Forward Looking Content

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FUT 1434
SUSE Linux Enterprise 15+
The future of OS
SUSE Software-Defined Infrastructure

**Application Delivery**
- Container Management: SUSE CaaS Platform
- Platform as a Service: SUSE Cloud Application Platform

**Software-Defined Infrastructure**
- Private Cloud / IaaS: SUSE OpenStack Cloud
  - Compute: Virtual Machine & Container
  - Storage: SUSE Enterprise Storage
  - Networking: SDN and NFV

**Operating System**
- SUSE Linux Enterprise Server

**Physical Infrastructure:** Server, Switches, Storage

- Infrastructure & Lifecycle Management: SUSE Manager
- SUSE OpenStack Cloud Monitoring

- Public Cloud: SUSE Cloud Service Provider Program
SUSE Linux Enterprise
SUSE Linux Enterprise

SUSE Linux Enterprise Server is a world-class, secure open source server operating system, built to power physical, virtual and cloud-based mission-critical workloads.

It helps organizations to accelerate innovation, enhance system reliability, meet tough security requirements and adapt to new technologies.

Increase up-time  Improve operational efficiency  Accelerate innovation
Roadmap

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<td>LTSS</td>
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<td>SP3</td>
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<tr>
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<td></td>
<td>GA</td>
<td>SP1</td>
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</tbody>
</table>
Lifecycle – SUSE Linux Enterprise 15

- 13 years total lifecycle
- Updates to next service pack (n+1) and skip-a-service-pack (n+2)
- Service Pack Overlap Support: 6 months
- Long Term Service Pack Support: up to 3 years after generic end of support
- SP6 under evaluation at time of SP5 decision
SUSE Linux Enterprise – release cycle

**Tick – Tock**
- SUSE is following a Tick-Tock approach for releases.

**Tick – odd versions**
- Bugfixes and maintenance updates
- Improvements for existing features
- Feature parity with recent SUSE Linux Enterprise 12
- Selected features

**Tock – even versions**
- All from Tick-Release
- Kernel version bump
- Stack upgrade
IT Transformation and Evolution of the Operating System
## IT Transformation

<table>
<thead>
<tr>
<th>IT Infrastructure</th>
<th>Mode 1</th>
<th>Mode 2</th>
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<tbody>
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<td>Datacenter</td>
<td>Hosted / Managed</td>
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<td>Application Architecture</td>
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<tr>
<td>Development Process</td>
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<tr>
<td>Agile</td>
<td>DevOps</td>
<td></td>
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</tbody>
</table>
Evolution of the Operating System

Past
Monolithic

SUSE Linux Enterprise Server

Modular

Containers
Live Patch
HA GEO
Real Time

SUSE Linux Enterprise Server

Future – Multimodal
Modular+

SAP System
HA
SAP Soln
Unified Installer
Server

Dev System

MicroOS

SUSE CaaS Platform

Live Patch
Unified Installer
Server

Web/Script

Public Cloud
# Multimodal OS Requirements

<table>
<thead>
<tr>
<th>Traditional Infrastructure</th>
<th>Software-Defined Infrastructure</th>
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</thead>
<tbody>
<tr>
<td>Multiple use cases</td>
<td>Single use case, Multiple Systems</td>
</tr>
<tr>
<td>Manual and automatic installation</td>
<td>Automatic and Centralized installation</td>
</tr>
<tr>
<td>Variety of updates, upgrades, legacy</td>
<td>Always up-to-date</td>
</tr>
<tr>
<td>Variable packaging and installation</td>
<td>Fit one purpose</td>
</tr>
<tr>
<td>May become huge in size and management</td>
<td>Small as possible for size and management</td>
</tr>
</tbody>
</table>
Accelerate Transformation with a Multimodal IT Infrastructure

• Tuesday, April 02, 05:45 PM - 06:45 PM
• Thursday, April 04, 03:15 PM - 04:15 PM
SUSE Linux Enterprise 15
Designed for IT Transformation & Multimodal

Traditional Infrastructure

Software-Defined Infrastructure
SUSE Linux Enterprise 15

Products
- Unified Installer

Modules
- Live Patching
- SAP Integration
- High Availability
- Geo
- Database
- Languages
- Real Time
- Workstation
- Compiler
- Web
- HPC
- Public Cloud

Containers
- Workload
- Workload
- Workload
- Workload
- Workload
- Software-Defined Infrastructure (SDI)

Common Code Base
All Architectures
SUSE Linux Enterprise 15 – Portfolio

Server and Desktop

- SUSE Linux Enterprise Server for x86-64, z Systems, LinuxOne, IBM Power, ARM64
- SUSE Linux Enterprise Server for SAP Applications
- SUSE Linux Enterprise Server for High Performance Computing
- SUSE Linux Enterprise Desktop
- SUSE Linux Enterprise Real Time
- SUSE Linux Enterprise Server with Expanded Support
- SUSE Linux Enterprise Point of Service

Server Extensions

- SUSE Linux Enterprise High Availability & GEO Clustering
- SUSE Linux Enterprise Live Patching
- SUSE Linux Enterprise Workstation Extension
- Long Term Service Pack Support
- SUSE Linux Enterprise Virtual Machine Driver Pack

