



U Y U N I

Uyuni 2024.07

インストールおよびアップグレードガイド

2024年07月 3日



目次

Deployment and Upgrade Guide Overview	1
1. 要件	2
1.1. 要件	2
1.1.1. サーバ要件	2
1.1.2. プロキシ要件	2
1.2. ネットワーク要件	3
1.2.1. 完全修飾ドメイン名(FQDN)	3
1.2.2. ホスト名とIPアドレス	3
1.2.3. Air-gapped Deployment	3
1.2.4. Ports	4
1.3. パブリッククラウドの要件	7
1.3.1. ネットワーク要件	8
1.3.2. Prepare Storage Volumes	8
2. Deployment and Installation	10
2.1. Server	10
2.1.1. Deploy on openSUSE Leap Micro 5.5	10
2.1.2. Uyuni Server Air-gapped Deployment	12
2.2. Install the Server (Legacy)	13
2.2.1. openSUSEにUyuniサーバをインストールする	13
2.3. Migration	14
2.3.1. Migrating the Uyuni server to a containerized environment	14
2.4. Proxy	16
2.4.1. コンテナ化されたUyuniプロキシの設定	16
2.4.2. Deploy a Uyuni 2024.07 Proxy	18
2.4.3. k3sでのコンテナ化されたUyuniプロキシのインストール	26
2.5. Install the Proxy	27
2.5.1. openSUSE Leapを使用したUyuniプロキシのインストール	27
3. Upgrade and Migration	28
3.1. Server	28
3.1.1. Migrating the Uyuni server to a containerized environment	28
3.2. Proxy	29
3.2.1. Proxy Migration	29
3.3. Clients	33
3.3.1. クライアントのアップグレード	33
4. Upgrade and Migration	34
4.1. Server	34
4.1.1. Container	34
4.1.2. Legacy	35
4.2. Proxy	38
4.2.1. プロキシのアップグレード	38
4.2.2. プロキシ - メジャーアップグレード	38
4.2.3. プロキシ - マイナーアップグレード	39
5. Basic Server Management	41
5.1. Custom YAML Configuration and Deployment with <code>mgradm</code>	41
5.2. Starting and Stopping Containers	42
5.3. List of persistent storage volumes	43
6. GNU Free Documentation License	45

Deployment and Upgrade Guide Overview

更新: 2024-07-03

This book provides guidance on deploying and upgrading Uyuni Server and Proxy. It is split into the following sections:

要件

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

Deployment

Describes tasks for deploying Uyuni as a container and initial setup.

Upgrade and Migration

Describes upgrade and migration of Uyuni

Public Cloud

You can also deploy Uyuni to a public cloud instance.

For more information on using Uyuni on a public cloud, see [Specialized-guides > Public-cloud-guide](#).

Chapter 1. 要件

1.1. 要件

次の表では、サーバとプロキシの最低要件を指定しています。

1.1.1. サーバ要件

表 1. x86-64アーキテクチャのサーバ要件

ソフトウェアおよびハードウェア	詳細	推奨
openSUSE Leap 15.5	クリーンインストール、最新	openSUSE Leap 15.5
CPU	-	専用64ビットCPUコア数は4つ以上(x86-64)
RAM	テストまたはベースインストール 運用サーバ	16GB以上 32GB以上
ディスク容量	/ (ルートディレクトリ) /var/lib/pgsql /var/spacewalk	40GB以上 50GB以上 必要な最低ストレージ: 100GB (これは、実装されたチェックによって確認されます) * 各SUSE製品およびPackage Hubでは50GB 360 GB for each Red Hat product
	/var/cache	Minimum 10 GB. Add 100 MB per SUSE product, 1 GB per Red Hat or other product. Double the space if the server is an ISS Master.
	Swap space	3 GB

1.1.2. プロキシ要件

表 2. プロキシ要件

Software and Hardware	Details	Recommendation
openSUSE Leap 15.5	Clean installation, up-to-date	openSUSE Leap 15.5
CPU		Minimum 2 dedicated 64-bit CPU cores
RAM	Test Server	Minimum 2 GB
	Production Server	Minimum 8 GB

Software and Hardware	Details	Recommendation
Disk Space	/ (root directory)	Minimum 40 GB
	/srv	Minimum 100 GB
	/var/cache (Squid)	Minimum 100 GB

Uyuniプロキシは、/var/cache/ディレクトリにパッケージをキャッシュします。/var/cache/の容量が不足している場合、プロキシは、古くなった、使用されていないパッケージを削除し、新しいパッケージに置き換えます。

この動作の結果は以下のとおりです。

- ・ プロキシ上の/var/cache/ディレクトリの容量を大きくすると、このディレクトリとUyuniサーバ間のトラフィックが少なくなります。
- ・ プロキシ上の/var/cache/ディレクトリをUyuniサーバ上の/var/spacewalk/と同じサイズにすることで、最初に同期した後のトラフィック量の増大が防止されます。
- ・ /var/cache/ディレクトリは、Uyuniサーバ上ではプロキシと比べて小さくできます。 サイズの推測のガイドについては、[server-hardware-requirements] セクションを参照してください。

1.2. ネットワーク要件

このセクションでは、Uyuniのネットワークとポートの要件について詳しく説明します。

1.2.1. 完全修飾ドメイン名(FQDN)

Uyuniサーバは、そのFQDNを正しく解決する必要があります。 FQDNを解決できない場合、多数のコンポーネントで重大な問題の原因になる場合があります。

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

1.2.2. ホスト名とIPアドレス

Uyuniのドメイン名をそのクライアントで解決できることを確認するには、サーバとクライアントの両方のマシンを動作中のDNSサーバに接続する必要があります。 リバース参照が正しく設定されていることも確認する必要があります。

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

1.2.3. Air-gapped Deployment

If you are on an internal network and do not have access to SUSE Customer Center, you can use an **Installation-and-upgrade > Container-deployment**.

運用環境では、Uyuniサーバおよびクライアントはファイアウォールを常に使用する必要があります。 必要

なポートの一覧は、[Installation-and-upgrade > Ports](#)を参照してください。

1.2.4. Ports

このセクションには、Uyuni内でのさまざまな通信に使用するポートの一覧が記載されています。

これらのポートすべてを開く必要はありません。サービスの使用に必要なポートのみを開く必要があります。

1.2.4.1. 外部の着信サーバポート

未許可アクセスからサーバを保護するためにUyuniサーバでファイアウォールを設定するには、外部の着信ポートが開いている必要があります。

これらのポートを開くと、外部ネットワークトラフィックがUyuniサーバにアクセスできるようになります。

表 3. Uyuniサーバの外部ポートの要件

Port number	Protocol	Used By	Notes
22			Required for ssh-push and ssh-push-tunnel contact methods.
67	TCP/UDP	DHCP	Required only if clients are requesting IP addresses from the server.
69	TCP/UDP	TFTP	Required if server is used as a PXE server for automated client installation.
80	TCP	HTTP	Required temporarily for some bootstrap repositories and automated installations.
443	TCP	HTTPS	Serves the Web UI, client, and server and proxy (<code>tftpsync</code>) 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.
25151	TCP	Cobbler	

1.2.4.2. 外部の送信サーバポート

サーバからアクセスできるアクセス先を制限するためにUyuniサーバでファイアウォールを設定するには、外部の送信ポートが開いている必要があります。

次のポートを開くと、Uyuniサーバからのネットワークトラフィックで外部サービスに通信できます。

表 4. Uyuniサーバの外部ポートの要件

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

1.2.4.3. 内部サーバポート

内部ポートは、Uyuniサーバによって内部で使用されます。 内部ポートはlocalhostのみからアクセスできます。

ほとんどの場合、これらのポートを調整する必要はありません。

表 5. Uyuniサーバの内部ポートの要件

ポート番号	注意
2828	サテライト検索APIであり、TomcatとTaskomaticのRHNアプリケーションで使用されます。
2829	Taskomatic APIであり、TomcatのRHNアプリケーションで使用されます。
8005	Tomcatのシャットダウンポート。
8009	TomcatからApache HTTPD (AJP)。
8080	TomcatからApache HTTPD (HTTP)。
9080	Salt-APIであり、TomcatとTaskomaticのRHNアプリケーションで使用されます。
32000	Taskomaticおよびサテライト検索を実行する仮想マシン(JVM)へのTCP接続用のポート。

ポート32768以上は一時ポートとして使用されます。 これらは、TCP接続の受信に最も頻繁に使用されます。 TCP接続リクエストが受信されると、送信元はこれらの一時ポート番号のいずれかを選択して、宛先ポートと照合します。

次のコマンドを使用して、一時ポートであるポートを確認できます。

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

1.2.4.4. 外部の着信プロキシポート

未許可アクセスからプロキシを保護するためにUyuniプロキシでファイアウォールを設定するには、外部の着信ポートが開いている必要があります。

これらのポートを開くと、外部ネットワークトラフィックがUyuniプロキシにアクセスできるようになります。

表 6. Uyuniプロキシの外部ポートの要件

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

1.2.4.5. 外部の送信プロキシポート

プロキシからアクセスできるアクセス先を制限するためにUyuniプロキシでファイアウォールを設定するには、外部の送信ポートが開いている必要があります。

次のポートを開くと、Uyuniプロキシからのネットワークトライフィックで外部サービスに通信できます。

表 7. Uyuniプロキシの外部ポートの要件

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

1.2.4.6. 外部クライアントポート

Uyuniサーバとそのクライアントの間でファイアウォールを設定するには、外部クライアントポートが開いている必要があります。

ほとんどの場合、これらのポートを調整する必要はありません。

表 8. Uyuniクライアントの外部ポートの要件

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.
9090	Outbound	TCP	Required for Prometheus user interface.
9093	Outbound	TCP	Required for Prometheus alert manager.
9100	Outbound	TCP	Required for Prometheus node exporter.
9117	Outbound	TCP	Required for Prometheus Apache exporter.
9187	Outbound	TCP	Required for Prometheus PostgreSQL.

