SUSE Linux Enterprise 15 Migration
From SLE11 SP4 and SLE12 SP4 to SLE15

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Distinguished Engineer
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Overview

- General
- Important SUSE Linux Enterprise 15 Changes
- Supported Upgrade Scenarios
- Upgrade or Fresh Installation
- Upgrade Related
- Upgrade by Booting from Media
- Installation and Upgrade via Network
- AutoYaST
General
Customer Dreams

• Inplace Online Migration
• No interruption of running services

=> We are working on this!
• TUT1110 – Transactional Updates in SLE15 SP1
• Wednesday, 10:00 am, Fisk 1

• No reboot
• ...
SLE15 Is No SLE12 SP3.5

- New major release
- Binary incompatible
- Old cruft removed
- Chance to solve old mistakes
- No inherited burdens
- ...

But the changes between SLE12 SP3 and SLE15 are much smaller than between SLE11 SP3 and SLE12.
Important SLE 15 Changes
Media Changes

No media per product anymore, instead:

- One Installer DVD for all products
- SUSE Linux Enterprise Server 15
- SUSE Linux Enterprise Desktop 15
- SUSE Linux Enterprise Server for SAP Applications 15
- SUSE Linux Enterprise High Performance Computing 15
- Additional Packages DVD with most Modules and Extensions
- You need to know what you do
- User friendly is only with registration
- Will maybe get better with SLE15 SP1 or SLE15 SP2
Product Changes

- SDK was replaced with Development Tools Module
- “SLES Base System” was split in two
- SLE-Module-Basesystem
- Identical for all products, so only one certification needed
- SLE-Product-SLES Module
- Product-specific data
- SLE-Module-Server-Applications
- SLE-Module-Desktop-Applications
- Advanced System Management Module was dropped
- Packages were moved around: for example, tomcat is now in the Web & Scripting Module
We Use systemd!

- xinetd was dropped → systemd.socket(5)
- No LSB init scripts by default → systemd.service(5)
- *insserv-compat* still available for 3rd party init scripts
- cron → systemd.timer(5) (WiP)
- cron itself will stay on SLE 15, but already dropped from first products
- Locale settings removed from sysconfig → localectl(1)
- tmpfiles.d(5) → mainly to populate /var
- sysusers.d(5) → to create system accounts
- Only needed accounts are installed and created
Functionality

- `/etc/SuSE-release` was finally removed → `os-release(5)`
- `reiserfs` is no longer supported → see release notes
- **BIOS Raids** → fresh installation might be required, see release notes
- `cryptconfig` was removed → see release notes before upgrade!
- `SuSEfirewall2` was replaced by `firewalld`
- `pam_unix2` and `pam_pwcheck` were removed (still available in Legacy for migration)
- `pam-config` --update (but needs manual checking afterwards)
- `LSB` is dead → use correct RPM dependencies instead
- `SMT` → `RMT`
Changes for Snapshot and Rollback

- Strict separation from data and code
- /var only contains variable data
- /var no longer part of snapshots (own subvolume)
- RPM database was moved to /usr/lib/sysimage
- /var/adm/update-scripts is obsolete
- /var/adm/fillup-templates was moved to /usr/share/fillup-templates
- /srv should only contain customer data
Supported Upgrade Scenarios
Supported Versions

- SUSE Linux Enterprise 15
- SUSE Linux Enterprise 11 SP4
- SUSE Linux Enterprise 12 SP3/SP4

Updating SUSE Linux Enterprise 11 SP4 directly to version 15 is a very long-distance jump, possibly bringing all problems for each interim version update to the surface.

