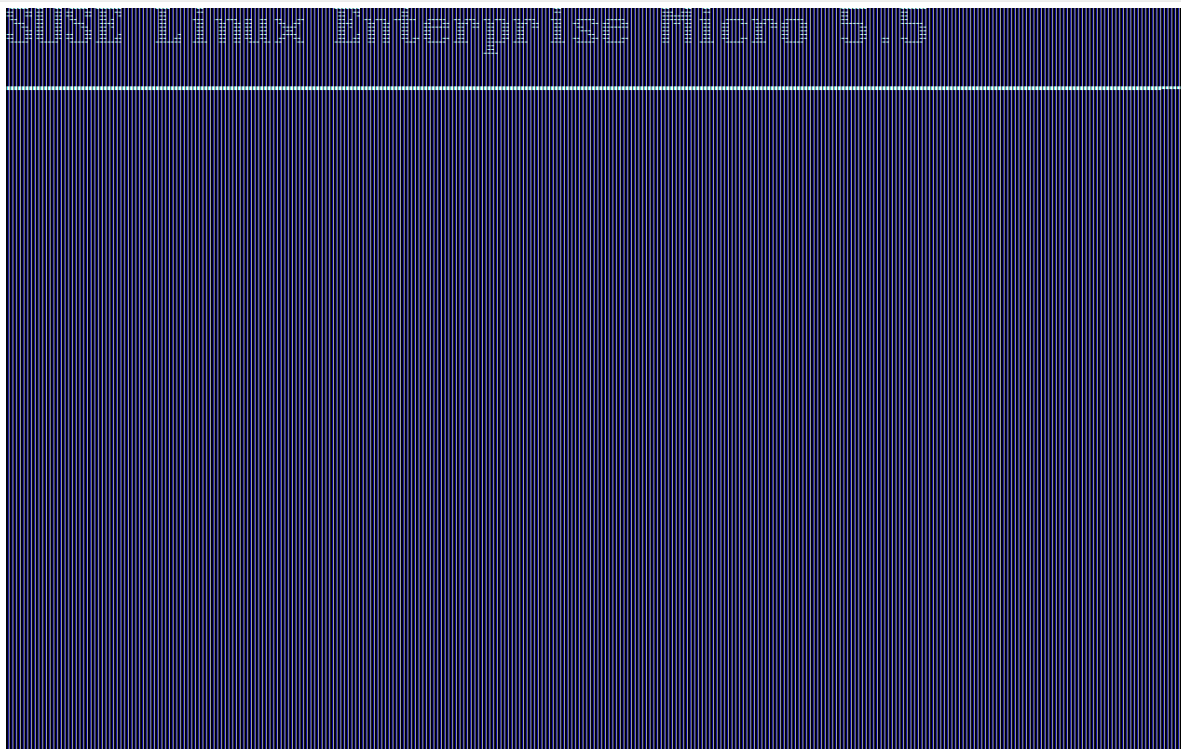


`/var/lib/containers/storage/volumes` Minimum 150 GB. Storage requirements should be calculated for the number of ISO distribution images, containers, and bootstrap repositories you will use.

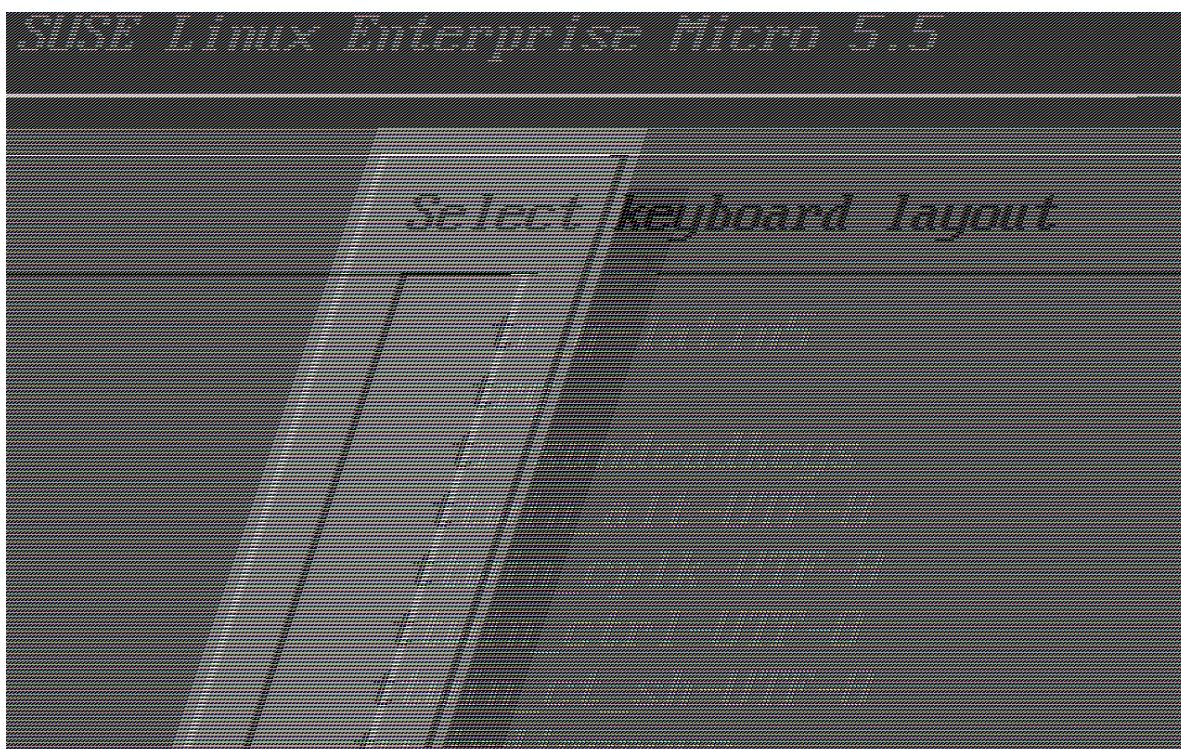
2.2.2.3. Initial KVM Setup

Procedure: Creating Initial Setup

1. Create a new virtual machine using the downloaded Minimal KVM image and select **Import existing disk image**.
2. Configure RAM and number of CPUs (at least 16 GB RAM and 4 CPUs).
3. Name your KVM machine and select the **Customize configuration before install** check box.
4. Click **[Begin Installation]** to boot from the image.
5. At the JeOS Firstboot screen select start to continue.



