



SUSE Multi-Linux Manager 5.1

# 安装和升级指南

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# Chapter 1. Preface

Installation, Deployment and Upgrade + SUSE Multi-Linux Manager 5.1

This guide provides comprehensive, step-by-step instructions for deploying, upgrading, and managing SUSE Multi-Linux Manager Server and Proxy.

It is organized into the following sections:

- **Requirements:** Outlines the essential hardware, software, and networking prerequisites to ensure a smooth setup.
- **Deployment and Installation:** Guides you through deploying SUSE Multi-Linux Manager as a container and completing the initial configuration.
- **Upgrade and Migration:** Details the process for upgrading and migrating SUSE Multi-Linux Manager while minimizing downtime.
- **Basic Server Management:** Covers fundamental server operations, helping you get started with SUSE Multi-Linux Manager efficiently.

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# Chapter 2. 要求

## 2.1. 一般要求

在安装之前，请确保：

1. SUSE Customer Center 帐户。您可以使用此帐户访问 SUSE Multi-Linux Manager 服务器、代理和零售分支服务器的组织身份凭证和注册密钥。
2. SUSE Multi-Linux Manager Web UI 支持的浏览器。
3. 环境的 SSL 证书。默认情况下，SUSE Multi-Linux Manager 5.1 使用自我签名证书。



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

以下小节包含有关这些要求的详细信息。

### 2.1.1. SUSE Customer Center 帐户和身份凭证

在部署 SUSE Multi-Linux Manager 5.1 之前，在 SUSE Customer Center 中创建一个帐户。

#### 过程：获取组织身份凭证

1. 在 Web 浏览器中导航到 <https://scc.suse.com/login>。
2. 登录到您的 SCC 帐户，或按照提示创建一个新帐户。
3. 如果您尚未这样做，请单击 **[ 连接到组织 ]** 并键入或搜索您的组织。
4. 单击 **[ 管理我的组织 ]**，然后在列表中单击您的组织名称以将其选中。
5. 单击 **[ 用户 ]** 选项卡，然后选择 **[ 组织身份凭证 ]** 子选项卡。
6. 记下您的登录信息，以便在设置 SUSE Multi-Linux Manager 期间使用。

根据组织的设置，还可能需要使用左侧导航栏中的 **[ 激活订阅 ]** 菜单激活您的订阅。

有关使用 SCC 的详细信息，请参见 <https://scc.suse.com/docs/help>。

### 2.1.2. SUSE Multi-Linux Manager Web UI 支持的浏览器

要使用 Web UI 管理您的 SUSE Multi-Linux Manager 环境，必须运行最新的 Web 浏览器。

以下浏览器支持 SUSE Multi-Linux Manager：

- SUSE Linux Enterprise Server 随附的最新 Firefox 浏览器
- 所有操作系统上的最新 Chrome 浏览器
- Windows 随附的最新 Edge 浏览器

不支持 Windows Internet Explorer。在 Windows Internet Explorer 中无法正常呈现 SUSE Multi-Linux Manager Web UI。

### 2.1.3. SSL 证书

SUSE Multi-Linux Manager 使用 SSL 证书来确保客户端注册到正确的服务器。SUSE Multi-Linux Manager 默认使用自我签名证书。如果您的证书已由第三方 CA 签名，可将其导入 SUSE Multi-Linux Manager 安装。

- 有关自我签名证书的详细信息，请参见 **Administration › Ssl-certs-selfsigned**。
- 有关导入的证书的详细信息，请参见 **Administration › Ssl-certs-imported**。

## 2.2. 硬件要求

下表概述了 x86-64、ARM、ppc64le 和 s390x 体系结构上的 SUSE Multi-Linux Manager 服务器与代理的硬件和软件要求。



基于 ppc64le 或 s390x 体系结构的 SUSE Multi-Linux Manager 安装无法使用安全引导来引导网络客户端。存在此限制是因为 shim 引导加载程序不适用于这两种体系结构。

有关 SUSE Multi-Linux Manager for Retail 硬件要求，请参见 **Retail › Retail-requirements**。

### 2.2.1. 服务器要求

One of SL Micro 6.1 or SUSE Linux Enterprise Server 15 SP7 is the operating system of the container host.

In the following, SUSE Linux Enterprise Server as the installed host operating system is explicitly mentioned only if it matters. Otherwise we either write SL Micro or just host operating system.

The container host with SL Micro as operating system requires as free disk space:

- 至少 100 GB 用于基础安装
- 再加上至少 130 GB 用于储存库数据

Depending on the amount of selected software, SUSE Linux Enterprise Server as operating system can require considerably more disk space.

默认情况下，SUSE Multi-Linux Manager 服务器容器会将镜像储存库（软件包或产品）、数据库和其他数据存储在 `/var/lib/containers/storage/volumes/` 目录的子目录中。如果此目录耗尽了磁盘空间，储存库同步将会失败。请根据您的镜像的客户端和储存库的数量和类型来估算 `/var/lib/containers/storage/volumes/` 目录所需的空。

有关文件系统和分区细节的详细信息，请参见 [installation-and-upgrade:hardware-requirements.pdf](#) 和本指南的安装和部署相关章节中的详细安装说明。

### 表格 1. 服务器硬件要求

| 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 | / (root directory)   | 40 GB  |
|            | <b>/var/lib/containers/storage/volumes</b>   | Minimum 150 GB (depending on the number of products) |
|            | <b>/var/lib/containers/storage/volumes/var-pgsql</b>   | Minimum 50 GB  |
| Swap space | Systems can benefit from additional swap space. SUSE recommends using a swap file instead of a swap partition. For more information about swap space, see <a href="#">installation-and-upgrade:hardware-requirements.pdf</a> . | 8 to 12 GB   |

The images by default have a 40 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 性能取决于硬件资源、网络带宽、客户端与服务器之间的延迟，等等。

根据所用体验和部署方式的不同，SUSE Multi-Linux Manager 服务器与足够数量的代理配套使用时，建议每个服务器处理的客户端不要超过 10,000 个，以便获得最佳性能。当客户端数量超过 10,000 个时，强烈建议改为使用集线器设置并咨询相关专业人员。即使优化了设置并配备了充足的代理，数量如此庞大的客户端也可能导致发生性能问题。

有关如何管理大量客户端的详细信息，请参见 **Specialized-guides** › **Large-deployments**。

2.2.2. 代理要求

One of SL Micro 6.1 or SUSE Linux Enterprise Server 15 SP7 is the operating system of the container host.



Minimum requirements are suitable for a quick test installation, such as a Proxy with one client. If you want to use a production environment start with recommended values.


表格 2. 代理硬件要求

| Hardware   | Details  | Recommendation                       |
|------------|--|--------------------------------------|
| CPU        | x86-64, ARM  | Minimum 2 dedicated 64-bit CPU cores |
|            | Recommended  | The same as minimum values           |
| RAM        | Minimum  | 2 GB                                 |
|            | Recommended  | 8 GB                                 |
| Disk Space | / (root directory)   | Minimum 40 GB                        |
|            | <b>/var/lib/containers/storage/volumes</b>   | Minimum 100 GB                       |
| Swap space | Systems can benefit from additional swap space. SUSE recommends using a swap file instead of a swap partition. For more information about swap space, see <a href="#">installation-and-upgrade:hardware-requirements.pdf</a> . | 4 to 8 GB                            |

默认情况下，SUSE Multi-Linux Manager 代理容器将软件包缓存在 **/var/lib/containers/storage/volumes/uyuni-proxy-squid-cache/** 目录中。如果可用空间不足，代理将去除旧的未使用软件包，并将其替换为较新的软件包。

鉴于这种行为：

- 代理上的 **/var/lib/containers/storage/volumes/uyuni-proxy-squid-cache/** 目录越大，代理与 SUSE Multi-Linux Manager 服务器之间的流量就越少。
- 使代理上的 **/var/lib/containers/storage/volumes/uyuni-proxy-squid-cache/** 目录与 SUSE Multi-Linux Manager 服务器上的 **/var/lib/containers/storage/volumes/var-spacewalk/** 保持相同的大小，可以避免在首次同步后出现大量的流量。
- SUSE Multi-Linux Manager 服务器上的 **/var/lib/containers/storage/volumes/uyuni-proxy-squid-cache/** 目录可能比代理上的目录要小。有关大小估算的指导，请参见[服务器要求](#)一节。




一般情况下，SUSE 建议将缓存目录的值调整为可用空间的 80 %。在服务器上生成代理配置时会设置 **cache\_dir** 值。无法直接在 **squid.conf** 中设置该选项。

### 2.2.3. Swap space

Workloads differ from system to system. Systems with heavy or unpredictable workloads can benefit from additional swap space, regardless of total RAM. It is recommended to place swap on the fastest available storage (for example, SSD). SUSE recommends using a swap file instead of a swap partition.

For size recommendations, see the tables above.

The following shell command snippet creates a 8GiB swap file.



A swap file on Btrfs filesystem prevent creating of a snapshot of that volume. **/var** in the following example is already excluded from the snapper snapshots, so it is safe to



```
use /var/swap.
```

```
## setup swapfile at /var/swap
# run following as a root user

# allocate 8GiB for swap file
fallocate -l 8G /var/swap
# ensure CoW is disabled for the swap file
chattr +C /var/swap
# allow only root access
chmod 600 /var/swap
# make swap file based on allocated file
mkswap /var/swap
# activate swap use for the running system
swapon /var/swap
# activate swap during the next boots
echo "/var/swap swap swap defaults 0 0" >> /etc/fstab
```

### 2.2.4. 数据库要求

PostgreSQL 是唯一受支持的数据库。不支持使用远程 PostgreSQL 数据库或装有 PostgreSQL 数据库的远程文件系统（例如 NFS）。换句话说，PostgreSQL 应该位于 SUSE Multi-Linux Manager 可用的最快的存储设备上。



由于存在潜在性能问题，我们不建议从 SUSE Multi-Linux Manager 远程运行 PostgreSQL 数据库。虽然这种环境在很多情况下是可行的甚至非常稳定，但如果发生问题，始终存在丢失数据的风险。

如果发生这种情况，SUSE 可能无法提供帮助。

### 2.2.5. 永久性存储和权限

默认情况下，在部署容器时会创建永久性卷。

但建议您将卷存储在一个或多个单独的存储设备上。这种设置有助于避免生产环境中丢失数据。此操作可在部署容器后再进行。

最好在首次部署容器之后设置存储设备。有关更多细节，请参见 **Installation-and-upgrade > Container-management**。

我们建议使用 XFS 作为所有卷的文件系统类型。用于存储存储库的磁盘大小取决于您要使用 SUSE Multi-Linux Manager 管理的发行套件和通道数目。请参见本节中的表格来估算所需大小。



Do not use NFS for Cobbler or PostgreSQL storage, neither NFS on SELinux environments. These scenarios are not supported.

在 SUSE Multi-Linux Manager 服务器上，使用以下命令找到所有可用的存储设备：

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

使用 **lsblk** 命令查看每个设备的名称和大小。

使用 **mgr-storage-server** 命令并加上设备名，可将外部磁盘设置为数据存储位置，您还可以选择指定服务器自身的磁盘用于数据库：

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

例如：

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

外部存储卷将设置为挂载到 **/manager\_storage** 和 **/pgsql\_storage** 的 XFS 分区。



此命令将在 **/var/lib/containers/storage/volumes** 中创建永久性存储卷。

有关详细信息，请参见 **Installation-and-upgrade > Container-management**。

可对通道数据和数据库使用同一个存储设备。但不建议这样做，因为不断增长的通道储存库可能会填满存储，从而给数据库完整性带来风险。使用独立的存储设备还可以提高性能。如果您想要使用单个存储设备，请结合单个设备名参数运行 **mgr-storage-server**。

如果您安装的是代理，**mgr-storage-proxy** 命令只接受单个设备名参数，并将外部存储位置设置为 Squid 缓存。

## 2.2.6. 逻辑卷管理 (LVM)

对于所有类型的虚拟机 (VM)，通常都不需要 LVM，也不建议使用。磁盘设置是虚拟的，因此卷可以使用单独的磁盘，这也是建议的做法。

对于其他部署，也建议为卷使用单独的磁盘。

On the container host of 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 container host of 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**.

## 2.3. 网络要求

本节详细说明 SUSE Multi-Linux Manager 的网络和端口要求。



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.

您可以考虑根据您的策略实现 SUSE Multi-Linux Manager 环境的网络隔离。

有关详细信息，请参见 <https://www.suse.com/support/kb/doc/?id=000020166>。

### 2.3.1. 完全限定的域名 (FQDN)

SUSE Multi-Linux Manager 服务器必须正确解析其 FQDN。如果无法解析 FQDN，可能会导致许多不同的组件出现严重问题。

有关配置主机名和 DNS 的详细信息，请参见 <https://documentation.suse.com/sles/15-SP6/html/SLES-all/cha-network.html#sec-network-yast-change-host>。

### 2.3.2. 主机名和 IP 地址

为确保 SUSE Multi-Linux Manager 域名可由其客户端解析，服务器和客户端计算机都必须连接到一台正常工作的 DNS 服务器。还需要确保正确配置反向查找。

有关设置 DNS 服务器的详细信息，请参见 <https://documentation.suse.com/sles/15-SP6/html/SLES-all/cha-dns.html>。

### 2.3.3. Reenable router advertisements

When the SUSE Multi-Linux Manager is installed using **mgradm install podman** or **mgrpky install podman**, it sets up Podman which enables IPv4 and IPv6 forwarding. This is needed for communication from the outside of the container.

However, if your system previously had `/proc/sys/net/ipv6/conf/eth0/accept_ra` set to **1**, it will stop using router advertisements. As a result, the routes are no longer obtained via router advertisements and the default IPv6 route is missing.

To recover correct functioning of the IPv6 routing, follow the procedure:

#### Procedure: Reenabling router advertisements

1. Create a file in `/etc/sysctl.d`, for example **99-ipv6-ras.conf**.
2. Add the following parameter and value to the file:

```
net.ipv6.conf.eth0.accept_ra = 2
```

3. 重引导。

### 2.3.4. Deployment behind HTTP or HTTPS OSI level 7 proxy

Some environments enforce internet access through a HTTP or HTTPS proxy. This could be a Squid server or similar. To allow the SUSE Multi-Linux Manager Server internet access in such configuration, you need to configure the following.

## Procedure: Configuring HTTP or HTTPS OSI level 7 proxy

1. For operating system internet access, modify **/etc/sysconfig/proxy** according to your needs:

```
PROXY_ENABLED="no"
HTTP_PROXY=""
HTTPS_PROXY=""
NO_PROXY="localhost, 127.0.0.1"
```

2. For **Podman** container internet access, modify **/etc/systemd/system/uyuni-server.service.d/custom.conf** according to your needs. For example, set:

```
[Service]
Environment=TZ=Europe/Berlin
Environment="PODMAN_EXTRA_ARGS="
Environment="https_proxy=user:password@http://192.168.10.1:3128"
```

3. For Java application internet access, modify **/etc/rhn/rhn.conf** according to your needs. On the container host, execute **mgrctl term** to open a command line inside the server container:

- a. Modify **/etc/rhn/rhn.conf** according to your needs. For example, set:

```
# Use proxy FQDN, or FQDN:port
server.satellite.http_proxy =
server.satellite.http_proxy_username =
server.satellite.http_proxy_password =
# no_proxy is a comma seperated list
server.satellite.no_proxy =
```

4. On the container host, restart the server to enforce the new configuration:

```
systemctl restart uyuni-server.service
```

### 2.3.5. 物理隔离的部署

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**.

在生产环境中，SUSE Multi-Linux Manager 服务器和客户端始终应使用防火墙。有关所需端口的完整列表，请参见 [installation-and-upgrade:network-requirements.pdf](#)。

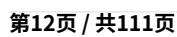
### 2.3.6. 所需的网络端口

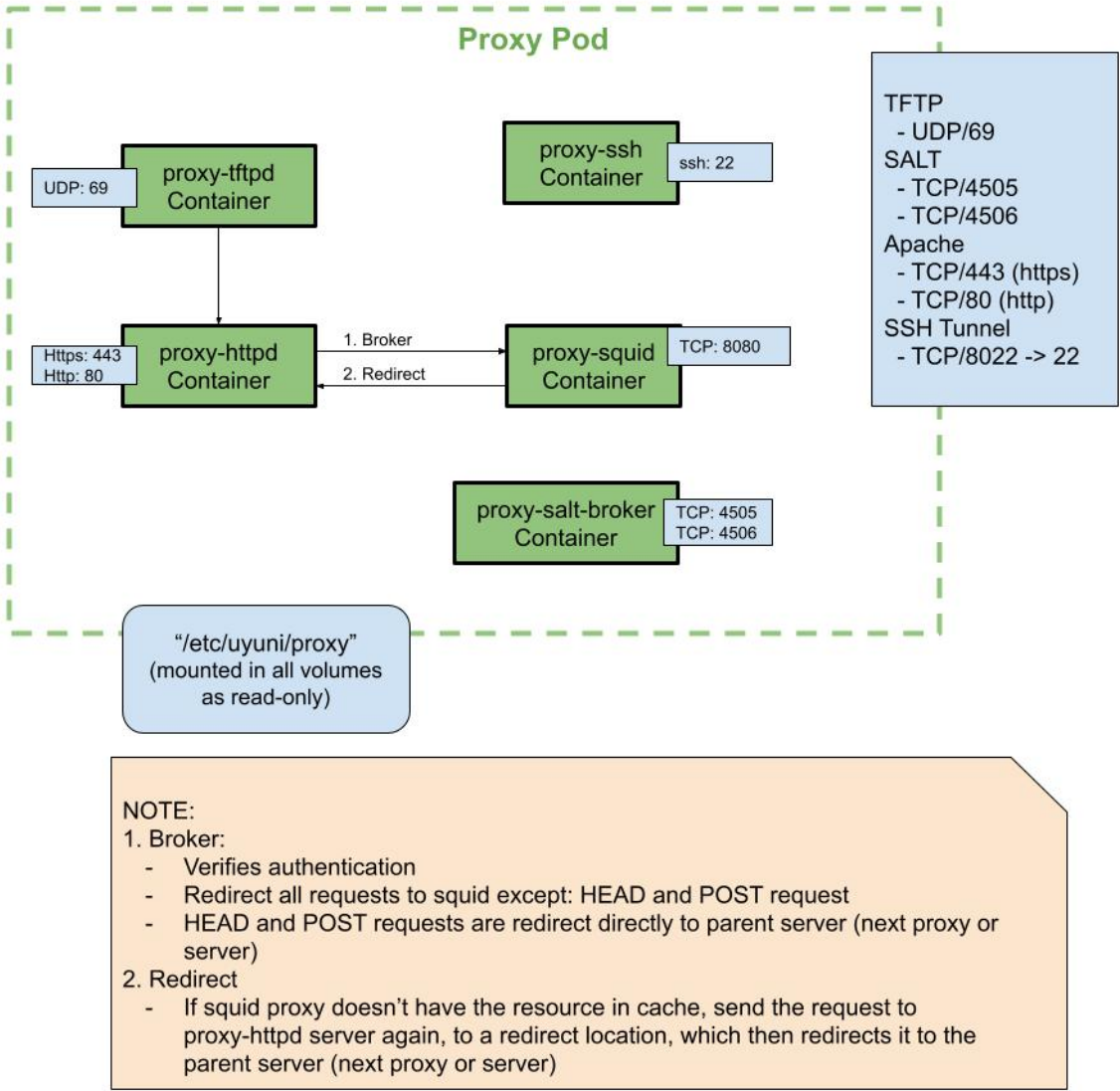
本节提供了 SUSE Multi-Linux Manager 中各种通讯使用的端口的综合列表。

您不需要打开所有这些端口。某些端口只有在您使用需要这些端口的服务时才需打开。

#### 2.3.6.1.1. 服务器

#### 2.3.6.1.2. 代理





2.3.6.2. 外部入站服务器端口

必须打开外部入站端口，以在 SUSE Multi-Linux Manager 服务器上配置防火墙用于防范未经授权访问服务器。

打开这些端口将允许外部网络流量访问 SUSE Multi-Linux Manager 服务器。

表格 3. SUSE Multi-Linux Manager Server 的外部端口要求

| Port number | Protocol | Used By | Notes   |
|-------------|----------|---------|---|
| 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. |

| Port number | Protocol | Used By    | Notes   |
|-------------|----------|------------|---|
| 80          | TCP      | HTTP       | Required temporarily for some bootstrap repositories and automated installations.   |
| 443         | TCP      | HTTPS      | Serves the Web UI, client, and server and proxy ( <b>tftpsync</b> ) 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    |   |

#### 2.3.6.3. 外部出站服务器端口

必须打开外部出站端口，以在 SUSE Multi-Linux Manager 服务器上配置防火墙用于限制服务器可访问的内容。

打开这些端口将允许来自 SUSE Multi-Linux Manager 服务器的网络流量与外部服务通讯。

#### 表格 4. SUSE Multi-Linux Manager Server 的外部端口要求

| 端口号   | 协议  | 使用方     | 备注   |
|-------|-----|---------|--|
| 80    | TCP | HTTP    | SUSE Customer Center 需要此端口。端口 80 不用于为 Web UI 传递数据。 |
| 443   | TCP | HTTPS   | SUSE Customer Center 需要此端口。                        |
| 25151 | TCP | Cobbler |  |

#### 2.3.6.4. 内部服务器端口

内部端口由 SUSE Multi-Linux Manager 服务器在内部使用。只能从 **localhost** 访问内部端口。

大多数情况下无需调整这些端口。

表格 5. SUSE Multi-Linux Manager Server 的内部端口要求

| 端口号   | 备注  |
|-------|---|
| 2828  | Satellite-search API，由 Tomcat 和 Taskomatic 中的 RHN 应用程序使用。           |
| 2829  | Taskomatic API，由 Tomcat 中的 RHN 应用程序使用。                              |
| 8005  | Tomcat 关机端口。  |
| 8009  | Tomcat 到 Apache HTTPD (AJP)。  |
| 8080  | Tomcat 到 Apache HTTPD (HTTP)。                                       |
| 9080  | Salt-API，由 Tomcat 和 Taskomatic 中的 RHN 应用程序使用。                       |
| 25151 | Cobbler 的 XMLRPC API  |
| 32000 | 与运行 Taskomatic 和 satellite-search 的 Java 虚拟机 (JVM) 建立 TCP 连接时使用此端口。 |

32768 和更高的端口用作临时端口。这些端口往往用于接收 TCP 连接。收到 TCP 连接请求后，发送方将选择其中一个临时端口号来与目标端口进行匹配。

可使用以下命令来确定哪些端口是临时端口：

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

### 2.3.6.5. 外部入站代理端口

必须打开外部入站端口，以在 SUSE Multi-Linux Manager Proxy 上配置防火墙用于防范未经授权访问代理。

打开这些端口将允许外部网络流量访问 SUSE Multi-Linux Manager Proxy。

表格 6. SUSE Multi-Linux Manager Proxy 的外部端口要求

| Port number | Protocol | Used By | Notes   |
|-------------|----------|---------|---|
| 22          |          |         | Only required if the user wants to manage the proxy host with Salt SSH.           |
| 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 ( <b>tftpsync</b> ) requests.                |



| Port number | Protocol | Used By | Notes   |
|-------------|----------|---------|---|
| 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. |
| 8022        |          |         | 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.     |

