

# SUSE<sup>®</sup> Linux Enterprise Server 12

Virtualization Technologies

# Guide

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**Product Guide**

Server

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# SUSE® Linux Enterprise Server 12 Virtualization Technologies

**Introduction: Included with SUSE® Linux Enterprise Server 12 are the latest open-source virtualization technologies, Xen and KVM. With these hypervisors SUSE Linux Enterprise Server can be used to provision, de-provision, install, monitor and manage multiple virtual machines (VM guests) on a single physical system.**

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SUSE Linux Enterprise Server also has supported Linux Containers (libvirt-lxc), the underlying OS-level virtualization technology, since 2012. Moreover, Docker, a popular open source technology that automates the deployment of applications inside software containers, is included in SUSE Linux Enterprise Server 12. It's also possible to subscribe to SUSE Linux Enterprise Virtual Machine Driver Pack, a bundle of paravirtualized disk, network and balloon drivers that allows customers to run fully virtualized Windows workloads on SUSE Linux Enterprise Server with near-native performance.

This guide briefly introduces the technologies that are included in SUSE Linux Enterprise Server 12 and provides guidelines for migrating from early versions.

## Virtualization in SUSE Linux Enterprise Server 12

SUSE Linux Enterprise is an enterprise-class Linux server operating system that offers two types of hypervisors: Xen and KVM. Both hypervisors support virtualization on 64-bit, x86-based

hardware architectures and support full virtualization mode. In addition, Xen supports paravirtualized mode, an efficient and lightweight virtualization technique. SUSE Linux Enterprise with Xen or KVM acts as a virtualization host server (VHS) that supports virtual machine (VM) guests with its own guest operating systems. The SUSE VM guest architecture consists of a hypervisor and management components that constitute the VHS, which runs many application-hosting VM guests.

The libvirt framework is the recommended way of managing VM guests. Interoperability between libvirt and libvirt-based applications such as virt-install is an essential part of the SUSE support stance.

SUSE Linux Enterprise Server 12 includes the following highlighted updates:

- *Xen is upgraded to version 4.4 with the new libxl toolstack.*
- *Qemu is upgraded to version 2.0, which provides vfio and better network performance.*

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- *Libvirt is upgraded to version 1.2.5 with sanitized logs, better DHCP support and a virtualization sandbox.*
  - *Management has been unified using the libvirt framework (libvirt-LXC, Xen, KVM).*
  - *libguestfs, a set of tools for accessing and modifying virtual machine (VM) disk images, is now supported.*
  - *virt-v2v, a tool for converting guests from a foreign hypervisor to run on KVM, is also supported.*
  - *The new libxl is now, for the first time, the default Xen tool stack (with full documentation explaining the change).*
  - *Virtual Machine Driver Pack 2.2 now supports the new Microsoft Windows Server 2012R2, and Windows 8.1 supports migration, i.e., moving a guest from Xen to KVM, and has a Windows guest agent for better host-to-guest communication.*

SUSE Linux Enterprise Server 12 been optimized to function as a performance-tuned guest OS on other third-party hypervisors, such as VMware ESX and Microsoft Hyper-V. Also, SUSE has partnered with Microsoft to develop a shim (or hypercall adapter) that translates Xen-specific calls from the paravirtualized SUSE Linux Enterprise Server kernel into Hyper-V compatible calls. This allows SUSE Linux Enterprise Server 12 to run as a paravirtualized guest. SUSE Linux Enterprise Server 12 in various forms is a supported guest OS on leading host platforms with YES Certification assurances.

## Virtualization Upgrade Paths

### SUSE Linux Enterprise Server 11 SP3 to SUSE Linux Enterprise Server 12

There are two supported migration scenarios from SUSE Linux Enterprise Server 11 SP3 to SUSE Linux Enterprise Server 12. You should use one of the following methods:

- *Booting from an installation medium (ISO image)*
- *Automated migration*

All virtualization host servers (VHSs) running SUSE Linux Enterprise Server 11 SP3 should first be upgraded to SUSE Linux

Enterprise Server 12. Upgrading VMs to SUSE Linux Enterprise Server 12 is possible after upgrading the host server. The upgrade is backward compatible: SUSE Linux Enterprise Server 11 SP3 VMs can run on SUSE Linux Enterprise Server 12.