1.2.4.7. 必要なURL

クライアントを登録して更新を実行するためにUyuniがアクセスできる必要があるURLがあります。ほとんどの場合、次のURLにアクセスできれば十分です。

- scc.suse.com
- updates.suse.com

SUSE以外のクライアントを使用している場合、該当するオペレーティングシステム用の特定のパッケージを提供するその他のサーバにもアクセスできる必要がある場合があります。たとえば、Ubuntuクライアントがある場合、Ubuntuサーバにアクセスできる必要があります。

SUSE以外のクライアントでファイアウォールアクセスのトラブルシューティングを行う方法の詳細については、**Administration > Troubleshooting**を参照してください。

1.3. パブリッククラウドの要件

このセクションは、パブリッククラウドインフラストラクチャにUyuniをインストールする要件について説明します。Amazon EC2、Google Compute Engine、およびMicrosoft Azureではテストを実施済みですが、若干の差異はあってもその他のプロバイダにも当てはまるはずです。

始める前に、考慮事項を次に示します。

- Uyuni設定プロシージャは、正引きで確認された逆引きDNS参照を実行します。設定プロシージャが完了してUyuniが期待どおりに動作するためには、この参照が成功する必要があります。Uyuniを設定する前に、ホスト名とIPの設定を実行することが重要です。
- Uyuniサーバとプロキシのインスタンスは、DNSエントリを介した制御を提供するネットワーク設定で実行する必要がありますが、大規模インターネットからはアクセスできません。
- このネットワーク設定内では、DNSの解決を提供する必要があります。hostname -fは、完全修飾ドメイン名(FQDN)を返す必要があります。
- DNSの解決は、クライアントを接続するためにも重要です。
- DNSは、選択したクラウドフレームワークに依存しています。詳細な手順については、クラウドプロバイダのドキュメントを参照してください。

- 外部仮想ディスクでソフトウェアリポジトリ、サーバデータベース、およびプロキシsquidキャッシュを探すことをお勧めします。こうすることによって、インスタンスが予期せずに終了した場合のデータ損失が防止されます。このセクションでは、外部仮想ディスクの設定方法の手順について説明します。

1.3.1. ネットワーク要件

パブリッククラウドでUyuniを使用するとき、制約のあるネットワークを使用する必要があります。適切なファイアウォール設定でVPCプライベートサブネットを使用することをお勧めします。指定したIP範囲にあるマシンのみがインスタンスにアクセスできる必要があります。



パブリッククラウド上でUyuniを実行することは、堅牢なセキュリティ対策を実装することを意味します。インスタンスへのアクセスを制限、フィルタ、監視、監査することが不可欠です。SUSEは、適切な境界セキュリティが欠如しているグローバルにアクセス可能なUyuniインスタンスを使用しないことを強くお勧めします。

UyuniのWeb UIにアクセスするには、ネットワークアクセス制御を設定するときにHTTPSを許可します。そうすると、UyuniのWeb UIにアクセスできます。

EC2およびAzureでは、新しいセキュリティグループを作成し、HTTPSの着信および受信のルールを追加します。GCEでは、[-----] セクションで [HTTPS-----] ボックスにチェックを付けます。

1.3.2. Prepare Storage Volumes

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

The Uyuni container utilizes default storage locations. These locations should be configured prior to deployment for custom storage. For more information see [Installation-and-upgrade > Container-management](#)



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

リポジトリストレージのディスクのサイズは、Uyuniで管理するディストリビューションおよびチャンネルの数によって決まります。仮想ディスクを接続すると、Unixデバイスノードとしてインスタンスに表示されます。デバイスノードの名前は、選択インスタンスの種類とプロバイダによって異なります。

Uyuniサーバのルートボリュームが100 GB以上であることを確認してください。500 GB以上のストレージディスクを追加し、可能な場合にはSSDストレージを選択します。Uyuniサーバのクラウドイメージは、スクリプトを使用して、インスタンス起動時にこの個別ボリュームを割り当てます。

インスタンスを起動すると、Uyuniサーバにログインし、次のコマンドを使用して、利用可能なすべてのストレージデバイスを検索できます。

```
hwinfo --disk | grep -E "デバイスファイル:"
```

選択したデバイスがわからない場合、lsblkコマンドを使用して、各デバイスの名前およびサイズを確認します。探している仮想ディスクのサイズと一致している名前を選択します。

suma-storageコマンドを使用して外部ディスクを設定できます。 設定すると、XFSパーティションが/manager_storageにマウントされ、データベースおよびリポジトリの場所として使用されます。

```
/usr/bin/suma-storage <devicename>
```

Chapter 2. Deployment and Installation

2.1. Server

2.1.1. Deploy on openSUSE Leap Micro 5.5

2.1.1.1. Deployment preparations

In this section, you will gain expertise in setting up and deploying a Uyuni Server. The process encompasses the installation of Podman, Uyuni container utilities, deployment, and then initiating interaction with the container through `mgrctl`.



- This section assumes you have already configured an openSUSE Leap Micro 5.5 host server, whether it is running on a physical machine or within a virtual environment.

2.1.1.2. Container Host general requirements

For general requirements, see [Installation-and-upgrade > General-requirements](#).

An openSUSE Leap Micro 5.5 server should be installed from installation media. This procedure is described below.

2.1.1.3. コンテナホストの要件

For CPU, RAM, and storage requirements, see [Installation-and-upgrade > Hardware-requirements](#).



- To guarantee that clients can resolve the FQDN domain name, both the containerized server and the host machines must be linked to a functional DNS server. Additionally, it is essential to ensure correct configuration of reverse lookups.

2.1.1.4. Update the host

2.1.1.5. Installing Uyuni tools for use with containers

Procedure: Installing Uyuni Tools on openSUSE Leap Micro 5.5

1. On your local host open a terminal window or start up a virtual machine running openSUSE Leap Micro 5.5.
2. Login.
3. Enter the `transactional-update shell`:

```
transactional-update shell
```

4. Add the following repository to your openSUSE Leap Micro 5.5 server:

```
zypper ar  
https://download.opensuse.org/repositories/systemsmanagement:/Uyuni:  
/Stable:/ContainerUtils/openSUSE_Leap_Micro_5.5/systemsmanagement:Uy  
uni:Stable:ContainerUtils.repo
```

5. Refresh the repository list and accept the key:

```
zypper ref
```

6. Install the container tools:

```
zypper in mgradm mgrctl mgradm-bash-completion mgrctl-bash-  
completion netavark
```

7. Exit the transactional shell:

```
transactional update # exit
```

8. Reboot the host.

For more information on the Uyuni Container Utilities, see [Uyuni Container Utilities](#).

2.1.1.6. Deploying an Uyuni container with Podman

2.1.1.6.1. mgradm overview

Uyuni is deployed as a container using the `mgradm` tool. There are two methods of deploying a Uyuni server as a container. In this section we will focus on basic container deployment.

For information on using a custom configuration file to deploy, see [Installation-and-upgrade > Container-management](#).

For additional information, you can explore further by running `mgradm --help` from the command line.

Procedure: Deploying an Uyuni container with Podman

1. From the terminal run the following command as the sudo user or as root.

```
sudo mgradm install podman
```

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



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

2. Wait for deployment to complete.
3. Open a browser and proceed to your servers FQDN.

In this section you learned how to deploy an Uyuni Server container.

2.1.1.6.2. Persistent volumes

Many users will want to specify locations for their persistent volumes.



- If you are just testing out Uyuni you do not need to specify these volumes. `mgradm` will setup the correct volumes by default.
- Specifying volume locations will generally be used for larger production deployments.

By default `podman` stores its volumes in `/var/lib/containers/storage/volumes/`.

You can provide custom storage for the volumes by mounting disks on this path or the expected volume path inside it such as: `/var/lib/containers/storage/volumes/var-spacewalk`. This is especially important for the database and package mirrors.

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

2.1.2. Uyuni Server Air-gapped Deployment

2.1.2.1. What is air-gapped deployment?

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

You can easily deploy container images using `Podman`, `Docker`, or `Skopeo` on a machine with internet access.

