SUSE

Upgrading to SUSE Linux Enterprise Server for SAP applications 16

WHAT?

This article describes the upgrade to SUSE Linux Enterprise Server for SAP applications 16.0.

WHY?

Learn how to upgrade to SUSE Linux Enterprise Server for SAP applications 16.0.

EFFORT

15 minutes of reading. The time of the upgrade itself depends on the size of the installation, the speed of the system and your Internet connection.

GOAL

Learn how to upgrade a system from SLES for SAP 15 to 16.0.

REQUIREMENTS

- A system with SUSE Linux Enterprise Server for SAP applications 15 SP7. Upgrades from other SLES for SAP versions are not supported for SLES for SAP 16.0.

- The system must be registered in order to access the package repositories.

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1 Lifecycle and upgrade paths

SUSE Linux Enterprise Server for SAP applications (SLES for SAP) allows upgrading an existing system to a later version. No new installation is required. Existing data, such as home and data directories and system configuration, is kept intact. Whether it is better to upgrade or perform a fresh installation depends on your specific scenario.

1.1 Product lifecycle

SUSE Linux Enterprise Server 16 introduces a new naming scheme for versions, using minor releases like 16.0 and 16.1. Minor releases are scheduled annually and always in November. Each minor release has 24 months of general support, giving you 12 months overlap with the next minor release. The last minor release, 16.6, will have 48 months of general support to complete a 10-year lifecycle. SUSE Linux Enterprise Server for SAP applications includes additional Long Term Support (LTS) for 3 years for all minor releases, giving you a total of 5 years overlap with the next minor release.

1.2 Upgrading versus fresh installation

Upgrades between two major versions of SUSE Linux Enterprise Server for SAP applications are supported by SUSE. Whether it is better to upgrade or perform a fresh installation depends on your specific scenario. While upgrades involve less work, fresh installations ensure you benefit from all the new features of a release, such as disk layout changes, specific file system features, and other improvements. To get the most out of your system, SUSE therefore recommends fresh installations in most scenarios.

In both cases—an upgrade and a fresh installation—customers need to check if system settings and default values still fit their requirements.

1.3 Supported upgrade and migration paths to SLES for SAP 16.0

SUSE Linux Enterprise Server for SAP applications 16.0 only allows upgrades from SLES for SAP 15 SP7. More upgrade paths are planned for later versions.

2 Distribution migration system

The distribution migration system provides an upgrade path for an installed SUSE Linux Enterprise Server for SAP applications system from one major version to another, for example, from SLES for SAP 15 SP7 to SLES for SAP 16.0.

2.1 Concept

While previous versions of SUSE Linux Enterprise Server for SAP applications were upgraded from the Unified Installer, SLES for SAP 16 uses the distribution migration system. This upgrade is done via the network using the Zypper migration workflow, which sends a request to the repository server, asking for an upgrade path. Supported repository servers are the SUSE Customer Center (SCC) and the repository mirroring tool (RMT). The request response contains the list of repositories required to upgrade the system. This requires the system to be registered before the upgrade. Additionally, the server providing the updates must have the necessary channels available and those channels must be up to date. This requirement is automatically met when a system is registered to the SUSE Customer Center (SCC) or for "Pay as you go" instances in the public cloud that are automatically registered to the SUSE-operated update infrastructure of the public cloud provider. However, administrative work may be required when the system to be upgraded is connected to an RMT server.

Upgrading to a new major version requires the system to be offline. This downtime is necessary to avoid system inconsistencies that could put the system into a state that does not allow recovery. Therefore, a live migration image is used for the upgrade.

The distribution migration system provides the live image and a start-up utility, `run_migration`, which reboots the running system into the upgrade live image. Once booted into the upgrade live image, the following chain of services will be executed:

1. Detect the system to be upgraded

2. Mount the necessary file systems

3. Set up the network to match the network configuration of the system to be upgraded

4. Prepare SSH access to the upgrade live image

5. Prepare the package manager for the upgrade task

6. Upgrade the system using zypper

7. Update the boot loader configuration

8. Unmount all mounted file systems

9. Reboot

If an error occurs prior to the start of the upgrade, the system will be reverted to its original state.

3 Preparing the upgrade

Before starting the upgrade procedure, make sure your system is properly prepared. Among other things, preparation involves backing up data and checking the release notes.

Perform the following steps before starting the upgrade:

1. Make sure the latest system updates are installed by running `zypper patch`.

2. Read the release notes. Find the list of all changes, new features and known issues in the release notes (https://www.suse.com/releasenotes/) ↗.
   Consult the release notes to check whether the following applies:

   - Your hardware needs special considerations

   - Any currently used software packages have changed significantly

   - Your installation requires special precautions

3. Back up your data by copying the existing configuration files to a separate medium (such as a tape device or removable hard disk). This primarily applies to files stored in `/etc` and some directories and files in `/var` and `/opt`.