6. Select keyboard layout.



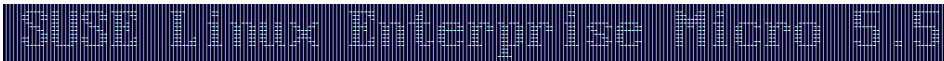
7. Accept the license agreement.



8. Select your time zone.



9. Enter a password for root.

The image shows the SUSE Linux Enterprise Micro 5.5 logo, which consists of the text "SUSE Linux Enterprise Micro 5.5" in a stylized font.

10. When installation completes log in as root.
11. Proceed to the next section.

2.2.2.4. Register SLE Micro and SUSE Multi-Linux Manager 5.1 Proxy

Procedure: Registering SLE Micro and SUSE Multi-Linux Manager 5.1 Proxy

1. Boot the virtual machine.
2. Log in as **root**.
3. Register SLE Micro with SCC.

```
transactional-update register -r <REGCODE> -e <your_email>
```

4. Reboot.
5. Register SUSE Multi-Linux Manager 5.1 Proxy with SUSE Customer Center.

```
transactional-update register -p SUSE-Manager-Proxy/5.0/x86_64 -r <REGCODE>
```

6. Reboot.
7. Update the system:

```
transactional-update
```

8. If updates were applied reboot.
9. This step is optional. However, if custom persistent storage is required for your infrastructure, use the `mgr-storage-proxy` tool.
 - For more information, see `mgr-storage-proxy --help`. This tool simplifies creating the container volumes.
 - Use the command in the following manner:

```
mgr-storage-proxy <storage-disk-device>
```

For example:

```
mgr-storage-proxy /dev/nvme1n1
```



This command will move the persistent storage volumes at `/var/lib/containers/storage/volumes` to the specified storage device.

For more information, see

- [Installation-and-upgrade › Container-management](#)
- [Administration › Troubleshooting](#)

2.2.2.5. Create an Activation Key for the Proxy

Procedure: Creating an Activation Key

1. Navigate to **Systems › Activation Keys**, and click **[Create key]**.
2. Create an activation key for the proxy host with SLE Micro 6.1 as the parent channel. This key should include all recommended channels and the proxy as an extension child channel.
3. Proceed to bootstrapping the proxy host as a `default` client.

2.2.2.6. Bootstrap the Proxy Host as a Client

Procedure: Bootstrapping the Proxy Host

1. Select **Systems › Bootstrapping**.
2. Fill in the fields for your proxy host.
3. Select the activation key created in the previous step from the drop-down.
4. Click [**Bootstrap**].
5. Wait for the bootstrap process to complete successfully. Check the **Salt** menu and confirm the Salt key is listed and accepted.
6. Reboot the proxy host.
7. Select the host from the **System** list and trigger a second reboot after all events are finished to conclude the onboarding.

Procedure: Updating the Proxy Host

1. Select the host from the **Systems** list and apply all patches to update it.
2. Reboot the proxy host.

2.2.2.7. Generate Proxy Configuration

The configuration archive of the SUSE Multi-Linux Manager Proxy is generated by the SUSE Multi-Linux Manager Server. Each additional Proxy requires its own configuration archive.



For Podman deployment, the container host for the SUSE Multi-Linux Manager Proxy must be registered as a client to the SUSE Multi-Linux Manager Server prior to generating this proxy configuration.

If a proxy FQDN is used to generate a proxy container configuration that is not a registered client (as in the Kubernetes use case), a new system entry will appear in system list. This new entry will be shown under previously entered Proxy FQDN value and will be of **Foreign** system type.

2.2.2.7.1. Generate the Proxy Configuration with Web UI

Procedure: Generating a Proxy Container Configuration Using Web UI

1. In the Web UI, navigate to **Systems › Proxy Configuration** and fill the required data:
2. In the **Proxy FQDN** field type fully qualified domain name for the proxy.
3. In the **Parent FQDN** field type fully qualified domain name for the SUSE Multi-Linux Manager Server or another SUSE Multi-Linux Manager Proxy.

4. In the **Proxy SSH port** field type SSH port on which SSH service is listening on SUSE Multi-Linux Manager Proxy. Recommended is to keep default 8022.
5. In the **Max Squid cache size [MB]** field type maximal allowed size for Squid cache. Recommended is to use at most 60% of available storage for the containers.



2 GB represents the default proxy squid cache size. This will need to be adjusted for your environment.

6. In the **SSL certificate** selection list choose if new server certificate should be generated for SUSE Multi-Linux Manager Proxy or an existing one should be used. You can consider generated certificates as SUSE Multi-Linux Manager builtin (self signed) certificates.

Depending on the choice then provide either path to signing CA certificate to generate a new certificate or path to an existing certificate and its key to be used as proxy certificate.

The CA certificates generated by the server are stored in the `/var/lib/containers/storage/volumes/root/_data/ssl-build` directory.

For more information about existing or custom certificates and the concept of corporate and intermediate certificates, see [Administration › Ssl-certs-imported](#).

7. Click **[Generate]** to register a new proxy FQDN in the SUSE Multi-Linux Manager Server and generate a configuration archive (`config.tar.gz`) containing details for the container host.
8. After a few moments you are presented with file to download. Save this file locally.

2.2.2.7.2. Generate Proxy Configuration With `spacecmd` and Self-Signed Certificate

You can generate a Proxy configuration using `spacecmd`.