Pull the desired image then, save the image as a tar archive. For example:

リスト 1. Podman

```
podman pull registry.suse.com/suse/manager/5.0/x86_64/server:5.0.0-beta2
podman save --output server.tar
registry.suse.com/suse/manager/5.0/x86_64/server:5.0.0-beta2
```

リスト 2. Docker

```
docker pull registry.suse.com/suse/manager/5.0/x86_64/server:5.0.0-beta2
docker save --output server.tar
registry.suse.com/suse/manager/5.0/x86_64/server:5.0.0-beta2
```

リスト 3. Skopeo

```
skopeo copy
docker://registry.suse.com/suse/manager/5.0/x86_64/server:5.0.0-beta2
docker-
archive:server.tar:registry.suse.com/suse/manager/5.0/x86_64/server:5.0.0
-beta2
```

Transfer the resulting `server-image.tar` to the Server container host and load it using the following command:

リスト 4. Load the Server Image

```
podman load -i server.tar
```

2.2. Install the Server (Legacy)

2.2.1. openSUSEにUyuniサーバをインストールする

Uyuniサーバは、openSUSEにインストールできます。

要件については、**Installation-and-upgrade** › **Uyuni-install-requirements**を参照してください。



openSUSE Leapの最新バージョンおよび更新の詳細については、
<https://doc.opensuse.org/release-notes/>を参照してください。

2.2.1.1. openSUSE LeapにUyuniをインストールする

プロシージャ: UyuniでopenSUSE Leapをインストールする

1. ベースシステムとして、使用可能なすべてのサービスパックとパッケージの更新を適用してopenSUSE Leapをインストールします。
2. **yast** › システム › Network Settings (ネットワーク設定) › Hostname/DNS (ホスト名/DNS) で、解決可能な完全修飾ドメイン名(FQDN)を設定します。
3. リポジトリの作成に使用する変数をrootとして設定します。

```
repo=repositories/systemsmanagement:/  
repo=${repo}Uyuni:/Stable/images/repo/Uyuni-Server-Pool-x86_64-  
Media1/
```

4. Uyuniサーバのソフトウェアをrootとしてインストールするためにリポジトリを追加します。

```
zypper ar https://download.opensuse.org/$repo uyuni-server-stable
```

5. rootとしてリポジトリからメタデータを更新します。

```
zypper ref
```

6. Uyuniサーバのパターンをrootとしてインストールします。

```
zypper in patterns-uyuni_server
```

7. 再起動します。

- 安定したバージョンのUyuniの詳細については、<https://www.uyuni-project.org/pages/stable-version.html>を参照してください。
- 開発版のUyuniの詳細については、<https://www.uyuni-project.org/pages/development-version.html>を参照してください。

インストールが完了したら、Uyuniの設定に進むことができます。 詳細については、**Installation-and-upgrade** › **Uyuni-server-setup**を参照してください。

2.3. Migration

2.3.1. Migrating the Uyuni server to a containerized environment

To migrate a regular Uyuni server to a container, a new machine is required.



It is not possible to perform an in-place migration.

The original server is referred to as the **source server**, while the newly set-up machine is designated as

the **destination server**.

The migration procedure currently does not include any hostname renaming functionality. Consequently, the fully qualified domain name (FQDN) on the new server will remain identical to that on the source server. Therefore, following migration, it will be necessary to manually adjust the DNS records to point to the new server.

Procedure: Initial preparation

1. Stop the source server:

```
spacewalk-service stop
```

2. Stop the source services:

```
systemctl stop postgresql
```

Procedure: Preparing the SSH connection

1. The SSH configuration and agent should be ready on the host for a passwordless connection to the source server.



To establish a passwordless connection, the migration script relies on an SSH agent running on the server. If one isn't active yet, initiate it by running `eval $(ssh-agent)`. Then, add the SSH key to the running agent with `ssh-add /path/to/the/private/key`. You'll be prompted to enter the password for the private key during this process.

2. The migration script only uses the source server fully qualified domain name in the SSH command.
3. This means that every other configuration required to connect needs to be defined in the `~/.ssh/config` file.

2.3.1.1. Prepare for Kubernetes

Before executing the migration command with `mgradm migrate`, it's essential to predefined **Persistent Volumes**, especially considering that the migration job initiates the container from scratch. Please consult the installation section for comprehensive guidance on preparing these volumes.

See: [Installation-and-upgrade > Container-management](#)

2.3.1.2. Migrating

Execute the following command to install a new Uyuni server, replacing `<Uyuni.source.fqdn>` with the appropriate FQDN of the source server:

```
mgradm migrate podman <{productname}.source.fqdn>
```

または

```
mgradm migrate kubernetes <{productname}.source.fqdn>
```



After successfully running the `mgradm migrate` command, the Salt setup on all clients will still point to the old server (source server). To redirect them to the new server (destination server), it is required to rename the new server at the infrastructure level (DHCP and DNS) to use the same Fully Qualified Domain Name and IP address as old server (source server).

2.4. Proxy

2.4.1. コンテナ化されたUyuniプロキシの設定

Uyuniプロキシコンテナのコンテナホストが準備されると、コンテナの設定には、設定を完了するための追加の手順がいくつか必要になります。

1. Uyuniプロキシ設定アーカイブファイルを生成します
2. インストール手順で準備したコンテナホストに設定アーカイブを転送し、抽出します
3. Start the proxy sevices with `mgrproxy`

2.4.1.1. Uyuniプロキシ設定を作成および生成する

Uyuniプロキシの設定はUyuniサーバによって生成され、この設定の生成は、コンテナ化されたプロキシごとに実行する必要があります。Uyuni設定を生成するには、次の2つの方法があります。Web UIまたはspacecmdコマンドを使用する方法です。

プロシージャ: Web UIを使用したコンテナサービス設定の生成

1. Web UIで、**システム › プロキシの設定**に移動し、必要なデータを入力します。
2. [--FQDN] フィールドに、プロキシの完全修飾ドメイン名を入力します。
3. [--FQDN] フィールドに、Uyuniサーバまたは別のUyuniプロキシの完全修飾ドメイン名を入力します。
4. [--SSH--SSH--SSH] フィールドに、SSHサービスがUyuniプロキシでリスンしているSSHポートを入力します。デフォルトの8022を維持することをお勧めします。
5. [Squid--[MB]] フィールドタイプで、Squidキャッシュの最大許容サイズ。通常、これはコンテナで使用可能なストレージの最大60%である必要があります。
6. In the SSL certificate selection list choose Use existing.
7. **[生成]** をクリックして、Uyuniサーバに新しいプロキシFQDNを登録し、コンテナホストの詳細を含む設定アーカイブを生成します。

8. しばらくすると、ダウンロードするファイルが表示されます。このファイルをローカルに保存します。

⚙️ Container Based Proxy Configuration ?

You can generate a set of configuration files and certificates in order to register and run a container-based proxy. Once the following form is filled out and submitted you will get a .zip archive to download.

Proxy FQDN *: e.g., proxy.domain.com

Server FQDN *: e.g., server.domain.com

FQDN of the server of proxy to connect to.

Proxy SSH port: 8022

Port range: 1 - 65535

Max Squid cache size (MB) *: e.g., 2048

Proxy administrator email *: admin

SSL certificate *:

- Create
- Use existing

CA certificate to use to sign the SSL certificate in PEM format *:

CA private key to use to sign the SSL certificate in PEM format *:

The CA private key password *:

SSL Certificate data

Alternate CNAMEs

2-letter country code:

State:

City:

Organization:

Organization Unit:

Email:

Generate

Clear fields

Procedure: Generating Container Services Configuration with `spacecmd`

1. コンソールで次のコマンドを実行します。

```
spacecmd proxy_container_config -- <proxy_fqdn> <parent_fqdn>
<squid_max_cache> <admin_email>
```

2. スクリプトによって提示された質問(すなわち、Uyuni資格情報とCAパスワード)に回答します。

これにより、Uyuniプロキシコンテナの設定を含むファイル`config.tar.gz`が生成されます。

`spacecmd`コンテナプロキシの生成の詳細については、[Reference](#) → [Spacecmd](#)を参照してください。

Proxy FQDNが登録されているminionではないUyuniプロキシコンテナ設定の生成に使用される場合、新しいシステムエントリがシステムリストに表示されます。この新しいエントリは、以前に入力されたFQDN値の下に表示され、システムタイプになります。

2.4.1.2. Uyuniプロキシ設定の転送

Both `spacecmd` command and Web UI ways generate a configuration archive. This archive needs to be made available on container host.

Transfer this generated archive to the container host.

For installation instructions to use the archive to get the proxy containers, see [Installation-and-upgrade](#) > [Container-deployment](#).

2.4.1.3. Uyuniプロキシコンテナを起動する

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

リスト 5. プロシージャ: Uyuniプロキシコンテナの起動

```
mgrpwy start uyuni-proxy-pod
```

呼び出して、すべてのコンテナが期待どおりに起動したかどうかを確認します

```
podman ps
```

5つのUyuniプロキシコンテナが存在する必要があります。

- proxy-salt-broker
- proxy-httppd
- proxy-tftpd
- proxy-squid
- proxy-ssh

また、`proxy-pod`コンテナポッドの一部である必要があります。

2.4.2. Deploy a Uyuni 2024.07 Proxy

This guide outlines the deployment process for the Uyuni 2024.07 Proxy. This guide presumes you have already successfully deployed a Uyuni 2024.07 Server. To successfully deploy, you will perform the following actions:

Checklist: Proxy Deployment

1. Review hardware requirements.
2. Synchronize the openSUSE Leap Micro 5.5 parent channel and the Proxy extension child channel on the server.
3. Install openSUSE Leap Micro 5.5 on a bare-metal machine.

4. During the installation, register openSUSE Leap Micro 5.5 along with the Uyuni 2024.07 Proxy extension.
5. Create a Salt activation key.
6. Bootstrap the Proxy as a Salt minion.
7. Generate a Proxy configuration.
8. Transfer the Proxy configuration from Server to Proxy
9. Use the Proxy configuration to register the Salt minion as a Proxy with Uyuni.

Supported operating system for the Proxy Container Host

The supported operating system for the container host is openSUSE Leap Micro 5.5.

Container host

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

2.4.2.1. Hardware Requirements for the Proxy

This table shows the hardware requirements for deploying Uyuni Proxy.

表9. プロキシハードウェア要件

Hardware	Details	Recommendation
CPU	x86-64, ARM	Minimum 2 dedicated 64-bit CPU cores
RAM	Minimum	2 GB
	Recommended	8 GB
Disk Space	/ (root directory)	Minimum 40 GB
	/var/lib/containers/storage/volumes/srv-www	Minimum 100 GB, Storage requirements should be calculated for the number of ISO distribution images, containers, and bootstrap repositories you will use.
	/var/lib/containers/storage/volumes/var-cache (Squid)	Minimum 100 GB

2.4.2.2. Sync the Parent and Proxy Extension Child channels

Products are listed on the **Admin > Setup Wizard → Products** page. This channel must be fully synchronized on the server, with the child channel [systemitem]Proxy as an extension option selected.