Update from SUSE Linux Enterprise 11 SP4 to SUSE Linux Enterprise 15 will combine all problems of updating from SUSE Linux Enterprise 11 SP4 to SUSE Linux Enterprise 12 SP3 and updating from SUSE Linux Enterprise 12 SP3 to SUSE Linux Enterprise 15, plus the new ones from updating SUSE Linux Enterprise 11 SP4 directly to SUSE Linux Enterprise 15.
Definitions

- Offline Migration
  - OS is not running
  - Machine is booted from DVD, USB-stick or network
  - Update stack is running from a RAM disk
  - Network may be available or not

- Online Migration
  - OS is running
  - Update stack is running from OS
  - Running system is updated
Supported Upgrade Scenarios

Offline Migration
• Boot from DVD, ISO image, USB stick, network (PXE,tftp)
• Either manual process or AutoYaST (autoupgrade=1)
• Either SLE-15-Packages DVD or SCC/SMT/RMT

Online Migration
• Not possible
Upgrade or Fresh Installation
Upgrade (1/2)

- No need to do new package selection
- Old stuff can stay (zypper packages --orphaned)
- Not maintained anymore
- No updates and security fixes
- But: old 3\textsuperscript{rd} party applications may continue to work
- Adjustment of configuration of 3\textsuperscript{rd} party packages
- SLE15 Modules – Which are needed for an upgrade?
- Functionality still supported? (e.g. Reiserfs!)
- Old, incompatible packages can be removed but still referenced in config files
Upgrade (2/2)

- Not all new features might be useable
- New /var layout for better snapshot and rollback
- Check for *.rpmnew and *.rpmsave config files
- Obsolete packages could still be the default
- openldap vs. 389-ds
- nss_ldap/pam_ldap vs. sssd
- ntpd vs. chrony
- ...
- Not all SLE11 packages can be directly updated to SLE15
- Updating RPMs takes longer than fresh installation
Fresh Installation

- All new features are usable
- Need to think about new disk layout
- Need to think about package selection
- No old stuff left
- Complete new installation of third-party software
- Migration of configuration files and data to new system
My Personal Recommendation

- If on SLES11 SP4:
  - Do a fresh installation
- If system was installed before SLES12 SP2:
  - Do a fresh installation
- If system was installed with SLES12 SP2 or later:
  - Do an upgrade
Upgrade Related
Upgrade Preparation

• Check the release notes
  – https://www.suse.com/releasenotes/x86_64/SUSE-SLES/15/
• Check to see if all partitions are still big enough
  – Software tends to grow from version to version
• Btrfs with snapshots enabled will store old system in a snapshot
  – Advantage: allows an easy rollback to the old system
• Make a backup
• On LDAP clients: migrate from pam_ldap to sssd
Upgrade Workflow

• Similar to Service-Pack Migration with YaST2 on SLE12
• Comfortable with registered systems against SCC/SMT
• Doable with Packages DVD
• In case without network
• Via local install server
During the Upgrade

• Enable all Modules
• Packages you used on SLE12 could now be in a different module

• The following modules will be needed at least for SLES:
  • SLE-Product-SLES15
  • SLE-Module-Basesystem15
  • (SLE-Module-Containers15)
  • SLE-Module-Desktop-Applications15
  • SLE-Module-Legacy15
  • SLE-Module-Server-Applications15
  • SLE-Module-Web-Scripting15
Upgrade by Booting from Media
With SCC, SMT or RMT
Upgrade by Booting from Media

- Select “Upgrade” in the DVD-Boot menu
- Select keyboard layout for upgrade (not used after upgrade!)
- Select installed system for upgrade
- Accept EULA
- Re-enable 3rd party repositories you still need
- **No manual selection of Extensions or Modules possible!**
- Check for conflicts
- Start upgrade

- Remove Modules not needed: SUSEConnect -d -p <Module>
<table>
<thead>
<tr>
<th>Language</th>
<th>Keyboard Layout</th>
</tr>
</thead>
<tbody>
<tr>
<td>English (US)</td>
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</tr>
</tbody>
</table>

Keyboard Test
Select for Update

Partition or System to Update:

<table>
<thead>
<tr>
<th>System</th>
<th>Partition</th>
<th>Architecture</th>
<th>File System</th>
<th>Label</th>
</tr>
</thead>
<tbody>
<tr>
<td>SUSE Linux Enterprise Server 12 SP4</td>
<td>/dev/xda3</td>
<td>x86_64</td>
<td>Linux (btrfs)</td>
<td></td>
</tr>
</tbody>
</table>