### 2.3.6.6. 外部出站代理端口

必须打开外部出站端口，以在 SUSE Multi-Linux Manager Proxy 上配置防火墙用于限制代理可访问的内容。

打开这些端口将允许来自 SUSE Multi-Linux Manager Proxy 的网络流量与外部服务通讯。

**表格 7. SUSE Multi-Linux Manager Proxy 的外部端口要求**

| Port number | Protocol | Used By | Notes  |
|-------------|----------|---------|--|
| 80          |          |         | Used to reach the server.  |
| 443         | TCP      | HTTPS   | Required for SUSE Customer Center.                               |
| 4505        | TCP      | Salt    | Required to connect to Salt master either directly or via proxy. |
| 4506        | TCP      | Salt    | Required to connect to Salt master either directly or via proxy. |

### 2.3.6.7. 外部客户端端口

必须打开外部客户端端口，以在 SUSE Multi-Linux Manager 服务器及其客户端之间配置防火墙。

大多数情况下无需调整这些端口。

**表格 8. SUSE Multi-Linux Manager 客户端的外部端口要求**

| 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.                         |

| Port number | Direction | Protocol | Notes  |
|-------------|-----------|----------|--|
| 443         | Outbound  |          | Used to reach the server or proxy.                               |
| 4505        | Outbound  | TCP      | Required to connect to Salt master either directly or via proxy. |
| 4506        | Outbound  | TCP      | Required to connect to Salt master either directly or via 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.                              |

### 2.3.6.8. 所需的 URL

SUSE Multi-Linux Manager 必须能够访问某些 URL 才能注册客户端和执行更新。大多数情况下，允许访问以下 URL 便已足够：

- [scc.suse.com](https://scc.suse.com)
- [updates.suse.com](https://updates.suse.com)
- [installer-updates.suse.com](https://installer-updates.suse.com)
- [registry.suse.com](https://registry.suse.com)
- [registry-storage.suse.com](https://registry-storage.suse.com)

您可以在以下文章中找到有关将指定 URL 及其关联 IP 地址列入白名单的更多信息：[访问受防火墙和/或代理保护的 SUSE Customer Center 和 SUSE 注册表](#)。

如果您正在使用非 SUSE 客户端，则还可能允许访问为这些操作系统提供特定软件包的其他服务器。例如，如果您使用的是 Ubuntu 客户端，则需要能够访问 Ubuntu 服务器。

有关为非 SUSE 客户端排查防火墙访问权限问题的详细信息，请参见 **Administration › Troubleshooting**。

## 2.4. 公有云要求

本节介绍在公有云基础结构上安装 SUSE Multi-Linux Manager 所要满足的要求。我们已在 Amazon EC2、Google Compute Engine 和 Microsoft Azure 上对这些指令进行过测试，不过它们进行一定修改后在其他提供商的云服务上也应能正常工作。

在开始之前，请注意以下一些事项：

- SUSE Multi-Linux Manager 设置过程执行正向确认的反向 DNS 查找。此操作必须成功，设置过程才能完成，并且 SUSE Multi-Linux Manager 才能按预期方式运行。请务必在设置 SUSE Multi-Linux Manager 之

前执行主机名和 IP 配置。

- SUSE Multi-Linux Manager Server 和 Proxy 实例需在适当的网络配置中运行，该网络配置可让您控制 DNS 项，但无法通过因特网自由访问。
- 在此网络配置中必须提供 DNS 解析：**hostname -f** 必须返回完全限定的域名 (FQDN)。
- DNS 解析对于连接客户端也很重要。
- DNS 取决于所选的云框架。有关详细说明，请参见云提供商文档。
- 我们建议将软件储存库、服务器数据库和代理 squid 缓存存储在外部虚拟磁盘上。这可以防止在实例意外终止时丢失数据。本节包含有关设置外部虚拟磁盘的说明。

### 2.4.1. 网络要求

在公有云上使用 SUSE Multi-Linux Manager 时，必须使用受限制的网络。我们建议使用带有适当防火墙设置的 VPN 专用子网。只能允许指定 IP 范围内的计算机访问该实例。



在公有云上运行 SUSE Multi-Linux Manager 意味着需要实施强大的安全措施。限制、过滤、监控并审计对实例的访问至关重要。SUSE 强烈建议不要配置全球均可访问但缺少充足边界安全保护的 SUSE Multi-Linux Manager 实例。

要访问 SUSE Multi-Linux Manager Web UI，请在配置网络访问控制时允许 HTTPS。这将允许您访问 SUSE Multi-Linux Manager Web UI。

在 EC2 和 Azure 中，创建一个新安全组，并添加 HTTPS 入站和出站规则。在 GCE 中，选中**防火墙**部分下的**允许 HTTPS 流量**复选框。

### 2.4.2. 准备存储卷

我们建议将 SUSE Multi-Linux Manager 的储存库和数据库存储在不同于根卷的存储设备上。这有助于避免丢失数据，有时还可以提高性能。

SUSE Multi-Linux Manager 容器利用默认存储位置。应在部署之前为自定义存储配置这些位置。有关详细信息，请参见 **Installation-and-upgrade > Container-management**



不要使用逻辑卷管理 (LVM) 进行公有云安装。

用于存储储存库的磁盘大小取决于您要使用 SUSE Multi-Linux Manager 管理的发行套件和通道数目。挂接虚拟磁盘时，它们将作为 Unix 设备节点显示在实例中。设备节点的名称因提供商及所选实例类型而异。

确保 SUSE Multi-Linux Manager 服务器的根卷大小不少于 100 GB。如果可能，请另外添加一个 500 GB 或以上大小的存储磁盘，并选择 SSD 存储类型。当您的实例启动时，SUSE Multi-Linux Manager 服务器的云映像会使用脚本来指派这个单独的卷。

启动实例后，您便可登录 SUSE Multi-Linux Manager 服务器，并使用以下命令查找所有可用的存储设备：

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

如果您不确定应选择哪个设备，可使用 **lsblk** 命令查看每个设备的名称和大小。请选择与要寻找的虚拟磁盘大小匹配的名称。

可以使用 **mgr-storage-server** 命令设置外部磁盘。这会创建一个挂载到 **/manager\_storage** 的 XFS 分区，并使用它作为存储数据库和储存库的位置：

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

有关设置存储卷和分区的详细信息（包括建议的最小大小），请参见 **Installation-and-upgrade** > **Hardware-requirements**。

## Chapter 3. 安装和部署

### 3.1. Install SUSE Multi-Linux Manager Server

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

#### 3.1.1. SUSE Multi-Linux Manager 5.1 Server Deployment

This guide shows you how to install and configure a SUSE Multi-Linux Manager 5.1 container on SL Micro 6.1 or SUSE Linux Enterprise Server 15 SP7.

##### 3.1.1.1. SUSE Multi-Linux Manager 的硬件要求

下表显示了在裸机上部署 SUSE Multi-Linux Manager 服务器所要满足的软件和硬件要求。在本指南中，您的计算机应具有 16 GB RAM 和至少 200 GB 磁盘空间。有关磁盘空间的背景信息，请参见 [Installation-and-upgrade > Hardware-requirements](#)。

表格 9. 软件和硬件要求

| Software and Hardware | Recommended  |
|-----------------------|--|
| Operating System      | SL Micro 6.1 or<br><br>SUSE Linux Enterprise Server 15 SP7           |
| 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<br><br>360 GB per Red Hat product |
| Swap space:           | 8 to 12 GB   |

#### 服务器容器主机支持的操作系統

The supported operating system for the container host is SL Micro 6.1 or SUSE Linux Enterprise Server 15 SP7.



#### 容器主机

容器主机是配备了容器引擎（例如 **Podman**）的服务器，可用于管理和部署容器。这些容器包含应用程序及其必备组件（例如库），但不包含完整的操作系统，因此体量很小。此设置可确保应用程序能够在不同环境中以一致的方式运行。容器主机为这些容器提供必要的资源，例如 CPU、内存和存储空间。

必须使用完全限定的域名（FQDN）才能完成服务器部署。如果您的路由器或网络无法为 FQDN 提供自动 DNS 置备，则部署过程将无法成功进行。FQDN 通常采用 <主机>.<域>.com 格式。

例如：

- **mlm.example.com**
- **mlm.container.lab**

有关详细信息，请参见 **Installation-and-upgrade › Network-requirements** 中有关网络要求的章节。

### 3.1.1.2. 永久性卷

SUSE Multi-Linux Manager 5.1 默认会定义所需的永久性存储卷。如果尚不存在，在安装期间 **mgradm** 工具将创建这些卷。

将在 **/var/lib/containers/storage/volumes/** 中创建这些卷，默认情况下，**Podman** 也会将其卷存储到此路径。

#### 建议

您可以通过将外部存储设备挂载到此目录来利用存储的简便性。由于这样会存储 PostgreSQL 数据库、储存库的二进制软件包、缓存、操作系统映像、自动安装发行套件和配置文件，我们提出了三项建议：

##### 快速存储

此挂载点最好是 NVMe 或 SSD 级设备。较慢的存储会对 SUSE Multi-Linux Manager 性能产生不利影响。

##### 大容量

建议的最小容量为 300 GB，如果需要管理多个 Linux 发行套件或体系结构，则应提供更多容量。

##### 建议的文件系统

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

##### 可选

可以通过将磁盘挂载到文件系统中的预期卷路径（例如 **/var/lib/containers/storage/volumes/var-spacewalk**）来为卷提供自定义存储。这样会增大 SUSE Multi-Linux Manager 部署复杂性，并且可能会影响建议的默认存储配置所提供的弹性。

有关容器中所有永久性卷的列表，请参见 **Installation-and-upgrade › Container-management**。

### 3.1.1.3. Prepare SUSE Multi-Linux Manager Server Host

You can deploy SUSE Multi-Linux Manager on SL Micro 6.1 or SUSE Linux Enterprise Server 15 SP7. SL Micro is a transactional system, while SUSE Linux Enterprise Server is a full server operating system.

Depending on your decision, either continue with [installation-and-upgrade:container-deployment/mlm/server-deployment-mlm.pdf](#) or with [installation-and-upgrade:container-deployment/mlm/server-deployment-mlm.pdf](#) and skip the not selected section.

#### 3.1.1.3.1. Prepare SL Micro 6.1 Host

##### Download the installation media

##### 过程：下载安装媒体

1. Locate the SL Micro 6.1 installation media at <https://www.suse.com/download/sle-micro/>, and download the appropriate media file.
2. 将下载下来的 .iso 映像放入一个 DVD 或 USB 闪存盘以进行安装。

##### Install SL Micro 6.1

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

### Procedure: Installing SL Micro 6.1

1. Insert the DVD or USB flash drive (USB disk or key) containing the installation image for SLE Micro 6.1.
2. 引导或重引导您的系统。
3. 使用箭头键选择**安装**。
4. Adjust Keyboard and language.
5. 单击**复选框**接受许可协议。
6. 单击**下一步**继续。
7. 选择注册方法。在本示例中，我们将在 SUSE Customer Center 中注册服务器。



SUSE Multi-Linux Manager 5.1 容器会安装为扩展。根据以下列出的所需特定扩展，您还需要有各个扩展的 SUSE Customer Center 注册代码。

- SUSE Multi-Linux Manager 5.1 服务器
- SUSE Multi-Linux Manager 5.1 代理
- SUSE Multi-Linux Manager 5.1 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.

8. 输入您的 SUSE Customer Center 电子邮件地址。
9. Enter your registration code for SL Micro 6.1.
10. 单击**下一步**继续。
11. To install a proxy, select the SUSE Multi-Linux Manager 5.1 Proxy extension; to install a server, select the SUSE Multi-Linux Manager 5.1 Server extension **Checkbox**.
12. 单击**下一步**继续。
13. Enter your SUSE Multi-Linux Manager 5.1 extension registration code.
14. 单击 [ **下一步** ] 继续。
15. 在 **NTP 配置**页面上, 单击 [ **下一步** ]。
16. 在**系统身份验证**页面上, 输入 root 用户的口令。单击 [ **下一步** ]。
17. 在**安装设置**页面上单击 [ **安装** ]。

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

#### OPTIONAL: Registration from the command line

If you added SUSE Multi-Linux Manager 5.1 as an extension during SL Micro 6.1 installation then you can skip this procedure. 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.



The following steps register a SUSE Multi-Linux Manager 5.1 extension 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.

### Procedure: Registering from the Command Line

1. List available extensions with the following command:

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

2. From the list of available extensions, select the one you wish to install:

- a. If installing the Server, use your SUSE Multi-Linux Manager Server Extension 5.1 x86\_64 registration code with following command:

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

- b. If installing the Proxy, use your SUSE Multi-Linux Manager Proxy Extension 5.1 x86\_64 registration code with following command:

```
transactional-update register -p Multi-Linux-Manager-Proxy/5.1/x86_64 -r  
<reg_code>
```



## 3. 重引导。

## 更新系统

## 过程：更新系统

1. 以 **root** 身份登录。
2. 运行 **transactional-update**:

```
transactional-update
```

## 3. 重引导。



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
```

To continue with deployment, see [installation-and-upgrade:container-deployment/mlm/server-deployment-mlm.pdf](#).

## 3.1.1.3.2. Prepare SUSE Linux Enterprise Server 15 SP7 Host

Alternatively, you can deploy SUSE Multi-Linux Manager on SUSE Linux Enterprise Server 15 SP7.

The following procedure describes the main steps of the installation process.

## Procedure: Installing SUSE Multi-Linux Manager Extensions on SUSE Linux Enterprise Server 15 SP7

1. Locate and download SUSE Linux Enterprise Server 15 SP7 **.iso** at <https://www.suse.com/download/sles/>.
2. Make sure that you have registration codes both for the host operating system (SUSE Linux Enterprise Server 15 SP7) and extensions
3. Start the installation of SUSE Linux Enterprise Server 15 SP7.
  - a. On the **Language, keyboard and product selection** select the product to install.
  - b. On the **License agreement** read the agreement and check **I Agree to the License Terms**.
4. Select the registration method. For this example, we will register the server with SUSE Customer Center.

5. 输入您的 SUSE Customer Center 电子邮件地址。
6. Enter your registration code for SUSE Linux Enterprise Server 15 SP7.
7. 单击**下一步**继续。



Please note that for SUSE Linux Enterprise Server 15 SP7, you are required to have a valid SUSE Linux Enterprise Server subscription and corresponding registration code, which you must provide on this screen. You will be required to enter the SUSE Multi-Linux Manager Extension registration code below.

8. In the screen **Extensions and Modules Selection** check the following:
  - Select the SUSE Multi-Linux Manager Server Extension to install the Server, or the SUSE Multi-Linux Manager Proxy Extension to install the Proxy.
  - Basesystem Module
  - Containers Module
9. 单击**下一步**继续。
10. Enter your SUSE Multi-Linux Manager 5.1 extension registration code.
11. 单击 **[ 下一步 ]** 继续。
12. 完成安装。
13. When the installation completes, log in to the newly installed server as root.
14. Update the System (optional, if the system was not set to download updates during install):

```
zypper up
```

15. 重引导。
16. Log in as root and install **podman** plus **mgradm** and **mgradm-bash-completion** (if not already automatically installed):

```
zypper install podman mgradm mgradm-bash-completion
```

17. Start the Podman service by rebooting the system, or running a command:

```
systemctl enable --now podman.service
```

To continue with deployment, see [installation-and-upgrade:container-deployment/mlm/server-deployment-mlm.pdf](#).

#### 3.1.1.4. 配置自定义永久性存储

配置永久性存储空间并非强制性要求，但这是唯一可避免在容器全盘空间用尽的情况下出现严重问题的方法。强烈建议您使用 **mgr-storage-server** 工具来配置自定义永久性存储空间。

有关详细信息，请参见 **mgr-storage-server --help**。此工具可以简化容器存储和数据库卷的创建。

+

如下所示使用命令：

+

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

+

例如：

+

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

+



此命令将在 **/var/lib/containers/storage/volumes** 中创建永久性存储卷。

有关详细信息，请参见

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

### 3.1.1.5. Deploy SUSE Multi-Linux Manager with mgradm



If you want to use third-party SSL certificates instead of the self-signed certificates, import them in the run of the following deployment procedure.

For more information about the requirements of third-party SSL certificates, see **Administration › Ssl-certs-imported**.



SUSE Multi-Linux Manager server hosts that are hardened for security may restrict execution of files from the **/tmp** folder. In such cases, as a workaround, export the **TMPDIR** environment variable to another existing path before running **mgradm**. For example:

```
export TMPDIR=/path/to/other/tmp
```

In SUSE Multi-Linux Manager updates, tools will be changed to make this workaround unnecessary.

## 过程：使用 mgradm 部署 SUSE Multi-Linux Manager 5.1

1. 以 root 身份登录。
2. Execute one of the following commands, depending on the SSL certificate variant (self-signed or third-party). Replace **<FQDN>** with your fully qualified domain name of the SUSE Multi-Linux Manager Server:

- Using self-signed certificates provided by SUSE Multi-Linux Manager:

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

- With importing SSL certificates using third-party SSL certificate flags (the example can adjusted if not all these certificates are needed):

```
mgradm install podman <FQDN> \
  --ssl-ca-intermediate <strings> \
  --ssl-ca-root <string> \
  --ssl-server-cert <string> \
  --ssl-server-key <string> \
  --ssl-db-ca-intermediate <strings> \
  --ssl-db-ca-root <string> \
  --ssl-db-cert <string> \
  --ssl-db-key <string>
```

For more information, see **mgradm install podman --help**.



If the executed 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 <电子邮件地址> -p <注册代码> registry.suse.com
```

根据提示使用 SUSE Multi-Linux Manager 5.1 注册密钥。

3. Enter CA key (certificate authority) and administrator account password when prompted.



管理员帐户口令长度必须至少为 5 个字符且不超过 48 个字符。

4. 按 **[ Enter ]**。
5. 输入管理帐户的电子邮件地址。按 **[ Enter ]**。
6. 等待部署完成。
7. 打开浏览器并访问您的服务器 FQDN。
8. 输入您的用户名（默认为 **admin**）以及在部署过程中设置的口令。

在本指南中，您已将 SUSE Multi-Linux Manager 5.1 服务器部署为容器。请继续阅读下一节来添加您的组织身份凭证，以便与 SUSE Customer Center 同步。

### 3.1.1.6. 将 SUSE Multi-Linux Manager 5.1 连接到 SUSE Customer Center

本节介绍如何通过 Web UI 与 SCC 同步，以及如何添加第一个客户端通道。

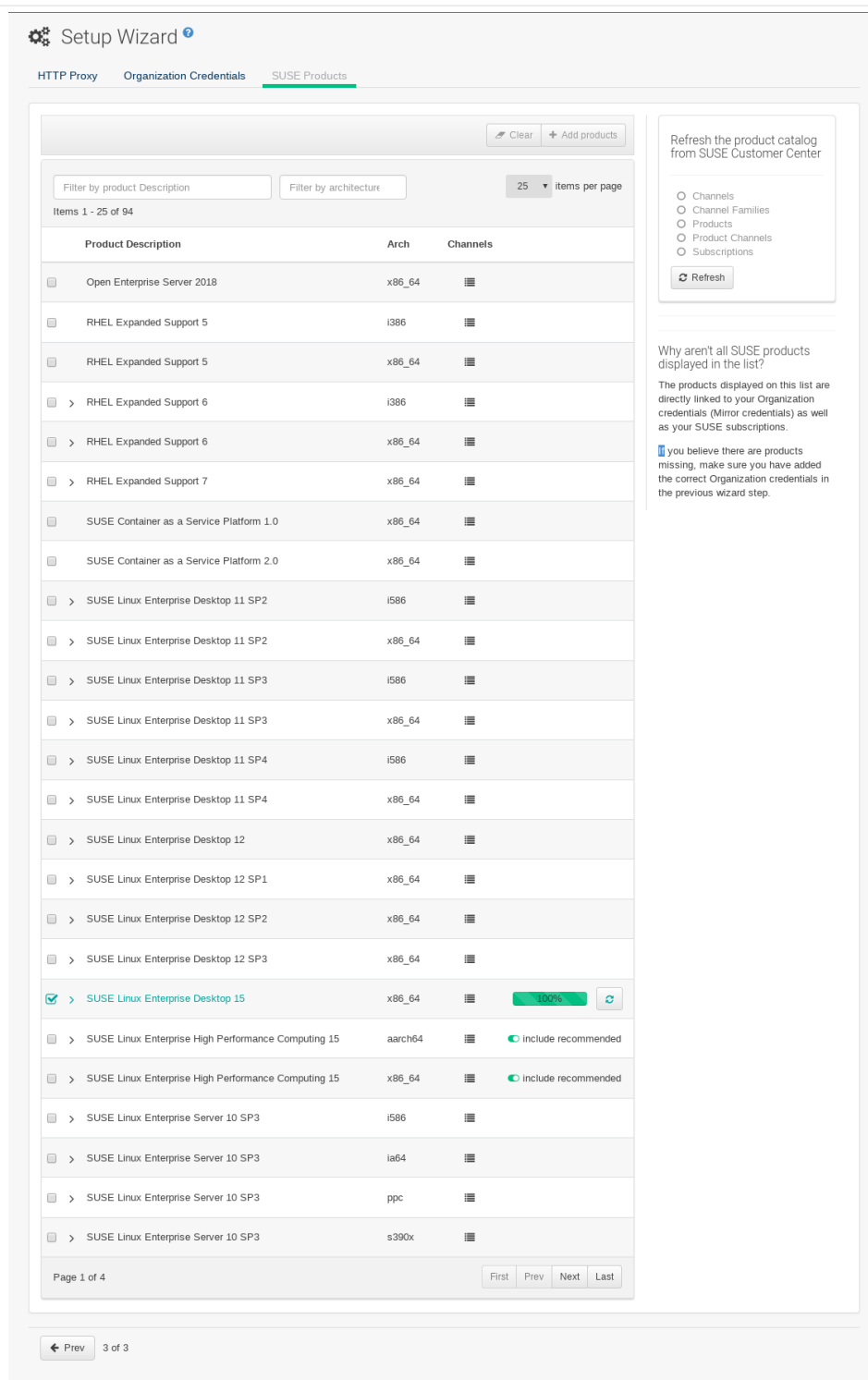
#### 过程：输入组织身份凭证

1. 打开浏览器并访问您的服务器 FQDN。
2. 输入您的用户名（默认为 **admin**）以及在部署过程中设置的口令。
3. 在 SUSE Multi-Linux Manager Web UI 中，选择**管理** > **安装向导**。
4. 在**安装向导**页中，选择 **[ 组织身份凭证 ]** 选项卡。
5. 单击 **[ 添加新身份凭证 ]**。
6. 在浏览器中访问 SUSE Customer Center。
7. 在左侧导航栏中选择您的组织。
8. 在页面顶部选择用户选项卡，然后单击 **[ 组织身份凭证 ]**。
9. 记下您的**镜像身份凭证**。
10. 返回 SUSE Multi-Linux Manager Web UI，输入**用户名**和**口令**，然后单击 **[ 保存 ]** 确认。

在系统以绿色打勾图标形式确认身份凭证后，请继续执行[过程：与 SUSE Customer Center 同步](#)。

#### 过程：与 SUSE Customer Center 同步

1. 在 Web UI 中，导航到**管理** > **安装向导**。
2. 在**安装向导**页面中选择 **SUSE 产品**选项卡。如果您最近在 SUSE Customer Center 中注册过产品，则表格中将开始填充产品列表。此操作可能需要几分钟时间才会完成。您可在右侧的**从 SUSE Customer Center 刷新产品目录**部分监控该操作的进度。该产品表格会列出体系结构、通道和状态信息。有关详细信息，请参见 **Reference > Admin**。



3. 使用**按产品说明过滤**和**按体系结构过滤**来过滤显示的产品列表。**[产品]** 页面上列出的通道将为客户端提供储存库。

- 选中每个通道左侧的复选框将相应通道添加到 SUSE Multi-Linux Manager。单击说明左侧的箭头符号可以展开产品并列出可用模块。
- 单击页面顶部的 **[添加产品]** 开始产品同步。

添加通道后，SUSE Multi-Linux Manager 将安排该通道的同步。这可能需要较长时间，因为 SUSE Multi-Linux Manager 会将通道软件源从 SUSE Customer Center 中的 SUSE 储存库复制到您服务器本地的

`/var/lib/containers/storage/volumes/var-spacewalk/` 目录。

通道完全同步后，将自动为其生成引导储存库。此步骤对于成功引导客户端至关重要，可确保通道同步和分发能够在客户端正常运行。SUSE Multi-Linux Manager 的安装和配置，以及为引导客户端准备所需通道的过程到此完成。

通道同步过程完成后，可以继续注册 SUSE Multi-Linux Manager 5.1 代理或其他客户端。

有关详细说明，请参见 **Client-configuration > Registration-overview**。

### 3.1.1.7. 进入容器进行管理

要在容器内访问外壳，请在容器主机上运行以下命令：

```
mgrctl term
```

## 3.1.2. 将 SUSE Multi-Linux Manager 5.1 服务器部署为虚拟机 - KVM

本节提供用于将 SUSE Multi-Linux Manager 5.1 部署为映像所需的虚拟机设置。KVM 将与虚拟机管理器 (virt-manager) 结合使用，作为此安装的沙箱。

### 3.1.2.1. 可用映像



部署 SUSE Multi-Linux Manager 5.1 服务器的首选方法是使用以下可用映像之一。所有工具都已包含在这些映像中，因而大大简化了部署。

SUSE Multi-Linux Manager 5.1 的映像可在 [SUSE Multi-Linux Manager 5.1 VM 映像](#) 中找到。



Customized SUSE Multi-Linux Manager 5.1 VM images are provided only for SL Micro 6.1. To run the product on SUSE Linux Enterprise Server 15 SP7, use the standard SUSE Linux Enterprise Server 15 SP7 installation media available at <https://www.suse.com/download/sles/> and enable the SUSE Multi-Linux Manager 5.1 extensions on top of it.