Setup Wizard

Product Description	Arch	Channels
<input type="checkbox"/> > SUSE Linux Enterprise Micro 5.0 x86_64	x86_64	<input type="checkbox"/> <input checked="" type="radio"/> include recommended
<input type="checkbox"/> > SUSE Linux Enterprise Micro 5.1 x86_64	x86_64	<input type="checkbox"/> <input checked="" type="radio"/> include recommended
<input type="checkbox"/> > SUSE Linux Enterprise Micro 5.2 x86_64	x86_64	<input type="checkbox"/> <input checked="" type="radio"/> include recommended
<input type="checkbox"/> > SUSE Linux Enterprise Micro 5.3 x86_64	x86_64	<input type="checkbox"/> <input checked="" type="radio"/> include recommended
<input type="checkbox"/> > SUSE Linux Enterprise Micro 5.4 x86_64	x86_64	<input type="checkbox"/> <input checked="" type="radio"/> include recommended
<input checked="" type="checkbox"/> > SUSE Linux Enterprise Micro 5.5 x86_64	x86_64	<input checked="" type="checkbox"/> <input checked="" type="radio"/>
<input type="checkbox"/> > SUSE Manager Client Tools for SLE Micro 5 x86_64 <small>recommended</small>		
<input type="checkbox"/> SUSE Manager Retail Branch Server Extension 5.0 x86_64 (BETA)		
<input type="checkbox"/> SUSE Package Hub 15 SP5 x86_64		
<input type="checkbox"/> SUSE Manager Server Extension 5.0 x86_64 (BETA)		
<input type="checkbox"/> SUSE Linux Enterprise Live Patching 15 SP5 x86_64		
<input checked="" type="checkbox"/> SUSE Manager Proxy Extension 5.0 x86_64 (BETA)		

图 1. Uyuni 2024.07 Channel Sync for Proxy

Task: Sync the Proxy Parent Channel and Proxy Extension

1. In the Uyuni Web UI select **Admin > Products**.
2. From the products page enter SLE Micro in the filter field.
3. Next use the dropdown to select the required architecture. For this example x86-64.
4. In the Product Description field select the SLE Micro 5.5 checkbox then use the dropdown to select the SUSE Manager Proxy Extension 5.0 x86_64 BETA extension.
5. Click the **[+ Add products]** button.
6. Wait for the sync to complete.

2.4.2.3. SLE Micro 5.5 Installation

Task: Download the Installation Media

1. Locate the SLE Micro 5.5 installation media at <https://www.suse.com/download/sle-micro/>.

2. You will need an account with SUSE Customer Center and must be logged in to download the ISO.
3. Download the following file: `SLE-Micro-5.5-DVD-x86_64-GM-Medial.iso`
4. Prepare a USB flash disk or DVD for installation.
5. Insert a DVD or a bootable USB stick containing the installation image for SLE Micro 5.5.
6. Boot or reboot your system.

For detailed documentation on preparing your machines OS (virtual or physical), see [SLE Micro 5.5 Deployment Guide](#).

Task: SLE Micro 5.5 Installation

1. Use the arrow keys to select `Installation`.
2. Adjust Keyboard and language. Click the `checkbox` to accept the License Agreement.
3. Click `Next` to continue.
4. Select your registration method. For this example we will register the server with SUSE Customer Center.



Uyuni 2024.07 Proxy as an extension

The Uyuni 2024.07 Proxy is registered as an extension. Therefore, in addition to acquiring an SUSE Customer Center registration key for SLE Micro 5.5, you will also need an SUSE Customer Center registration code for the following extension:

- Uyuni 2024.07 Proxy

5. Enter your SUSE Customer Center Email address.
6. Enter your registration code for SLE Micro 5.5.
7. Click `Next` to continue.
8. On the Extension and Module Selection page uncheck the **Hide Development Versions** checkbox.
9. Select the Uyuni 2024.07 Proxy extension checkbox.
10. Click `Next` to continue.
11. Enter your Uyuni 2024.07 Proxy extension registration code.
12. をクリックして続行します。
13. On the NTP Configuration page click **[Next]**.
14. On the Authentication for the System page enter a password for the root user. Click **[Next]**.
15. On the Installation Settings page click **[Install]**.

This concludes installation of SLE Micro 5.5 and Uyuni 2024.07 Proxy as an extension.

2.4.2.3.1. Update the system

Task: Update the System

1. Login as **root**.
2. Run **transactional-update**:

```
transactional-update
```

3. Reboot the system.
4. Login as root.
5. Install the container utilities:



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

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

6. Reboot the system.

2.4.2.4. Create an Activation Key for the Proxy

Task: Create an Activation Key

1. Select **Systems > Activation Keys** then click **[+ Create key]**.
2. Create an activation key for the proxy host with SLE Micro 5.5 as the parent channel. This key should include all recommended channels and the Proxy as an extension child channel.
3. Proceed to bootstrapping the proxy host as a minion.

2.4.2.5. Bootstrap the Proxy Host as a Minion

Task: Bootstrap the Proxy Host

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

Task: Update the Proxy Host

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

2.4.2.6. Generate the Proxy Configuration

The configuration archive of the Uyuni Proxy is generated by the Uyuni Server. Each additional Proxy requires its own configuration archive.



- The container host for the Uyuni Proxy must be registered as a salt minion to the Uyuni Server prior to generating this Proxy configuration.

You will perform the following tasks:

1. Generate a Proxy configuration file.
2. Transfer the configuration to the Proxy.
3. Start the Proxy with the `mgrproxy` command.

Task: Generating a Proxy Container Configuration using Web UI

1. Web UIで、**システム > プロキシの設定**に移動し、必要なデータを入力します。
2. [--FQDN] フィールドに、プロキシの完全修飾ドメイン名を入力します。
3. [--FQDN] フィールドに、Uyuniサーバまたは別のUyuniプロキシの完全修飾ドメイン名を入力します。
4. [--SSH--SSH--SSH] フィールドに、SSHサービスがUyuniプロキシでリスンしているSSHポートを入力します。デフォルトの8022を維持することをお勧めします。
5. [Squid--Storage--[MB]] フィールドタイプで、Squidキャッシュの最大許容サイズ。通常、これはコンテナで使用可能なストレージの最大60%である必要があります。
[SSL--] 選択リストで、Uyuniプロキシ用に新しいサーバ証明書を生成するか、既存のサーバ証明書を使用するかを選択します。生成された証明書は、Uyuni組み込みの(自己署名)証明書と見なすことができます。

選択に応じて、新しい証明書を生成するための署名CA証明書へのパス、またはプロキシ証明書として使用される既存の証明書とそのキーへのパスのいずれかを指定します。

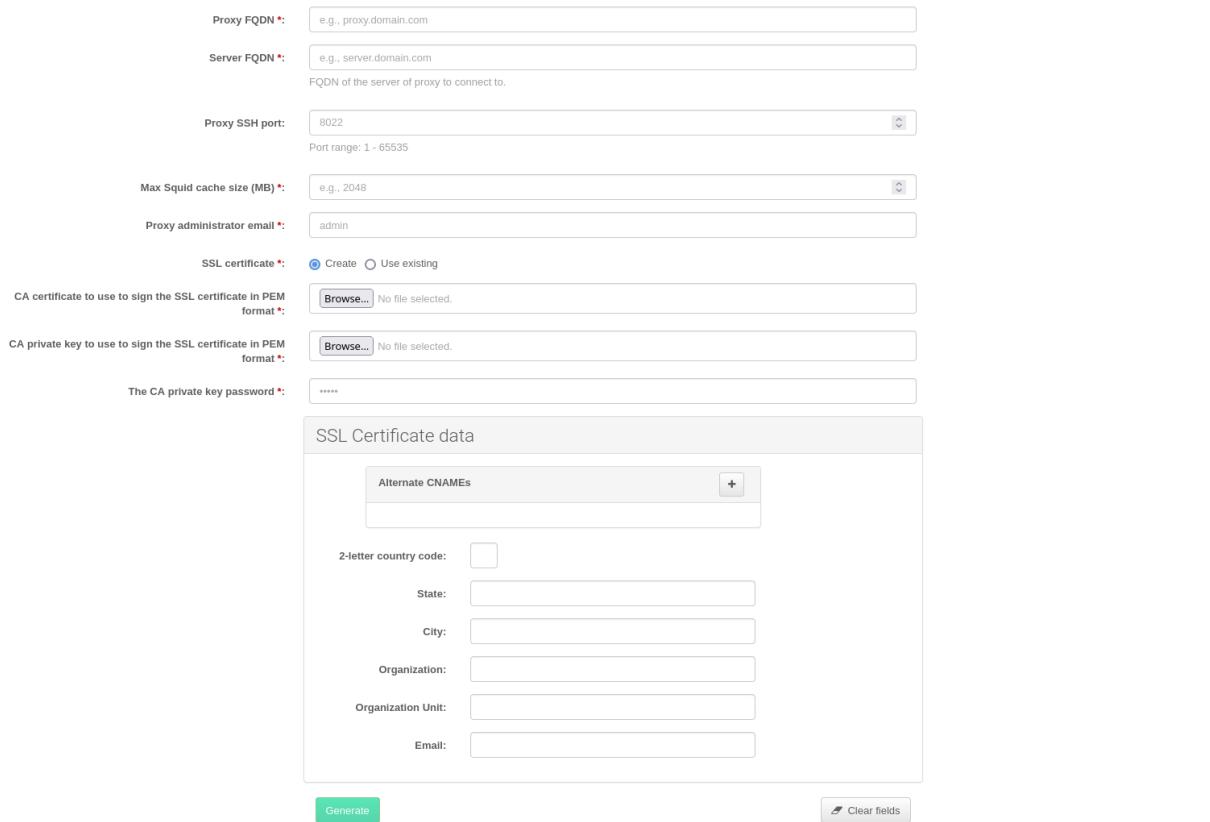
The CA certificates generated on the server are stored in the `/var/lib/containers/storage/volumes/root/ssl-build` directory.