Procedure: Generating Proxy Configuration with `spacecmd` and Self-Signed Certificate

1. SSH into your container host.
2. Execute the following command replacing the Server and Proxy FQDN:

```
mgrctl exec -ti 'spacecmd proxy_container_config_generate_cert -- dev-
pxy.example.com dev-srv.example.com 2048 email@example.com -o
/tmp/config.tar.gz'
```

3. Copy the generated configuration from the server container:

```
mgrctl cp server:/tmp/config.tar.gz .
```

2.2.2.7.3. Generate Proxy Configuration With `spacecmd` and Custom Certificate

You can generate a Proxy configuration using `spacecmd` for a custom certificates rather than the default self-signed certificates.

Procedure: Generating Proxy Configuration with `spacecmd` and Custom Certificate

1. SSH into your Server container host.
2. Execute the following command replacing the Server and Proxy FQDN:

```
for f in ca.crt proxy.crt proxy.key; do
  mgrctl cp $f server:/tmp/$f
done
mgrctl exec -ti 'spacecmd proxy_container_config -- -p 8022 pxy.example.com
srv.example.com 2048 email@example.com /tmp/ca.crt /tmp/proxy.crt
/tmp/proxy.key -o /tmp/config.tar.gz'
```

3. Copy the generated configuration from the server container:

```
mgrctl cp server:/tmp/config.tar.gz .
```

2.2.2.8. Transfer the Proxy Configuration

The Web UI generates a configuration archive. This archive needs to be made available on the proxy container host.

Procedure: Copying the Proxy Configuration

1. If not already done, copy the configuration archive (`config.tar.gz`) generated in the previous step from the server container to the server host:

```
mgrctl cp server:/root/config.tar.gz .
```

2. If not already done, copy the files from the server host to the proxy host:

```
scp config.tar.gz <proxy-FQDN>:/root
```

3. On the proxy host, install the Proxy with:

```
mgrpxy install podman config.tar.gz
```

2.2.2.9. Start the SUSE Multi-Linux Manager 5.1 Proxy

Container can now be started with the `mgrpxy` command:

Procedure: Start and Check Proxy Status

1. Start the Proxy by calling:

```
mgrpxy start
```

2. Check container status by calling:

```
mgrpxy status
```

Five SUSE Multi-Linux Manager Proxy containers should be present and should be part of the `proxy-pod` container pod:

- proxy-salt-broker
- proxy-httpd
- proxy-tftpd
- proxy-squid
- proxy-ssh

2.2.2.9.1. Using a Custom Container Image for a Service

By default, the SUSE Multi-Linux Manager Proxy suite is set to use the same image version and registry path for each of its services. However, it is possible to override the default values for a specific service using the install parameters ending with `-tag` and `-image`.

For example, use it like this:

```
mgrpxy install podman --httpd-tag 0.1.0 --httpd-image
registry.opensuse.org/uyuni/proxy-httpd /path/to/config.tar.gz
```

It adjusts the configuration file for the httpd service, where registry.opensuse.org/uyuni/proxy-httpd is the image to use and [0.1.0](#) is the version tag, before restarting it.

To reset the values to defaults, run the install command again without those parameters:

```
mgrpxy install podman /path/to/config.tar.gz
```

This command first resets the configuration of all services to the global defaults and then reloads it.

2.2.3. SUSE Multi-Linux Manager Proxy Deployment as a Virtual Machine - VMware

This chapter provides the Virtual Machine settings for deployment of SUSE Multi-Linux Manager 5.1 Proxy as an image. VMware will be used as a sandbox for this installation.

2.2.3.1. Available Images



The preferred method for deploying SUSE Multi-Linux Manager Proxy is to use one of the following available images. All tools are included in these images greatly simplifying deployment.

Images for SUSE Multi-Linux Manager 5.1 Proxy are available at [SUSE Multi-Linux Manager 5.1 VM images](#).



For more information on preparing raw images, see <https://documentation.suse.com/sle-micro/6.1/html/Micro-deployment-raw-images-virtual-machines/index.html#deployment-preparing-configuration-device>.

For additional information on the self install images, see <https://documentation.suse.com/sle-micro/6.1/html/Micro-deployment-selfinstall-images/index.html>

Table 13. Available Proxy Images

Architecture	Image Format
aarch64	qcow2, vmdk
x86_64	qcow2, vmdk, raw, Self Installer

2.2.3.2. Virtual Machine Settings – VMware

This sections describes VMware configurations, focusing on the creation of an extra virtual disk essential for the SUSE Multi-Linux Manager Proxy storage partition within VMware environments.

Procedure: Creating the VMware Virtual Machine

1. Download SUSE Multi-Linux Manager Proxy **.vmdk** file then transfer a copy to your VMware storage.
2. Make a copy of uploaded **.vmdk** file using VMware web interface. This will convert provided **.vmdk** file to the format suitable for vSphere hypervisor.
3. Create and name a new virtual machine based on the Guest OS Family **Linux** and Guest OS Version SUSE Linux Enterprise 15 (64-bit).
4. Add an additional **Hard Disk 2** of 500 GB (or more).
5. Configure RAM and number of CPUs (at least 16 GB RAM and 4 CPUs).
6. Set the network adapter as required.
7. Power on the VM, and follow firstboot dialogs (keyboard layout, license agreement, time zone, password for root).
8. When installation completes log in as root.
9. Proceed to the next section.

2.2.3.3. Register SLE Micro and SUSE Multi-Linux Manager 5.1 Proxy

Procedure: Registering SLE Micro and SUSE Multi-Linux Manager 5.1 Proxy

1. Boot the virtual machine.
2. Log in as **root**.
3. Register SLE Micro with SCC.

```
transactional-update register -r <REGCODE> -e <your_email>
```

4. Reboot.

5. Register SUSE Multi-Linux Manager 5.1 Proxy with SUSE Customer Center.

```
transactional-update register -p SUSE-Manager-Proxy/5.0/x86_64 -r <REGCODE>
```

6. Reboot.

7. Update the system:

```
transactional-update
```

8. If updates were applied reboot.

9. This step is optional. However, if custom persistent storage is required for your infrastructure, use the `mgr-storage-proxy` tool.