Cloud, Storage and Management

- SUSE OpenStack Cloud
- SUSE Enterprise Storage
- SUSE CaaS Platform
- SUSE Manager
- SUSE Manager Management Pack for Microsoft System Center Operations Manager
- SUSE Studio

SUSE Linux Enterprise

New with Service Pack 1
Deliverables with SLE 15+

**Mediums/Channels**
- Unified Installer
- Off-line installation medium
- On-line installation & update channels
- JeOS
- Containers
- Windows Subsystem for Linux (WSL)
- Quarterly Update

**Architectures**
- X86-64
- Power LE
- System z
- ARM64

**Target scenarios**
- Physical
- Virtual host
- Virtual guest
- Container
- Public cloud
  - Amazon EC2
  - Microsoft Azure
  - Google Cloud
  - Oracle Cloud Infrastructure
  - Alibaba Cloud
SUSE Linux Enterprise 15 – Themes

Multimode – address traditional & software defined infrastructure
  Provide a common code base for traditional and agile data center.

Ease of use – hassle-free use of modules & extensions
  Easily search, install, and use packages across the SUSE universe.

Unified Installer
  Install all SUSE Linux Enterprise 15 products starting from a single medium.

Community to Enterprise
  Migrate openSUSE Leap in place to SUSE Linux Enterprise SP1
  • Quarterly Updates: regular re-spin of Unified Installer and Packages Media
  • Transactional Update: role for transactional operating system
SUSE Linux Enterprise 15
Details
SUSE Linux Enterprise 15
Modular+
Modules evolution from 12 to 15

SUSE Linux Enterprise 11&12
- One image for each product
- Some modules on top
- “Software Development Kit” (SDK) on top

SUSE Linux Enterprise 15
- Single installation image for all products
- “everything is a module”
- SDK integrated
Modules and Products

Product (consists of modules)

Module

SLE HA
- High Availability

SLE Server
- Server Apps
- Legacy

Common Code Base Modules
- Base System
- Desktop Apps

SLE Desktop
- Workstation

Pool of Modules
- Container
- Python
- Public Cloud
- ...
Flexible Modular System

- Basesystem (all products)
- Server application (SLES)
- Desktop Applications (SLES / SLED)
- Workstation extension (SLED / WE)
- Containers (SLES)
- Development tools (all products)
- SAP Applications (SLES for SAP)
- Legacy (SLES)
- Web Scripting (SLES)
- Public Cloud (SLES)
- Package Hub (SLES / SLED)
- HPC (SLE HPC)
- SP1
  - Python2 (SLES / SLED)
  - Transactional Server (SLES Technology Preview)
  - Realtime (SLE RT)
  - SUSE Manager

Not all modules are available on all products
Package Hub – Enterprise meets Community

- Community packages for SUSE Linux Enterprise
- Enterprise customers to take part of Community innovation
- Ease access with standard SUSE Linux Enterprise tools
Package Hub – Enterprise meets Community

Package Hub 12 vs 15

SLE 15 + Package Hub ~ LEAP

Based on x86_64 package data
SUSE Linux Enterprise 15
Ease of Use
Ease of use – **zypper search-packages**

**Search the SUSE Universe**
- Search packages across all modules, including not enabled modules
- Avoid missed-but-available features
- Leverages SUSE Customer Center search engine

**Visible**
- Shows needed module and subscription requirements

**15 SP1**
- Integrated into **zypper search**
Search Packages Example

**Search**
zypper search-packages chromium →
chromium SUSE Package Hub (PackageHub/15/x86_64)

**Activate**
SUSEConnect -product PackageHub/15/x86_64

**Install**
zypper in chromium

**SP1**
zypper search-packages can be triggered directly from zypper search
SUSE Linux Enterprise 15
Unified Installer & Update
Unified Installer – Overview

**Unified Installer**
- Install all SUSE Linux Enterprise 15 products from a single medium
- Leverages SUSE on-line, disconnected, off-line, or hybrid setup
- Includes SLES, SLES for SAP, SLED, SLE HPC, SLE LP, SLE HA
- SP1: includes SUSE manager, Point of Service products, SLE RT

**Packages Media**
- For use in off-line or hybrid setup
- Additional media with all packages/modules for all products
Unified Installer – Installation Scenarios

On-line
- Boot the Unified Installer
- Use SUSE Customer Center: directly, RMT/SMT, SUSE Manager
- **NO Packages media needed**

Disconnected
- Boot the Unified Installer
- Use two RMT/SMT or SUSE Manager with air-gap
- **NO Packages media needed**

Off-line
- Boot the Unified Installer
- Use the Packages Media local on the system to be installed

Hybrid
- Boot the Unified Installer
- Use local on-line resource pre-loaded with Packages media

Image based
- Unified Installer medium + on-line / disconnected Repositories → silver image
- JeOS images + on-line / disconnected Repositories
- Build Service + Kiwi
Install Workflow – on-line

Start Unified Installer
The Unified Installer is the same for all SUSE Linux Enterprise 15 products