Show All Partitions
SUSE Linux Enterprise Server 15 License Agreement

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[ ] I Agree to the License Terms.
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<td>SLE-Module-Containers12-Debuginfo-Pool</td>
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Possible Migration Targets
- Base system Module 15 x86_64 will be installed.
- Containers module will be upgraded to Containers Module 15 x86_64.
- Desktop Applications Module 15 x86_64 will be installed.
- Server Applications Module 15 x86_64 will be installed.
- SUSE Cloud Application Platform Tools Module 15 x86_64 will be installed.
- SUSE Linux Enterprise Software Development Kit 12 SP3 will be upgraded to Development Tools Module 15 x86_64.
- Legacy Module 15 x86_64 will be installed.
- Public Cloud Module 15 x86_64 will be installed.
- Web and Scripting Module 15 x86_64 will be installed.
- SUSE Linux Enterprise Server 12 SP1 will be upgraded to SUSE Linux Enterprise Server 15 x86_64.
- Toolchain Module will be upgraded to Development Tools Module 15 x86_64.

Select the Migration Target

Migration Summary

- Base system Module 15 x86_64 will be installed.
- Containers module will be upgraded to Containers Module 15 x86_64.
- Desktop Applications Module 15 x86_64 will be installed.
- Server Applications Module 15 x86_64 will be installed.
- SUSE Cloud Application Platform Tools Module 15 x86_64 will be installed.
- SUSE Linux Enterprise Software Development Kit 12 SP3 will be upgraded to Development Tools Module 15 x86_64.
- Legacy Module 15 x86_64 will be installed.
- Public Cloud Module 15 x86_64 will be installed.
- Web and Scripting Module 15 x86_64 will be installed.
Refreshing Repository...

- Refresh Metadata
- Rebuild Cache

Contacting the Registration Server
Updating to Base system Module 16 x86_64 ...

Downloading: https://updates.suse.com/...

Refreshing Repository...
The registration server offers update repositories.
Would you like to enable these repositories during upgrade in order to receive the latest updates?

Yes  No
Add On Product

- I would like to install an additional Add On Product
  - Scan Using SLP...
  - Specify URL...
  - FTP...
  - HTTP...
  - HTTPS...
  - SMB/CIFS
  - NFS...
  - IP...
  - DVD...
  - Hard Disk...
  - USB Mass Storage (USB Stick, Disk)...
  - Local Directory...
  - Local ISO Image...

- Download repository description files
Installation Settings

Click a headline to make changes.

System
- System and Hardware Settings

Update Options
- New product Desktop Applications Module will be installed
- New product Basesystem Module will be installed
- Product Toolchain Module will be updated to Development Tools Module
- Product SUSE Linux Enterprise Software Development Kit 12 SP3 will be updated to Development Tools Module RC1
- Product Containers module will be updated to Containers Module
- Product SUSE Linux Enterprise Server 12 SP3 will be updated to SUSE Linux Enterprise Server 15

Add-On Products
- No add-on product selected for installation

Packages
- Packages to Update: 1385
- New Packages to Install: 400
- Packages to Remove: 99
- Total Size of Packages to Update: 2.9 GB

Backup
- Create Backup of Modified Files
- Create Backup of /etc/sysconfig Directory

Language
- Primary Language: English (US)

Keyboard Layout
- English (US)

Boot Config
-
### Performing Upgrade

#### Details

<table>
<thead>
<tr>
<th>Media</th>
<th>Remaining</th>
<th>Packages</th>
<th>Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total</td>
<td>2.705 GB</td>
<td>1747</td>
<td></td>
</tr>
<tr>
<td>SLE-Module Basesystem15-Pool</td>
<td>1.185 GB</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SLE-Module Containers15-Pool</td>
<td>1.185 GB</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SLE-Module Desktop-Applications15-Pool</td>
<td>2.00 KB</td>
<td></td>
<td></td>
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<tr>
<td>SLE-Module-DevTools15-Pool</td>
<td>492.76 MB</td>
<td></td>
<td>421</td>
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<tr>
<td>SLE-Module-Legacy15-Pool</td>
<td>34.28 MB</td>
<td></td>
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<tr>
<td>SLE-Module-Legacy15-Pool</td>
<td>20.03 MB</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