既存の証明書またはカスタム証明書、および企業証明書と中間証明書の概念の詳細については、**Administration > Ssl-certs-imported**を参照してください。

6. **[生成]**をクリックして、Uyuniサーバに新しいプロキシFQDNを登録し、コンテナホストの詳細を含む設定アーカイブを生成します。
7. しばらくすると、ダウンロードするファイルが表示されます。このファイルをローカルに保存します。

Container Based Proxy Configuration [?](#)

You can generate a set of configuration files and certificates in order to register and run a container-based proxy. Once the following form is filled out and submitted you will get a .zip archive to download.



Proxy FQDN *: e.g., proxy.domain.com

Server FQDN *: e.g., server.domain.com

FQDN of the server of proxy to connect to.

Proxy SSH port: 8022

Port range: 1 - 65535

Max Squid cache size (MB) *: e.g., 2048

Proxy administrator email *: admin

SSL certificate *:

- Create
- Use existing

CA certificate to use to sign the SSL certificate in PEM format *:

CA private key to use to sign the SSL certificate in PEM format *:

The CA private key password *:

.....

SSL Certificate data

Alternate CNAMEs	<input type="button" value="+"/>
2-letter country code:	<input type="text"/>
State:	<input type="text"/>
City:	<input type="text"/>
Organization:	<input type="text"/>
Organization Unit:	<input type="text"/>
Email:	<input type="text"/>

2.4.2.7. Transfer the Proxy Configuration

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

Task: Copy the Proxy configuration

1. Copy the files from the Server container to the Server host OS:

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

2. Next copy the files from the Server host OS to the Proxy host:

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

3. Install the Proxy with:

```
mgrpctl install podman config.tar.gz
```

2.4.2.8. Start the Uyuni 2024.07 Proxy

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

Task: Start and Check Proxy Status

1. Start the Proxy by calling:

```
mgrpxy start
```

2. Check container status by calling:

```
mgrpxy status
```

5つのUyuniプロキシコンテナが存在する必要があります。

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

And should be part of the `proxy-pod` container pod.

2.4.2.8.1. サービスにカスタムコンテナイメージを使用する

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

たとえば、次のように使用します。

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

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

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

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

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

2.4.3. k3sでのコンテナ化されたUyuni Proxyのインストール

2.4.3.1. k3sのインストール

On the container host machine, install k3s (replace <K3S_HOST_FQDN> with the FQDN of your k3s host):

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

2.4.3.2. Installing tools

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

The `mgrpxy` package is available in the container utils repository: pick the one matching the distribution in: <https://download.opensuse.org/repositories/systemsmanagement:/Uyuni:/Stable:/ContainerUtils/>.

To install them run:

```
zypper in helm mgrpxy
```

2.4.3.3. Uyuni Proxy helmチャートの配備

To configure the storage of the volumes to be used by the Uyuni Proxy pod, define persistent volumes for the following claims. If you do not customize the storage configuration, k3s will automatically create the storage volumes for you.

The persistent volume claims are named:

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

Create the configuration for the Uyuni Proxy as documented in **Installation-and-upgrade > Container-deployment**. Copy the configuration `tar.gz` file and then install:

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

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

2.5. Install the Proxy

2.5.1. openSUSE Leapを使用したUyuniプロキシのインストール

Uyuniプロキシは、openSUSE Leap 15.5にインストールできます。

プロシージャ: Uyuniプロキシを使用したopenSUSE Leapのインストール

1. openSUSE Leapをインストールし、利用できるすべてのパッケージ更新を適用します。
2. **yast** › **システム** › **Network Settings (ネットワーク設定)** › **Hostname/DNS (ホスト名/DNS)** で、解決可能な完全修飾ドメイン名(FQDN)を設定します。
3. Uyuniプロキシソフトウェアでリポジトリを追加します。 `root`として次のように入力します。

```
repo=repositories/systemsmanagement:/  
repo=${repo}Uyuni:/Stable/images/repo/Uyuni-Proxy-Pool-x86_64-  
Media1/  
zypper ar https://download.opensuse.org/$repo uyuni-proxy-stable
```

4. リポジトリからメタデータを更新します。`root`として次のように入力します。

```
zypper ref
```

5. Uyuniプロキシのパターンをインストールします。`root`として次のように入力します。

```
zypper in patterns-uyuni_proxy
```

6. Uyuniプロキシを起動します。

- For more information about the stable version of Uyuni, see <https://www.uyuni-project.org/pages/stable-version.html>.
- For more information about the development version of Uyuni, see <https://www.uyuni-project.org/pages/devel-version.html>.

インストールが完了したら、Uyuniの設定に進むことができます。 詳細については、**Installation-and-upgrade** › **Uyuni-proxy-registration**を参照してください。

Chapter 3. Upgrade and Migration

3.1. Server

3.1.1. Migrating the Uyuni server to a containerized environment

To migrate a regular Uyuni server to a container, a new machine is required.



It is not possible to perform an in-place migration.

The original server is referred to as the **source server**, while the newly set-up machine is designated as the **destination server**.

The migration procedure currently does not include any hostname renaming functionality. Consequently, the fully qualified domain name (FQDN) on the new server will remain identical to that on the source server. Therefore, following migration, it will be necessary to manually adjust the DNS records to point to the new server.

Procedure: Initial preparation

1. Stop the source server:

```
spacewalk-service stop
```

2. Stop the source services:

```
systemctl stop postgresql
```

Procedure: Preparing the SSH connection

1. The SSH configuration and agent should be ready on the host for a passwordless connection to the source server.



To establish a passwordless connection, the migration script relies on an SSH agent running on the server. If one isn't active yet, initiate it by running `eval $(ssh-agent)`. Then, add the SSH key to the running agent with `ssh-add /path/to/the/private/key`. You'll be prompted to enter the password for the private key during this process.

2. The migration script only uses the source server fully qualified domain name in the SSH command.
3. This means that every other configuration required to connect needs to be defined in the `~/.ssh/config` file.

3.1.1.1. Prepare for Kubernetes

Before executing the migration command with mgradm migrate, it's essential to predefine **Persistent Volumes**, especially considering that the migration job initiates the container from scratch. Please consult the installation section for comprehensive guidance on preparing these volumes.

See: [Installation-and-upgrade > Container-management](#)

3.1.1.2. Migrating

Execute the following command to install a new Uyuni server, replacing **<Uyuni.source.fqdn>** with the appropriate FQDN of the source server:

```
mgradm migrate podman <{productname}.source.fqdn>
```

または

```
mgradm migrate kubernetes <{productname}.source.fqdn>
```

3.2. Proxy

3.2.1. Proxy Migration

In Uyuni 2024.04, the containerized proxy is managed by a set of systemd services.

In Uyuni 2024.07, management of the containerized proxy was re-designed and made simpler with the `mgrpxy` tool.

This section will help you migrate from the legacy `systemd` proxy using the new `mgrpxy` tool.

An in-place migration from Uyuni 2024.04 to 2024.06 will remain unsupported due to the HostOS change from SUSE Linux Enterprise Server 15 SP4 to openSUSE Leap Micro 5.5



The traditional contact protocol is no longer supported in Uyuni 2024.07 and later. Before migrating from Uyuni 2024.04 to 2024.07, any existing traditional clients including the traditional proxies must be migrated to Salt.

For more information about migrating traditional Uyuni 2024.04 clients to Salt clients, see <https://documentation.suse.com/suma/4.3/en/suse-manager/client-configuration/contact-methods-migrate-traditional.html>

3.2.1.1. Migrate from Legacy to Containerized Proxy with Systemd

3.2.1.1.1. Generate the Proxy Configuration

Task: Generate the Proxy Configuration

1. Log in to the Uyuni Server Web UI.
2. Select **Systems > Proxy Configuration** from the left navigation.
3. Enter your Proxy FQDN. Use the same FQDN as the original proxy host.
4. Enter your Server FQDN.
5. Enter the Proxy port number. We recommend using the default port of 8022
6. Certificate and private key are located on the Server container host in `/var/lib/containers/storage/volumes/root/_data/ssl-build/`.
 - RHN-ORG-TRUSTED-SSL-CERT
 - RHN-ORG-PRIVATE-SSL-KEY
7. Copy the certificate and key to your machine with:

```
scp root@uyuni-server-example.com:/root/ssl-build/RHN-ORG-PRIVATE-
SSL-KEY .
scp root@uyuni-server-example.com:/root/ssl-build/RHN-ORG-TRUSTED-
SSL-CERT .
```

8. Select **[Choose File]** and browse your local machine for the certificate.
9. Select **[Choose File]** and brose your local machine for the private key.
10. Enter the CA password.
11. Click **[Generate]**.