Select the product to install
The Unified Installer allows to select product and applicable extension

Register
Register a system for production or evaluation

Run product installation
The Unified Installer installs the product using the designed product workflow
SUSE Linux Enterprise 15 Update
Update Types

On-line Update
• The update runs on the current up and running system
• Limited to non-intrusive changes
  → Designed for **minor** version updates (i.e. 15 GA → 15 Service Pack 1)

Off-line Update
• The update runs of a booted update-system
• The to-be-updated system's file systems are mounted
• Intrusive changes are possible
  → Designed for **major** version updates (i.e. 12 → 15 GA / 15 Service Pack 1)

Transactional Update
• The update is applied into a new snapshot, the running system is not touched
• The updated snapshot is activated by reboot
• Intrusive changes are possible
  → Designed for maintenance updates, **minor** & **major** version updates
Transaction Update (Tech Preview)

Consistent root filesystem
- Atomic RPM updates
- Reboot activates updates
- Automatic rollback available

Btrfs
- Read-only root filesystem
- Use btrfs snapshots (read-only and read-write) and snapper
- System configuration is handled with overlayfs

Availability
- Starting with SLES 15-SP1
- Dedicated module and system role
- Feedback welcome
Update Paths – Route to 15+

SUSE Linux Enterprise 12 SP4 → 15 GA/SP1
- Boot Unified Installer (Off-line update)

SUSE Linux Enterprise 11 SP4 → 15 GA/SP1
- Boot Unified Installer (Off-line update)
- Major changes require manual interaction
- SUSE recommendation: full installation of 15 GA/SP1

SUSE Linux Enterprise 15 GA → 15 SP1
- Run update from installed system (On-line update)
- Boot Unified Installer (Off-line update)
Major Changes
NVDIMM technology is used for Persistent Memory (non-volatile).

Intel Optane DC Persistent Memory support
  • A joint effort with SAP and Intel
  • Builds on top of features already in SLES since 12 SP3

HPE’s Persistent Scalable Memory offering for ProLiant Gen10 servers also are supported for Microsoft SQL Server 2017 for Linux SQL Server
NVDIMM impact – SAP recovery

Faster SAP HANA database reboot

• Replace RAM with Intel Optane® DC persistent memory for SAP HANA databases*

• Avoid the wait time to reload data from storage into memory after system restarts

Only SUSE supports this!

Faster start times for less downtime

| Traditional System (with SSD storage) | 50 min |
| Persistent Memory | 4 min | 12.5x improvement |

Increased memory capacity while reducing TCO

Memory capacity per CPU

> 3 TB

Source:
Blog by Andreas Schuster, Product Manager – SAP HANA Platform

* SAP Note 2618154
SUSE Linux Enterprise 15 – openJDK

OpenJDK 1.8
• Supported till Oct 2027

Long Term Support Version openJDK 11
• Starting with SUSE Linux Enterprise 15 SP1
• Supported till 1 HY/2025

N+1 Long Term Support Version openJDK 17
• Starting with SUSE Linux Enterprise 15 SP4 (1 HY/2022)
• Supported till end of SUSE Linux Enterprise 15 (end of general support Jul 2028)

N+2 Long Term Support Version openJDK 23
• Runtime available as update for SUSE Linux Enterprise 15 SP5 (1 HY/2026)
• Supported till end of SUSE Linux Enterprise 15 (end of general support Jul 2028)

Future Looking statement. Subject to change.
Based on announced upstream project schedule
Tool Chain

- **Kernel 4.12**

- **GCC 7 as system compiler**
  - Will stay the same during SLE 15 lifetime
  - Yearly updates will be provided on top

- **OpenSSL**
  - 1.1.x as default
  - 1.0.x available in Legacy for a grace period
Major Changes

• Major update on scripting languages
  • Ruby 2.5
  • PHP7
  • Perl 5.24
  • Python 3.6
    Python 2 will be in dedicated Module starting with 15 SP1
• GNOME 3.26
• HA
  • Hawk2 UI improvements
  • DRBD multi-node three-way replication
  • cluster-raid 10 (as Technical Preview)
New Applications

- **389-DS**
  - OpenLdap libraries still available
- **Chrony**
  - ntpd will be in Legacy for a grace period
- **Firewalld**
  - Will replace SUSEFirewall2
- **Wayland**
  - Default on SLED
  - Not for all platforms available
Btrfs layout simplified

/var as single subvolume
- No more 10 subvolumes under /var
- Simplified rollback and more consistent snapshots
- Available in new installation only

Each home-directory as subvolume
- Starting with SLES 15SP1
- Only when specified and when using btrfs for /home
15 SP1: Quarterly Updates

Checkpointing – New Installs
Setup new systems with a recent, up-to-date, well known state.

Checkpointing – Existing Installs
Update systems to a well known state.

Merge of released updates
No new features

Silver-Image provided by SUSE
Fine granular staging by SUSE Manager
15 SP1: Easy Performance

Bcache
- Part of SLES since 12 SP1
- Use SSD as cache for volumes

Easy setup
- Installer support
- YaST partitioner
- Also available through AutoYaST
SUSE Linux Enterprise 15+

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