### 表格 10. 可用服务器映像

| 体系结构    | 映像格式                 |
|---------|----------------------|
| aarch64 | qcow2、vmdk           |
| x86_64  | qcow2、vmdk、raw、自安装程序 |
| ppc64le | raw、自安装程序            |
| s390x * | qcow2、raw            |

\* s390x 有两个可用存储选项：CDL DASD 和 FBA。

### 3.1.2.2. 虚拟机管理器 (virt-manager) 设置

使用 **virt-manager** 创建新虚拟机时请输入以下设置。



下表指定了最低要求。这些要求适用于快速测试安装，例如具有一个客户端的服务器。如果您想要使用生产环境，并且需要有关磁盘空间的背景信息，请参见 **Installation-and-upgrade > Hardware-requirements**。

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

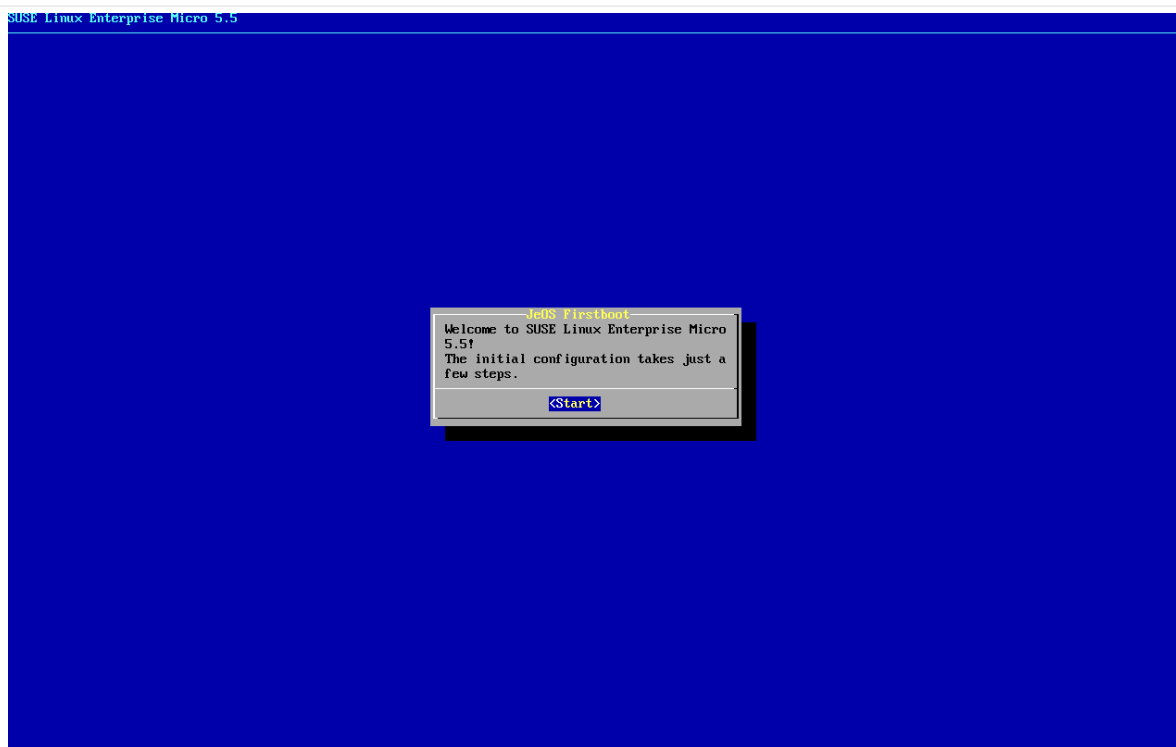
\*) For minimum values, see [installation-and-upgrade:hardware-requirements.pdf](#).

### 3.1.2.3. 初始 KVM 设置

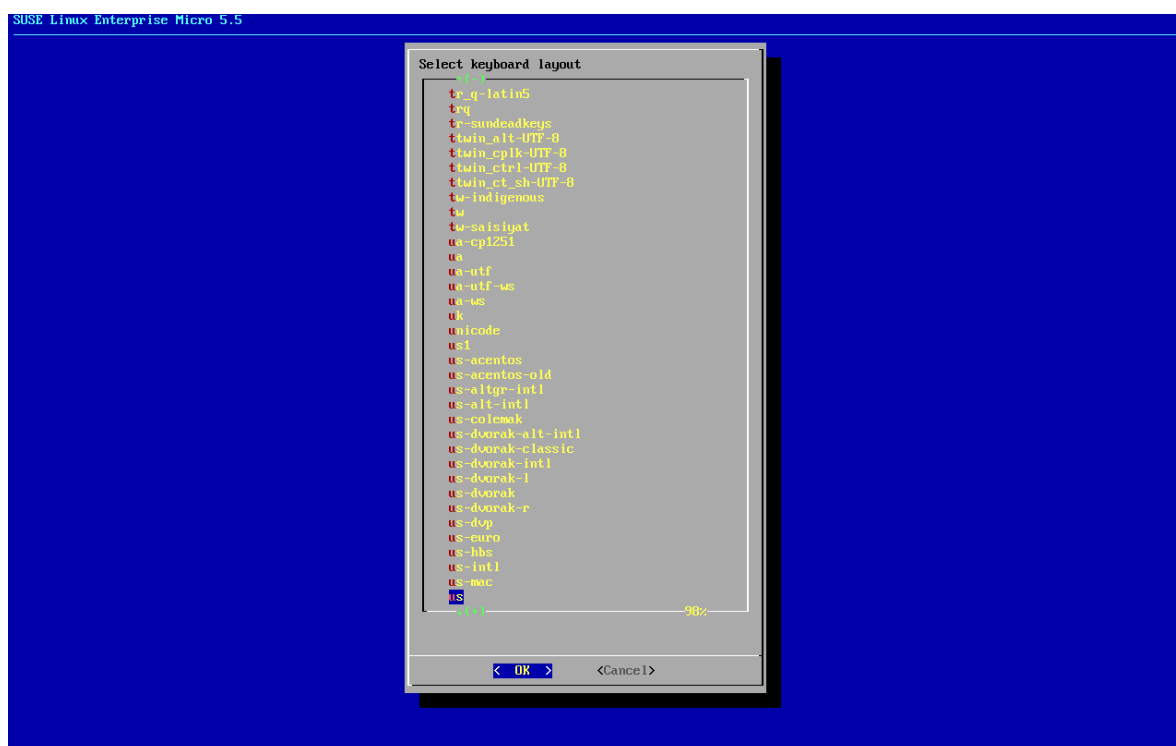
#### 过程：创建初始设置

1. 使用下载的 Minimal KVM 映像创建一个新虚拟机，然后选择**导入现有磁盘映像**。
2. Configure RAM and number of CPUs.
3. 为您的 KVM 计算机命名。
4. 单击 **[ 开始安装 ]** 以从映像引导。
5. 在 JeOS 首次引导屏幕上选择“开始”以继续。

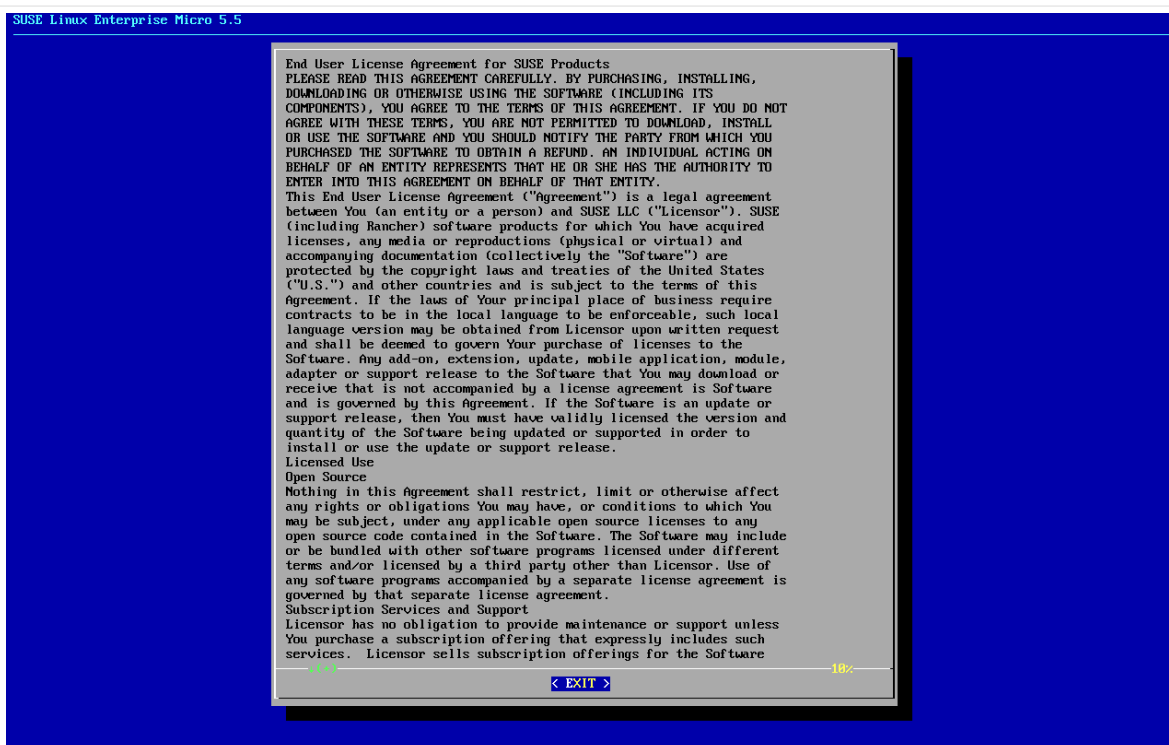




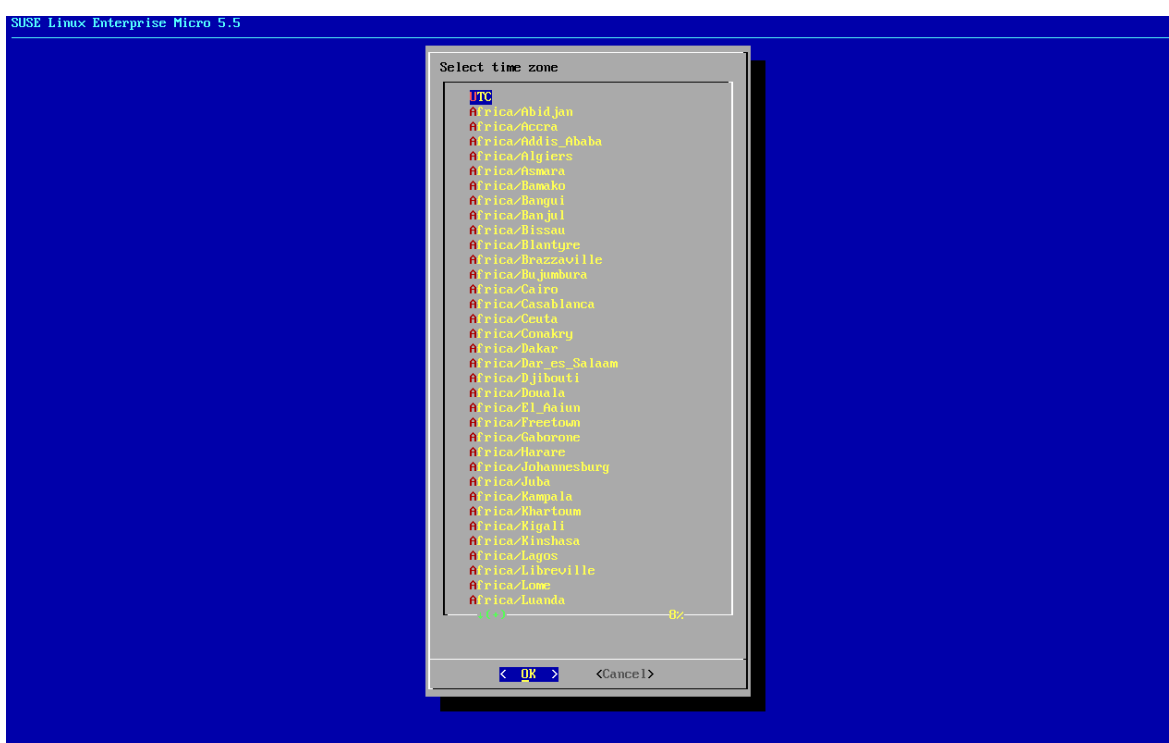
## 6. 选择键盘布局。



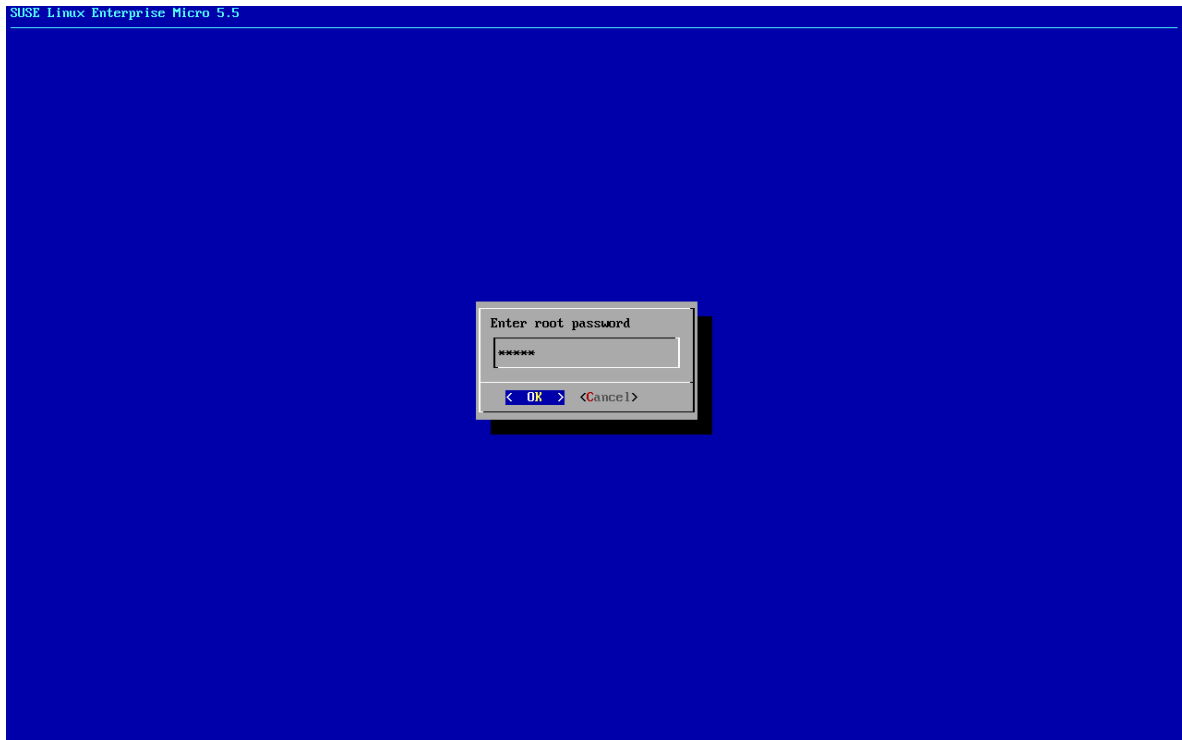
## 7. 接受许可协议。



## 8. 选择您的时区。



## 9. 输入 root 口令。



10. 安装完成后，以 root 身份登录。
11. 继续阅读下一节。

#### 3.1.2.4. 注册 SL Micro 和 SUSE Multi-Linux Manager 5.1 服务器



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



SUSE Multi-Linux Manager server hosts that are hardened for security may restrict execution of files from the **/tmp** folder. In such cases, as a workaround, export the **TMPDIR** environment variable to another existing path before running **mgradm**. For example:

```
export TMPDIR=/path/to/other/tmp
```

In SUSE Multi-Linux Manager updates, tools will be changed to make this workaround unnecessary.

### 过程：注册 SL Micro 和 SUSE Multi-Linux Manager 5.1

1. 引导虚拟机。
2. 以 **root** 身份登录。
3. 在 SCC 中注册 SL Micro。

```
transactional-update register -r <注册代码> -e <您的电子邮件地址>
```

4. 重引导。
5. 在 SUSE Customer Center 中注册 SUSE Multi-Linux Manager 5.1。

```
transactional-update register -p Multi-Linux-Manager-Server/5.1/x86_64 -r <REGCODE>
```

6. 重引导。
7. 更新系统：

```
transactional-update
```

8. 如果已应用更新，请重引导。
9. 此步骤是可选的。但是，如果您的基础架构需要自定义的永久性存储，请使用 **mgr-storage-server** 工具。有关详细信息，请参见 **mgr-storage-server --help**。此工具可以简化容器存储和数据库卷的创建。
  - 如下所示使用命令：

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

例如：

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



此命令会将 **/var/lib/containers/storage/volumes** 中的永久性存储卷移动到指定的存储设备。

有关详细信息，请参见

- **Installation-and-upgrade › Container-management**
- **Administration › Troubleshooting**

10. Execute one of the following commands, depending on the SSL certificate variant (self-signed or third-party). Replace **<FQDN>** with your fully qualified domain name of the SUSE Multi-Linux Manager Server:

- Using self-signed certificates provided by SUSE Multi-Linux Manager:

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

- With importing SSL certificates using third-party SSL certificate flags (the example can adjusted if not all these certificates are needed):

```
mgradm install podman <FQDN> \
  --ssl-ca-intermediate <strings> \
  --ssl-ca-root <string> \
  --ssl-server-cert <string> \
```

```
--ssl-server-key <string> \  
--ssl-db-ca-intermediate <strings> \  
--ssl-db-ca-root <string> \  
--ssl-db-cert <string> \  
--ssl-db-key <string>
```

For more information, see **mgradm install podman --help**.

### 3.1.3. 将 SUSE Multi-Linux Manager 5.1 服务器部署为虚拟机 - VMware

本章提供用于将 SUSE Multi-Linux Manager 5.1 部署为映像的虚拟机设置。将使用 VMware 作为此安装的沙箱。

#### 3.1.3.1. 可用映像



部署 SUSE Multi-Linux Manager 5.1 服务器的首选方法是使用以下可用映像之一。所有工具都已包含在这些映像中，因而大大简化了部署。

SUSE Multi-Linux Manager 5.1 的映像可在 [SUSE Multi-Linux Manager 5.1 VM 映像](#) 中找到。



Customized SUSE Multi-Linux Manager 5.1 VM images are provided only for SL Micro 6.1. To run the product on SUSE Linux Enterprise Server 15 SP7, use the standard SUSE Linux Enterprise Server 15 SP7 installation media available at <https://www.suse.com/download/sles/> and enable the SUSE Multi-Linux Manager 5.1 extensions on top of it.



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>

表格 11. 可用服务器映像

| 体系结构    | 映像格式                 |
|---------|----------------------|
| aarch64 | qcow2、vmdk           |
| x86_64  | qcow2、vmdk、raw、自安装程序 |
| ppc64le | raw、自安装程序            |
| s390x * | qcow2、raw            |

\* s390x 有两个可用存储选项：CDL DASD 和 FBA。

### 3.1.3.2. SUSE Multi-Linux Manager 虚拟机设置 - VMware

本节说明 VMware 配置，重点介绍如何在 VMware 环境中创建对 SUSE Multi-Linux Manager 存储分区至关重要的额外虚拟磁盘。

#### 过程：创建 VMware 虚拟机

1. 下载 SUSE Multi-Linux Manager Server **.vmdk** 文件，然后将该文件副本传输到您的 VMware 存储区。
2. 使用 VMware Web 界面复制上载的 **.vmdk** 文件。这会将提供的 **.vmdk** 文件转换成适合 vSphere 超级管理程序的格式。
3. 创建一个新的虚拟机，并根据 Guest 操作系统系列 **Linux** 和 Guest 操作系统版本 SUSE Linux Enterprise 15（64 位）为其命名。

+

1. 额外添加一个 500 GB（或更多空间）的**硬盘 2**。
2. Configure RAM and number of CPUs with minimum values. \*)
3. 根据需要设置网络适配器。
4. 启动 VM，然后按照首次引导对话框中的提示操作（键盘布局、许可协议、时区、root 的口令）。
5. 安装完成后，以 root 身份登录。
6. 继续阅读下一节。

\*) For minimum values, see [installation-and-upgrade:hardware-requirements.pdf](#).