3.2.1.1.2. Transfer Proxy Configuration to New Host

Task: Transfer the Proxy Configuration

1. From the Server transfer the generated tar.gz file containing the proxy configuration to the new Proxy host:

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

2. Disable the legacy proxy prior to executing the next step:

リスト 6. Disable the Legacy Proxy

```
spacewalk-proxy stop
```

3. Deploy the new Proxy with:

```
systemctl start uyuni-proxy-pod
```

4. Enable the new Proxy with:

```
systemctl enable --now uyuni-proxy-pod
```

5. Run `podman ps` to verify all the containers are present and running:

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

3.2.1.2. Migrate Uyuni 2024.04 Proxy to Uyuni 2024.07 Containerized Proxy

Task: Migrate Uyuni 2024.04 Containerized Proxy to Uyuni 2024.07 New Containerized Proxy

1. Boot your new machine and begin installation of openSUSE Leap Micro 5.5.
2. Complete the installation.
3. Update the system:

```
transactional-update --continue
```

4. Install `mgrpxy` and optionally, `mgrpxy-bash-completion`:

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

5. 再起動します。
6. Copy your tar.gz proxy configuration to the host.

3.2.1.3. Installing packages using the Web UI

The `mgrpxy` and `mgrpxy-bash-completion` packages can also be installed via the web UI after the minion has been bootstrapped and registered with the Server.

Task: Installing Packages using the Web UI

1. After installation, ensure that the SLE Micro 5.5 Parent channel and Proxy child channels are added and synced from the **Admin > Setup Wizard → Products** page.

2. In the Web UI, go to **Systems > Activation Keys** and create an activation key linked to the synced SLE Micro 5.5 channel.
3. Bootstrap your system as a minion using the **Systems > Bootstrapping** page.
4. Once the new machine is onboarded and displayed in the systems list, select the system and navigate to the **System Details > Install Package** page.
5. Install the packages `mgrpaxy` and `mgrpaxy-bash-completion`.
6. Reboot the system.

3.2.1.4. Generate Proxy Config with spacecmd and Self-Signed Certificate

Task: Generate Proxy Config with spacecmd and Self-Signed Certificate

You can generate a Proxy configuration using spacecmd.

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

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

3. Copy the generated config to the Proxy:

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

4. Deploy the Proxy with:

```
mgrpaxy install podman config.tar.gz
```

3.2.1.5. Generate Proxy Config with spacecmd and Custom Certificate

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



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

Task: Generate Proxy Config with spacecmd and Custom Certificate

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

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

3. Copy the generated config to the Proxy:

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

4. Deploy the Proxy with:

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

3.3. Clients

3.3.1. クライアントのアップグレード

クライアントは、基盤となるオペレーティングシステムのバージョン設定システムを使用します。 SUSEオペレーティングシステムを使用するクライアントの場合、UyuniのWeb UI内でアップグレードを実行できます。

クライアントのアップグレードの詳細については、[Client-configuration](#) › [Client-upgrades](#)を参照してください。

Chapter 4. Upgrade and Migration

4.1. Server

4.1.1. Container

4.1.1.1. Migrating the Uyuni server to a containerized environment

To migrate a regular Uyuni server to a container, a new machine is required.



! It is not possible to perform an in-place migration.

The original server is referred to as the **source server**, while the newly set-up machine is designated as the **destination server**.

The migration procedure currently does not include any hostname renaming functionality. Consequently, the fully qualified domain name (FQDN) on the new server will remain identical to that on the source server. Therefore, following migration, it will be necessary to manually adjust the DNS records to point to the new server.

Procedure: Initial preparation

1. Stop the source server:

```
spacewalk-service stop
```

2. Stop the source services:

```
systemctl stop postgresql
```

Procedure: Preparing the SSH connection

1. The SSH configuration and agent should be ready on the host for a passwordless connection to the source server.



! To establish a passwordless connection, the migration script relies on an SSH agent running on the server. If one isn't active yet, initiate it by running `eval $(ssh-agent)`. Then, add the SSH key to the running agent with `ssh-add /path/to/the/private/key`. You'll be prompted to enter the password for the private key during this process.

2. The migration script only uses the source server fully qualified domain name in the SSH command.
3. This means that every other configuration required to connect needs to be defined in the `~/.ssh/config` file.

4.1.1.1.1. Prepare for Kubernetes

Before executing the migration command with mgradm migrate, it's essential to predefine **Persistent Volumes**, especially considering that the migration job initiates the container from scratch. Please consult the installation section for comprehensive guidance on preparing these volumes.

See: [Installation-and-upgrade > Container-management](#)

4.1.1.1.2. Migrating

Execute the following command to install a new Uyuni server, replacing **<Uyuni.source.fqdn>** with the appropriate FQDN of the source server:

```
mgradm migrate podman <{productname}.source.fqdn>
```

または

```
mgradm migrate kubernetes <{productname}.source.fqdn>
```



After successfully running the `mgradm migrate` command, the Salt setup on all clients will still point to the old server (source server). To redirect them to the new server (destination server), it is required to rename the new server at the infrastructure level (DHCP and DNS) to use the same Fully Qualified Domain Name and IP address as old server (source server).

4.1.2. Legacy

4.1.2.1. サーバ - マイナーアップグレード

1年に数回、Uyuniチームは、Uyuniサーバのマイナーアップグレードをリリースします。この更新は、バグ修正および機能の向上に対処し、新機能を導入する場合もあります。



Some additional manual steps might be required, and this information is only available in the release notes. For more information about such a major upgrade, see [Installation-and-upgrade > Server-major-upgrade-uyuni](#).

For information about your upgrade, see the release notes at <https://www.uyuni-project.org/pages/stable-version.html>.

マイナーアップグレードの実行は、オペレーティングシステムパッケージの更新と似ています。

プロシージャ: Uyuniサーバのパッケージを更新する

デフォルトでは、複数の更新リポジトリがUyuniサーバ用に設定され、有効化されます。新規および更新したパッケージは自動的に使用可能になります。

It is recommended you make a backup of the server before upgrading. For more information about backing up Uyuni, see [Administration > Backup-restore](#).

1. Uyuniサーバのコマンドプロンプトでrootとしてspacewalkサービスを停止します。

```
spacewalk-service stop
```

2. ソフトウェアリポジトリを更新します。

```
zypper ref
```

3. 新しいパッケージを更新します: (zypperによってプロンプトが表示されたらこれを繰り返します)

```
zypper up
```

Uyuni is different from SUSE Manager in this step. SUSE Manager uses `zypper patch`, but Uyuni requires `zypper up`.

+

1. If zypper reports that the Uyuni package will not be upgraded, run the command manually:

```
zypper install Uyuni-Server-release
```

2. spacewalkサービスを再起動します。

```
spacewalk-service start
```

パッチ更新が再起動を推奨している場合、再起動します。



デフォルトでは、zypperは、10分ごとにリポジトリを更新します(/etc/zypp/zypp.confのrepo.refresh.delayを参照)。autorefreshは無効になっている場合、zypper refを実行してすべてのリポジトリを更新します。

Uyuni 2020.04以降では、`spacewalk-schema-upgrade`は不要になりました。

スキーマのアップグレードは、`spacewalk-service start`を使用してspacewalkサービスが開始されると自動的に実行されます。

パッケージの更新の影響を受けるサービスは更新後に自動で再起動されません。これらのサービスは、潜在的な障害を回避するために、手動で再起動する必要があります。`zypper ps`を使用して、古いコードを使用していて再起動が必要なアプリケーションを確認してください。

4.1.2.2. サーバ - メジャーアップグレード

Uyuniのコアコンポーネントが新しいメジャーバージョンにアップグレードされた場合、Uyuniサーバでメジャーアップグレードを実行する必要があります。これは、PostgreSQL、Salt、またはopenSUSE Leapのバージョンアップグレードが必要な場合です。openSUSE Leapは、基盤となるベースオペレーティングシステム(OS)です。

追加の手動手順が必要な場合があります。この情報はリリースノートでのみ確認できます。アップグレードの追加情報については、次の場所にあるリリースノートを参照してください:

<https://www.uyuni-project.org/pages/stable-version.html>

You will not be able to fix issues that arise during the migration. Ensure you have created a backup before you start the migration. For more information about backing up Uyuni, see **Administration** > **Backup-restore**. If you are running Uyuni Server on a virtual machine, we recommend that you create a snapshot before you start.

アップグレードの前に、ストレージ要件が満たされていることを確認してください。詳細については、[uyuni-install-requirements.pdf](#)を参照してください。サービスパックの移行と新しいソフトウェアパッケージのダウンロードのための十分な空き容量がない場合、移行プロシージャによってルートパーティションがいっぱいになる可能性があります。PostgreSQLをアップグレードする場合の`/var/lib/pgsql`も同様です。古いデータベースのコピーを使用するため、データベースのコピーに対応するために少なくとも十分な空き容量があることを確認してください。

`server-migrator.sh`スクリプトを使用すると、Uyuniサーバが最新バージョンに移行されます。基盤となるオペレーティングシステムもバージョン15.5にアップグレードされます。このスクリプトはsusemanagerパッケージの一部です。

プロシージャ: Uyuniサーバの移行

1. `server-migrator.sh`スクリプトを実行する前に、最新バージョンのsusemanagerパッケージがインストールされているかどうかを確認してください。

```
zypper ref
zypper up susemanager
```

2. /usr/lib/susemanager/bin/server-migrator.shスクリプトを実行してベースOSおよびUyuniサーバをアップグレードします。



- 移行が完了したら、Uyuniサーバを手動で再起動します。

4.2. Proxy

4.2.1. プロキシのアップグレード

Uyuniプロキシはクライアントと同じ方法で管理されます。



- 2024.07へのアップグレード手順は、メジャーアップグレードまたはマイナーアップグレードのいずれかです。詳細については、Uyuni 2024.07リリースノートを参照してください。