- For more information, see `mgr-storage-proxy --help`. This tool simplifies creating the container volumes.
- Use the command in the following manner:

```
mgr-storage-proxy <storage-disk-device>
```

For example:

```
mgr-storage-proxy /dev/nvme1n1
```



This command will move the persistent storage volumes at `/var/lib/containers/storage/volumes` to the specified storage device.

For more information, see

- [Installation-and-upgrade › Container-management](#)
- [Administration › Troubleshooting](#)

2.2.3.4. Create an Activation Key for the Proxy

Procedure: Creating an Activation Key

1. Navigate to [Systems › Activation Keys](#), and click [\[Create key \]](#).

2. Create an activation key for the proxy host with SLE Micro 6.1 as the parent channel. This key should include all recommended channels and the proxy as an extension child channel.
3. Proceed to bootstrapping the proxy host as a **default** client.

2.2.3.5. Bootstrap the Proxy Host as a Client

Procedure: Bootstrapping the Proxy Host

1. Select **Systems › Bootstrapping**.
2. Fill in the fields for your proxy host.
3. Select the activation key created in the previous step from the drop-down.
4. Click **[Bootstrap]**.
5. Wait for the bootstrap process to complete successfully. Check the **Salt** menu and confirm the Salt key is listed and accepted.
6. Reboot the proxy host.
7. Select the host from the **System** list and trigger a second reboot after all events are finished to conclude the onboarding.

Procedure: Updating the Proxy Host

1. Select the host from the **Systems** list and apply all patches to update it.
2. Reboot the proxy host.

2.2.3.6. Generate Proxy Configuration

The configuration archive of the SUSE Multi-Linux Manager Proxy is generated by the SUSE Multi-Linux Manager Server. Each additional Proxy requires its own configuration archive.



For Podman deployment, the container host for the SUSE Multi-Linux Manager Proxy must be registered as a client to the SUSE Multi-Linux Manager Server prior to generating this proxy configuration.

If a proxy FQDN is used to generate a proxy container configuration that is not a registered client (as in the Kubernetes use case), a new system entry will appear in system list. This new entry will be shown under previously entered Proxy FQDN value and will be of **Foreign** system type.

2.2.3.6.1. Generate the Proxy Configuration with Web UI

Procedure: Generating a Proxy Container Configuration Using Web UI

1. In the Web UI, navigate to **Systems** › **Proxy Configuration** and fill the required data:
2. In the **Proxy FQDN** field type fully qualified domain name for the proxy.
3. In the **Parent FQDN** field type fully qualified domain name for the SUSE Multi-Linux Manager Server or another SUSE Multi-Linux Manager Proxy.
4. In the **Proxy SSH port** field type SSH port on which SSH service is listening on SUSE Multi-Linux Manager Proxy. Recommended is to keep default 8022.
5. In the **Max Squid cache size [MB]** field type maximal allowed size for Squid cache. Recommended is to use at most 60% of available storage for the containers.



2 GB represents the default proxy squid cache size. This will need to be adjusted for your environment.

6. In the **SSL certificate** selection list choose if new server certificate should be generated for SUSE Multi-Linux Manager Proxy or an existing one should be used. You can consider generated certificates as SUSE Multi-Linux Manager builtin (self signed) certificates.

Depending on the choice then provide either path to signing CA certificate to generate a new certificate or path to an existing certificate and its key to be used as proxy certificate.

The CA certificates generated by the server are stored in the `/var/lib/containers/storage/volumes/root/_data/ssl-build` directory.

For more information about existing or custom certificates and the concept of corporate and intermediate certificates, see **Administration** › **Ssl-certs-imported**.

7. Click **[Generate]** to register a new proxy FQDN in the SUSE Multi-Linux Manager Server and generate a configuration archive (`config.tar.gz`) containing details for the container host.
8. After a few moments you are presented with file to download. Save this file locally.

2.2.3.6.2. Generate Proxy Configuration With `spacecmd` and Self-Signed Certificate

You can generate a Proxy configuration using `spacecmd`.

Procedure: Generating Proxy Configuration with `spacecmd` and Self-

Signed Certificate

1. SSH into your container host.
2. Execute the following command replacing the Server and Proxy FQDN:

```
mgrctl exec -ti 'spacecmd proxy_container_config_generate_cert -- dev-
pxy.example.com dev-srv.example.com 2048 email@example.com -o
/tmp/config.tar.gz'
```

3. Copy the generated configuration from the server container:

```
mgrctl cp server:/tmp/config.tar.gz .
```

2.2.3.6.3. Generate Proxy Configuration With `spacecmd` and Custom Certificate

You can generate a Proxy configuration using `spacecmd` for a custom certificates rather than the default self-signed certificates.

Procedure: Generating Proxy Configuration with `spacecmd` and Custom Certificate

1. SSH into your Server container host.
2. Execute the following command replacing the Server and Proxy FQDN:

```
for f in ca.crt proxy.crt proxy.key; do
  mgrctl cp $f server:/tmp/$f
done
mgrctl exec -ti 'spacecmd proxy_container_config -- -p 8022 pxy.example.com
srv.example.com 2048 email@example.com /tmp/ca.crt /tmp/proxy.crt
/tmp/proxy.key -o /tmp/config.tar.gz'
```

3. Copy the generated configuration from the server container:

```
mgrctl cp server:/tmp/config.tar.gz .
```

2.2.3.7. Transfer the Proxy Configuration

The Web UI generates a configuration archive. This archive needs to be made available on the proxy container host.