For more information, see the guide that comes with SUSE Linux Enterprise at: [www.suse.com/documentation/sles-12/singlehtml/book\\_virt/book\\_virt.html](http://www.suse.com/documentation/sles-12/singlehtml/book_virt/book_virt.html)

### Xen Upgrade Path

SUSE Linux Enterprise Server 12 provides a suitable opportunity to move to the new libxl toolstack and remove the deprecated, unmaintained xend stack. Before doing any upgrade of the Xen host, you should carefully read the dedicated Appendix XM, XL Toolstacks and Libvirt framework available in the Virtualization Guide to be aware of all impacts of this upgrade at: [www.suse.com/documentation/sles-12/book\\_virt/data/cha\\_xmtox1.html](http://www.suse.com/documentation/sles-12/book_virt/data/cha_xmtox1.html)

### KVM/Qemu Upgrade Path

To upgrade a SUSE Linux Enterprise Server 11 SP3 KVM host to SUSE Linux Enterprise Server 12 no manual intervention is required. To avoid any downtime you can now do a live migration from a SUSE Linux Enterprise Server 11 SP3 host to a SUSE Linux Enterprise Server 12 host. Before performing a live migration it's recommended to read and follow the recommendations and requirements available in the official documentation at: [www.suse.com/documentation/sles-12/book\\_virt/data/sec\\_libvirt\\_admin\\_migrate.html#\\_blank](http://www.suse.com/documentation/sles-12/book_virt/data/sec_libvirt_admin_migrate.html#_blank)

### Virtual Machine Driver Pack (VMDP)

All VMs running Windows 2008 or later must be updated with VMDP 2.0 or later before being deployed on SUSE Linux Enterprise Server 12 Xen or KVM. Without the update, Windows VMs will revert to using emulated devices instead of the paravirtualized drivers provided by VMDP. For more information about VMDP please refer to the official documentation and, in particular, the Upgrade section, at: [www.suse.com/documentation/sle-vmdp-22/singlehtml/vmdp-install/vmdp-install.html#\\_blank](http://www.suse.com/documentation/sle-vmdp-22/singlehtml/vmdp-install/vmdp-install.html#_blank)

## Supported Virtualization Platforms

### Supported Hardware Virtualization Technologies

SUSE Linux Enterprise Server 12 is supported on these IBM z System architectures: z196 EC, z114 BC, zEC12 and zBC12, and z13 systems, in both logical partition (LPAR) and z/VM versions 5.4, 6.1 and sub-sequent releases. SUSE Linux Enterprise Server 12 features a 32-bit application environment to deploy legacy 31-bit applications.

### Recommended Host System Requirements

Only x86-64 (64bit) VHSs are supported for Xen and KVM. For the Xen host, it is highly recommended that Dom0 has a minimum of two CPUs at its disposal. We also recommend disabling ballooning and giving dom0 an explicit amount of memory.

#### Recommended system requirements for Xen or KVM:

- At least 1 GB RAM for Xen or KVM virtual host server
- At least an additional 256 MB RAM per Xen or KVM virtual machine (on top of the amount required by the guest operating system)

**Note:** *if a machine hosts three virtual machines that are each 1 GB in size, you need the following amount of RAM in the machine: 1 GB (for host) + 3 GB (for the virtual machines) + 256MB \* three virtual machines (for VM management and IO overhead) = 4.75 GB.*

#### Recommended system requirements for containers:

- At least 1GB RAM for the host server
- At least an additional 256MB RAM per containers

**Note:** *Virtual memory requirements may vary with the purpose of the overall VM configuration, including operating systems and application solution stacks. After installation, the amount of memory can be adjusted dynamically either:*

- With the administrative user interface
- By using the command line
- By statically adding the required entries in the VM configuration file

## Supported Virtualization Guests

SUSE Linux Enterprise Server 12 supports a large list of guest operating systems both fully virtualized and paravirtualized, with the exception of Windows, which is only supported fully virtualized. All guest operating systems are supported both in 32b and 64b environments, unless stated otherwise (Novell NetWare).