メジャーアップグレード

[Installation-and-upgrade > Proxy-uyuni](#)を参照してください。

マイナーアップグレード

[Installation-and-upgrade > Proxy-minor-uyuni](#)を参照してください。

4.2.2. プロキシ - メジャーアップグレード

プロキシ更新を実行する前に、保守ウィンドウをスケジュールします。 プロキシからUyuniに登録したクライアントは、更新の実行中にはUyuniに接続できません。
保守ウィンドウの詳細について
は、[Administration > Maintenance-windows](#)を参照してください。



- プロキシメジャーアップグレードには、オペレーティングシステムのバージョンアップグレードが含まれます。 詳細については、Uyuni 2024.07リリースノートを参照してください。

4.2.2.1. アップグレードの準備

プロシージャ: コマンドプロンプトでopenSUSE Leap 15.5ソフトウェアチャンネルを追加する

1. Uyuni サーバのコマンドプロンプトで root になり、 spacewalk-common-channels コマンドを特定のチャンネルに対して実行します:

```
spacewalk-common-channels opensuse_leap15_5 \
opensuse_leap15_5-non-oss \
opensuse_leap15_5-non-oss-updates \
opensuse_leap15_5-updates \
opensuse_leap15_5-backports-updates \
opensuse_leap15_5-sle-updates \
uyuni-proxy-stable-leap-155
```

2. `spacewalk-repo-sync`を使用して、すべてのチャンネルを完全に同期します。

4.2.2.2. プロキシのアップグレード

プロキシを更新するには、まずプロキシサービスを停止し、ソフトウェアリポジトリを置き換え、ソフトウェアを更新し、最後にプロキシサービスを再起動します。

プロシージャ: Uyuni プロキシの更新

1. Uyuniプロキシで、プロキシサービスを停止します。

spacewalk-proxy stop

spacewalk-proxy start

多数のプロキシを更新する必要がある場合、Uyuniサーバでこのコマンドシーケンスのアクションチェーンを作成できます。アクションチェーンを使用して、複数のプロキシで同時に更新を実行できます。

4.2.3. プロキシ - マイナーアップグレード

プロキシ更新を実行する前に、保守ウィンドウをスケジュールします。プロキシからUyuniに登録したクラ
イアントは、更新の実行中にはUyuniに接続できません。
は、**Administration > Maintenance-windows**を参照してください。



マイナープロキシアップグレードには、オペレーティングシステムのバージョンアップグレードは含まれません。 詳細については、Uyuni 2024.07リリースノートを参照してください。

4.2.3.1. プロキシのアップグレード

プロキシを更新するには、まずプロキシサービスを停止し、ソフトウェアを更新し、最後にプロキシサービスを再起動します。

プロシージャ: Uyuniプロキシの更新

1. Uyuniプロキシで、プロキシサービスを停止します。

```
spacewalk-proxy stop
```

2. UyuniサーバのWeb UIで、**システム** › **プロキシ**に移動し、プロキシの名前をクリックします。
3. プロキシで更新するすべてのパッケージを選択し、選択を適用します。
4. Uyuniプロキシで、プロキシサービスを開始します。

```
spacewalk-proxy start
```

多数のプロキシを更新する必要がある場合、Uyuniサーバでこのコマンドシーケンスのアクションチェーンを作成できます。 アクションチェーンを使用して、複数のプロキシで同時に更新を実行できます。

Chapter 5. Basic Server Management

5.1. Custom YAML Configuration and Deployment with `mgradm`

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



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

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

Procedure: Deploying the Uyuni container with Podman using a custom configuration file

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

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

# Password for the CA certificate
ssl:
    password: MySuperSecretSSLPASSWORD

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

# Organization name
organization: YourOrganization

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

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

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

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



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

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

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

In this section you learned how to deploy an Uyuni 2024.07 Server container using a custom YAML configuration.

5.2. Starting and Stopping Containers

The Uyuni 2024.07 Server container can be restarted, started, and stopped using the following commands:

To restart the Uyuni 2024.07 Server execute the following command:

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

To start the server execute the following command:

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

To stop the server execute the following command:

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

5.3. List of persistent storage volumes

Modifications performed within containers are not retained. Any alterations made outside of persistent volumes will be discarded. Below is a list of persistent volumes for Uyuni 2024.07.

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



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

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

表 10. Persistent Volumes: **Podman Default Storage**

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

表 11. Persistent Volumes: **root**

Volume Name	Volume Directory
root	/root

表 12. Persistent Volumes: **var/**

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

表 13. Persistent Volumes: **srv/**

Volume Name	Volume Directory
srv-salt	/srv/salt
srv-www	/srv/www/
srv-tftpboot	/srv/tftpboot

Volume Name	Volume Directory
srv-formulametadata	/srv/formula_metadata
srv-pillar	/srv/pillar
srv-susemanager	/srv/susemanager
srv-spacewalk	/srv/spacewalk

表 14. Persistent Volumes: **etc/**

Volume Name	Volume Directory
etc-apache2	/etc/apache2
etc-rhn	/etc/rhn
etc-systemd-multi	/etc/systemd/system/multi-user.target.wants
etc-systemd-sockets	/etc/systemd/system/sockets.target.wants
etc-salt	/etc/salt
etc-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

Chapter 6. GNU Free Documentation License

Copyright © 2000, 2001, 2002 Free Software Foundation, Inc. 51 Franklin St, Fifth Floor, Boston, MA 02110-1301 USA. Everyone is permitted to copy and distribute verbatim copies of this license document, but changing it is not allowed.

0. PREAMBLE

The purpose of this License is to make a manual, textbook, or other functional and useful document "free" in the sense of freedom: to assure everyone the effective freedom to copy and redistribute it, with or without modifying it, either commercially or noncommercially. Secondarily, this License preserves for the author and publisher a way to get credit for their work, while not being considered responsible for modifications made by others.

This License is a kind of "copyleft", which means that derivative works of the document must themselves be free in the same sense. It complements the GNU General Public License, which is a copyleft license designed for free software.

We have designed this License in order to use it for manuals for free software, because free software needs free documentation: a free program should come with manuals providing the same freedoms that the software does. But this License is not limited to software manuals; it can be used for any textual work, regardless of subject matter or whether it is published as a printed book. We recommend this License principally for works whose purpose is instruction or reference.

1. APPLICABILITY AND DEFINITIONS

This License applies to any manual or other work, in any medium, that contains a notice placed by the copyright holder saying it can be distributed under the terms of this License. Such a notice grants a world-wide, royalty-free license, unlimited in duration, to use that work under the conditions stated herein. The "Document", below, refers to any such manual or work. Any member of the public is a licensee, and is addressed as "you". You accept the license if you copy, modify or distribute the work in a way requiring permission under copyright law.

A "Modified Version" of the Document means any work containing the Document or a portion of it, either copied verbatim, or with modifications and/or translated into another language.

A "Secondary Section" is a named appendix or a front-matter section of the Document that deals exclusively with the relationship of the publishers or authors of the Document to the Document's overall subject (or to related matters) and contains nothing that could fall directly within that overall subject. (Thus, if the Document is in part a textbook of mathematics, a Secondary Section may not explain any mathematics.) The relationship could be a matter of historical connection with the subject or with related matters, or of legal, commercial, philosophical, ethical or political position regarding them.

The "Invariant Sections" are certain Secondary Sections whose titles are designated, as being those of Invariant Sections, in the notice that says that the Document is released under this License. If a section does not fit the above definition of Secondary then it is not allowed to be designated as Invariant. The Document may contain zero Invariant Sections. If the Document does not identify any Invariant Sections then there are none.

The "Cover Texts" are certain short passages of text that are listed, as Front-Cover Texts or Back-Cover Texts, in the notice that says that the Document is released under this License. A Front-Cover Text may be at most 5 words, and a Back-Cover Text may be at most 25 words.

A "Transparent" copy of the Document means a machine-readable copy, represented in a format whose specification is available to the general public, that is suitable for revising the document straightforwardly with generic text editors or (for images composed of pixels) generic paint programs or (for drawings) some widely available drawing editor, and that is suitable for input to text formatters or for automatic translation to a variety of formats suitable for input to text formatters. A copy made in an otherwise Transparent file format whose markup, or absence of markup, has been arranged to thwart or discourage subsequent modification by readers is not Transparent. An image format is not Transparent if used for any substantial amount of text. A copy that is not "Transparent" is called "Opaque".

Examples of suitable formats for Transparent copies include plain ASCII without markup, Texinfo input format, LaTeX input format, SGML or XML using a publicly available DTD, and standard-conforming simple HTML, PostScript or PDF designed for human modification. Examples of transparent image formats include PNG, XCF and JPG. Opaque formats include proprietary formats that can be read and edited only by proprietary word processors, SGML or XML for which the DTD and/or processing tools are not generally available, and the machine-generated HTML, PostScript or PDF produced by some word processors for output purposes only.

The "Title Page" means, for a printed book, the title page itself, plus such following pages as are needed to hold, legibly, the material this License requires to appear in the title page. For works in formats which do not have any title page as such, "Title Page" means the text near the most prominent appearance of the work's title, preceding the beginning of the body of the text.

A section "Entitled XYZ" means a named subunit of the Document whose title either is precisely XYZ or contains XYZ in parentheses following text that translates XYZ in another language. (Here XYZ stands for a specific section name mentioned below, such as "Acknowledgements", "Dedications", "Endorsements", or "History".) To "Preserve the Title" of such a section when you modify the Document means that it remains a section "Entitled XYZ" according to this definition.

The Document may include Warranty Disclaimers next to the notice which states that this License applies to the Document. These Warranty Disclaimers are considered to be included by reference in this License, but only as regards disclaiming warranties: any other implication that these Warranty Disclaimers may have is void and has no effect on the meaning of this License.