### 3.1.3.3. 注册 SL Micro 和 SUSE Multi-Linux Manager 5.1 服务器

开始之前，从 SUSE Customer Center (<https://scc.suse.com>) 获取您的 SUSE Multi-Linux Manager 注册代码。



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



SUSE Multi-Linux Manager server hosts that are hardened for security may restrict execution of files from the **/tmp** folder. In such cases, as a workaround, export the **TMPDIR** environment variable to another existing path before running **mgradm**. For example:

```
export TMPDIR=/path/to/other/tmp
```

In SUSE Multi-Linux Manager updates, tools will be changed to make this workaround unnecessary.

#### 过程：注册 SL Micro 和 SUSE Multi-Linux Manager 5.1

1. 引导虚拟机。

2. 以 **root** 身份登录。
3. Register SL Micro with SCC.

```
transactional-update register -r <注册代码> -e <您的电子邮件地址>
```

4. 重引导。
5. 在 SUSE Customer Center 中注册 SUSE Multi-Linux Manager 5.1。

```
transactional-update register -p Multi-Linux-Manager-Server/5.1/x86_64 -r <REGCODE>
```

6. 重引导
7. 更新系统：

```
transactional-update
```

8. 如果已应用更新，请重引导。
9. 此步骤是可选的。但是，如果您的基础架构需要自定义的永久性存储，请使用 **mgr-storage-server** 工具。有关详细信息，请参见 **mgr-storage-server --help**。此工具可以简化容器存储和数据库卷的创建。
  - 如下所示使用命令：

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

例如：

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



此命令将在 **/var/lib/containers/storage/volumes** 中创建永久性存储卷。

有关详细信息，请参见

- **Installation-and-upgrade › Container-management**
- **Administration › Troubleshooting**

10. Execute one of the following commands, depending on the SSL certificate variant (self-signed or third-party). Replace **<FQDN>** with your fully qualified domain name of the SUSE Multi-Linux Manager Server:
  - Using self-signed certificates provided by SUSE Multi-Linux Manager:

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

- With importing SSL certificates using third-party SSL certificate flags (the example can adjusted if not all these certificates are needed):

```
mgradm install podman <FQDN> \
  --ssl-ca-intermediate <strings> \
  --ssl-ca-root <string> \
  --ssl-server-cert <string> \
  --ssl-server-key <string> \
  --ssl-db-ca-intermediate <strings> \
  --ssl-db-ca-root <string> \
  --ssl-db-cert <string> \
  --ssl-db-key <string>
```

For more information, see `mgradm install podman --help`.

### 3.1.4. SUSE Multi-Linux Manager 服务器物理隔离的部署

#### 3.1.4.1. 什么是物理隔离的部署？

物理隔离部署是指设置和操作与不安全网络（尤其是互联网）物理隔离的任何联网系统。这种部署通常用于军事设施、金融系统、关键基础架构等高安全性环境，以及处理敏感数据，因而必须防范其受到外部威胁的任何位置。

#### 3.1.4.2. 部署

SUSE Multi-Linux Manager 支持两种部署变体。

##### 3.1.4.2.1. 通过虚拟机部署

建议的安装方法是使用所提供的 SUSE Multi-Linux Manager 虚拟机映像选项，因为所需的全部工具和容器映像都已预先加载并且随时可用。

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

要升级 SUSE Multi-Linux Manager 服务器，用户应升级系统中的所有软件包，并按照[服务器升级](#)中定义的过程操作。

##### 3.1.4.2.2. Deploy SUSE Multi-Linux Manager on SL Micro

SUSE Multi-Linux Manager 还在 RPM 中提供了可在系统上安装的所需的全部容器映像。



用户应在内部网络上提供所需的 RPM。这可以通过使用第二个 SUSE Multi-Linux Manager 服务器或 RMT 服务器来完成。

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

1. Install SL Micro
2. 更新系统



3. 安装工具软件包和映像包（将 \$ARCH\$ 替换为正确的体系结构）

```
transactional-update pkg install mgradm* mgrctl* multi-linux-manager-5.1-$ARCH$-server-*
```

4. 重引导。
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](#).

要升级 SUSE Multi-Linux Manager 服务器，用户应升级系统中的所有软件包，并按照[服务器升级](#)中定义的过程操作。

### 3.1.4.3. PTFs

The PTF images are not available as packages. This means that they should be pulled using **podman** on a machine with internet access, then saved in an archive, transferred to the air-gapped machine and loaded there.

## Procedure: Pulling the image on a machine with internet access

1. Install **podman**.
2. Authenticate against the SUSE Registry using the SCC credentials:

```
set +o history
echo SCC_MIRRORING_PASSWORD | podman login -u "SCC_MIRRORING_USER" --password-stdin registry.suse.com
set -o history
```

3. Create a **/tmp/ptf-images** temporary file with the URL of the PTF images, one per line. In most of the cases only the server image is needed and it can be created with a command like the following, after replacing the **SCC\_USERID** and **PTFID** values.

```
SCC_USERID=aXXXX
PTFID=12345
echo "registry.suse.com/a/$SCC_USERID/$PTFID/suse/multi-linux-manager/5.1/x86_64/server:latest-ptf-$PTFID" >>/tmp/ptf-images
```

4. Pull each of the container images of the PTF and save them in a tar archive.

```
for image in `cat /tmp/ptf-images`; do
    podman pull $image
done
podman save -o /tmp/ptf-images.tar `cat /tmp/ptf-images`
```

5. Transfer the **/tmp/ptf-images.tar** images archive on the server to patch.

## Procedure: Loading the images on the server to patch

1. Ensure the **ptf-images.tar** file is available on the server.
2. Load the images from the archive:

```
podman load -i ptf-images.tar
```

3. Install the PTF using **mgradm support ptf podman** as would be done on a connected machine. Because the images are already loaded they will not be pulled.

### 3.1.5. 公有云部署

公有云通过 Bring-your-own-subscription (BYOS) 或 Pay-as-you-go (PAYG) 模式提供 SUSE Multi-Linux Manager。

有关在公有云中使用 SUSE Multi-Linux Manager 的详细信息，请参见 **Specialized-guides › Public-cloud-guide**。

### 3.1.6. Connect PAYG instance

在三大主流公有云提供商（AWS、GCP 和 Azure）中，SUSE：

- 提供 SLES、SLES for SAP 等产品的自定义 PAYG 产品映像。
- 为以 PAYG 形式提供的产品操作按区域 RMT 服务器镜像储存库

This document describes how to connect existing PAYG instance to SUSE Multi-Linux Manager server, and gives basic information about credentials collection from the instance. The goal of this connection is to extract authentication data so the SUSE Multi-Linux Manager Server can connect to a cloud RMT host. Then the SUSE Multi-Linux Manager Server has access to products on the RMT host that are not already available with the SCC organization credentials.

Before using PAYG feature make sure that:

- PAYG 实例是从正确的 SUSE 产品映像（例如 SLES、SLES for SAP、SLE HPC）启动的，以便能够访问所需储存库
- SUSE Multi-Linux Manager 服务器可以直接或通过堡垒连接到 PAYG 实例（最好位于同一区域）
- A basic SCC account is required. Enter your valid SCC credentials in **Admin › Setup Wizard › Organization Credentials**. This account is required for accessing the SUSE Multi-Linux Manager client tools for bootstrapping regardless of PAYG instances.
- If you bootstrap the PAYG instance to SUSE Manager, SUSE Manager will disable its PAYG repositories then add repositories from where it mirrored the data from the RMT server. The final result will be PAYG instances acquiring the same repositories from the RMT servers but through the SUSE Manager server itself. Of course repositories can still be setup primarily from SCC.

#### 3.1.6.1. Connecting PAYG instance

#### Procedure: Connecting new PAYG instance

1. 在 SUSE Multi-Linux Manager Web UI 中，导航到**管理** > **安装向导** > **PAYG**，然后单击 **[ 添加 PAYG ]**。
2. 从页面的 **PAYG 连接说明** 部分开始。
3. 在**说明**字段中添加说明。
4. 转移到页面的**实例 SSH 连接数据**部分。
5. 在**主机**字段中，键入要从 SUSE Multi-Linux Manager 连接的实例 DNS 或 IP 地址。
6. 在 **SSH 端口** 字段中输入端口号或使用默认值 22。
7. 在**用户**字段中输入云中指定的用户名。
8. 在**口令**字段中输入口令。
9. 在**SSH 私有密钥**字段中输入实例密钥。
10. 在**SSH 私有密钥通行口令**字段中输入密钥通行口令。



身份验证密钥必须采用 PEM 格式。

如果您要通过 SSH 堡垒连接实例而不是直接连接，请执行[Procedure: Adding SSH bastion connection data](#)。

否则，请执行[Procedure: Finishing PAYG connecting](#)。

## Procedure: Adding SSH bastion connection data

1. 导航到页面的**堡垒 SSH 连接数据**部分。
2. 在**主机**字段中输入堡垒主机名。
3. 在**SSH 端口**字段中输入堡垒端口号。
4. 在**用户**字段中输入堡垒用户名。
5. 在**口令**字段中输入堡垒口令。
6. 在**SSH 私有密钥**字段中输入堡垒密钥。
7. 在**SSH 私有密钥通行口令**字段中输入堡垒密钥通行口令。

执行[Procedure: Finishing PAYG connecting](#)完成设置过程。

## Procedure: Finishing PAYG connecting

1. 要完成添加新 PAYG 连接数据的过程，请单击 **[ 创建 ]**。
2. 返回 PAYG 连接数据**细节**页面。顶部的**信息**部分会显示更新的连接状态。
3. **管理** > **安装向导** > **Pay-as-you-go** 屏幕中也会显示连接状态。
4. 如果实例的身份验证数据正确，**状态**列会显示“已成功更新身份凭证”。



如果在任何时间输入了无效数据，**管理** > **安装向导** > **PAYG** 中会显示新创建的实例，同时**状态**列会显示错误消息。

一旦服务器上有可用的身份验证信息，可用产品列表即会更新。

Available products are all versions of the same product family and architecture as the one installed in the PAYG instance. For example, if the instance has the SUSE Linux Enterprise Server 15 SP1 product installed, SUSE Linux Enterprise Server 15 SP2, SUSE Linux Enterprise Server 15 SP3, SUSE Linux Enterprise Server 15 SP4 and SUSE Linux Enterprise Server 15 SP5 are automatically shown in **Admin > Setup Wizard > Products**.

当有产品显示为可用时，用户便可选中该产品名称旁边的复选框并单击 **[添加产品]**，将产品添加到 SUSE Multi-Linux Manager 中。

成功消息显示后，您可以在 Web UI 中导航到**软件 > 通道列表 > 所有**校验新添加的通道。

要监控每个通道的同步进度，请查看 SUSE Multi-Linux Manager 服务器上 `/var/log/rhn/reposync` 目录中的日志文件。



If a product is provided by both the PAYG instance and one of the SCC subscriptions, it will appear only once in the products list.

When the channels belonging to that product are synced, the data might still come from the SCC subscription, and not from the Pay-As-You-Go instance.

#### 3.1.6.1.1. Deleting the instance connection data

下面的过程介绍如何删除实例的 SSH 连接数据。

### Procedure: Deleting connection data to instance

1. 打开**管理 > 安装向导 > PAYG**。
2. 在现有实例列表中找到该实例。
3. 单击实例细节。
4. 选择 **[删除]** 并确认您的选择。
5. 您将返回到实例列表。刚才删除的实例不再显示。

#### 3.1.6.2. Instance credential collect status

SUSE Multi-Linux Manager 服务器使用从实例收集的身份凭证来连接 RMT 服务器和下载使用 reposync 的软件包。Taskomatic 会使用定义的 SSH 连接数据每 10 分钟刷新一次这些身份凭证。RMT 服务器连接始终使用从 PAYG 实例收集的最近已知身份验证身份凭证。

The status of the PAYG instance credentials collect is shown in the column **Status** or on the instance details page. When the instance is not reachable, the credential update process will fail.

When the instance is unreachable, the credential update process will fail and the credentials will become invalid after the second failed refresh. Synchronization of channels will fail when the credentials are invalid. To avoid this keep the connected instances running.

除非明确删除了 SSH 连接数据，否则 PAYG 实例将一直连接到 SUSE Multi-Linux Manager 服务器。要删除实例的 SSH 连接数据，请执行[Procedure: Deleting connection data to instance](#)。

并非在任何时间都可从 SUSE Multi-Linux Manager 服务器访问 PAYG 实例。

- 如果实例存在但已停止，系统将使用最新的已知身份凭证尝试连接实例。身份凭证的有效时长取决于云提供商。
- If the instance no longer exists, but is still registered with SUMA, its credentials are no longer valid and the authentication will fail. “状态”列中会显示错误消息。



错误消息只会指出实例不再可用。云提供商需要对实例的状态进行进一步诊断。



在 PAYG 实例中进行以下任意操作或更改都将导致身份凭证失效：  
\* 去除 zypper 身份凭证文件  
\* 去除导入的证书  
\* 从 `/etc/hosts` 中去除特定于云的条目

### 3.1.6.3. Registering PAYG system as a client

您可以将从中收集身份凭证的 PAYG 实例注册为 Salt 客户端。需要为实例注册有效的云连接，否则它将无法访问通道。如果用户去除相关云软件包，身份凭证收集可能会停止工作。

首先，将 PAYG 实例设置为收集身份验证数据，以使其可以同步通道。

该过程的其余步骤与非公有云客户端的步骤相同，包括同步通道、自动创建引导脚本、创建激活密钥，以及启动注册。

有注册客户端的详细信息，请参见 [Client-configuration > Registration-overview](#)。

### 3.1.6.4. 查错

#### 检查身份凭证

- 如果脚本无法收集身份凭证，将会在日志和 Web UI 中提供正确的错误消息。
- 如果身份凭证无法工作，`reposync` 应该会显示正确的错误消息。

#### 使用 `registercloudguest`

- 刷新或更改 `registercloudguest` 与公有云更新基础架构的连接不应影响身份凭证的使用。
- 如果未使用 `cloud guest` 命令注册新的云连接，运行 `registercloudguest --clean` 将会导致发生问题。

## 3.2. 安装 SUSE Multi-Linux Manager 代理

部署 SUSE Multi-Linux Manager 代理的场景多种多样。所有这些场景都假定您已成功部署 SUSE Multi-Linux Manager 5.1 服务器。

### 3.2.1. SUSE Multi-Linux Manager 5.1 Proxy Deployment

This guide outlines the deployment process for the SUSE Multi-Linux Manager 5.1 Proxy container on SL

Micro 6.1 or SUSE Linux Enterprise Server 15 SP7. This guide presumes you have already successfully deployed a SUSE Multi-Linux Manager 5.1 Server.



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.

要成功完成部署，请执行以下操作：

## 过程：部署代理

1. 查看硬件要求。
2. Synchronize the SL Micro 6.1 or SUSE Linux Enterprise Server 15 SP7 parent channel and the proxy extension child channel on the server.
3. Install SL Micro or SUSE Linux Enterprise Server on a bare-metal machine.
4. During the installation, register SL Micro or SUSE Linux Enterprise Server along with the SUSE Multi-Linux Manager Proxy extension.
5. 创建 Salt 激活密钥。
6. 使用 **default** 连接方法将代理作为客户端引导。
7. 生成代理配置。
8. 将服务器中的代理配置传输到代理。
9. 使用代理配置将客户端作为代理注册到 SUSE Multi-Linux Manager。

### 代理容器主机支持的操作系统

The supported operating system for the container host are SL Micro 6.1 and SUSE Linux Enterprise Server 15 SP7.



#### 容器主机

容器主机是配备了容器引擎（例如 Podman）的服务器，可用于管理和部署容器。这些容器包含应用程序及其必备组件（例如库），但不包含完整的操作系统，因此体量很小。此设置可确保应用程序能够在不同环境中以一致的方式运行。容器主机为这些容器提供必要的资源，例如 CPU、内存和存储。

#### 3.2.1.1. 代理的硬件要求

有关部署 SUSE Multi-Linux Manager 代理的硬件要求，请参见 [installation-and-upgrade:hardware-requirements.pdf](#)。

#### 3.2.1.2. 同步父通道和代理扩展子通道

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. 在 SUSE Multi-Linux Manager Web UI 中，选择**管理** > **产品**。
2. From the products page enter SL Micro or SUSE Linux Enterprise Server in the filter field.
3. 接下来，在下拉列表中选择所需的体系结构，在本示例中为 x86-64。
4. In the **Product Description** field select the SL Micro 6.1 or SUSE Linux Enterprise Server 15 SP7 checkbox then use the drop-down to select the **SUSE Multi-Linux Manager Proxy Extension 5.1 x86\_64** extension.
5. 单击 **[ 添加产品 ]** 按钮。
6. 等待同步完成。

### 3.2.1.3. Prepare SUSE Multi-Linux Manager Proxy Host

In the following subsections, you either prepare the proxy host with SLE Micro or SUSE Linux Enterprise Server.

#### 3.2.1.3.1. Prepare SL Micro 6.1 Host

##### Download the installation media

##### 过程：下载安装媒体

1. Locate the SL Micro 6.1 installation media at <https://www.suse.com/download/sle-micro/>, and download the appropriate media file.
2. 将下载下来的 .iso 映像放入一个 DVD 或 USB 闪存盘以进行安装。

##### Install SL Micro 6.1

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

## Procedure: Installing SL Micro 6.1

1. Insert the DVD or USB flash drive (USB disk or key) containing the installation image for SLE Micro 6.1.
2. 引导或重引导您的系统。
3. 使用箭头键选择**安装**。
4. Adjust Keyboard and language.
5. 单击**复选框**接受许可协议。
6. 单击**下一步**继续。
7. 选择注册方法。在本示例中，我们将在 SUSE Customer Center 中注册服务器。



SUSE Multi-Linux Manager 5.1 容器会安装为扩展。根据以下列出的所需特定扩展，您还需要有各个扩展的 SUSE Customer Center 注册代码。

- SUSE Multi-Linux Manager 5.1 服务器
- SUSE Multi-Linux Manager 5.1 代理
- SUSE Multi-Linux Manager 5.1 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.

8. 输入您的 SUSE Customer Center 电子邮件地址。
9. Enter your registration code for SL Micro 6.1.
10. 单击**下一步**继续。
11. To install a proxy, select the SUSE Multi-Linux Manager 5.1 Proxy extension; to install a server, select the SUSE Multi-Linux Manager 5.1 Server extension **Checkbox**.
12. 单击**下一步**继续。
13. Enter your SUSE Multi-Linux Manager 5.1 extension registration code.
14. 单击 [ **下一步** ] 继续。
15. 在 **NTP 配置**页面上, 单击 [ **下一步** ]。
16. 在**系统身份验证**页面上, 输入 root 用户的口令。单击 [ **下一步** ]。
17. 在**安装设置**页面上单击 [ **安装** ]。

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

#### OPTIONAL: Registration from the command line

If you added SUSE Multi-Linux Manager 5.1 as an extension during SL Micro 6.1 installation then you can skip this procedure. 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.



The following steps register a SUSE Multi-Linux Manager 5.1 extension 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.

### Procedure: Registering from the Command Line

1. List available extensions with the following command:

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

2. From the list of available extensions, select the one you wish to install:
  - a. If installing the Server, use your SUSE Multi-Linux Manager Server Extension 5.1 x86\_64 registration code with following command:



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

- b. If installing the Proxy, use your SUSE Multi-Linux Manager Proxy Extension 5.1 x86\_64 registration code with following command:

```
transactional-update register -p Multi-Linux-Manager-Proxy/5.1/x86_64 -r
<reg_code>
```

3. 重引导。

## 更新系统

### 过程：更新系统

1. 以 **root** 身份登录。
2. 运行 **transactional-update**:

```
transactional-update
```

3. 重引导。



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
```

To continue with deployment, see [installation-and-upgrade:container-deployment/mlm/proxy-deployment-mlm.pdf](#).

#### 3.2.1.3.2. Prepare SUSE Linux Enterprise Server 15 SP7 Host

Alternatively, you can deploy SUSE Multi-Linux Manager on SUSE Linux Enterprise Server 15 SP7.

The following procedure describes the main steps of the installation process.

### Procedure: Installing SUSE Multi-Linux Manager Extensions on SUSE Linux Enterprise Server 15 SP7

1. Locate and download SUSE Linux Enterprise Server 15 SP7 **.iso** at <https://www.suse.com/download/sles/>.

2. Make sure that you have registration codes both for the host operating system (SUSE Linux Enterprise Server 15 SP7) and extensions
3. Start the installation of SUSE Linux Enterprise Server 15 SP7.
  - a. On the **Language, keyboard and product selection** select the product to install.
  - b. On the **License agreement** read the agreement and check **I Agree to the License Terms**.
4. Select the registration method. For this example, we will register the server with SUSE Customer Center.
5. 输入您的 SUSE Customer Center 电子邮件地址。
6. Enter your registration code for SUSE Linux Enterprise Server 15 SP7.
7. 单击**下一步**继续。



Please note that for SUSE Linux Enterprise Server 15 SP7, you are required to have a valid SUSE Linux Enterprise Server subscription and corresponding registration code, which you must provide on this screen. You will be required to enter the SUSE Multi-Linux Manager Extension registration code below.

8. In the screen **Extensions and Modules Selection** check the following:
  - ☐ Select the SUSE Multi-Linux Manager Server Extension to install the Server, or the SUSE Multi-Linux Manager Proxy Extension to install the Proxy.
  - ☐ Basesystem Module
  - ☐ Containers Module
9. 单击**下一步**继续。
10. Enter your SUSE Multi-Linux Manager 5.1 extension registration code.
11. 单击 [ **下一步** ] 继续。
12. 完成安装。
13. When the installation completes, log in to the newly installed server as root.
14. Update the System (optional, if the system was not set to download updates during install):

```
zypper up
```

15. 重引导。
16. Log in as root and install **podman** plus **mgradm** and **mgradm-bash-completion** (if not already automatically installed):

```
zypper install podman mgradm mgradm-bash-completion
```

17. Start the Podman service by rebooting the system, or running a command:

```
systemctl enable --now podman.service
```

To continue with deployment, see [installation-and-upgrade:container-deployment/mlm/proxy-deployment-mlm.pdf](#).

#### 3.2.1.4. 配置自定义永久性存储

Configuring persistent storage is optional, but it is the only way to avoid serious trouble with container full disk conditions. If custom persistent storage is required for your infrastructure, use the **mgr-storage-proxy** tool.

有关详细信息，请参见 **mgr-storage-proxy --help**。此工具可以简化容器存储和 Squid 缓存卷的创建。

如下所示使用命令：