4. Check the available disk space. If you suspect you are running short of disk space, free up disk space or resize partitions.

5. If your machine serves as a VM Host Server for KVM, properly shut down all running VM Guests prior to the upgrade.

4 Customizing the upgrade process

The upgrade live image is preconfigured to run without any further setup. The following configuration options are completely optional. Change only what is necessary and only if you know what you are doing.

4.1 Optional configuration of the upgrade process

The migration system reads a custom configuration file from the system to be upgraded. The content of this file modifies the behavior of the upgrade process. Prior to the start of the upgrade process, create the following file if a change of the default behavior is needed:

```
> sudo  ssh INSTANCE_USER@IP_OF_INSTANCE touch /etc/sle-migration-service.yml'
```

The custom config file supports the following settings:

Control Zypper Installation Mode

If the upgrade process is used on systems that are not registered or for which the repository server has no upgrade path, it is required to switch off the use of the migration workflow.

```
use_zypper_migration: true|false
```

> **Note**
>
> The use of the migration workflow is the default behavior. If the migration workflow is not used, the setup of the repositories must be performed manually. Once done, the upgrade process uses `zypper dup` and expects all required repositories to be set up correctly.

Specify Migration Product

By default, the system will be migrated to SLES15 SP3. This default target can be changed through the `migration_product` setting. The product must be specified with the triplet `name/version/arch` found in `/etc/products.d/baseproduct` of the target product, for example:

```
migration_product: SLES/15.3/x86_64
```

✋ Warning

Changing the default product leads to unsupported territory and is not tested nor covered by the SUSE support offering. The specified product name must be supported by the repository server used for the migration. If the given product does not exist or the repository server cannot calculate an upgrade path, an error message from the repository server will be logged in the migration log file. Also see: Lifecycle and support (https://documentation.suse.com/sles/15-SP6/html/SLES-all/cha-upgrade-background.html) ↗ .

Preserve System Data

Preserve custom data files, such as udev rules, from the system being migrated and ensure they are applied in the upgraded system.

The `preserve` section has three subsections that govern file preservation and system actions:

- `static`: Files in this subsection are copied into the DMS directly, with no further processing.

- `rules`: If this subsection contains files, they are preserved, and the DMS reloads udev to make these rules effective.

- `sysctl`: Preserving these files triggers sysctl --system to apply the configuration changes.

```
preserve:
  rules:
    - /etc/udev/rules.d/a.rules
    - /etc/udev/rules.d/b.rules
  static:
    - /etc/sysconfig/proxy
    - /path/to/be/preserved/*.suffix
```

✎ Note

udev rules that require custom drivers will not have the desired effect as the migration system will not include these drivers and therefore execution of those rules will fail. Rules with such properties should not be listed.

✎ Note

The DMS provides a set of default preservable files that vary based on the target version and architecture. User-defined values will supplement this default list.

Enable Debug Mode

If enabled, it prevents the upgrade system from rewinding the setup steps and rebooting due to a failed upgrade, allowing the issue to be debugged.

```
debug: true|false
```

Configure Reboot Method

By default, the migration system uses `kexec` to boot back into the host system once migration is complete. If this is in any way problematic, a regular `reboot` can be requested by setting `soft_reboot: false`.

```
soft_reboot: true|false
```

Enable verbosity for zypper migration

If enabled, it will run the zypper migration plugin with increased verbosity.

```
verbose_migration: true|false
```

Enable the fix option for pre_checks

If enabled (default), the run_pre_checks systemd process will use the `--fix` option to automatically remediate applicable issues before the migration is started.

```
pre_checks_fix: true|false
```

Configure Make initrd Method

The live system may not contain all the tools required to create an initrd that meets the needs of the system being upgraded. Building a host-independent initrd will create an initrd that includes the tools and modules available on the system being upgraded. If needed, a host-independent initrd can be created by setting `build_host_independent_initrd: True`.

```
build_host_independent_initrd: true|false
```

Configure Dependency Solver Test Case Generation

It is possible that during the migration packages get installed that were not on the system previously and are pulled in because of dependencies. This setting will set up the migration so that a solver test case is generated. The information from the test case can then be used to understand why a given package was installed.

```
debug_solver: true|false
```

5 Performing the upgrade

This section describes the actual upgrade procedure with the distribution migration system.

5.1 Requirements

- The system must be registered with the SUSE Customer Center or an RMT server. "Pay as you go" instances in the public cloud are automatically registered to the SUSE-operated update infrastructure.