Procedure: Copying the Proxy Configuration

1. If not already done, copy the configuration archive (`config.tar.gz`) generated in the previous step from the server container to the server host:

```
mgrctl cp server:/root/config.tar.gz .
```

2. If not already done, copy the files from the server host to the proxy host:

```
scp config.tar.gz <proxy-FQDN>:/root
```

3. On the proxy host, install the Proxy with:

```
mgrpky install podman config.tar.gz
```

2.2.3.8. Start the SUSE Multi-Linux Manager 5.1 Proxy

Container can now be started with the `mgrpky` command:

Procedure: Start and Check Proxy Status

1. Start the Proxy by calling:

```
mgrpky start
```

2. Check container status by calling:

```
mgrpky status
```

Five SUSE Multi-Linux Manager Proxy containers should be present and should be part of the `proxy-pod` container pod:

- `proxy-salt-broker`
- `proxy-httpd`
- `proxy-tftpd`
- `proxy-squid`
- `proxy-ssh`

2.2.3.8.1. Using a Custom Container Image for a Service

By default, the SUSE Multi-Linux Manager Proxy suite is set to use the same image version and registry path for each of its services. However, it is possible to override the default values for a specific service using the install parameters ending with `-tag` and `-image`.

For example, use it like this:

```
mgrpky install podman --httpd-tag 0.1.0 --httpd-image
registry.opensuse.org/uyuni/proxy-httpd /path/to/config.tar.gz
```

It adjusts the configuration file for the httpd service, where `registry.opensuse.org/uyuni/proxy-httpds` is the image to use and `0.1.0` is the version tag, before restarting it.

To reset the values to defaults, run the install command again without those parameters:

```
mgrpky install podman /path/to/config.tar.gz
```

This command first resets the configuration of all services to the global defaults and then reloads it.

2.2.4. SUSE Multi-Linux Manager 5.1 Proxy Deployment on K3s

2.2.4.1. Installing K3s



SUSE Multi-Linux Manager Proxy is supported on K3s running on top of SL Micro in a single node cluster. If you need to deploy it in any other Kubernetes environment, contact support for evaluation.

On the container host machine, install `K3s` (replace `<K3S_HOST_FQDN>` with the FQDN of your K3s host):

```
curl -sfL https://get.k3s.io | INSTALL_K3S_EXEC="--tls-san=<K3S_HOST_FQDN>" sh -
```

2.2.4.2. Installing Tools

The installation requires the `mgrpky` and `helm` packages.

The `mgrpky` and `helm` packages are available in the SUSE Multi-Linux Manager Proxy product

repositories.

1. To install it, run:

```
transactional-update pkg install helm mgrpxy
```

2. Reboot

2.2.4.2.1. Generate the Proxy Configuration with Web UI

Procedure: Generating a Proxy Container Configuration Using Web UI

1. In the Web UI, navigate to **Systems › Proxy Configuration** and fill the required data:
2. In the **Proxy FQDN** field type fully qualified domain name for the proxy.
3. In the **Parent FQDN** field type fully qualified domain name for the SUSE Multi-Linux Manager Server or another SUSE Multi-Linux Manager Proxy.
4. In the **Proxy SSH port** field type SSH port on which SSH service is listening on SUSE Multi-Linux Manager Proxy. Recommended is to keep default 8022.
5. In the **Max Squid cache size [MB]** field type maximal allowed size for Squid cache. Recommended is to use at most 60% of available storage for the containers.



2 GB represents the default proxy squid cache size. This will need to be adjusted for your environment.

6. In the **SSL certificate** selection list choose if new server certificate should be generated for SUSE Multi-Linux Manager Proxy or an existing one should be used. You can consider generated certificates as SUSE Multi-Linux Manager builtin (self signed) certificates.

Depending on the choice then provide either path to signing CA certificate to generate a new certificate or path to an existing certificate and its key to be used as proxy certificate.

The CA certificates generated by the server are stored in the `/var/lib/containers/storage/volumes/root/_data/ssl-build` directory.

For more information about existing or custom certificates and the concept of corporate and intermediate certificates, see **Administration › Ssl-certs-imported**.

7. Click **[Generate]** to register a new proxy FQDN in the SUSE Multi-Linux Manager Server and generate a configuration archive (`config.tar.gz`) containing details for the container host.

8. After a few moments you are presented with file to download. Save this file locally.

2.2.4.2.2. Generate Proxy Configuration With `spacecmd` and Self-Signed Certificate

You can generate a Proxy configuration using `spacecmd`.

Procedure: Generating Proxy Configuration with `spacecmd` and Self-Signed Certificate

1. SSH into your container host.
2. Execute the following command replacing the Server and Proxy FQDN:

```
mgrctl exec -ti 'spacecmd proxy_container_config_generate_cert -- dev-pxy.example.com dev-srv.example.com 2048 email@example.com -o /tmp/config.tar.gz'
```

3. Copy the generated configuration from the server container:

```
mgrctl cp server:/tmp/config.tar.gz .
```

2.2.4.2.3. Generate Proxy Configuration With `spacecmd` and Custom Certificate

You can generate a Proxy configuration using `spacecmd` for a custom certificates rather than the default self-signed certificates.

Procedure: Generating Proxy Configuration with `spacecmd` and Custom Certificate

1. SSH into your Server container host.
2. Execute the following command replacing the Server and Proxy FQDN:

```
for f in ca.crt proxy.crt proxy.key; do
  mgrctl cp $f server:/tmp/$f
done
mgrctl exec -ti 'spacecmd proxy_container_config -- -p 8022 pxy.example.com
srv.example.com 2048 email@example.com /tmp/ca.crt /tmp/proxy.crt
/tmp/proxy.key -o /tmp/config.tar.gz'
```

3. Copy the generated configuration from the server container:

```
mgrctl cp server:/tmp/config.tar.gz .
```

2.2.4.3. Deploying the SUSE Multi-Linux Manager Proxy Helm Chart

To configure the storage of the volumes to be used by the SUSE Multi-Linux Manager Proxy pod, define persistent volumes for the following claims. If you do not customize the storage configuration, K3s will automatically create the storage volumes for you.

The persistent volume claims are named:

- `squid-cache-pv-claim`
- `package-cache-pv-claim`
- `tftp-boot-pv-claim`

Create the configuration for the SUSE Multi-Linux Manager Proxy as documented in **Installation-and-upgrade › Container-deployment**. Copy the configuration `tar.gz` file and then install:

```
mgrpky install kubernetes /path/to/config.tar.gz
```

For more information see <https://kubernetes.io/docs/concepts/storage/persistent-volumes/> (kubernetes) or <https://rancher.com/docs/k3s/latest/en/storage/> (K3s) documentation.