```
mgr-storage-proxy <存储磁盘设备>
```

例如：

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



此命令将在 **/var/lib/containers/storage/volumes** 中创建永久性存储卷。

有关详细信息，请参见

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

#### 3.2.1.5. 为代理创建激活密钥

##### 过程：创建激活密钥

1. Navigate to **Systems › Activation Keys**, and click **[ Create key ]**.
2. Create an activation key for the proxy host with SL Micro 6.1 or SUSE Linux Enterprise Server 15 SP7 as the parent channel. This key should include all recommended channels and the proxy as an extension child channel.
3. 继续将代理主机作为 **default** 客户端进行引导。

#### 3.2.1.6. 将代理主机作为客户端进行引导

##### 过程：引导代理主机

1. 选择**系统 › 引导**。
2. 填写代理主机的相关字段。
3. 从下拉列表中选择上一步骤中创建的激活密钥。
4. 单击 **[ 引导 ]**。

5. 等待引导过程成功完成。检查 **Salt** 菜单，确认 Salt 密钥已列出并已接受。
6. Reboot the proxy host if the operating system is SL Micro.
7. Select the host from the **System** list and trigger a second reboot in case of SL Micro after all events are finished to conclude the onboarding.

## 过程：更新代理主机

1. 从**系统**列表中选择主机，并应用所有补丁以将其更新。
2. Reboot the proxy host if the operating system is SL Micro.

### 3.2.1.7. Generate Proxy Configuration

SUSE Multi-Linux Manager 代理的配置存档由 SUSE Multi-Linux Manager 服务器生成。每个附加代理都需要自身的配置存档。



对于 Podman 部署，在生成此代理配置之前，必须将 SUSE Multi-Linux Manager 代理的容器主机作为客户端注册到 SUSE Multi-Linux Manager 服务器。

如果使用代理 FQDN 生成非注册客户端的代理容器配置（如 Kubernetes 用例中那样），系统列表中将出现一个新的系统项。此新项将显示在之前输入的“代理 FQDN”值下方并属于**外部**系统类型。

#### 3.2.1.7.1. 使用 Web UI 生成代理配置

### Procedure: Generating a Proxy Container Configuration Using Web UI

1. 在 Web UI 中，导航到**系统 > 代理配置**，然后填写所需数据：
2. 在**代理 FQDN**字段中，键入代理的完全限定域名。
3. 在**父 FQDN**字段中，键入 SUSE Multi-Linux Manager 服务器或另一个 SUSE Multi-Linux Manager 代理的完全限定域名。
4. 在**代理 SSH 端口**字段中，键入 SSH 服务在 SUSE Multi-Linux Manager 代理上监听的 SSH 端口。建议保留默认值 8022。
5. In the **Max Squid cache size [MB]** field type maximal allowed size for Squid cache. Recommended is to use at most 80% of available storage for the containers.



2 GB 表示默认的代理 squid 缓存大小。需要根据您的环境调整此大小。

在 **SSH 证书**选择列表中，选择应为 SUSE Multi-Linux Manager 代理生成新服务器证书还是使用现有证书。您可以考虑作为 SUSE Multi-Linux Manager 内置（自我签名）证书生成的证书。

+ 然后根据所做的选择提供用于生成新证书的签名 CA 证书的路径，或者要用作代理证书的现有证书及其密钥的路径。

+ 服务器生成的 CA 证书存储在 `/var/lib/containers/storage/volumes/root/_data/ssl-build` 目录中。

+ 有关现有或自定义证书的详细信息以及企业和中间证书的概念，请参见 **Administration > Ssl-certs-imported**。

1. 单击 **[生成]** 以在 SUSE Multi-Linux Manager 服务器中注册新代理 FQDN，并生成包含容器主机细节的配置存档 (**config.tar.gz**)。
2. 片刻之后，系统会显示文件可供下载。请将此文件保存在本地。

### 3.2.1.7.2. Generate Proxy Configuration With spacecmd and Self-Signed Certificate

可以使用 **spacecmd** 生成代理配置。

#### 过程：使用 **spacecmd** 和自我签名证书生成代理配置

1. 通过 SSH 连接到您的容器主机。
2. 执行以下命令（替换其中的服务器和代理 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. 从服务器容器复制生成的配置：

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

### 3.2.1.7.3. Generate Proxy Configuration With spacecmd and Custom Certificate

可以使用 **spacecmd** 为自定义证书（而不是默认的自我签名证书）生成代理配置。

#### 过程：使用 **spacecmd** 和自定义证书生成代理配置

1. 通过 SSH 连接到您的服务器容器主机。
2. 执行以下命令（替换其中的服务器和代理 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. 从服务器容器复制生成的配置：

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

### 3.2.1.8. 传输代理配置

Web UI 将生成配置存档。需要在代理容器主机上提供此存档。

#### 过程：复制代理配置

1. 从服务器容器将上一步生成的配置存档 (**config.tar.gz**) 复制到服务器主机（如果还未执行此操作）：

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

2. 将服务器主机中的文件复制到代理主机（如果还未执行此操作）：

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

3. 在代理主机上使用以下命令安装代理：

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

### 3.2.1.9. 启动 SUSE Multi-Linux Manager 代理

现在可以使用 **mgrpky** 命令启动容器：

#### 过程：启动代理并检查状态

1. 调用以下命令启动代理：

```
mgrpky start
```

2. 调用以下命令检查容器状态：

```
mgrpky status
```

应该会显示以下五个 SUSE Multi-Linux Manager 代理容器，并且它们应该是 **proxy-pod** 容器 Pod 的一部分：

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

### 3.2.1.10. Use a Custom Container Image for a Service

默认情况下，SUSE Multi-Linux Manager 代理套件配置为针对其每个服务使用相同的映像版本和注册表路径。但是，可以使用以 **-tag** 和 **-image** 结尾的 **install** 参数覆盖特定服务的默认值。

例如：

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

该命令会在重启动 httpd 服务之前调整其配置文件。其中 **registry.opensuse.org/uyuni/proxy-httpds** 是要使

用的映像，**0.1.0** 是版本标记。

要重置为默认值，请再次运行 `install` 命令但不要指定这些参数：

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

此命令首先将所有服务的配置重置为全局默认值，然后重新装载配置。

## 3.2.2. Convert a Client to MLM Proxy

### 3.2.2.1. 概览

This chapter describes how to convert a client system into a SUSE Multi-Linux Manager Proxy using the Web UI.

It assumes that the proxy host system has already been bootstrapped, is subscribed to the base operating system channel (such as SUSE Linux Enterprise Server 15 SP7 or SL Micro 6.1) and to the Proxy Extension channel.

For information about client onboarding, see **Client-configuration › Registration-overview**.

### 3.2.2.2. 要求

Before starting the conversion, ensure the following requirements are fulfilled.

#### 3.2.2.2.1. Supported Systems

Only the following operating systems are currently supported for proxy conversion:

- SUSE Linux Enterprise Server 15 SP7
- SL Micro 6.1

#### 3.2.2.2.2. Client Must Be

- Already onboarded in SUSE Multi-Linux Manager
- Reachable via the network
- Subscribed to the appropriate proxy extension channel:
  - SUSE Multi-Linux Manager Proxy Extension 5.1 (matching architecture)

### 3.2.2.3. Preparation

Before proceeding with the proxy conversion, make sure the following preparations are completed to avoid interruptions during the conversion process.

#### 3.2.2.3.1. SSL Certificates

Valid SSL certificates are required to secure communication between the proxy and other components.

You need:

- The public certificate of the Certificate Authority (CA) that signed the certificate on the SUSE Multi-Linux Manager server
- A certificate for the proxy.
- The corresponding private key for the proxy certificate.



If your CA uses an intermediate certificate chain, you must include all intermediate certificates as well.

If you are not using third party certificates, you can generate them using the **rhns-ssl-tool** inside the SUSE Multi-Linux Manager container.

## Generate a proxy certificate

1. On the SUSE Multi-Linux Manager server host, run:

```
mgrctl exec -ti -- rhns-ssl-tool --gen-server \
  --set-hostname="<PROXY-FQDN>" \
  --dir="/root/ssl-build"
```

For more information about other parameters, see **Administration > Ssl-certs-selfsigned**.

2. Transfer the certificates to SUSE Multi-Linux Manager server host

```
mgrctl cp server:/root/ssl-build/<PROXY-FQDN>/server.crt /root/proxycert.pem
mgrctl cp server:/root/ssl-build/<PROXY-FQDN>/server.key /root/proxykey.pem
mgrctl cp server:/root/ssl-build/RHN-ORG-TRUSTED-SSL-CERT /root/rootca.pem
```



To confirm the exact folder where the certificates and key files were generated, you can list the directories with:

```
mgrctl exec -ti -- ls -ltd /root/ssl-build/*/
```

3. Transfer the certificates from the SUSE Multi-Linux Manager server host to your local machine or other target system:

```
scp <MLM-FQDN>:/root/proxycert.pem ./
scp <MLM-FQDN>:/root/proxykey.pem ./
scp <MLM-FQDN>:/root/rootca.pem ./
```

### 3.2.2.3.2. Packages Preparation

It is recommended to deploy the container images as RPM packages. Please ensure the following packages are installed on the client:

- suse-multi-linux-manager-5.1-<ARCH>-proxy-httpd-image



- suse-multi-linux-manager-5.1-<ARCH>-proxy-salt-broker-image
- suse-multi-linux-manager-5.1-<ARCH>-proxy-squid-image
- suse-multi-linux-manager-5.1-<ARCH>-proxy-ssh-image
- suse-multi-linux-manager-5.1-<ARCH>-proxy-tftpd-image

You can install these packages from the Web UI by navigating to the **Software > Packages > Install** tab, then searching for the packages above, and installing them.

For details on air-gapped deployment, see **Installation-and-upgrade > Container-deployment**

### 3.2.2.4. Setup Proxy Client

1. Navigate to the client's **Overview** page.
2. Click button [ **Convert to Proxy** ].

Confirm you were redirected to the proxy configuration form.

This page can be accessed later from the **Details > Proxy > Configuration** tab.

3. In the Web UI, navigate to **Proxy > Configuration** and fill in the required data:

#### Procedure: Configuring the Proxy

- a. In the **Parent FQDN** field, type the fully qualified domain name for the parent server or proxy.
- b. In the **Proxy SSH port** field, type the SSH port on which the SSH service is listening on the SUSE Multi-Linux Manager Proxy. It is recommended to keep the default: 8022.
- c. In the **Max Squid cache size** field, type the maximum allowed size for the Squid cache, in Gigabytes.
- d. In the **Proxy admin email** field, type the administrator's email address.
- e. In the **Certificates** section, provide the certificates for the SUSE Multi-Linux Manager Proxy, obtained in the preparation step.
- f. In the **Source** section, select one of the two options: **RPM** or **Registry**.
  - The **RPM** option is recommended for air-gapped or restricted environments. The **Registry** option can be used if connectivity to the container image registry is available. + If selected, you will be prompted to choose between two sub-options: **Simple** or **Advanced**.
    - If **Simple** is selected, provide values in the **Registry URL** and **Containers Tag** fields.
      - For **Registry URL** use: **registry.suse.com/suse/multi-linux-manager/5.1/x86\_64**.
      - Select the tag from the drop-down list.
    - If **Advanced** is selected, an additional section of the form is shown:
      - For each individual container URL field, use the registry: **registry.suse.com/suse/multi-linux-manager/5.1/x86\_64** followed by the corresponding suffix, for example, **proxy-httpd** or **salt-broker**.

- Select the tag from the drop-down list.

4. Once all fields are filled, click **[Apply]** to apply the configuration and schedule the proxy installation task.

3.2.2.5. Verify Proxy Activation

Check the client’s event history to confirm task success.

(Optional) Access the proxy’s HTTP endpoint to validate it shows a welcome page.

3.2.3. 将 SUSE Multi-Linux Manager 代理部署为虚拟机 - KVM

本节提供用于将 SUSE Multi-Linux Manager 5.1 代理部署为映像的虚拟机设置。KVM 将与虚拟机管理器 (virt-manager) 结合使用，作为此安装的沙箱。

3.2.3.1. 可用映像



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 simplifying deployment.

SUSE Multi-Linux Manager 5.1 代理的映像可在 [SUSE Multi-Linux Manager 5.1 VM 映像](#) 中找到。



Customized SUSE Multi-Linux Manager 5.1 VM images are provided only for SL Micro 6.1. To run the product on SUSE Linux Enterprise Server 15 SP7, use the standard SUSE Linux Enterprise Server 15 SP7 installation media available at <https://www.suse.com/download/sles/> and enable the SUSE Multi-Linux Manager 5.1 extensions on top of it.



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>

表格 12. 可用代理映像

| 体系结构    | 映像格式                          |
|---------|-------------------------------|
| aarch64 | qcow2、vmdk                    |
| x86_64  | qcow2、vmdk、raw、Self Installer |

3.2.3.2. 虚拟机管理器 (virt-manager) 设置

使用 **virt-manager** 创建新虚拟机时请输入以下设置。



This table specifies the minimum requirements. These are suitable for a quick test installation, such as a proxy 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:             | Minimum *)  |
| CPU' s:             | Minimum *)  |
| Storage Format:     | .qcow2 40 GB (Default) Root Partition             |
| Name:               | test-setup  |
| Network             | Bridge br0  |

\*) For minimum values, see [installation-and-upgrade:hardware-requirements.pdf](#).



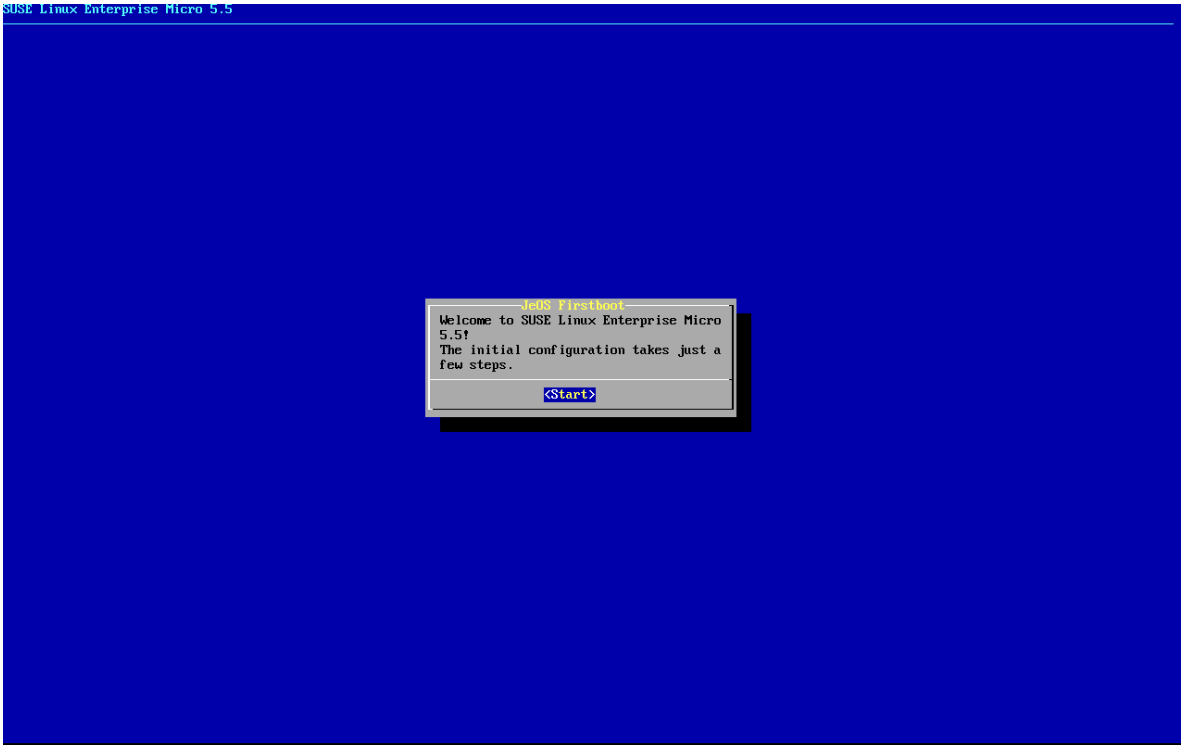
**/var/lib/containers/storage/volumes** 至少具有 100 GB 空间。应根据您要使用的 ISO 发行套件映像、容器和引导储存库的数量来计算存储要求。

3.2.3.3. 初始 KVM 设置

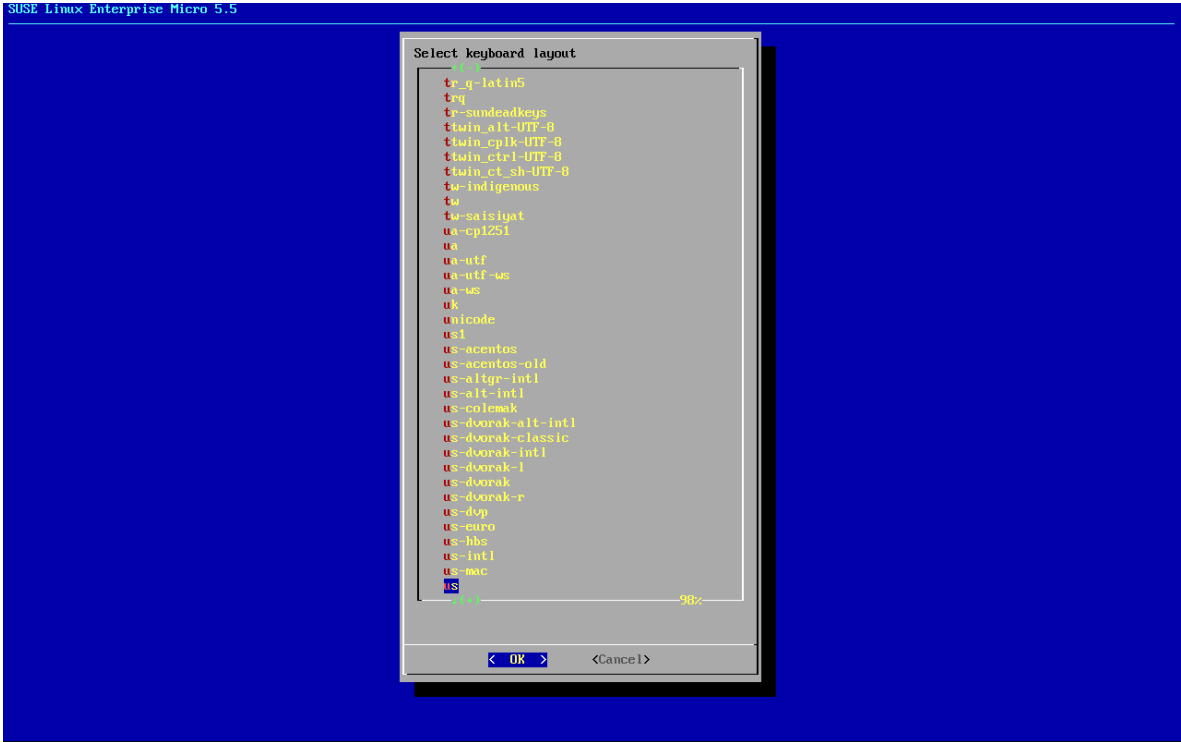
For settings, see [installation-and-upgrade:container-deployment/mlm/proxy-deployment-vm-mlm.pdf](#).

过程：创建初始设置

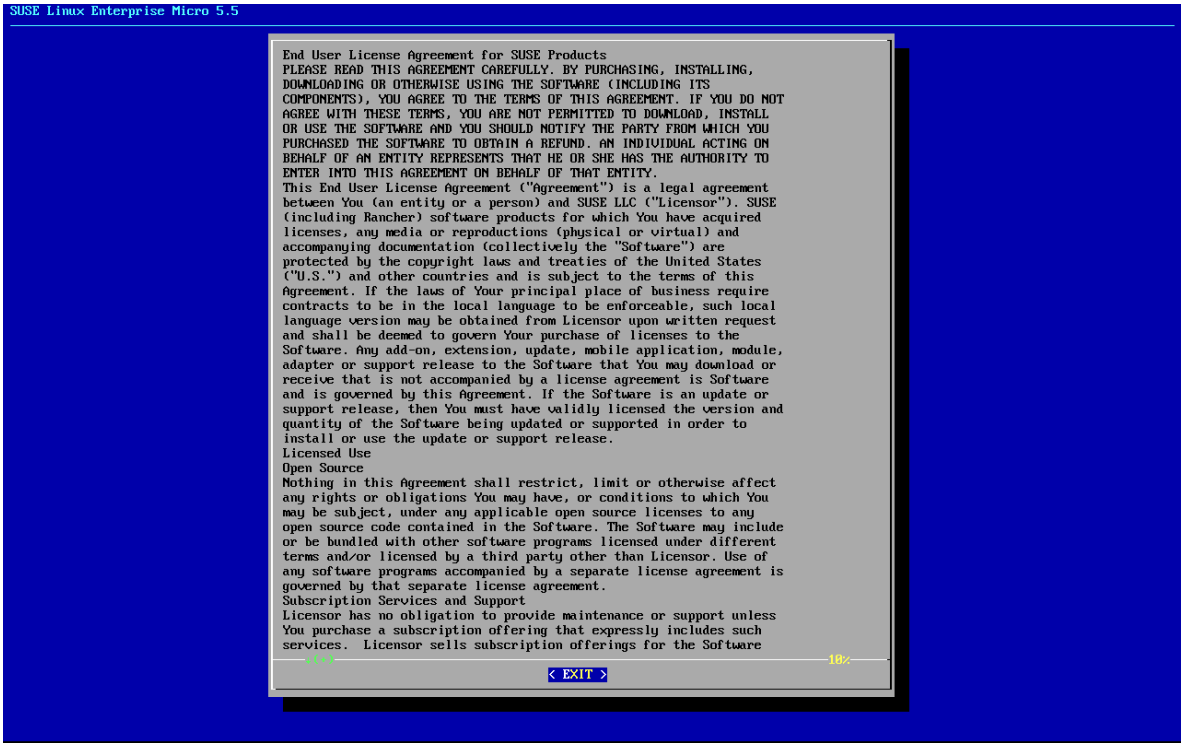
1. 使用下载的 Minimal KVM 映像创建一个新虚拟机，然后选择**导入现有磁盘映像**。
2. Configure RAM and number of CPUs with minimum values. \*)
3. 为 KVM 计算机命名，并选中**在安装之前自定义配置**复选框。
4. 单击 **[ 开始安装 ]** 以从映像引导。
5. 在 JeOS 首次引导屏幕上选择“开始”以继续。



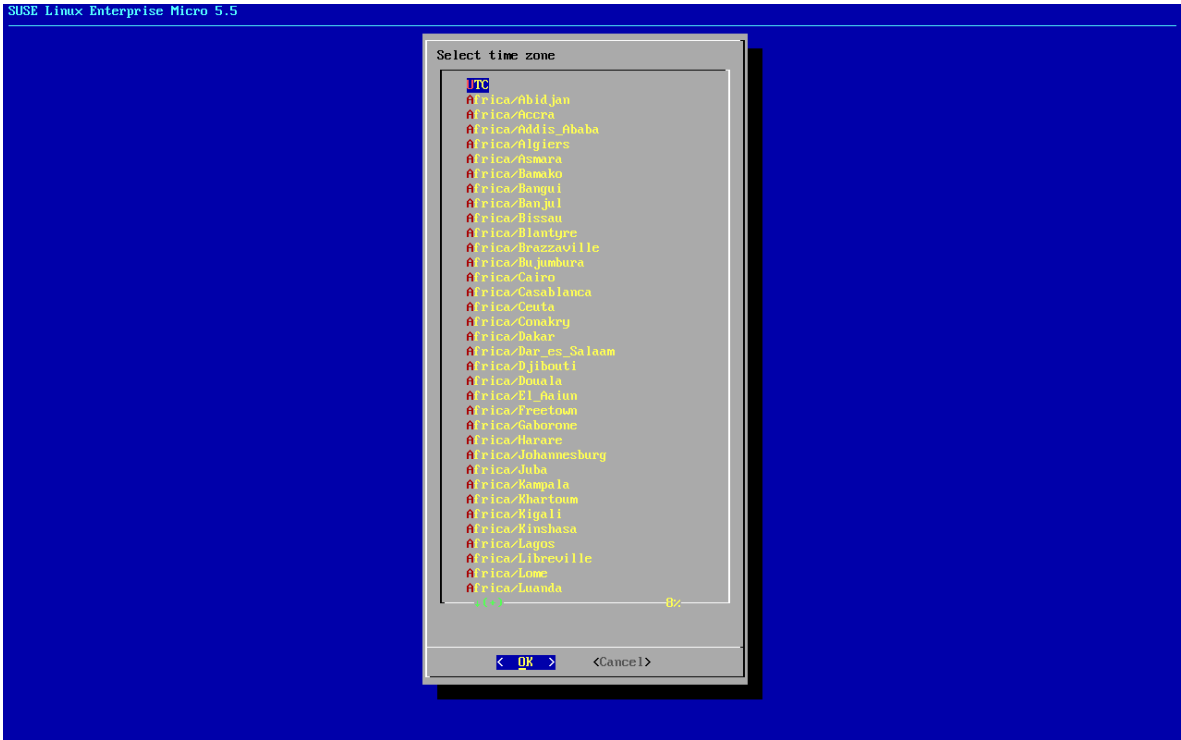
6. 选择键盘布局。



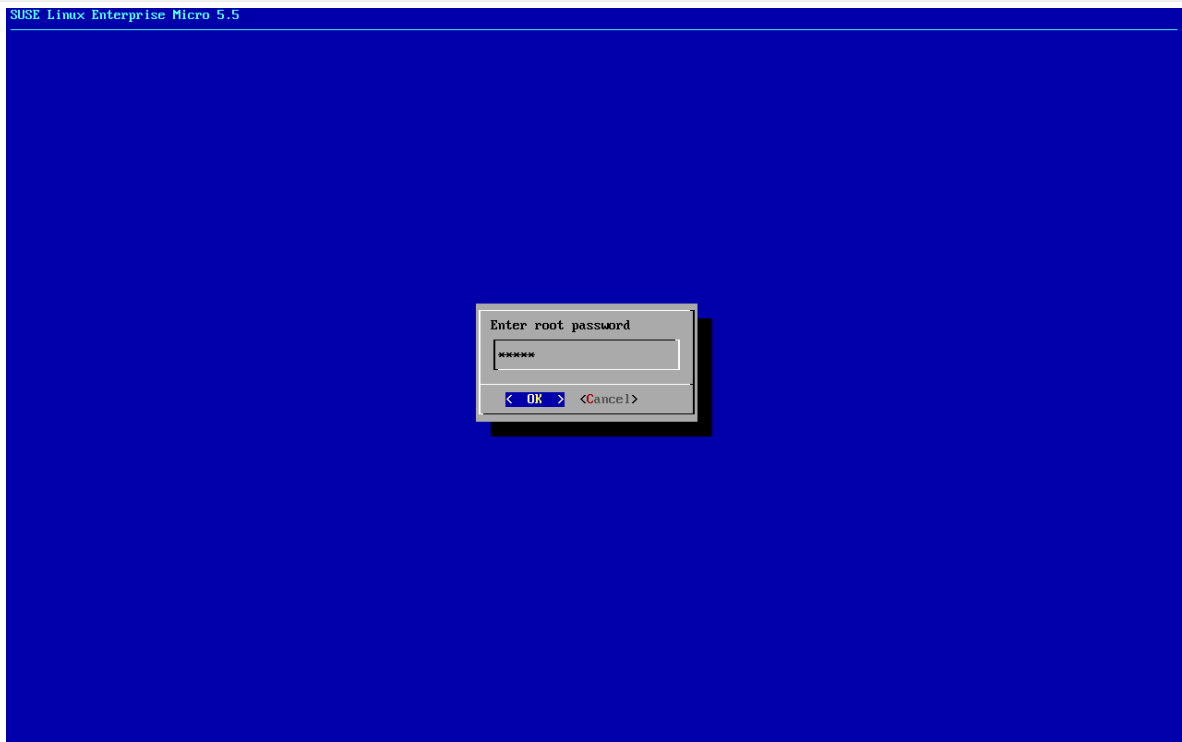
7. 接受许可协议。



8. 选择您的时区。



9. 输入 root 口令。



10. 安装完成后，以 root 身份登录。

11. 继续阅读下一节。

\*) For minimum values, see [installation-and-upgrade:hardware-requirements.pdf](#).

#### 3.2.3.4. Register SL Micro and SUSE Multi-Linux Manager 5.1 Proxy

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

1. 引导虚拟机。
2. 以 **root** 身份登录。
3. 在 SCC 中注册 SL Micro。

