Hewlett Packard Enterprise

Technical white paper

RED HAT ENTERPRISE LINUX 9 OPERATING SYSTEM FOR HPE PROLIANT SERVERS

CONTENTS

ABSTRACT

This white paper provides the information to install the Red Hat® Enterprise Linux® 9 server operating system on HPE ProLiant servers. Key topics addressed in this paper include:

- Supported configurations on HPE ProLiant servers
- Recommended system configuration and server platforms
- Supported software, storage options, and network adapters
- Procedures for installations

Red Hat provides Red Hat Enterprise Linux 9 is distributed with the kernel version 5.14, which provides support for the following architectures:

- AMD 64/Intel® 64/Arm® 64/IBM POWER9/IBM Z

NOTE
To obtain an evaluation version of the Red Hat Enterprise Linux 9 operating system (OS), see the following Red Hat website: access.redhat.com/downloads.

A paid subscription is required for downloading from the Red Hat Software and Download Center. However, you can request a free evaluation subscription at the same site.

This link and other Red Hat links provided in this paper will take you outside the HPE website. HPE does not control and is not responsible for information outside hpe.com.

INTRODUCTION TO RED HAT ENTERPRISE LINUX 9

Red Hat Enterprise Linux 9 is the newest generation of the Red Hat Enterprise Linux OS. In this release, Red Hat integrates improvements across the server, systems, and overall Red Hat open source experience. The improvements and enhancements include updates to virtualization; greater scalability and efficiency; environmentally sustainable IT; and much more. For a complete list of improvements, enhancements, and fixes, see the Red Hat Enterprise Linux documentation at access.redhat.com/documentation.

New features

Kernel security patches without reboot in the web console

This web console update allows users to apply kernel security patches without forcing reboots by using the kpatch framework. Administrators can also automatically subscribe any future kernel to the live patching stream.

The diag modules are now available in the kernel

The diag modules are now included with the kernel image. The diag modules no longer need to be dynamically loaded when the ss command is used with this update. This allows better debugging of networking issues regardless of the customer policy on kernel modules.

cgroup-v2 enabled by default in RHEL 9

The control groups version 2 (cgroup-v2) feature implements a single hierarchy model that simplifies the management of control groups. Also, it ensures that a process can only be a member of a single control group at a time. Deep integration with system improves the end-user experience when configuring resource control on a RHEL system.

Development of new features is mostly done for cgroup-v2, which has some features that are missing in cgroup-v1. Similarly, cgroup-v1 contains some legacy features that are missing in cgroup-v2. Also, the control interfaces are different. Therefore, third-party software with direct dependency on cgroup-v1 may not run properly in the cgroup-v2 environment.

To use cgroup-v1, you need to add the following parameters to the kernel command-line:

```
systemd.unified_cgroup_hierarchy=0
systemd.legacy_systemd_cgroup_controller
```

A new crashkernel.default file for kdump memory allocation
A new implementation of the crashkernel.default file is now available on the RHEL 9 version of kdump. The crashkernel.default file is shipped with each kernel, and it contains the default crash kernel value for the corresponding kernel build. The default value is used by kdump to control the default crash kernel memory value of each kernel. The value forms a good reference for kdump memory reservation. Using this value as the base to estimate the required memory, you can configure the desired crashkernel= value.

As a result, this improves the memory allocation for kdump when a system has less than 4 GB available memory.

Note that the crashkernel=auto option in the boot command line is no longer supported on RHEL 9 and later releases.

For more information, see the /usr/share/doc/kexec-tools/crashkernel-howto.txt file. With Red Hat Enterprise Linux 9, KVM virtualization supports the 5-level paging feature, which significantly increases the physical and virtual address space that the host and guest systems can use.

Core scheduling is supported in RHEL 9
With the core scheduling functionality, users can prevent tasks that should not trust each other from sharing the same CPU core. Likewise, users can define groups of tasks that can share a CPU core.