The list of supported guest configurations for SUSE Linux Enterprise Server 12 is available at: [www.suse.com/documentation/sles-12/singlehtml/book\\_virt/book\\_virt.html#virt.support.feature.support](http://www.suse.com/documentation/sles-12/singlehtml/book_virt/book_virt.html#virt.support.feature.support). Any guest OS support is only valid as long as the original vendor supports that OS as part of the product lifecycle.

### Premium Support Offerings

SUSE offers Standard and Priority level subscriptions. SUSE also offers Enterprise Services, which include a Service Account Manager and dedicated Premium Service Engineers. For the latest information, visit: [www.suse.com/products/server/how-to-buy/](http://www.suse.com/products/server/how-to-buy/)

When deploying SUSE Linux Enterprise Server on IBM z Systems hardware, customers are required to have a paid subscription for each Integrated Facility for Linux (IFL) or Central Processor (CP) to be entitled to service. Each additional IFL or CP that will run SUSE Linux Enterprise Server requires an additional subscription. Any number of SUSE Linux Enterprise Server instances (using multiple LPARs or z/VM) can run on the entitled IFLs or CPs. Find more information at: [www.suse.com/products/systemz/features/#server](http://www.suse.com/products/systemz/features/#server)

### Other Useful Information

There are several places where you can find virtualization or SUSE Linux Enterprise Server information:

- *The new SUSE Linux Enterprise Server 12 introduces many improvements in its supported virtualization technologies. For detailed information, refer to What's New in SUSE Linux Enterprise Server 12 VT components at: [www.suse.com/releases/notes/x86\\_64/SUSE-SLES/12/#InfraPackArch.ArchIndependent.Virtualization](http://www.suse.com/releases/notes/x86_64/SUSE-SLES/12/#InfraPackArch.ArchIndependent.Virtualization)*

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- *List of network devices supported (virtualization related) at: [www.suse.com/releasenotes/x86\\_64/SUSE-SLES/12/#fate-317893](http://www.suse.com/releasenotes/x86_64/SUSE-SLES/12/#fate-317893)*
  - *The list of devices supported for booting (virtualization related) at: [www.suse.com/releasenotes/x86\\_64/SUSE-SLES/12/#fate-317892](http://www.suse.com/releasenotes/x86_64/SUSE-SLES/12/#fate-317892)*
  - *Supported disk formats and protocols (virtualization related) at: [www.suse.com/releasenotes/x86\\_64/SUSE-SLES/12/#fate-317891](http://www.suse.com/releasenotes/x86_64/SUSE-SLES/12/#fate-317891)*
  - *KVM supported limits at: [www.suse.com/releasenotes/x86\\_64/SUSE-SLES/12/#TechInfo.KVM](http://www.suse.com/releasenotes/x86_64/SUSE-SLES/12/#TechInfo.KVM)*
  - *Xen supported limits at: [www.suse.com/releasenotes/x86\\_64/SUSE-SLES/12/#TechInfo.XEN](http://www.suse.com/releasenotes/x86_64/SUSE-SLES/12/#TechInfo.XEN)*
  - *The Virtualization Guide at: [www.suse.com/documentation/sles-12/book\\_virt/data/book\\_virt.html](http://www.suse.com/documentation/sles-12/book_virt/data/book_virt.html)*
  - *The Virtual Machine Driver Pack documentation at: [www.suse.com/documentation/sle-vmdp-22/index.html](http://www.suse.com/documentation/sle-vmdp-22/index.html)*
  - *The Xen-to-KVM documentation at: [www.suse.com/documentation/sles-12/book\\_quickstarts/data/art\\_sles\\_xen2kvmquick.html](http://www.suse.com/documentation/sles-12/book_quickstarts/data/art_sles_xen2kvmquick.html)*
  - *Docker Quick Start documentation at: [www.suse.com/documentation/sles-12/dockerquick/data/dockerquick.html](http://www.suse.com/documentation/sles-12/dockerquick/data/dockerquick.html)*
  - *For vendor system-specific limits please consult the SUSE YES! Certification page at: [www.suse.com/yessearch/Search.jsp](http://www.suse.com/yessearch/Search.jsp)*



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