```
transactional-update register -r <注册代码> -e <您的电子邮件地址>
```

4. 重引导。
5. 在 SUSE Customer Center 中注册 SUSE Multi-Linux Manager 5.1 代理。

```
transactional-update register -p Multi-Linux-Manager-Proxy/5.1/x86_64 -r <REGCODE>
```

6. 重引导。
7. 更新系统：

```
transactional-update
```

8. 如果已应用更新，请重引导。
9. 此步骤是可选的。但是，如果您的基础架构需要自定义的永久性存储，请使用 **mgr-storage-proxy** 工具。有关详细信息，请参见 **mgr-storage-proxy --help**。此工具可以简化容器卷的创建过程。
  - 如下所示使用命令：

```
mgr-storage-proxy <存储磁盘设备>
```

例如：

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



此命令会将 `/var/lib/containers/storage/volumes` 中的永久性存储卷移动到指定的存储设备。

有关详细信息，请参见

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

### 3.2.3.5. 为代理创建激活密钥

#### 过程：创建激活密钥

1. Navigate to **Systems › Activation Keys** , and click [ **Create key** ].
2. Create an activation key for the proxy host with SL Micro 6.1 or SUSE Linux Enterprise Server 15 SP7 as the parent channel. This key should include all recommended channels and the proxy as an extension child channel.
3. 继续将代理主机作为 **default** 客户端进行引导。

### 3.2.3.6. 将代理主机作为客户端进行引导

#### 过程：引导代理主机

1. 选择**系统 › 引导**。
2. 填写代理主机的相关字段。
3. 从下拉列表中选择上一步骤中创建的激活密钥。
4. 单击 [ **引导** ]。
5. 等待引导过程成功完成。检查 **Salt** 菜单，确认 Salt 密钥已列出并已接受。
6. Reboot the proxy host if the operating system is SL Micro.
7. Select the host from the **System** list and trigger a second reboot in case of SL Micro after all events are finished to conclude the onboarding.

## 过程：更新代理主机

1. 从系统列表中选择主机，并应用所有补丁以将其更新。
2. Reboot the proxy host if the operating system is SL Micro.

### 3.2.3.7. Generate Proxy Configuration

SUSE Multi-Linux Manager 代理的配置存档由 SUSE Multi-Linux Manager 服务器生成。每个附加代理都需要自身的配置存档。



对于 Podman 部署，在生成此代理配置之前，必须将 SUSE Multi-Linux Manager 代理的容器主机作为客户端注册到 SUSE Multi-Linux Manager 服务器。

如果使用代理 FQDN 生成非注册客户端的代理容器配置（如 Kubernetes 用例中那样），系统列表中将出现一个新的系统项。此新项将显示在之前输入的“代理 FQDN”值下方并属于**外部**系统类型。

#### 3.2.3.7.1. 使用 Web UI 生成代理配置

### Procedure: Generating a Proxy Container Configuration Using Web UI

1. 在 Web UI 中，导航到**系统 > 代理配置**，然后填写所需数据：
2. 在**代理 FQDN**字段中，键入代理的完全限定域名。
3. 在**父 FQDN**字段中，键入 SUSE Multi-Linux Manager 服务器或另一个 SUSE Multi-Linux Manager 代理的完全限定域名。
4. 在**代理 SSH 端口**字段中，键入 SSH 服务在 SUSE Multi-Linux Manager 代理上监听的 SSH 端口。建议保留默认值 8022。
5. In the **Max Squid cache size [MB]** field type maximal allowed size for Squid cache. Recommended is to use at most 80% of available storage for the containers.



2 GB 表示默认的代理 squid 缓存大小。需要根据您的环境调整此大小。

在 **SSH 证书**选择列表中，选择应为 SUSE Multi-Linux Manager 代理生成新服务器证书还是使用现有证书。您可以考虑作为 SUSE Multi-Linux Manager 内置（自我签名）证书生成的证书。

+ 然后根据所做的选择提供用于生成新证书的签名 CA 证书的路径，或者要用作代理证书的现有证书及其密钥的路径。

+ 服务器生成的 CA 证书存储在 `/var/lib/containers/storage/volumes/root/_data/ssl-build` 目录中。

+ 有关现有或自定义证书的详细信息以及企业和中间证书的概念，请参见 **Administration > Ssl-certs-imported**。

1. 单击 **[生成]** 以在 SUSE Multi-Linux Manager 服务器中注册新代理 FQDN，并生成包含容器主机细节的配置存档 (`config.tar.gz`)。
2. 片刻之后，系统会显示文件可供下载。请将此文件保存在本地。



### 3.2.3.7.2. Generate Proxy Configuration With spacecmd and Self-Signed Certificate

可以使用 **spacecmd** 生成代理配置。

#### 过程：使用 spacecmd 和自我签名证书生成代理配置

1. 通过 SSH 连接到您的容器主机。
2. 执行以下命令（替换其中的服务器和代理 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. 从服务器容器复制生成的配置：

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

### 3.2.3.7.3. Generate Proxy Configuration With spacecmd and Custom Certificate

可以使用 **spacecmd** 为自定义证书（而不是默认的自我签名证书）生成代理配置。

#### 过程：使用 spacecmd 和自定义证书生成代理配置

1. 通过 SSH 连接到您的服务器容器主机。
2. 执行以下命令（替换其中的服务器和代理 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. 从服务器容器复制生成的配置：

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

### 3.2.3.8. 传输代理配置

Web UI 将生成配置存档。需要在代理容器主机上提供此存档。

#### 过程：复制代理配置

1. 从服务器容器将上一步生成的配置存档 (**config.tar.gz**) 复制到服务器主机（如果还未执行此操作）：

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

2. 将服务器主机中的文件复制到代理主机（如果还未执行此操作）：

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

3. 在代理主机上使用以下命令安装代理：

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

### 3.2.3.9. 启动 SUSE Multi-Linux Manager 5.1 代理

现在可以使用 **mgrpky** 命令启动容器：

#### 过程：启动代理并检查状态

1. 调用以下命令启动代理：

```
mgrpky start
```

2. 调用以下命令检查容器状态：

```
mgrpky status
```

应该会显示以下五个 SUSE Multi-Linux Manager 代理容器，并且它们应该是 **proxy-pod** 容器 Pod 的一部分：

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

#### 3.2.3.9.1. 为服务使用自定义容器映像

默认情况下，SUSE Multi-Linux Manager 代理套件设置为针对其每个服务使用相同的映像版本和注册表路径。但是，可以使用以 **-tag** 和 **-image** 结尾的 **install** 参数覆盖特定服务的默认值。

例如，可以按如下方式使用此命令：

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

该命令会在重启动 httpd 服务之前调整其配置文件。其中 **registry.opensuse.org/uyuni/proxy-httpds** 是要使用的映像，**0.1.0** 是版本标记。

要重置为默认值，请再次运行 **install** 命令但不要指定这些参数：


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

此命令首先将所有服务的配置重置为全局默认值，然后重新装载配置。

### 3.2.4. 将 SUSE Multi-Linux Manager 代理部署为虚拟机 - VMware

本节提供用于将 SUSE Multi-Linux Manager 5.1 代理部署为映像的虚拟机设置。将使用 VMware 作为此安装的沙箱。

#### 3.2.4.1. 可用映像



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 simplifying deployment.

SUSE Multi-Linux Manager 5.1 代理的映像可在 [SUSE Multi-Linux Manager 5.1 VM 映像](#) 中找到。



Customized SUSE Multi-Linux Manager 5.1 VM images are provided only for SL Micro 6.1. To run the product on SUSE Linux Enterprise Server 15 SP7, use the standard SUSE Linux Enterprise Server 15 SP7 installation media available at <https://www.suse.com/download/sles/> and enable the SUSE Multi-Linux Manager 5.1 extensions on top of it.



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>

表格 13. 可用代理映像

| 体系结构    | 映像格式                          |
|---------|-------------------------------|
| aarch64 | qcow2、vmdk                    |
| x86_64  | qcow2、vmdk、raw、Self Installer |

#### 3.2.4.2. 虚拟机设置 - VMware

This section 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.



This section specifies the minimum requirements. These are suitable for a quick test installation, such as a proxy with one client.

- If you want to use a production environment and need background information about disk space, see **Installation-and-upgrade > Hardware-requirements**.

## 过程：创建 VMware 虚拟机

1. 下载 SUSE Multi-Linux Manager 代理 **.vmdk** 文件，然后将该文件副本传输到您的 VMware 存储区。
2. 使用 VMware Web 界面复制上载的 **.vmdk** 文件。这会将提供的 **.vmdk** 文件转换成适合 vSphere 超级管理程序的格式。
3. 创建一个新的虚拟机，并根据 Guest 操作系统系列 **Linux** 和 Guest 操作系统版本 SUSE Linux Enterprise 15 (64 位) 为其命名。
4. Add an additional **Hard Disk 2** of 100 GB (or more).
5. Configure RAM and number of CPUs with minimum values. \*)
6. 根据需要设置网络适配器。
7. 启动 VM，然后按照首次引导对话框中的提示操作（键盘布局、许可协议、时区、root 的口令）。
8. 安装完成后，以 root 身份登录。
9. 继续阅读下一节。

\*) For minimum values, see [installation-and-upgrade:hardware-requirements.pdf](#).

### 3.2.4.3. Register SL Micro and SUSE Multi-Linux Manager 5.1 Proxy

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

1. 引导虚拟机。
2. 以 **root** 身份登录。
3. 在 SCC 中注册 SL Micro。

```
transactional-update register -r <注册代码> -e <您的电子邮件地址>
```

4. 重引导。
5. 在 SUSE Customer Center 中注册 SUSE Multi-Linux Manager 5.1 代理。

```
transactional-update register -p Multi-Linux-Manager-Proxy/5.1/x86_64 -r <REGCODE>
```

6. 重引导。
7. 更新系统：

```
transactional-update
```

8. 如果已应用更新，请重引导。

9. 此步骤是可选的。但是，如果您的基础架构需要自定义的永久性存储，请使用 **mgr-storage-proxy** 工具。有关详细信息，请参见 **mgr-storage-proxy --help**。此工具可以简化容器卷的创建过程。

- 如下所示使用命令：

```
mgr-storage-proxy <存储磁盘设备>
```

例如：

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

此命令会将 `/var/lib/containers/storage/volumes` 中的永久性存储卷移动到指定的存储设备。



有关详细信息，请参见

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

#### 3.2.4.4. 为代理创建激活密钥

##### 过程：创建激活密钥

1. Navigate to **Systems › Activation Keys**, and click **[ Create key ]**.
2. Create an activation key for the proxy host with SL Micro 6.1 or SUSE Linux Enterprise Server 15 SP7 as the parent channel. This key should include all recommended channels and the proxy as an extension child channel.
3. 继续将代理主机作为 **default** 客户端进行引导。

#### 3.2.4.5. 将代理主机作为客户端进行引导

##### 过程：引导代理主机

1. 选择**系统 › 引导**。
2. 填写代理主机的相关字段。
3. 从下拉列表中选择上一步骤中创建的激活密钥。
4. 单击 **[ 引导 ]**。
5. 等待引导过程成功完成。检查 **Salt** 菜单，确认 Salt 密钥已列出并已接受。
6. Reboot the proxy host if the operating system is SL Micro.
7. Select the host from the **System** list and trigger a second reboot in case of SL Micro after all events are finished to conclude the onboarding.

##### 过程：更新代理主机

1. 从**系统**列表中选择主机，并应用所有补丁以将其更新。
2. Reboot the proxy host if the operating system is SL Micro.

### 3.2.4.6. Generate Proxy Configuration

SUSE Multi-Linux Manager 代理的配置存档由 SUSE Multi-Linux Manager 服务器生成。每个附加代理都需要自身的配置存档。



对于 Podman 部署，在生成此代理配置之前，必须将 SUSE Multi-Linux Manager 代理的容器主机作为客户端注册到 SUSE Multi-Linux Manager 服务器。

如果使用代理 FQDN 生成非注册客户端的代理容器配置（如 Kubernetes 用例中那样），系统列表中将出现一个新的系统项。此新项将显示在之前输入的“代理 FQDN”值下方并属于**外部**系统类型。

#### 3.2.4.6.1. 使用 Web UI 生成代理配置

### Procedure: Generating a Proxy Container Configuration Using Web UI

1. 在 Web UI 中，导航到**系统 > 代理配置**，然后填写所需数据：
2. 在**代理 FQDN**字段中，键入代理的完全限定域名。
3. 在**父 FQDN**字段中，键入 SUSE Multi-Linux Manager 服务器或另一个 SUSE Multi-Linux Manager 代理的完全限定域名。
4. 在**代理 SSH 端口**字段中，键入 SSH 服务在 SUSE Multi-Linux Manager 代理上监听的 SSH 端口。建议保留默认值 8022。
5. In the **Max Squid cache size [MB]** field type maximal allowed size for Squid cache. Recommended is to use at most 80% of available storage for the containers.



2 GB 表示默认的代理 squid 缓存大小。需要根据您的环境调整此大小。

在 **SSH 证书**选择列表中，选择应为 SUSE Multi-Linux Manager 代理生成新服务器证书还是使用现有证书。您可以考虑作为 SUSE Multi-Linux Manager 内置（自我签名）证书生成的证书。

+ 然后根据所做的选择提供用于生成新证书的签名 CA 证书的路径，或者要用作代理证书的现有证书及其密钥的路径。

+ 服务器生成的 CA 证书存储在 **/var/lib/containers/storage/volumes/root/\_data/ssl-build** 目录中。

+ 有关现有或自定义证书的详细信息以及企业和中间证书的概念，请参见 **Administration > Ssl-certs-imported**。

1. 单击 **[生成]** 以在 SUSE Multi-Linux Manager 服务器中注册新代理 FQDN，并生成包含容器主机细节的配置存档 (**config.tar.gz**)。
2. 片刻之后，系统会显示文件可供下载。请将此文件保存在本地。

### 3.2.4.6.2. Generate Proxy Configuration With spacecmd and Self-Signed Certificate

可以使用 **spacecmd** 生成代理配置。

#### 过程：使用 **spacecmd** 和自我签名证书生成代理配置

1. 通过 SSH 连接到您的容器主机。
2. 执行以下命令（替换其中的服务器和代理 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. 从服务器容器复制生成的配置：

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

### 3.2.4.6.3. Generate Proxy Configuration With spacecmd and Custom Certificate

可以使用 **spacecmd** 为自定义证书（而不是默认的自我签名证书）生成代理配置。

#### 过程：使用 **spacecmd** 和自定义证书生成代理配置

1. 通过 SSH 连接到您的服务器容器主机。
2. 执行以下命令（替换其中的服务器和代理 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. 从服务器容器复制生成的配置：

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

### 3.2.4.7. 传输代理配置

Web UI 将生成配置存档。需要在代理容器主机上提供此存档。

#### 过程：复制代理配置

1. 从服务器容器将上一步生成的配置存档 (**config.tar.gz**) 复制到服务器主机（如果还未执行此操作）：

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

2. 将服务器主机中的文件复制到代理主机（如果还未执行此操作）：

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

3. 在代理主机上使用以下命令安装代理：

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

### 3.2.4.8. 启动 SUSE Multi-Linux Manager 5.1 代理

现在可以使用 **mgrpky** 命令启动容器：

#### 过程：启动代理并检查状态

1. 调用以下命令启动代理：

```
mgrpky start
```

2. 调用以下命令检查容器状态：

```
mgrpky status
```

应该会显示以下五个 SUSE Multi-Linux Manager 代理容器，并且它们应该是 **proxy-pod** 容器 Pod 的一部分：

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

#### 3.2.4.8.1. 为服务使用自定义容器映像

默认情况下，SUSE Multi-Linux Manager 代理套件设置为针对其每个服务使用相同的映像版本和注册表路径。但是，可以使用以 **-tag** 和 **-image** 结尾的 **install** 参数覆盖特定服务的默认值。

例如，可以按如下方式使用此命令：

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

该命令会在重启动 httpd 服务之前调整其配置文件。其中 **registry.opensuse.org/uyuni/proxy-httpds** 是要使用的映像，**0.1.0** 是版本标记。

要重置为默认值，请再次运行 **install** 命令但不要指定这些参数：



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

此命令首先将所有服务的配置重置为全局默认值，然后重新装载配置。

### 3.2.5. 在 K3s 上部署 SUSE Multi-Linux Manager 5.1 代理

#### 3.2.5.1. 安装 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.

在容器主机计算机上，安装 **K3s**（请将 **<K3S\_HOST\_FQDN>** 替换为 k3s 主机的 FQDN）：

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

#### 3.2.5.2. 安装工具

在安装时需要提供 **mgrpky** 和 **helm** 软件包。

**mgrpky** 和 **helm** 软件包可在 SUSE Multi-Linux Manager 代理产品储存库中找到。

1. To install it, run:

```
transactional-update pkg install helm mgrpky
```

2. 重引导

##### 3.2.5.2.1. 使用 Web UI 生成代理配置

### Procedure: Generating a Proxy Container Configuration Using Web UI

1. 在 Web UI 中，导航到**系统 > 代理配置**，然后填写所需数据：
2. 在**代理 FQDN**字段中，键入代理的完全限定域名。
3. 在**父 FQDN**字段中，键入 SUSE Multi-Linux Manager 服务器或另一个 SUSE Multi-Linux Manager 代理的完全限定域名。
4. 在**代理 SSH 端口**字段中，键入 SSH 服务在 SUSE Multi-Linux Manager 代理上监听的 SSH 端口。建议保留默认值 8022。
5. In the **Max Squid cache size [MB]** field type maximal allowed size for Squid cache. Recommended is to use at most 80% of available storage for the containers.



2 GB 表示默认的代理 squid 缓存大小。需要根据您的环境调整此大小。

在 **SSH 证书** 选择列表中，选择应为 SUSE Multi-Linux Manager 代理生成新服务器证书还是使用现有证书。您可以考虑作为 SUSE Multi-Linux Manager 内置（自我签名）证书生成的证书。

+ 然后根据所做的选择提供用于生成新证书的签名 CA 证书的路径，或者要用作代理证书的现有证书及其密钥的路径。

+ 服务器生成的 CA 证书存储在 `/var/lib/containers/storage/volumes/root/_data/ssl-build` 目录中。

+ 有关现有或自定义证书的详细信息以及企业和中间证书的概念，请参见 **Administration** › **Ssl-certs-imported**。

1. 单击 **[生成]** 以在 SUSE Multi-Linux Manager 服务器中注册新代理 FQDN，并生成包含容器主机细节的配置存档 (`config.tar.gz`)。
2. 片刻之后，系统会显示文件可供下载。请将此文件保存在本地。

#### 3.2.5.2.2. Generate Proxy Configuration With spacecmd and Self-Signed Certificate

可以使用 **spacecmd** 生成代理配置。

#### 过程：使用 spacecmd 和自我签名证书生成代理配置

1. 通过 SSH 连接到您的容器主机。
2. 执行以下命令（替换其中的服务器和代理 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. 从服务器容器复制生成的配置：

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

#### 3.2.5.2.3. Generate Proxy Configuration With spacecmd and Custom Certificate

可以使用 **spacecmd** 为自定义证书（而不是默认的自我签名证书）生成代理配置。

#### 过程：使用 spacecmd 和自定义证书生成代理配置

1. 通过 SSH 连接到您的服务器容器主机。
2. 执行以下命令（替换其中的服务器和代理 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. 从服务器容器复制生成的配置：

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

### 3.2.5.3. 部署 SUSE Multi-Linux Manager 代理 helm 图表

要配置 SUSE Multi-Linux Manager 代理 Pod 使用的卷存储空间，请为以下声明定义永久性卷。如果您未自定义存储配置，K3s 将自动为您创建存储卷。

永久性卷声明已命名为：

- **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
```

有关详细信息，请参见 <https://kubernetes.io/docs/concepts/storage/persistent-volumes/> (kubernetes) 或 <https://rancher.com/docs/k3s/latest/en/storage/> (K3s) 文档。

## 3.2.6. SUSE Multi-Linux Manager 代理物理隔离的部署

### 3.2.6.1. 什么是物理隔离的部署？

物理隔离部署是指设置和操作与不安全网络（尤其是互联网）物理隔离的任何联网系统。这种部署通常用于军事设施、金融系统、关键基础架构等高安全性环境，以及处理敏感数据，因而必须防范其受到外部威胁的任何位置。



At the moment, air-gapped deployment is available only on SL Micro.