#### Actions performed:

- Downloading `libosds-data` (download size 1.24 MB)
- Installing `libosds-data` (installed size 6.76 MB)
- Downloading `metatheme-azwaita-common` (download size 52.9 KB)
- Installing `metatheme-azwaita-common` (installed size 51.9 KB)
- Downloading `mm-data` (download size 42.9 KB)
- Installing `mm-data` (installed size 3 KB)
- Downloading `xcursor-themes` (download size 34.9 KB)
- Installing `xcursor-themes` (installed size 3.47 MB)
- Downloading `gnome-menu-branding-SLE-12-1.7-noarch.rpm` (installed size 34.8 KB)
- Installing `gnome-menu-branding-SLE-12-1.7-noarch.rpm` (installed size 40.05 MB)
- Installing `gnome-user-docs-lang` (installed size 10.95 MB)
- Installing `gnome-user-docs-lang` (installed size 40.05 MB)

#### Installing Packages...

- Remaining: 2.705 GB, 1747 packages
- Progress: 15%

### SLES15 Release Notes

- [Abort](#)
- [Back](#)
- [Next](#)
With Packages DVD
Upgrade by Using Packages DVD (unregistered)

- Select “Upgrade” in the DVD-Boot menu
- Select keyboard layout for upgrade (not used after upgrade!)
- Select installed system for upgrade
- Accept EULA
- Re-enable 3rd party repositories you still need
- Insert Packages DVD
- Manual selection of Extensions or Modules required!
- Check for conflicts
- Start upgrade
Previously Used Repositories

These repositories were found on the system you are upgrading:

<table>
<thead>
<tr>
<th>Current Status</th>
<th>Repository</th>
<th>URL</th>
</tr>
</thead>
<tbody>
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<td>SLE-Module-Legacy15-Debuginfo-Pool</td>
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</tr>
<tr>
<td></td>
<td>SLE-Module-Legacy15-Updates</td>
<td><a href="https://updates.suse.com/SUSE/Updates/">https://updates.suse.com/SUSE/Updates/</a></td>
</tr>
</tbody>
</table>

Media Based Upgrade

The media based upgrade is requested. In this mode YaST will not contact the registration server to obtain the new software repositories required for migration.

Please add the installation media manually in the next step.

Warning!

The media based upgrade for registered systems is not supported!

If you upgrade the system using media the registration status will not be updated and the system will be still registered using the previous product. The packages from the registration repositories can conflict with the new packages.
Add On Product

- Scan Using SLP...
- Specify URL...
- FTP
- HTTP...
- HTTPS...
- SMB/CIFS
- NFS...
- CD...
- DVD...
- Hard Disk...
- USB Mass Storage (USB Stick, Disk)...
- Local Directory...
- Local ISO Image...

- Download repository description files
Available Extensions and Modules

- Base system Module 15.0
- Containers Module 15.0
- Desktop Applications Module 15.0
- Development Tools Module 15.0
- HPC Module 15.0
- Legacy Module 15.0
- Live Patching 15.0
- Public Cloud Module 15.0
- SAP Applications Module 15.0
- SLE 15 HPC 15.0
- SLE 15 SAP 15.0
- SLED 15 15.0
- SLE HA 15 15.0
- SLES 15 15.0
- SLE WE 15 15.0
- Server Applications Module 15.0
- Web Scripting Module 15.0

The dependencies between products are not handled automatically. The dependent modules or extensions must be selected manually.
Dependencies of Modules

• Dependency check is not done during selection
• Dependency check is done in the final overview screen
• Modules can still be added or removed from the overview screen
## Add-On Product Installation