2.2.5. SUSE Multi-Linux Manager Proxy Air-gapped Deployment

2.2.5.1. What is air-gapped deployment?

Air-gapped deployment refers to the setup and operation of any networked system that is physically isolated from insecure networks, especially the internet. This type of deployment is commonly used in high-security environments such as military installations, financial systems, critical infrastructure, and anywhere sensitive data is handled and must be protected from external threats.

2.2.5.2. Deploy with Virtual Machine

The recommended installation method is using the provided SUSE Multi-Linux Manager Virtual Machine Image option, since all the needed tools and container images are pre-loaded and will work out of the box.

For more information about installing SUSE Multi-Linux Manager Proxy Virtual Machine, see [Deploy Proxy as a Virtual Machine](#).

To upgrade SUSE Multi-Linux Manager Proxy, users should follow the procedures defined in [Proxy Upgrade](#).

2.2.5.3. Deploy SUSE Multi-Linux Manager on SL Micro

SUSE Multi-Linux Manager also provides all the needed container images in RPM's that can be installed on the system.

Procedure: Install SUSE Multi-Linux Manager on SL Micro in Air-gapped

1. Install SL Micro.
2. Bootstrap the Proxy Host OS as a Client on SUSE Multi-Linux Manager Server.
3. Update the system.
4. Install tools packages and image packages (replace \$ARCH\$ with the correct architecture)

```
transactional-update pkg install mgrpxy* mgrctl* suse-manager-5.0-$ARCH$-proxy-*
```

5. Reboot.
6. Deploy SUSE Multi-Linux Manager with mgrpxy.

For more detailed information about installing SUSE Multi-Linux Manager Proxy on SL Micro, see [Deploy Proxy as a Virtual Machine](#).

To upgrade SUSE Multi-Linux Manager Proxy, users should follow the procedures defined in [Proxy Upgrade](#).

Chapter 3. Upgrade and Migration

3.1. Server

3.1.1. SUSE Multi-Linux Manager Server Migration to a Containerized Environment

3.1.1.1. Requirements and Considerations

3.1.1.1.1. General

- To migrate a SUSE Multi-Linux Manager 4.3 Server to a container, you require a new machine with SL Micro 6.1 and `mgradm` installed.
- An in-place migration from SUSE Multi-Linux Manager 4.3 to 5.1 is unsupported because of the change of the underlying operating system from SUSE Linux Enterprise Server 15 SP4 to SL Micro 6.1.
- Before migrating from SUSE Multi-Linux Manager 4.3 to 5.1, any existing traditional clients including the traditional proxies must be migrated to Salt. For more information about migrating traditional SUSE Multi-Linux Manager 4.3 clients to Salt clients, see <https://documentation.suse.com/suma/4.3/en/suse-manager/client-configuration/contact-methods-migrate-traditional.html>.
- Traditional contact protocol is no longer supported in SUSE Multi-Linux Manager 5.0 and later.

3.1.1.1.2. Hostnames

- The current migration procedure does not include functionality for renaming hostnames. As a result, the fully qualified domain name (FQDN) of the new server will remain the same as that of the old server.
- The IP address must remain unchanged to ensure that the clients can contact the server.



After the migration, it will be necessary to manually update the DHCP and DNS records to point to the new server.

3.1.1.3. GPG Keys

- Self trusted GPG keys are not migrated.
- GPG keys that are trusted in the RPM database only are not migrated. Thus synchronizing channels with `spacewalk-repo-sync` can fail.
- The administrator must migrate these keys manually from the 4.3 installation to the container host after the actual server migration.

Procedure: Manual Migration of the 4.3 GPG Keys to New Server

1. Copy the keys from the 4.3 server to the container host of the new server.
2. Later, add each key to the migrated server with the command `mgradm gpg add <PATH_TO_KEY_FILE>`.

3.1.1.2. Migration

3.1.1.2.1. Initial Preparation on the Old 4.3 Server

The migration can take a very long time depending on the amount of data that needs to be replicated.

To reduce downtime it is possible to run the migration multiple times in a process of initial replication, re-replication, or final replication and switch over while all the services on the old server can stay up and running.



Only during the final migration the processes on the old server need to be stopped.

For all non-final replications add the parameter `--prepare` to prevent the automatic stopping the services on the old server. For example:

```
mgradm migrate podman <oldserver.fqdn> --prepare
```

Procedure: Initial Preparation on the 4.3 Server

1. Stop the SUSE Multi-Linux Manager services:

```
spacewalk-service stop
```

2. Stop the PostgreSQL service:

```
systemctl stop postgresql
```

3.1.1.2.2. SSH Connection Preparation

Pre-installing SUSE Multi-Linux Manager on the prepared SL Micro 6.1 with `mgradm` is not necessary. The migration process will take care of the server installation.

Procedure: Preparing the SSH Connection

1. Ensure that for `root` an SSH key exists on the new 5.1 server. If a key does not exist, create it with:

```
ssh-keygen -t rsa
```

2. The SSH configuration and agent should be ready on the new server for a connection to the 4.3 server that does not prompt for a password.

```
eval $(ssh-agent); ssh-add
```



To establish a connection that does not prompt for a password, the migration script relies on an SSH agent running on the new server. If the agent is not active yet, initiate it by running `eval $(ssh-agent)`. Then add the SSH key to the running agent with `ssh-add` followed by the path to the private key. You will be prompted to enter the password for the private key during this process.

3. Copy the public SSH key to the SUSE Multi-Linux Manager 4.3 Server (`<oldserver.fqdn>`) with `ssh-copy-id`. Replace `<oldserver.fqdn>` with the FQDN of the 4.3 server:

```
ssh-copy-id <old server.fqdn>
```

The SSH key will be copied into the old server's `~/.ssh/authorized_keys` file. For more information, see the `ssh-copy-id` manpage.