### 3.2.6.2. 通过虚拟机部署

建议的安装方法是使用所提供的 SUSE Multi-Linux Manager 虚拟机映像选项，因为所需的全部工具和容器映像都已预先加载并且随时可用。

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

要升级 SUSE Multi-Linux Manager 代理，用户应按照[代理升级](#)中定义的过程操作。

### 3.2.6.3. Deploy SUSE Multi-Linux Manager on SL Micro

SUSE Multi-Linux Manager 还在 RPM 中提供了可在系统上安装的所需的全部容器映像。

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

1. Install SL Micro.
2. 将代理主机操作系统作为 SUSE Multi-Linux Manager 服务器上的客户端进行引导。

3. 更新系统。
4. 安装工具软件包和映像包（将 \$ARCH\$ 替换为正确的体系结构）

```
transactional-update pkg install mgrpxy* mgrctl* multi-linux-manager-5.1-$ARCH$-  
proxy-*
```

5. 重引导。
6. 使用 mgrpxy 部署 SUSE Multi-Linux Manager。

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

要升级 SUSE Multi-Linux Manager 代理，用户应按照[代理升级](#)中定义的过程操作。

# Chapter 4. 升级和迁移

## 4.1. 服务器

### 4.1.1. Distribution Upgrade and Server Migration



- SUSE Multi-Linux Manager 5.0 must be stopped before upgrade.
- SUSE Multi-Linux Manager 5.0 is not supported on top of SL Micro 6.1 & SUSE Linux Enterprise Server 15 SP7 as host os

SUSE Multi-Linux Manager server hosts that are hardened for security may restrict execution of files from the **/tmp** folder. In such cases, as a workaround, export the **TMPDIR** environment variable to another existing path before running **mgradm**. For example:



```
export TMPDIR=/path/to/other/tmp
```

In SUSE Multi-Linux Manager updates, tools will be changed to make this workaround unnecessary.

#### 4.1.1.1. SLE Micro 5.5 to SL Micro 6.1

This document provides the tested procedure to upgrade a SLE Micro 5.5 host deployed with SUSE Multi-Linux Manager 5.0 Server to SL Micro 6.1 and migrate to SUSE Multi-Linux Manager 5.1.

##### 4.1.1.1.1. Prerequisites

- SUSE Multi-Linux Manager 5.0 is installed and running on SLE Micro 5.5.
- System is registered and has active subscriptions with SCC.

##### 4.1.1.1.2. Distribution Upgrade and Server Migration

### Procedure: Migration from SUSE Multi-Linux Manager 5.0 to SUSE Multi-Linux Manager 5.1

#### 1. Verify Current Product Status

```
SUSEConnect --status-text
```

#### Confirm:

- Base OS: **SUSE Linux Enterprise Micro 5.5**
- Extension: **SUSE Manager Server 5.0 Extension**

#### 2. Ensure System is Updated

```
transactional-update patch
```

- If patches were applied, **reboot the system** before proceeding to migration:

```
reboot
```

- If no updates were found, you can proceed directly to the migration step.

### 3. Start the Migration:

```
transactional-update migration --auto-agree-with-licenses --gpg-auto-import-keys
```

Follow the prompts and select the available migration to **SUSE Linux Micro 6.1** and **SUSE Multi-Linux Manager Server Extension 5.1**.

### 4. Reboot to Apply Changes

```
reboot
```

### 5. Post-Reboot Checks:

Verify upgraded OS and SUSE Multi-Linux Manager extension:

```
cat /etc/os-release  
SUSEConnect --status-text
```

You should see:

- **SL-Micro 6.1**
- **Multi-Linux Manager Server Extension 5.1**

Enable Root SSH Access (if required). SL Micro 6.1 disables root login via SSH by default. Edit `/etc/ssh/sshd_config.d/sshd.conf`:

```
PermitRootLogin yes
```

And restart the service:

```
systemctl restart sshd
```

For more information, see **Administration › Troubleshooting**.

## 6. Upgrade Server Containers

```
mgradm upgrade podman
```

Follow the prompts to pull and configure the new 5.1.0 containers.

## 7. Check running containers:

```
podman ps
```

You should see:

- **server:5.1.0**
- **server-postgresql:5.1.0**

## 8. Verify SUSE Multi-Linux Manager Tools

```
mgradm --version
```

Expected output:

- Version **5.1.11** or later
- References **5.1.0**



- Errors for missing services like **uyuni-db** or **saline** during upgrade can be ignored if not installed previously.

### 4.1.1.1.3. Migration Complete

The system is now running SUSE Multi-Linux Manager 5.1 on SL Micro 6.1. Continue with post-migration validation.

### 4.1.1.1.4. Database Backup Volume

Server migration or upgrade with **mgradm migration** or **mgradm upgrade** can create a volume with the database backup.

When the PostgreSQL database version is increased, the old database must be stored in a separate location before running the upgrade. For this purpose **mgradm** dynamically creates the volume **var-pgsql-backup**. When the migration or upgrade is done and the user has validated that the new system is

working as expected, this volume can be removed safely.

#### 4.1.1.2. SUSE Linux Enterprise Server 15 SP6 to 15 SP7

This document provides the tested procedure to upgrade a SUSE Linux Enterprise Server 15 SP6 host deployed with SUSE Multi-Linux Manager 5.0 Server to SUSE Linux Enterprise Server 15 SP7 with SUSE Multi-Linux Manager 5.1.

##### 4.1.1.2.1. Prerequisites

- SUSE Multi-Linux Manager 5.0 is installed and running on SUSE Linux Enterprise Server 15 SP6.
- The system is registered and has valid subscriptions in SUSE Customer Center (SCC).
- Ensure backups are created before proceeding.

##### 4.1.1.2.2. Distribution Upgrade and Server Migration

### Procedure: Migration from SUSE Multi-Linux Manager 5.0 to SUSE Multi-Linux Manager 5.1

#### 1. Verify Current Product Status

```
SUSEConnect --status-text
```

#### Confirm:

- Base OS: **SUSE Linux Enterprise Server 15 SP6**
- Extension: **SUSE Manager Server 5.0 Extension**

#### 2. Apply All System Patches

```
zypper patch
```

**Reboot** if the update stack was updated:

```
reboot
```

#### 3. Launch the Zypper migration tool

```
zypper migration
```

Zypper 会显示可能的迁移目标以及详细摘要。

#### 4. 选择适当的目标，并按照提示完成迁移。



## 5. After the upgrade completes, reboot the system:

```
reboot
```

## 6. Post-Reboot: Verify Upgrade Status

```
cat /etc/os-release  
SUSEConnect --status-text
```

Expected output:

- **VERSION="15-SP7"**
- SUSE Multi-Linux Manager Server Extension **5.1** is active

## 7. Upgrade Server Containers

```
mgradm upgrade podman
```

Follow prompts to pull the new container images and reconfigure the environment.

## 8. Check Running Containers

```
podman ps
```

Expected containers:

- **server:5.1.0**
- **server-postgresql:5.1.0**

## 9. Verify SUSE Multi-Linux Manager Tools Version

```
mgradm --version
```

Expected output:

- Version **5.1.11** or later
- Image tag **5.1.0**

#### 4.1.1.2.3. Migration Complete

The system is now successfully upgraded to SUSE Linux Enterprise Server 15 SP7 and SUSE Multi-Linux Manager 5.1. Validate your setup before resuming production operations.



SUSE Multi-Linux Manager 5.1 introduces a rebranded set of client tools for all supported operating systems. This transition is seamless, and users performing a new product synchronization should only notice the updated channel names.

Channels named **SUSE Manager Client Tools for XYZ**, used by clients previously registered with SUSE Multi-Linux Manager 4.3 or 5.0, are no longer available in version 5.1 and will no longer receive updates in 5.1.

Although the legacy channels remain assigned to existing clients after migration, the corresponding repositories have been removed.

To ensure continued updates, users must:

- Mirror the new **SUSE Multi-Linux Manager Client Tools for XYZ** channels for the relevant products and assign them to the appropriate clients.
- Unassign the outdated **SUSE Manager Client Tools for XYZ** channels.

This also means that any CLM projects based on the old client tools must be adjusted accordingly.

#### 4.1.1.2.4. Database Backup Volume

Server migration or upgrade with **mgradm migration** or **mgradm upgrade** can create a volume with the database backup.

When the PostgreSQL database version is increased, the old database must be stored in a separate location before running the upgrade. For this purpose **mgradm** dynamically creates the volume **var-pgsql-backup**. When the migration or upgrade is done and the user has validated that the new system is working as expected, this volume can be removed safely.

### 4.1.2. 将 SUSE Multi-Linux Manager 服务器迁移到容器化环境

#### 4.1.2.1. 要求和注意事项

##### 4.1.2.1.1. 常规

- To migrate a SUSE Multi-Linux Manager 4.3 Server to a container, you require a new machine with SL Micro 6.1 or SUSE Linux Enterprise Server 15 SP7 and **mgradm** installed.
- An in-place migration from SUSE Multi-Linux Manager 4.3 to 5.1 is not supported, regardless of whether the chosen host operating system is SL Micro 6.1 or SUSE Linux Enterprise Server 15 SP7.

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](https://www.suse.com/suse-manager/client-configuration/contact-methods-migrate-traditional.html).

- SUSE Multi-Linux Manager 5.0 及更高版本不再支持传统联系协议。



This guide only covers the migration from SUSE Multi-Linux Manager 4.3 to 5.1. Migrating an existing SUSE Multi-Linux Manager 5.1 instance to the same version while switching the host operating system from SL Micro 6.1 to SUSE Linux Enterprise Server 15 SP7, or vice versa, is not handled by the **mgradm migrate** command.

#### 4.1.2.1.2. 主机名

- 当前的迁移过程不包含重命名主机名的功能。因此，新服务器的完全限定域名（FQDN）将与旧服务器的一样。
- IP 地址必须保持不变，以确保客户端可以连接到服务器。



迁移之后，需要手动更新 DHCP 和 DNS 记录以指向新的服务器。

#### 4.1.2.1.3. GPG 密钥

- 自信任 GPG 密钥不会被迁移。
- 仅在 RPM 数据库中可信的 GPG 密钥不会迁移。因此，使用 **spacewalk-repo-sync** 同步通道可能会失败。
- 在完成服务器的实际迁移后，管理员必须手动将这些密钥从所安装的 4.3 系统迁移到容器主机。

### 过程：将 4.3 GPG 密钥手动迁移到新服务器

1. 将 4.3 服务器中的密钥复制到新服务器的容器主机。
2. 稍后，使用命令 **mgradm gpg add <PATH\_TO\_KEY\_FILE>** 将每个密钥添加到迁移的服务器。

#### 4.1.2.2. 迁移

##### 4.1.2.2.1. Prepare SUSE Multi-Linux Manager 5.1 Server Host



Do not pre-install SUSE Multi-Linux Manager on the prepared SL Micro 6.1 or SUSE Linux Enterprise Server 15 SP7 system.

The migration process is designed to perform the server installation automatically. Running **mgradm install** and then **mgradm migrate** is not supported and will lead to an unsupported system state.

In the following steps, we are only preparing the host system, not installing the actual SUSE Multi-Linux Manager 5.1 Server.

#### Prepare SL Micro 6.1 Host

#### Download the installation media

### 过程：下载安装媒体

1. Locate the SL Micro 6.1 installation media at <https://www.suse.com/download/sle-micro/>, and download the appropriate media file.
2. 将下载下来的 .iso 映像放入一个 DVD 或 USB 闪存盘以进行安装。

## Install SL Micro 6.1

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

## Procedure: Installing SL Micro 6.1

1. Insert the DVD or USB flash drive (USB disk or key) containing the installation image for SLE Micro 6.1.
2. 引导或重引导您的系统。
3. 使用箭头键选择**安装**。
4. Adjust Keyboard and language.
5. 单击**复选框**接受许可协议。
6. 单击**下一步**继续。
7. 选择注册方法。在本示例中，我们将在 SUSE Customer Center 中注册服务器。



SUSE Multi-Linux Manager 5.1 容器会安装为扩展。根据以下列出的所需特定扩展，您还需要有各个扩展的 SUSE Customer Center 注册代码。

- SUSE Multi-Linux Manager 5.1 服务器
- SUSE Multi-Linux Manager 5.1 代理
- SUSE Multi-Linux Manager 5.1 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.

8. 输入您的 SUSE Customer Center 电子邮件地址。
9. Enter your registration code for SL Micro 6.1.
10. 单击**下一步**继续。
11. To install a proxy, select the SUSE Multi-Linux Manager 5.1 Proxy extension; to install a server, select the SUSE Multi-Linux Manager 5.1 Server extension **Checkbox**.
12. 单击**下一步**继续。
13. Enter your SUSE Multi-Linux Manager 5.1 extension registration code.
14. 单击 [ **下一步** ] 继续。
15. 在 **NTP 配置**页面上，单击 [ **下一步** ]。
16. 在**系统身份验证**页面上，输入 root 用户的口令。单击 [ **下一步** ]。

17. 在**安装设置**页面上单击 **[ 安装 ]**。

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

### OPTIONAL: Registration from the command line

If you added SUSE Multi-Linux Manager 5.1 as an extension during SL Micro 6.1 installation then you can skip this procedure. 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.



The following steps register a SUSE Multi-Linux Manager 5.1 extension 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.

### Procedure: Registering from the Command Line

1. List available extensions with the following command:

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

2. From the list of available extensions, select the one you wish to install:

- a. If installing the Server, use your SUSE Multi-Linux Manager Server Extension 5.1 x86\_64 registration code with following command:

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

- b. If installing the Proxy, use your SUSE Multi-Linux Manager Proxy Extension 5.1 x86\_64 registration code with following command:

```
transactional-update register -p Multi-Linux-Manager-Proxy/5.1/x86_64 -r  
<reg_code>
```

3. 重引导。

### 更新系统

#### 过程：更新系统

1. 以 **root** 身份登录。
2. 运行 **transactional-update**:

```
transactional-update
```

3. 重引导。



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
```

### Prepare SUSE Linux Enterprise Server 15 SP7 Host

Alternatively, you can deploy SUSE Multi-Linux Manager on SUSE Linux Enterprise Server 15 SP7.

The following procedure describes the main steps of the installation process.

### Procedure: Installing SUSE Multi-Linux Manager Extensions on SUSE Linux Enterprise Server 15 SP7

1. Locate and download SUSE Linux Enterprise Server 15 SP7 **.iso** at <https://www.suse.com/download/sles/>.
2. Make sure that you have registration codes both for the host operating system (SUSE Linux Enterprise Server 15 SP7) and extensions
3. Start the installation of SUSE Linux Enterprise Server 15 SP7.
  - a. On the **Language, keyboard and product selection** select the product to install.
  - b. On the **License agreement** read the agreement and check **I Agree to the License Terms**.
4. Select the registration method. For this example, we will register the server with SUSE Customer Center.
5. 输入您的 SUSE Customer Center 电子邮件地址。
6. Enter your registration code for SUSE Linux Enterprise Server 15 SP7.
7. 单击**下一步**继续。



Please note that for SUSE Linux Enterprise Server 15 SP7, you are required to have a valid SUSE Linux Enterprise Server subscription and corresponding registration code, which you must provide on this screen. You will be required to enter the SUSE Multi-Linux Manager Extension registration code below.

8. In the screen **Extensions and Modules Selection** check the following:
  - ☐ Select the SUSE Multi-Linux Manager Server Extension to install the Server, or the SUSE Multi-Linux Manager Proxy Extension to install the Proxy.
  - ☐ Basesystem Module
  - ☐ Containers Module

9. 单击**下一步**继续。
10. Enter your SUSE Multi-Linux Manager 5.1 extension registration code.
11. 单击 **[ 下一步 ]** 继续。
12. 完成安装。
13. When the installation completes, log in to the newly installed server as root.
14. Update the System (optional, if the system was not set to download updates during install):

```
zypper up
```

15. 重引导。
16. Log in as root and install **podman** plus **mgradm** and **mgradm-bash-completion** (if not already automatically installed):

```
zypper install podman mgradm mgradm-bash-completion
```

17. Start the Podman service by rebooting the system, or running a command:

```
systemctl enable --now podman.service
```

#### 4.1.2.2.2. SSH 连接准备

This step ensures that the new SUSE Multi-Linux Manager 5.1 Server can connect to the existing 4.3 Server over SSH without requiring a password. It involves generating and configuring SSH keys, setting up an SSH agent, and copying the public key to the old server. This setup is required for the migration process to run without manual intervention.

### 过程：准备 SSH 连接

1. 确保对于 **root**，新 5.1 服务器上存在 SSH 密钥。如果不存在密钥，请使用以下命令创建一个：

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

2. 新服务器上的 SSH 配置和代理应准备就绪，这样在连接 4.3 服务器时就不会提示输入口令。

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



迁移脚本依赖新服务器上运行的 SSH 代理来建立不提示输入口令的连接。如果该代理尚未激活，请运行 **eval \$(ssh-agent)** 将其启动。然后，使用 **ssh-add**（后跟私用密钥的路径）将 SSH 密钥添加到正在运行的代理。在此过程中，系统将提示您输入私用密钥的口令。

3. 使用 **ssh-copy-id** 将公共 SSH 密钥复制到 SUSE Multi-Linux Manager 4.3 服务器 (**<oldserver.fqdn>**)。将 **<oldserver.fqdn>** 替换为 4.3 服务器的 FQDN：

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

SSH 密钥将会被复制到旧服务器的 `~/.ssh/authorized_keys` 文件中。有关详细信息，请参见 [ssh-copy-id](#) 手册页。

4. 在新服务器上与旧的 SUSE Multi-Linux Manager 服务器建立 SSH 连接，检查是否不需要口令。此外，主机指纹不得有任何问题。如果遇到问题，请从 `~/.ssh/known_hosts` 文件中去除旧指纹。然后重试。指纹将存储在本地 `~/.ssh/known_hosts` 文件中。

#### 4.1.2.2.3. 执行迁移

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.

这包括但不限于内存 (RAM)、CPU 核心、存储和网络带宽。



SUSE Multi-Linux Manager server hosts that are hardened for security may restrict execution of files from the `/tmp` folder. In such cases, as a workaround, export the **TMPDIR** environment variable to another existing path before running **mgradm**. For example:

```
export TMPDIR=/path/to/other/tmp
```

In SUSE Multi-Linux Manager updates, tools will be changed to make this workaround unnecessary.

### 过程：执行迁移

1. This step is optional. If custom persistent storage is required for your infrastructure, use the **mgr-storage-server** tool. For more information about **mgr-storage-server**, see [installation-and-upgrade:hardware-requirements.pdf](#).
2. 执行以下命令来安装新的 SUSE Multi-Linux Manager 服务器。请将 `<oldserver.fqdn>` 替换为 4.3 服务器的 FQDN：



Make sure to upgrade your 4.3 server and apply all available updates before starting the migration process. Additionally, remove any unnecessary channels to help reduce the overall migration time.



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.

只有在最终迁移期间才需要停止旧服务器上的进程。

For all non-final replications add the parameter **--prepare** to prevent the automatic stopping the services on the old server. For example on SUSE Multi-Linux Manager server:



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

## Procedure: Final Migration

1. Stop the SUSE Multi-Linux Manager services on 4.3 Server:

```
spacewalk-service stop
```

2. Stop the PostgreSQL service on 4.3 Server:

```
systemctl stop postgresql
```

3. Perform the migration on SUSE Multi-Linux Manager server

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

4. 迁移可信 SSL CA 证书。

### 证书的迁移

作为 RPM 的一部分安装并存储在 SUSE Multi-Linux Manager 4.3 上 `/usr/share/pki/trust/anchors/` 目录中的可信 SSL CA 证书将不会迁移。由于 SUSE 不会在容器中安装 RPM 软件包，因此迁移完成后，管理员必须手动从所安装的 4.3 系统中迁移这些证书文件。

## 过程：迁移证书

1. 将 4.3 服务器中的该文件复制到新服务器。例如，复制为 `/local/ca.file`。
2. 使用以下命令将文件复制到容器中：

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



成功运行 **mgradm migrate** 命令后，所有客户端上的 Salt 设置仍会指向旧的 4.3 服务器。

要将其重定向到 5.1 服务器，需要在基础架构级别（DHCP 和 DNS）重命名新服务器，以使用与 4.3 服务器相同的 FQDN 和 IP 地址。

Adjusting the IP address can be avoided if the latest version of the minion is installed on the clients, as the newer version can automatically re-connect with the server using only the FQDN.



SUSE Multi-Linux Manager 5.1 introduces a rebranded set of client tools for all supported operating systems. This transition is seamless, and users performing a new product synchronization should only notice the updated channel names.

Channels named **SUSE Manager Client Tools for XYZ**, used by clients previously registered with SUSE Multi-Linux Manager 4.3 or 5.0, are no longer available in

version 5.1 and will no longer receive updates in 5.1.

Although the legacy channels remain assigned to existing clients after migration, the corresponding repositories have been removed.

To ensure continued updates, users must:

- Mirror the new **SUSE Multi-Linux Manager Client Tools for XYZ** channels for the relevant products and assign them to the appropriate clients.
- Unassign the outdated **SUSE Manager Client Tools for XYZ** channels.

This also means that any CLM projects based on the old client tools must be adjusted accordingly.

### 4.1.3. SUSE Multi-Linux Manager Server Upgrade

Before running the upgrade command, it is recommended to update the host operating system. Updating the host operating system will also result in the update of the SUSE Multi-Linux Manager tooling such as the **mgradm** tool.

#### Procedure: Upgrading SUSE Multi-Linux Manager Server

1. Refresh software repositories with **zypper**:

```
zypper ref
```

2. Depending on the host operating system, proceed with these steps:

**For a transactional system such as SL Micro:**

1. 使用 **transactional-update** 应用可用的更新:

```
transactional-update
```

2. 如果已应用更新，请**重引导**。

**For SUSE Linux Enterprise Server:**

Update installed software with **zypper**:

```
zypper up
```

3. 可使用以下命令更新 SUSE Multi-Linux Manager 服务器容器:

```
mgradm upgrade podman
```

此命令可使容器保持最新状态并重新启动服务器。



### 升级到特定版本

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.

要查看 `upgrade` 命令及其参数的详细信息，请使用以下命令：

```
mgradm upgrade podman -h
```

对于物理隔离的安装，请先升级容器 RPM 软件包，然后运行 **mgradm** 命令。

#### 4.1.3.1. Database Backup Volume

Server migration or upgrade with **mgradm migration** or **mgradm upgrade** can create a volume with the database backup.

When the PostgreSQL database version is increased, the old database must be stored in a separate location before running the upgrade. For this purpose **mgradm** dynamically creates the volume **var-pgsql-backup**. When the migration or upgrade is done and the user has validated that the new system is working as expected, this volume can be removed safely.

## 4.2. 代理

### 4.2.1. 代理迁移

#### 4.2.1.1. Introduction

This document provides the tested and validated procedures for migrating both the **host operating system** and the **proxy extension** in environments managed by **SUSE Multi-Linux Manager**, specifically targeting systems deployed with **SUSE Multi-Linux Manager Proxy 5.0**.

The upgrade scenarios covered include:

- Migrating from **SUSE Linux Enterprise Micro (SLE Micro) 5.5** to **SLE Micro 6.1**
- Migrating from **SUSE Linux Enterprise Server (SLES) 15 SP6** to **SLES 15 SP7**
- Upgrading the **SUSE Multi-Linux Manager Proxy Extension** from **version 5.0** to **version 5.1**

#### 4.2.1.2. SLE Micro 5.5 to SL Micro 6.1

This section provides the tested procedure to upgrade a SLE Micro 5.5 host deployed with SUSE Multi-Linux Manager 5.0 Proxy to SL Micro 6.1 with SUSE Multi-Linux Manager 5.1 Proxy.

##### 4.2.1.2.1. Prerequisites

- SUSE Multi-Linux Manager 5.0 Proxy is installed and running on SLE Micro 5.5.
- Proxy system is registered with the SUSE Multi-Linux Manager Server.

#### 4.2.1.2.2. Distribution Upgrade and Proxy Migration

### Procedure: Migrate SUSE Multi-Linux Manager 5.0 Proxy to SUSE Multi-Linux Manager 5.1

#### 1. Verify System and Proxy Version

```
cat /etc/os-release  
mgrpxy --version
```

#### Confirm:

- Operating System: **SLE Micro 5.5**
- Proxy Component: **mgrpxy version 0.1.29 or higher**

#### 2. Check Running Containers

```
podman ps
```

Ensure the following containers are running:

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

#### 3. Synchronize Proxy Products in SUSE Multi-Linux Manager Server

Use the Web UI to synchronize:

- **SL-Micro 6.1**
- **SUSE Multi-Linux Manager 5.1 Proxy Extension**

#### 4. Perform Proxy Product Migration

Use the Web UI to migrate from:

- **SLE Micro 5.5 + SUSE Multi-Linux Manager Proxy 5.0 Extension to**
- **SL Micro 6.1 + SUSE Multi-Linux Manager Proxy 5.1 Extension**



**Do not select** optional channels when prompted, unless you have confirmed they are required.

## 5. Monitor the Migration Action

## 6. Reboot the System

```
reboot
```

## 7. Post-Reboot Validation

```
cat /etc/os-release  
mgrpxy --version
```

Expected:

- OS: **SL Micro 6.1**
- Updated Proxy version

Enable Root SSH Access (if required). SL Micro 6.1 disables root login via SSH by default. Edit `/etc/ssh/sshd_config.d/sshd.conf`:

+

```
PermitRootLogin yes
```

+

And restart the service:

+

```
systemctl restart sshd
```

+

For more information, see **Administration › Troubleshooting**.

## 1. Upgrade proxy containers:

```
mgrpxy upgrade podman
```

## 2. Validate Proxy Containers

```
podman ps
```

All expected proxy containers should be up and running.



- If migration fails due to missing GPG keys (e.g. key ID **09D9EA69**), refer to Bug 1243373.
- Also check for issues like missing libraries (**liblua5.3.so.5**) as reported in Bug 1243457.

### 4.2.1.2.3. Migration Complete

The proxy host system is now running SL Micro 6.1 with updated SUSE Multi-Linux Manager 5.1 Proxy packages and synchronized product channels.

### 4.2.1.3. SUSE Linux Enterprise Server 15 SP6 to 15 SP7

This section provides the tested procedure to upgrade a SUSE Linux Enterprise Server SP7 host deployed with SUSE Multi-Linux Manager 5.0 Proxy to SUSE Linux Enterprise Server SP7 with SUSE Multi-Linux Manager 5.1 Proxy.

#### 4.2.1.3.1. Prerequisites

- SUSE Multi-Linux Manager Proxy 5.0 is installed and running on SUSE Linux Enterprise Server 15 SP6.
- Proxy system is registered with the SUSE Multi-Linux Manager Server.

#### 4.2.1.3.2. Distribution Upgrade and Proxy Migration

### Procedure: Update SUSE Multi-Linux Manager Proxy Components on SUSE Linux Enterprise Server 15 SP6

#### 1. Verify Operating System and Proxy Version

```
cat /etc/os-release
mgrpxy --version
```

#### Expected Output:

```
NAME="SLES"
VERSION="15-SP6"
VERSION_ID="15.6"
PRETTY_NAME="SUSE Linux Enterprise Server 15 SP6"
ID="sles"
ID_LIKE="suse"
```

and

```
mgrpxy version 0.1.29 (HEAD 053c629)
```

## 2. List Running Proxy Containers

```
podman ps
```

Verify the following containers are running:

- **proxy-salt-broker**
- **proxy-httpd**
- **proxy-squid**
- **proxy-tftpd**
- **proxy-ssh**
- Supporting infrastructure container(s)

## 3. Synchronize Products on the SUSE Multi-Linux Manager Server

Using the Web UI, synchronize the following:

- **SUSE Linux Enterprise Server 15 SP6**
- **SUSE Multi-Linux Manager Proxy Extension 5.0**

## 4. Trigger the Product Migration via Web UI

Navigate to the proxy system in the SUSE Multi-Linux Manager Web UI and select:

- **Migrate from: SLES 15 SP6 + Manager Proxy Extension 5.0**
- **To: SLES 15 SP7 + Manager Proxy Extension (updated channels)**



When prompted, **do not select** optional channels unless you have confirmed they are required.

## 5. Monitor the Migration Job

Check job status under the system action history in the Web UI.

## 6. Reboot the Proxy System

```
reboot
```

## 7. Validate Post-Reboot Status

```
cat /etc/os-release
mgrpxy --version
```

Expected:

- OS: **SUSE Linux Enterprise Server 15 SP7**
- Updated **mgrpxy** version (e.g., **5.1.9**)

## 8. Update proxy containers:

```
mgrpxy upgrade podman
```

## 9. Confirm Proxy Containers Are Operational

```
podman ps
```

Ensure all relevant proxy containers are up:

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

### 4.2.1.3.3. Migration Complete

The proxy host system is now running SUSE Linux Enterprise Server 15 SP7 with updated SUSE Multi-Linux Manager 5.1 Proxy packages and synchronized product channels.

## 4.2.2. 代理迁移

在 SUSE Multi-Linux Manager 4.3 中，可以使用三种不同的方法来部署代理：基于 RPM 的部署、在 podman 或 k3s 上运行的容器化部署。

在 SUSE Multi-Linux Manager 5.1 中，使用 podman 运行的容器化代理管理功能经过重新设计，并已通过 **mgrpxy** 工具进行简化。同时，去除了基于 RPM 的支持，现在仅支持使用 podman 或 k3s 运行的容器化版本。



本节介绍如何使用 **mgrpky** 工具从 Proxy 4.3 迁移。



An in-place migration from SUSE Multi-Linux Manager 4.3 to 5.1 is unsupported. The host operating system has changed from SUSE Linux Enterprise Server 15 SP4 to SL Micro 6.1 or SUSE Linux Enterprise Server 15 SP7.

SUSE Multi-Linux Manager 5.0 及更高版本不再支持传统联系协议。在从 SUSE Multi-Linux Manager 4.3 迁移到 5.1 之前，必须将所有现有的传统客户端（包括传统代理）迁移到 Salt。

有关迁移到 Salt 客户端的详细信息，请参见 <https://documentation.suse.com/suma/4.3/en/suse-manager/client-configuration/contact-methods-migrate-traditional.html>

#### 4.2.2.1. 部署新的 SUSE Multi-Linux Manager 代理

由于不支持就地迁移，用户必须使用新的 FQDN 部署新的 SUSE Multi-Linux Manager 代理。

有关安装 SUSE Multi-Linux Manager 代理的详细信息，请参见 `ref:installation-and-upgrade:install-proxy.adoc[]`。

#### 4.2.2.2. 将客户端迁移到新代理



在迁移客户端之前，请确保新代理已部署并且完全正常运行。

#### 过程：在代理之间迁移客户端

1. 登录到 SUSE Multi-Linux Manager 服务器 Web UI。
2. 在左侧导航栏中，选择 **系统** > **系统列表**。
3. 导航到旧的 4.3 代理页面，然后单击 **代理** 选项卡。
4. 在“SSM”中选择所有系统。
5. 在左侧导航栏中，选择 **系统** > **系统集管理器**。
6. 选择子菜单 **其他** > **代理**。
7. 从下拉列表中选择要迁移到的新代理。
8. 单击 **[ 更改代理 ]**。

所有选定的客户端现在都将迁移到新代理。您可以检查日程安排进度，以确认所有客户端是否已成功迁移。

几分钟后，客户端将开始显示新的连接路径。当所有客户端都已在新代理下显示了连接路径时，就不再需要旧的 4.3 代理系统，可以将其去除。

#### 4.2.2.3. TFTP files synchronization

Containerized proxies do not use tftpsync mechanism to transfer tftproot files. Instead these files are transparently downloaded and cached on demand.

To prevent false positive errors during **cobbler sync** run, migrated 4.3 proxies need to be removed from tftpsync mechanism.

If you previously configured a 4.3 proxy to receive TFTP files, one of the following configuration option is required:

In the server container, run **configure-tftpsync.sh** with the list of remaining 4.3 proxies as arguments. If no 4.3 proxies remain, run **configure-tftpsync.sh** with no arguments.

In the server container, manually remove the relevant proxy from the **proxies** setting in the **/etc/cobbler/settings.yaml** file. If there are no 4.3 proxies remaining, then manually remove the **proxies** list completely.

### 4.2.3. SUSE Multi-Linux Manager Proxy Upgrade

Before running the upgrade command, it is recommended to update the host operating system. Updating the host operating system will also result in the update of the SUSE Multi-Linux Manager tooling such as the **mgrpky** tool.

#### Procedure: Upgrading SUSE Multi-Linux Manager Proxy

1. Refresh software repositories with **zypper**:

```
zypper ref
```

2. Depending on the host operating system, proceed with these steps:

**For a transactional system such as SL Micro:**

1. 使用 **transactional-update** 应用可用的更新:

```
transactional-update
```

2. 如果已应用更新，请**重引导**。

**For SUSE Linux Enterprise Server:**

Update installed software with **zypper**:

```
zypper up
```

3. The SUSE Multi-Linux Manager Proxy containers running on **podman** can be updated using the following command:

```
mgrpky upgrade podman
```

或者，可使用以下命令更新 Kubernetes 群集上运行的容器：

### mgrpxy upgrade kubernetes



如果升级到特定版本时未指定标记参数，则默认会升级到最新版本。要升级到特定版本，请为标记参数提供所需的映像标记。



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.

对于物理隔离的安装，请先升级容器 RPM 软件包，然后运行 **mgrpxy upgrade podman** 命令。

## 4.3. 客户端

### 4.3.1. Upgrade Clients

客户端采用底层操作系统的版本控制系统。对于运行 SUSE 操作系统的客户端，可在 SUSE Multi-Linux Manager Web UI 中进行升级。

有关升级客户端的详细信息，请参见 **Client-configuration** › **Client-upgrades**。

# Chapter 5. 基本的服务器和代理管理

## 5.1. 使用 **mgradm** 进行自定义 YAML 配置和部署

您可以选择创建自定义的 **mgradm.yaml** 文件，供 **mgradm** 工具在部署期间使用。



如果未提供基本变量，**mgradm** 将提示您使用命令行参数或 **mgradm.yaml** 配置文件来提供这些变量。

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. 准备一个名为 **mgradm.yaml** 的配置文件，以以下示例所示：

```
# 数据库口令。默认会随机生成
db:
  password: MySuperSecretDBPass

# CA 证书的口令
ssl:
  password: MySuperSecretSSLPassword

# 您的 SUSE Customer Center 身份凭证
scc:
  user: ccUsername
  password: ccPassword

# 组织名称
organization: YourOrganization

# 用于发送通知的电子邮件地址
emailFrom: notifications@example.com

# 管理员帐户细节
admin:
  password: MySuperSecretAdminPass
  login: LoginName
  firstName: Admin
  lastName: Admin
  email: email@example.com
```

2. 在终端中，以 root 身份运行以下命令。服务器 FQDN 是选填的。

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



必须以 **sudo** 或 **root** 用户身份部署容器。如果您遗漏此步骤，终端中将显示以下错误。

```
INF 正在设置 uyuni 网络
9:58AM INF 正在启用系统服务
```

```
9:58AM FTL 无法打开 /etc/systemd/system/uyuni-server.service
进行写入, error="open /etc/systemd/system/uyuni-server.service:
permission denied"
```

3. 等待部署完成。
4. 打开浏览器并访问您的服务器 FQDN 或 IP 地址。

## 5.2. 启动和停止容器

可使用以下命令重新启动、启动和停止 SUSE Multi-Linux Manager 5.1 服务器容器：

要**重新启动** SUSE Multi-Linux Manager 5.1 服务器，请执行以下命令：

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

要**启动**服务器，请执行以下命令：

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

要**停止**服务器，请执行以下命令：

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

## 5.3. Containers used by SUSE Multi-Linux Manager

Below is a list of containers used by SUSE Multi-Linux Manager 5.1.

**表格 14. Server Containers**

| Container Name           | Description                             |
|--------------------------|---|
| uyuni-server             | Main product container                  |
| uyuni-db                 | Database container for the product      |
| uyuni-hub-xmlrpc         | XML-RPC gateway for Hub deployment      |
| uyuni-server-attestation | Server COCO attestation                 |
| uyuni-saline             | Saline container for Salt observability |
| uyuni-server-migration   | Migration helper container              |

表格 15. Proxy Containers

| Container Name          | Description  |
|-------------------------|--|
| uyuni-proxy-httpd       | Main proxy container handling all HTTP communication |
| uyuni-proxy-squid       | Squid cache  |
| uyuni-proxy-salt-broker | Salt forwarder                                       |
| uyuni-proxy-ssh         | SSH forwarder  |
| uyuni-proxy-tftpd       | TFTPD to HTTP translator and forwarder               |

## 5.4. Persistent Container Volumes

在容器中执行的修改不会保留。在永久性卷外部所做的任何更改都将被丢弃。下面列出了 SUSE Multi-Linux Manager 5.1 的永久性卷。

要自定义默认卷位置，请确保在首次启动 Pod 之前使用 **podman volume create** 命令创建必要的卷。



请确保此表格与 Helm 图表和 systemctl 服务定义中所述的卷映射完全一致。

### 5.4.1. 服务器

以下卷存储在服务器上的 **Podman** 默认存储位置。

表格 16. 永久性卷：Podman 默认存储

| 卷名称       | 卷目录                                  |
|-----------|--------------------------------------|
| Podman 存储 | /var/lib/containers/storage/volumes/ |

表格 17. 永久性卷：root

| 卷名称  | 卷目录   |
|------|-------|
| root | /root |

表格 18. 永久性卷：var/

| Volume Name      | Volume Directory      |
|------------------|-----------------------|
| var-cobbler      | /var/lib/cobbler      |
| var-salt         | /var/lib/salt         |
| var-pgsql        | /var/lib/pgsql        |
| var-pgsql-backup | /var/lib/pgsql-backup |

| Volume Name   | Volume Directory |
|---------------|------------------|
| var-cache     | /var/cache       |
| var-spacewalk | /var/spacewalk   |
| var-log       | /var/log         |

表格 19. 永久性卷：srv/

| 卷名称                 | 卷目录                   |
|---------------------|-----------------------|
| srv-salt            | /srv/salt             |
| srv-www             | /srv/www/             |
| srv-tftpboot        | /srv/tftpboot         |
| srv-formulametadata | /srv/formula_metadata |
| srv-pillar          | /srv/pillar           |
| srv-susemanager     | /srv/susemanager      |
| srv-spacewalk       | /srv/spacewalk        |

表格 20. 永久性卷：etc/

| 卷名称                 | 卷目录   |
|---------------------|---|
| 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                      |

### 5.4.2. 代理

以下卷存储在代理上的 **Podman** 默认存储位置。

**表格 21. 永久性卷：Podman 默认存储**

| 卷名称       | 卷目录   |
|-----------|---|
| Podman 存储 | <code>/var/lib/containers/storage/volumes/</code> |

**表格 22. 永久性卷：srv/**

| 卷名称                  | 卷目录                        |
|----------------------|----------------------------|
| uyuni-proxy-tftpboot | <code>/srv/tftpboot</code> |

**表格 23. 永久性卷：var/**

| 卷名称                     | 卷目录                           |
|-------------------------|-------------------------------|
| uyuni-proxy-rhn-cache   | <code>/var/cache/rhn</code>   |
| uyuni-proxy-squid-cache | <code>/var/cache/squid</code> |

## 5.5. Understanding **mgr-storage-server** and **mgr-storage-proxy**

**mgr-storage-server** and **mgr-storage-proxy** are helper scripts provided with SUSE Multi-Linux Manager 5.0 and later.

They are designed to configure storage for SUSE Multi-Linux Manager Server and Proxy.

The scripts take disk devices as arguments. **mgr-storage-proxy** requires a single argument for the storage disk device. **mgr-storage-server** requires a storage disk device and can optionally accept a second argument for a dedicated database disk device. While both normal and database storage can reside on the same disk, it is advisable to place the database on a dedicated, high-performance disk to ensure better performance and easier management.

### 5.5.1. What these tools do

Both **mgr-storage-server** and **mgr-storage-proxy** perform standard storage setup operations:

- Validate the provided storage devices.
- Ensure that devices are empty and suitable for use.
- Create XFS filesystems on the specified devices.
- Mount the devices temporarily for data migration.
- Move the relevant storage directories to the new devices.
- Create entries in `/etc/fstab` so that the storage mounts automatically on boot.



- Remount the devices at their final locations.

## 表格 24. Additional tool-specific behavior

|                           |  |
|---------------------------|--|
| <b>mgr-storage-server</b> | <ul style="list-style-type: none"> <li>• Optionally supports a separate device for database storage.</li> <li>• Stops SUSE Manager services during migration, restarts them afterward. Moves Podman volumes directory <b>/var/lib/containers/storage/volumes</b> to the prepared storage, and optionally <b>/var/lib/containers/storage/volumes/var-pgsql</b> to the prepared database storage.</li> </ul> |
| <b>mgr-storage-proxy</b>  | <ul style="list-style-type: none"> <li>• Focuses only on proxy storage (no database storage support).</li> <li>• Stops and restarts the proxy service during migration.</li> <li>• Moves podman volumes directory <b>/var/lib/containers/storage/volumes</b> to the prepared storage.</li> </ul>   |



Both tools automate standard Linux storage operations. There is no hidden or custom logic beyond what a Linux administrator would do manually.

### 5.5.2. What these tools do not do

- They do **not** create or manage LVM volumes.
- They do **not** configure RAID or complex storage topologies.
- They do **not** prevent you from managing storage using normal Linux tools after setup.
- They do **not** provide dynamic resizing or expansion capabilities — these must be handled using standard Linux storage tools.

### 5.5.3. Post-installation storage management

Once storage has been configured, you can safely manage it using standard Linux commands.

#### 5.5.3.1. Examples

#### 列表 1. Example 1: Extending storage if using LVM

```
lvextend -L +10G /dev/your_vg/your_lv
xfs_growfs /var/lib/containers/storage/volumes
```

#### Example 2: Migrating to a larger disk

1. Add and format the new disk.
2. Mount it temporarily.
3. Use **rsync** to copy data.
4. Update **/etc/fstab**.

5. Remount at the correct location.

### 5.5.4. When to use, or not use

- ! Always take a backup before making changes to your storage setup.
- Use these tools **only** during initial storage setup or when migrating to new storage where the tool is expected to handle data migration and update **/etc/fstab**.
- Do **not** rerun these scripts for resizing or expanding storage. Use standard Linux tools (e.g., **lvextend**, **xfs\_growfs**) for such operations.

### 5.5.5. Summary

**mgr-storage-server** and **mgr-storage-proxy** help automate the initial persistent storage setup for SUSE Multi-Linux Manager components using standard Linux storage practices. They do not limit or interfere with standard storage management afterward.

After setup, continue managing your storage using familiar Linux tools.



A full database volume can cause significant issues with system operation. As disk usage notifications have not yet been adapted for containerized environments, users are encouraged to monitor the disk space used by Podman volumes themselves, either through tools such as Grafana, Prometheus, or any other preferred method. Pay particular attention to the `var-pgsql` volume, located under `/var/lib/containers/storage/volumes/`.

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