<table>
<thead>
<tr>
<th>Product</th>
<th>Media</th>
</tr>
</thead>
<tbody>
<tr>
<td>sle-module-basesystem</td>
<td>dvd:///dev/sr0, Directory /Module-Basesystem</td>
</tr>
<tr>
<td>sle-module-containers</td>
<td>dvd:///dev/sr0, Directory /Module-Containers</td>
</tr>
<tr>
<td>sle-module-desktop-applications</td>
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<tr>
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<td>dvd:///dev/sr0, Directory /Module-Development Tools</td>
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<tr>
<td>sle-module-web-scripting</td>
<td>dvd:///dev/sr0, Directory /Module-Web-Scripting</td>
</tr>
<tr>
<td>SLES</td>
<td>dvd:///dev/sr0, Directory /Product-SLES</td>
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Click a headline to make changes.

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- System and Hardware Settings

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- Create Backup of /etc/skelconfig Directory

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Keyboard Layout
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Booter
Installation and Upgrade via Network
tftpboot installer RPM

The installer is also provided as RPM

Install tftpboot installer RPM:


A bootable USB stick can be created from this with `mksusecd`
addon= Option

The addon= Option can point to a directory including several Modules and/or products containing a media.1/products file:
  • YaST will show the Module Selection Dialog

The addon= Option can point directly to Products, Modules and Extensions:
  • YaST will directly add the Repository

If the system will be registered during installation or was registered before upgrade, no addon= Option is needed for standard SLE Modules and Extensions.
PXE/tftpboot with Install Server

append initrd=SLE-15-x86_64/boot/x86_64/loader/initrd
instsys=tftp://TFTP_SERVER/SLE-15-x86_64/boot/x86_64/root
install=REPO_URL
addon=PACKAGES_DVD_URL
[upgrade=1]

Or

addon=MODULE1_URL,MODULE2_URL,MODULE3_URL
–URL can be everything linuxrc supports (https://en.opensuse.org/SDB:Linuxrc)
PXE/tftpboot with RMT or SMT Server

Use following append line:

```
append initrd=SLE-15-<arch>/boot/<arch>/loader/initrd


install=http://<SMT-SERVER>/repo/SUSE/Products/SLE-Product-SLES/15/<arch>/product/

[addon=http://<SMT-SERVER>/repo/SUSE/Products/SLE-Module-Basesystem/15/<arch>/product/]

[upgrade=1]
```
AutoYaST
AutoYaST Profile Changes

- Explicitly select the product you want to install from Installer-DVD

```xml
<software>
  <products config:type="list">
    <product>SLES</product>
  </products>
</software>
```

- Changes for firewall → firewalld instead of SuSEFirwall2
- Changes for NTP Configuration → chrony instead of ntpd
- New Storage (libstorage-ng)
AutoYaST Profile Changes

• Using the Packages DVD

```
<add-on>
  <add_on_products config:type="list">
    <listentry>
      <media_url><![CDATA[dvd:///]]></media_url>
      <product>sle-module-basesystem</product>
      <product_dir>/Module-Basesystem</product_dir>
    </listentry>
  </add_on_products>
</add-on>
```

• For NFS, FTP, HTTP, ... change the `media_url` tag accordingly
AutoYaST Profile Changes

- AutoYaST automatically reorders Modules/Extensions according to their dependencies during registration.
- Depending Modules/Extensions will be automatically added.
- But only if a registration key is given or not needed.

- You can find more at: https://github.com/yast/yast-autoinstallation/blob/master/doc/profile_changes_SLE15.md
Upgrade with AutoYaST

- AutoYaST profile has the same format as for installations
- Parts such as “partitioning” don’t make sense
- “Upgrade” section
- Old ‘only_installed_packages’ option was removed
- ‘stop_on_solver_conflict’
- “Software” section
- Block RPMs you don’t want
- Backup before update
- Back up only sysconfig and modified config files
Questions?

Thank you.