2. VERBATIM COPYING

You may copy and distribute the Document in any medium, either commercially or noncommercially, provided that this License, the copyright notices, and the license notice saying this License applies to the Document are reproduced in all copies, and that you add no other conditions whatsoever to those of this License. You may not use technical measures to obstruct or control the reading or further copying of the copies you make or distribute. However, you may accept compensation in exchange for copies. If you distribute a large enough number of copies you must also follow the conditions in section 3.

You may also lend copies, under the same conditions stated above, and you may publicly display copies.

3. COPYING IN QUANTITY

If you publish printed copies (or copies in media that commonly have printed covers) of the Document, numbering more than 100, and the Document's license notice requires Cover Texts, you must enclose the copies in covers that carry, clearly and legibly, all these Cover Texts: Front-Cover Texts on the front cover, and Back-Cover Texts on the back cover. Both covers must also clearly and legibly identify you as the publisher of these copies. The front cover must present the full title with all words of the title equally prominent and visible. You may add other material on the covers in addition. Copying with changes limited to the covers, as long as they preserve the title of the Document and satisfy these conditions, can be treated as verbatim copying in other respects.

If the required texts for either cover are too voluminous to fit legibly, you should put the first ones listed (as many as fit reasonably) on the actual cover, and continue the rest onto adjacent pages.

If you publish or distribute Opaque copies of the Document numbering more than 100, you must either include a machine-readable Transparent copy along with each Opaque copy, or state in or with each Opaque copy a computer-network location from which the general network-using public has access to download using public-standard network protocols a complete Transparent copy of the Document, free of added material. If you use the latter option, you must take reasonably prudent steps, when you begin distribution of Opaque copies in quantity, to ensure that this Transparent copy will remain thus accessible at the stated location until at least one year after the last time you distribute an Opaque copy (directly or through your agents or retailers) of that edition to the public.

It is requested, but not required, that you contact the authors of the Document well before redistributing any large number of copies, to give them a chance to provide you with an updated version of the Document.

4. MODIFICATIONS

You may copy and distribute a Modified Version of the Document under the conditions of sections 2 and 3 above, provided that you release the Modified Version under precisely this License, with the Modified Version filling the role of the Document, thus licensing distribution and modification of the Modified Version to whoever possesses a copy of it. In addition, you must do these things in the Modified Version:

- A. Use in the Title Page (and on the covers, if any) a title distinct from that of the Document, and from those of previous versions (which should, if there were any, be listed in the History section of the Document). You may use the same title as a previous version if the original publisher of that version gives permission.
- B. List on the Title Page, as authors, one or more persons or entities responsible for authorship of the modifications in the Modified Version, together with at least five of the principal authors of the Document (all of its principal authors, if it has fewer than five), unless they release you from this requirement.
- C. State on the Title page the name of the publisher of the Modified Version, as the publisher.
- D. Preserve all the copyright notices of the Document.
- E. Add an appropriate copyright notice for your modifications adjacent to the other copyright notices.
- F. Include, immediately after the copyright notices, a license notice giving the public permission to use the Modified Version under the terms of this License, in the form shown in the Addendum below.

-
- G. Preserve in that license notice the full lists of Invariant Sections and required Cover Texts given in the Document' s license notice.
 - H. Include an unaltered copy of this License.
 - I. Preserve the section Entitled "History", Preserve its Title, and add to it an item stating at least the title, year, new authors, and publisher of the Modified Version as given on the Title Page. If there is no section Entitled "History" in the Document, create one stating the title, year, authors, and publisher of the Document as given on its Title Page, then add an item describing the Modified Version as stated in the previous sentence.
 - J. Preserve the network location, if any, given in the Document for public access to a Transparent copy of the Document, and likewise the network locations given in the Document for previous versions it was based on. These may be placed in the "History" section. You may omit a network location for a work that was published at least four years before the Document itself, or if the original publisher of the version it refers to gives permission.
 - K. For any section Entitled "Acknowledgements" or "Dedications", Preserve the Title of the section, and preserve in the section all the substance and tone of each of the contributor acknowledgements and/or dedications given therein.
 - L. Preserve all the Invariant Sections of the Document, unaltered in their text and in their titles. Section numbers or the equivalent are not considered part of the section titles.
 - M. Delete any section Entitled "Endorsements". Such a section may not be included in the Modified Version.
 - N. Do not retitle any existing section to be Entitled "Endorsements" or to conflict in title with any Invariant Section.
 - O. Preserve any Warranty Disclaimers.

If the Modified Version includes new front-matter sections or appendices that qualify as Secondary Sections and contain no material copied from the Document, you may at your option designate some or all of these sections as invariant. To do this, add their titles to the list of Invariant Sections in the Modified Version' s license notice. These titles must be distinct from any other section titles.

You may add a section Entitled "Endorsements", provided it contains nothing but endorsements of your Modified Version by various parties—for example, statements of peer review or that the text has been approved by an organization as the authoritative definition of a standard.

You may add a passage of up to five words as a Front-Cover Text, and a passage of up to 25 words as a Back-Cover Text, to the end of the list of Cover Texts in the Modified Version. Only one passage of Front-Cover Text and one of Back-Cover Text may be added by (or through arrangements made by) any one entity. If the Document already includes a cover text for the same cover, previously added by you or by arrangement made by the same entity you are acting on behalf of, you may not add another; but you may replace the old one, on explicit permission from the previous publisher that added the old one.

The author(s) and publisher(s) of the Document do not by this License give permission to use their names for publicity for or to assert or imply endorsement of any Modified Version.

5. COMBINING DOCUMENTS

You may combine the Document with other documents released under this License, under the terms defined in section 4 above for modified versions, provided that you include in the combination all of the

Invariant Sections of all of the original documents, unmodified, and list them all as Invariant Sections of your combined work in its license notice, and that you preserve all their Warranty Disclaimers.

The combined work need only contain one copy of this License, and multiple identical Invariant Sections may be replaced with a single copy. If there are multiple Invariant Sections with the same name but different contents, make the title of each such section unique by adding at the end of it, in parentheses, the name of the original author or publisher of that section if known, or else a unique number. Make the same adjustment to the section titles in the list of Invariant Sections in the license notice of the combined work.

In the combination, you must combine any sections Entitled "History" in the various original documents, forming one section Entitled "History"; likewise combine any sections Entitled "Acknowledgements", and any sections Entitled "Dedications". You must delete all sections Entitled "Endorsements".

6. COLLECTIONS OF DOCUMENTS

You may make a collection consisting of the Document and other documents released under this License, and replace the individual copies of this License in the various documents with a single copy that is included in the collection, provided that you follow the rules of this License for verbatim copying of each of the documents in all other respects.

You may extract a single document from such a collection, and distribute it individually under this License, provided you insert a copy of this License into the extracted document, and follow this License in all other respects regarding verbatim copying of that document.

7. AGGREGATION WITH INDEPENDENT WORKS

A compilation of the Document or its derivatives with other separate and independent documents or works, in or on a volume of a storage or distribution medium, is called an "aggregate" if the copyright resulting from the compilation is not used to limit the legal rights of the compilation's users beyond what the individual works permit. When the Document is included in an aggregate, this License does not apply to the other works in the aggregate which are not themselves derivative works of the Document.

If the Cover Text requirement of section 3 is applicable to these copies of the Document, then if the Document is less than one half of the entire aggregate, the Document's Cover Texts may be placed on covers that bracket the Document within the aggregate, or the electronic equivalent of covers if the Document is in electronic form. Otherwise they must appear on printed covers that bracket the whole aggregate.

8. TRANSLATION

Translation is considered a kind of modification, so you may distribute translations of the Document under the terms of section 4. Replacing Invariant Sections with translations requires special permission from their copyright holders, but you may include translations of some or all Invariant Sections in addition to the original versions of these Invariant Sections. You may include a translation of this License, and all the license notices in the Document, and any Warranty Disclaimers, provided that you also include the original English version of this License and the original versions of those notices and disclaimers. In case of a disagreement between the translation and the original version of this License or a notice or disclaimer, the original version will prevail.

If a section in the Document is Entitled "Acknowledgements", "Dedications", or "History", the requirement (section 4) to Preserve its Title (section 1) will typically require changing the actual title.

9. TERMINATION

You may not copy, modify, sublicense, or distribute the Document except as expressly provided for under this License. Any other attempt to copy, modify, sublicense or distribute the Document is void, and will automatically terminate your rights under this License. However, parties who have received copies, or rights, from you under this License will not have their licenses terminated so long as such parties remain in full compliance.

10. FUTURE REVISIONS OF THIS LICENSE

The Free Software Foundation may publish new, revised versions of the GNU Free Documentation License from time to time. Such new versions will be similar in spirit to the present version, but may differ in detail to address new problems or concerns. See <http://www.gnu.org/copyleft/>.

Each version of the License is given a distinguishing version number. If the Document specifies that a particular numbered version of this License "or any later version" applies to it, you have the option of following the terms and conditions either of that specified version or of any later version that has been published (not as a draft) by the Free Software Foundation. If the Document does not specify a version number of this License, you may choose any version ever published (not as a draft) by the Free Software Foundation.

ADDENDUM: How to use this License for your documents

Copyright (c) YEAR YOUR NAME.

Permission is granted to copy, distribute and/or modify this document under the terms of the GNU Free Documentation License, Version 1.2 or any later version published by the Free Software Foundation; with no Invariant Sections, no Front-Cover Texts, and no Back-Cover Texts.

A copy of the license is included in the section entitled "GNU Free Documentation License".