- The upgrade path must be supported. Currently, it is only possible to upgrade from SUSE Linux Enterprise Server for SAP applications 15 SP7 to 16.0. It is possible to configure other versions of SUSE Linux Enterprise Server for SAP applications as the migration target, but doing so is not a tested or supported use case.

- The server that provides the migration target must have the appropriate repositories synced, and they must be up to date. This requirement is automatically met by the SUSE Customer Center, and the SUSE-operated update infrastructure in the public cloud. If you are using an RMT server, make sure to mirror all relevant channels.

- The operating system needs to reside on a single partition. Support for multiple partitions, such as LVM, is limited to configurations where the separated partitions do not contain OS-critical data or processes. For example, a separate `/home` partition will function whereas a separate `/var` will not.

> 🔖 Note: SSH access during upgrade
>
> During the upgrade, it is only possible to log in via SSH key-based login. If your system is not configured for it, it is recommended that at least one of the users on the system has a `~/.ssh/authorized_keys` file with a private key accessible by the person executing the system upgrade.

5.2 Upgrading to SUSE Linux Enterprise Server for SAP applications16.0

The distribution migration process can be invoked using two different methods. One method is the **run_migration** included with the `SLES16-Migration` package. The second method to invoking the migration process is via reboot after installing the `suse-migration-sle16-activation` package.

Depending on your architecture, perform the following steps for your architecture to trigger the upgrade:

Use `reboot` on AMD64/Intel 64, AArch64, ppc64le

After installing the `suse-migration-sle16-activation` package, start the migration process by rebooting the system:

```
> sudo  zypper in suse-migration-sle16-activation
> sudo  reboot
```

The `suse-migration-sle16-activation` package installs `SLES16-Migration` as a dependency and modifies the bootloader configuration to boot into the upgrade image.

Use `run_migration` on s390x:

Modifying the boot loader configuration is not supported on s390x, so you start the migration directly with **`run_migration`**.

```
> sudo  zypper in SLES16-Migration
> sudo  run_migration
```

The **`run_migration`** utility uses **`Kexec`** and does not work in Xen-based environments. If **`Kexec`** causes a kernel panic, refer to this TID: https://www.suse.com/support/kb/doc/?id=000019733 and set the `soft_reboot` customization option.

6   Finishing the upgrade

After the upgrade, you need to perform some additional tasks. The following section guides you through these steps.

1. Use **`zypper packages`** to check for orphaned and unneeded packages.

    a. Orphaned packages are no longer available in any of the configured package repositories. They can no longer get updated and become unsupported.
    For a list of orphaned packages, run:

    ```
    > zypper packages --orphaned
    ```

    b. Unneeded packages are dependencies of packages that have been installed either explicitly by the user or implicitly as part of a pattern or product, and that have been removed in the meantime. They are usually no longer needed and should be removed, too.

For a list of unneeded packages, run:

```
> zypper packages --unneeded
```

💡 **Tip**

To avoid unneeded packages, use **zypper rm** with the `--clean-deps` option.

c. You can combine both lists into one:

```
> zypper packages --orphaned --unneeded
```

d. Use these lists to determine which packages are still needed and which can be safely removed.

✋ **Warning: Do not remove packages you need**

If packages are renamed or removed from a pattern or product, **zypper** may no longer consider them explicitly installed and mark them as unneeded, even though they are still crucial for your installation.

Carefully review the list of packages you are removing.

To remove all orphaned and unneeded packages with a single command, run:

```
> sudo zypper rm $(zypper --no-refresh packages --orphaned --unneeded | gawk
  '{print $5}' | tail -n +5)
```

Exclude a single package or pattern from being uninstalled:

```
> sudo zypper rm $(zypper --no-refresh packages --orphaned --unneeded | gawk
  '{print $5}' | tail -n +5 | grep -v PACKAGE_TO_EXCLUDE)
```

Exclude multiple packages defined in a text file, separated by a newline:

```
> sudo zypper rm $(zypper --no-refresh packages --orphaned --unneeded | gawk
  '{print $5}' | tail -n +5 | grep -v -f /PACKAGES/TO/KEEP.txt)
```

2. Check for any `*.rpmnew` and `*.rpmsave` files. When an upgrade includes changes to a default configuration file that has been altered after package installation, instead of overwriting the file, one of these file types is created. While `*.rpmnew` contains the new default configuration and leaves your altered file untouched, `*.rpmsave` is a copy of your altered configuration that has been replaced by the new default file.

   If you find any of these files, examine their content and merge desirable changes. You do not need to search the whole file system, only the `/etc` directory. Use the following command:

   ```
   > find /etc/ -name "*.rpmnew" -o -name "*.rpmsave"
   ```

7 For more information

For more information about the Distribution Migration System, refer to https://documentation.suse.com/suse-distribution-migration-system/15/html/distribution-migration-system/ ↗ .

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