These groups can be specified:

- To improve security by mitigating some cross-Symmetric Multithreading (SMT) attacks
- To isolate tasks that need a whole core. For example, for tasks in real-time environments or for tasks that rely on specific processor features such as Single Instruction, Multiple Data (SIMD) processing

The kernel-rt source tree has been updated to RHEL 9.0 tree
The kernel-rt sources have been updated to use the latest Red Hat Enterprise Linux kernel source tree. The real-time patch set has also been updated to the latest upstream version, v5.14-rt15. These updates provide a number of bug fixes and enhancements.

RECOMMENDED HPE PROLIANT SERVER PLATFORMS

The following tables list the minimum system, storage, and virtualization memory requirements (as determined by Red Hat) for installing Red Hat Enterprise Linux 9 on HPE ProLiant servers. Current minimum information can be found at access.redhat.com/articles/rhel-limits.

Minimum system requirements

TABLE 1. Memory requirements

	AMD 64/Intel 64
Minimum	1 GB
Recommended	1 GB + 1 GB per logical CPU

TABLE 2. Storage requirements

	AMD 64/Intel 64
Minimum	10 GB
Recommended	20 GB

TABLE 3. Virtualization memory requirements

	AMD 64/Intel 64
Minimum	2 GB
Recommended	2 GB for host + at least 512 MB per guest

Supported configurations

If your server meets the recommended system requirements established by Red Hat, then Red Hat Enterprise Linux 9 should install and run on any HPE server listed in the "Recommended system configuration" section of this document.

Recommended system configuration

This section lists the recommended system configurations established by Red Hat for Red Hat Enterprise Linux 9 bare-metal installations, as well as those supported by HPE. For information about installing Red Hat Enterprise Linux 9 in a virtualized environment, see the Red Hat Enterprise Virtualization software documentation at the following Red Hat website: access.redhat.com/documentation.

IMPORTANT

To help ensure successful installation and use of Red Hat Enterprise Linux 9 on your HPE ProLiant server, comply with the system requirements recommended in this white paper and see the Red Hat documentation at access.redhat.com/documentation.

Do not use this white paper as the sole source of installation information.

For the most recent supported hardware configurations, see the following HPE Servers Support and Certification Matrices website: hpe.com/servers/rhelcert.

You can also see the Red Hat Ecosystem webpage: access.redhat.com/ecosystem.

To determine the required ROM version and the supported HPE ProLiant servers, see the following web resources for assistance:

- HPE software and drivers: support.hpe.com/connect/s/search?language=en_US#t=DriversandSoftware
- Red Hat on HPE ProLiant support matrix: hpe.com/servers/rhelcert

SUPPORTED COMPONENTS FOR HPE PROLIANT SERVERS

Software drivers

HPE recommends using the drivers contained in the Red Hat Enterprise Linux media, when applicable. Other software and firmware smart components required for HPE specific customers are provided through HPE Service Pack for ProLiant (SPP).

The SPP replaces the HPE ProLiant Support Pack (PSP) and Smart Update Firmware DVD. The SPP provides the HPE ProLiant server drivers, utilities, and management agents previously available from the PSP. The SPP also includes firmware previously available on the Smart Update Firmware DVD.

The SPP ISO includes:

- A boot environment
- Smart Update Manager (SUM), the SPP deployment tool
- Driver, software, and firmware components for HPE ProLiant servers

You can find the current downloadable version of HPE Service Pack for ProLiant and documentation at the following website: techlibrary.hpe.com/us/en/enterprise/servers/products/service_pack/spp/index.aspx

Note: For information on supported components for HPE Synergy servers, please visit the HPE Synergy Software Release Information website: techhub.hpe.com/us/en/enterprise/docs/index.aspx?doc=/eginfolib/synergy/sw_release_info/index.html.

Storage, tape, and network options

For a list of supported HPE ProLiant options—such as server smart arrays, NICs, tapes, and SCSI controllers—see the QuickSpecs for the supported server. You can find QuickSpecs at hpe.com/info/quickspecs.

HPE can provide updated NIC drivers in the SPP as needed. HPE drivers are not available in the Red Hat Enterprise Linux 9 distribution. However, corresponding NIC drivers from Intel, Broadcom, Emulex, QLogic, and Mellanox are in the distribution, and you can use them instead.