4. Establish an SSH connection from the new server to the old SUSE Multi-Linux Manager Server to check that no password is needed. Also there must not be any problem with the host fingerprint. In case of trouble, remove old fingerprints from the `~/.ssh/known_hosts` file. Then try

again. The fingerprint will be stored in the local `~/.ssh/known_hosts` file.

3.1.1.2.3. Perform the Migration

When planning your migration from SUSE Multi-Linux Manager 4.3 to SUSE Multi-Linux Manager 5.1, ensure that your target instance meets or exceeds the specifications of the old setup.

This includes, but is not limited to, memory (RAM), CPU Cores, Storage, and Network Bandwidth.

Procedure: Performing the Migration

1. This step is optional. If custom persistent storage is required for your infrastructure, use the `mgr-storage-server` tool.
 - For more information, see `mgr-storage-server --help`. This tool simplifies creating the container storage and database volumes.
 - Use the command in the following manner:

```
mgr-storage-server <storage-disk-device> [<database-disk-device>]
```

For example:

```
mgr-storage-server /dev/nvme1n1 /dev/nvme2n1
```



This command will create the persistent storage volumes at `/var/lib/containers/storage/volumes`.

For more information, see [Installation-and-upgrade › Container-management](#).

2. Execute the following command to install a new SUSE Multi-Linux Manager server. Replace `<oldserver.fqdn>` with the FQDN of the 4.3 server:

```
mgradm migrate podman <oldserver.fqdn>
```

3. Migrate trusted SSL CA certificates.

Migration of the Certificates

Trusted SSL CA certificates that were installed as part of an RPM and stored on SUSE Multi-Linux

Manager 4.3 in the `/usr/share/pki/trust/anchors/` directory will not be migrated. Because SUSE does not install RPM packages in the container, the administrator must migrate these certificate files manually from the 4.3 installation after the migration.

Procedure: Migrating the Certificates

1. Copy the file from the 4.3 server to the new server. For example, as `/local/ca.file`.
2. Copy the file into the container with:

```
mgrctl cp /local/ca.file server:/etc/pki/trust/anchors/
```



After successfully running the `mgradm migrate` command, the Salt setup on all clients will still point to the old 4.3 server.

To redirect them to the 5.1 server, it is required to rename the new server at the infrastructure level (DHCP and DNS) to use the same FQDN and IP address as 4.3 server.

3.1.2. SUSE Multi-Linux Manager Server Upgrade

Before running the upgrade command, it is recommended to upgrade the `mgradm` tool first.

Procedure: Upgrading Server

1. Refresh software repository with `zypper`:

```
zypper ref
```

2. Apply available updates with `transactional-update`:

```
transactional-update
```

3. If updates were applied, `reboot`.
4. The SUSE Multi-Linux Manager Server container can be updated using the following command:

```
mgradm upgrade podman
```

This command will bring the status of the container up-to-date and restart the server.



Upgrading to specific version

If you do not specify the tag parameter, it will default to upgrading to the most recent version. To upgrade to a specific version, provide the tag parameter with the desired image tag.

For more information on the upgrade command and its parameters, use the following command:

```
mgradm upgrade podman -h
```

For air-gapped installations, first upgrade the container RPM packages, then run the `mgradm` command.

3.2. Proxy

3.2.1. Proxy Migration

In SUSE Multi-Linux Manager 4.3, the proxy can be deployed using three different methods: RPM based, containerized running on podman or k3s.

In SUSE Multi-Linux Manager 5.1, management of the containerized proxy running with podman was re-designed and made simpler with the `mgrpky` tool. At the same time, RPM based support was removed, and only the containerized version running with podman or k3s is supported.

This section describes migrating from Proxy 4.3 using the `mgrpky` tool.



An in-place migration from SUSE Multi-Linux Manager 4.3 to 5.1 is unsupported because the host operating system has changed from SUSE Linux Enterprise Server 15 SP4 to SL Micro 6.1.

The traditional contact protocol is no longer supported in SUSE Multi-Linux Manager 5.0 and later. Before migrating from SUSE Multi-Linux Manager 4.3 to 5.1, any existing traditional clients including the traditional proxies must be migrated to Salt.

For more information about migrating to Salt clients, see <https://documentation.suse.com/suma/4.3/en/suse-manager/client-configuration/contact-methods-migrate-traditional.html>

3.2.1.1. Deploy a New SUSE Multi-Linux Manager Proxy

Because in-place migration is not supported, the users must deploy a new SUSE Multi-Linux Manager proxy with a new FQDN.

For more information about installing SUSE Multi-Linux Manager Proxy, see [Installation-and-upgrade › Install-proxy](#).

3.2.1.2. Migrate Clients to the New Proxy



Before migrating the clients, ensure that the new proxy is already deployed and fully functional.

Procedure: Migrating Client Between Proxies

1. Log in to the SUSE Multi-Linux Manager Server Web UI.
2. From the left navigation, select **Systems › Systems List**.
3. Navigate to the old 4.3 proxy page, and click the **Proxy** tab.
4. Select all systems to "SSM".
5. From the left navigation, select **Systems › System Set Manager**.
6. Select the sub-menu **Misc › Proxy**.
7. From the drop-down select the new proxy to migrate to.
8. Click **[Change Proxy]**.

All selected clients will now be migrated to the new proxy. You can check the schedule progress to verify if all clients were successfully migrated.

After a few minutes, the clients will start to show up the new connection path. When all clients have the connection path under the new proxy, the old 4.3 proxy system is not needed anymore and can be removed.

3.2.2. SUSE Multi-Linux Manager Proxy Upgrade

Before running the upgrade command, it is recommended to upgrade the `mgrpky` tool first.

Procedure

1. One can do so by running the following command:

```
transactional-update
```

2. If updates were applied, `reboot`.
3. The SUSE Multi-Linux Manager 5.1 Proxy containers running on `podman` can be updated using the following command:

```
mgrpky upgrade podman
```

4. Or, those running on a Kubernetes cluster can update using:

```
mgrpky upgrade kubernetes
```



If you do not specify the tag parameter when upgrading to specific version, it will default to upgrading to the most recent version. To upgrade to a specific version, provide the tag parameter with the desired image tag.



While there is an option to upgrade a specific container using its specific tag, this feature is intended for applying PTFs only.

We highly recommend using the same tag for all proxy containers to ensure consistency under normal circumstances.

For air-gapped installations, first upgrade the container RPM packages, then run the `mgrpky`

`upgrade podman` command.

3.3. Clients

3.3.1. Upgrade Clients

Clients use the versioning system of their underlying operating system. For clients using SUSE operating systems, you can perform upgrades within the SUSE Multi-Linux Manager Web UI.

For more information about upgrading clients, see [Client-configuration](#) › [Client-upgrades](#).

Chapter 4. Basic Server and Proxy Management

4.1. Custom YAML Configuration and Deployment with **mgradm**

You have the option to create a custom **mgradm.yaml** file, which the **mgradm** tool can utilize during deployment.



mgradm will prompt for basic variables if they are not provided using command line parameters or the **mgradm.yaml** configuration file.

For security, using command line parameters to specify passwords should be **avoided**. Use a configuration file with proper permissions instead.

Procedure: Deploying the SUSE Multi-Linux Manager Container with Podman Using a Custom Configuration File

1. Prepare a configuration file named **mgradm.yaml** similar to the following example:

```
# Database password. Randomly generated by default
db:
  password: MySuperSecretDBPass

# Password for the CA certificate
ssl:
  password: MySuperSecretSSLPassword

# Your SUSE Customer Center credentials
scc:
  user: ccUsername
  password: ccPassword

# Organization name
organization: YourOrganization

# Email address sending the notifications
emailFrom: notifications@example.com

# Administrators account details
admin:
  password: MySuperSecretAdminPass
  login: LoginName
  firstName: Admin
  lastName: Admin
  email: email@example.com
```

2. From the terminal, as root, run the following command. Entering your server's FQDN is optional.

```
mgradm -c mgradm.yaml install podman <FQDN>
```



You must deploy the container as sudo or root. The following error will be displayed on the terminal if you miss this step.

```
INF Setting up uyuni network
9:58AM INF Enabling system service
9:58AM FTL Failed to open /etc/systemd/system/uyuni-server.service
for writing error="open /etc/systemd/system/uyuni-server.service:
permission denied"
```

3. Wait for deployment to complete.
4. Open a browser and proceed to your server's FQDN or IP address.

4.2. Starting and Stopping Containers

The SUSE Multi-Linux Manager 5.1 Server container can be restarted, started, and stopped using the following commands:

To **restart** the SUSE Multi-Linux Manager 5.1 Server execute the following command:

```
# mgradm restart
5:23PM INF Welcome to mgradm
5:23PM INF Executing command: restart
```

To **start** the server execute the following command:

```
# mgradm start
5:21PM INF Welcome to mgradm
5:21PM INF Executing command: start
```

To **stop** the server execute the following command:

```
# mgradm stop
5:21PM INF Welcome to mgradm
5:21PM INF Executing command: stop
```

4.3. Persistent Container Volumes

Modifications performed within containers are not retained. Any alterations made outside of persistent volumes will be discarded. Below is a list of persistent volumes for SUSE Multi-Linux Manager 5.1.

To customize the default volume locations, ensure you create the necessary volumes before launching the pod for the first time, utilizing the **podman volume create** command.



Ensure that this table aligns precisely with the volumes mapping outlined in both the Helm chart and the systemctl services definitions.

4.3.1. Server

The following volumes are stored under the **Podman** default storage location on the server.

Table 14. Persistent Volumes: Podman Default Storage

Volume Name	Volume Directory
Podman Storage	<code>/var/lib/containers/storage/volumes/</code>

Table 15. Persistent Volumes: root

Volume Name	Volume Directory
root	<code>/root</code>

Table 16. Persistent Volumes: var/

Volume Name	Volume Directory
var-cobbler	<code>/var/lib/cobbler</code>
var-salt	<code>/var/lib/salt</code>
var-pgsql	<code>/var/lib/pgsql</code>
var-cache	<code>/var/cache</code>
var-spacewalk	<code>/var/spacewalk</code>
var-log	<code>/var/log</code>

Table 17. Persistent Volumes: srv/

Volume Name	Volume Directory
srv-salt	<code>/srv/salt</code>
srv-www	<code>/srv/www/</code>
srv-tftpboot	<code>/srv/tftpboot</code>
srv-formulametadata	<code>/srv/formula_metadata</code>
srv-pillar	<code>/srv/pillar</code>
srv-susemanager	<code>/srv/susemanager</code>
srv-spacewalk	<code>/srv/spacewalk</code>

Table 18. Persistent Volumes: etc/

Volume Name	Volume Directory
etc-apache2	/etc/apache2
etc-rhn	/etc/rhn
etc-systemd-multi	/etc/systemd/system/multi-user.target.wants
etc-systemd-sockets	/etc/systemd/system/sockets.target.wants
etc-salt	/etc/salt
etc-sssd	/etc/sssd
etc-tomcat	/etc/tomcat
etc-cobbler	/etc/cobbler
etc-sysconfig	/etc/sysconfig
etc-tls	/etc/pki/tls
etc-postfix	/etc/postfix
ca-cert	/etc/pki/trust/anchors

4.3.2. Proxy

The following volumes are stored under the Podman default storage location on the proxy.

Table 19. Persistent Volumes: Podman Default Storage

Volume Name	Volume Directory
Podman Storage	/var/lib/containers/storage/volumes/

Table 20. Persistent Volumes: srv/

Volume Name	Volume Directory
uyuni-proxy-tftpboot	/srv/tftpboot

Table 21. Persistent Volumes: var/

Volume Name	Volume Directory
uyuni-proxy-rhn-cache	<code>/var/cache/rhn</code>
uyuni-proxy-squid-cache	<code>/var/cache/squid</code>

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