RED HAT ENTERPRISE LINUX 9 INSTALLATION FOR 64-BIT ARCHITECTURES ON HPE PROLIANT SERVERS

Red Hat Enterprise Linux 9 can be installed in numerous ways—from local media, remote media via HPE iLO Virtual Media, and through a network-based NFS or PXE server. This white paper provides instructions for installing the OS from local media and from a PXE network connection.

To further streamline deployment, HPE introduces intelligent provisioning—an essential single-server deployment tool embedded in HPE ProLiant Gen10 servers. Intelligent provisioning simplifies HPE ProLiant server setup, providing a reliable and consistent way to deploy HPE ProLiant server configurations. Additional information is available at hpe.com/info/intelligentprovisioning.

Preinstallation tasks

To prepare for installation, ensure that:

- The server selected for installation is a supported platform. You can verify this information by referring to the Red Hat Enterprise Linux support matrix at hpe.com/servers/rhelcert.
- At the same website, examine **Minimum Supported Red Hat Updates** for HPE ProLiant servers.
- For information about other options added to the server for the supported HPE ProLiant or BladeSystem server smart arrays, NICs, and SCSI controllers, see the supported server's HPE QuickSpecs at: hpe.com/info/quickspecs.
- Obtain the latest ROM from the HPE Business Support Center website: hpe.com/info/bizsupport.
- Update to the latest firmware and options for the server. Download the SPP from the HPE Software Delivery Repository at: downloads.linux.hpe.com/SDR.
- You can find instructions for installing the SPP in the "Installing the HPE Service Pack for ProLiant" section of this white paper.
- Use the ROM-Based Setup Utility (RBSU) to set the date/time and configure the boot controller order (if necessary).
- Decide on array type: software or hardware.
- Configure the RAID settings for the server. HPE recommends using the Array Configuration Utility to complete this task. You can also use a new tool called HPE Smart Storage Administrator (HPE SSA), which offers a single interface for quickly setting up, configuring, and managing the HPE Smart Array controllers and the HPE SAS Host Bus Adapters (HBAs). Note that HPE SSA is supported on HPE ProLiant next Gen servers and controllers only. See the HPE Smart Storage Administrator User Guide for information about usage and support.
- If you use the HPE Smart Array controller, see the HPE Smart Array SR Gen10 User Guide for information about configuration, installation, operation, and support.
- Ensure enough disk space is available for installation. For disk space requirements, see the "Minimum system requirements" section in this white paper.
- Choose an installation method: DVD, hard drive, NFS, URL (HTTP/FTP).
- Choose a boot method: local media, network, or HPE iLO Virtual Media.
- Prepare driver updates, if necessary, during installation.

Installation procedures

To install Red Hat Enterprise Linux 9 on 64-bit architectures, complete the following steps.

Installing using local media

1. Make sure the server has a DVD drive (either native or attached).

NOTE

A license key might be required to use HPE iLO Virtual Media with HPE ProLiant servers. For instructions on using HPE iLO Virtual Media to install the OS, see the HPE iLO 6 User Guide available at hpe.com/info/ilo.

(First, click the Resources tab and then select the **HPE iLO User Guide** title.)

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2. To begin the installation, insert the Red Hat Enterprise Linux 9 media into the DVD drive and boot the server from the DVD.
3. Select the preferred Boot Menu option. The default option is “Test this media and install Red Hat Enterprise Linux 9.0.0”.
4. Continue following the on-screen instructions to complete the installation.

Installing using PXE boot via network

1. Make sure a properly configured PXE server and a network adapter that supports PXE are available.
2. If a driver update diskette is required to support a driver that is not in the distribution, ensure the driver is added to the PXE server. You can find instructions on how to add a driver update to the PXE server at: access.redhat.com/articles/15453 (To view this Red Hat Knowledgebase article, you need a Red Hat Network subscription.).
3. Ensure the computer is configured to boot from the network adapter. In most cases, you can do this by inspecting and modifying the system’s BIOS settings.
4. Power on the server to be configured.
5. When the PXE menu appears, select the operating system you want to install.
6. Select the preferred Boot Menu option. The default option is “Test this media and install Red Hat Enterprise Linux 9.0.”
7. Continue following the on-screen instructions to complete the installation.

UPGRADING FROM A PREVIOUS RED HAT ENTERPRISE LINUX RELEASE TO RED HAT ENTERPRISE LINUX 9

Red Hat does not currently support upgrading from an earlier major version of Red Hat Enterprise Linux.

SUPPORT FOR SECURE BOOT ON UEFI PLATFORMS

Red Hat Enterprise Linux 9 server operating system includes support for the UEFI secure boot feature, which means that Red Hat Enterprise Linux 9 can be installed and run on systems where UEFI secure boot is enabled.

The secure boot technology ensures that the system firmware checks whether the system boot loader is signed with a cryptographic key authorized by a database contained in the firmware. With signature verification in the next-stage boot loader, kernel, and potentially the user space, it is possible to prevent the execution of unsigned code.

For more information on secure boot on UEFI-based HPE servers, visit support.hpe.com/hpesc/public/docDisplay?docLocale=en_US&docId=a00016407en_us.

INSTALLING THE HPE SERVICE PACK FOR PROLIANT

You can download and install the HPE Service Pack for ProLiant by using the Software Delivery Repository, as described in this section.

Getting SPP updates from the HPE Software Delivery Repository (SDR)

HPE offers a repository hosting the HPE Service Pack for ProLiant and management components from HPE. The repository offers multiple means for acquiring the SPP, including direct download and mirroring. If your system has direct access to the network repository, you can configure your system to query the repository for installing and updating any specified components as needed.

You can find detailed information on the Software Delivery Repository and retrieval methods at downloads.linux.hpe.com/SDR.

HPE Server Support Guide for HPE Service Pack for ProLiant is available at hpe.com/info/spp/documentation.

Smart Update Manager (SUM)

SPP is deployed using SUM, designed to enable consolidated maintenance and distribution of firmware and software components. SUM enables you to deploy software for multiple HPE ProLiant servers from a single GUI. SUM detects the installed hardware and current versions of firmware and software in use on targeted servers. SUM installs only the required and user-selected components. The default configuration is to install all available components. Before launching SUM, you must ensure that all necessary Red Hat Package Managers are installed and that the minimum requirements for operation are met. For a list of required RPMs and minimum requirements, see the SUM release notes.

Information on SUM can be found at hpe.com/info/hpsum.

The Smart Update Manager User Guide and Smart Update Manager Release Notes are available at hpe.com/info/hpsum/documentation.

Installing the HPE Service Pack for ProLiant

You can install the Service Pack for ProLiant through the Software Delivery Repository or from the deliverable downloaded from hpe.com. Before installing the SPP, ensure that necessary RPMs are installed. For a list of RPMs required for installation, see the release notes for SPP or SUM.

Deploying SPP with SUM

1. Verify that the minimum requirements for SUM in Red Hat Enterprise Linux 9 are met. You can find a list of platform-specific compatibility libraries in the SUM help file. You can view the SUM help file (hpsum_welcome_help_en.html) in a web browser without starting SUM.
2. Start SUM.
3. In the **Source Selection** screen, verify that the directory path in the **Directory** field has the location of the smart components in the SPP, and then select **Start Inventory**. SUM performs an inventory of the available updates and discovers the hardware and software installed on the local system. After the inventory and discovery processes are complete, the **Select Installation Hosts** screen appears.
4. Select the local host or one (or more) remote host for SPP deployment. The **Select Bundle Filter** screen displays the SPP bundle information.
5. Select the bundle and the appropriate filter options. For remote deployments, additional screens enable you to update information on a per-host basis.
6. After selecting the bundle for all hosts being updated, access the **Select Items to be Installed** screen to complete the following tasks:
    a. Select the components to be installed.
    b. Review failed dependencies before installation.
    c. Review the revision history of the components.
7. To proceed with the installation, click **Install**. After the installation is complete, the **Installation Results** screen appears.
8. If any components failed to install successfully, complete the following steps:
    a. Review the installation logs for information about any failures.
    b. Exit SUM.
    c. Make the required updates to the environment.
    d. Restart installation of the SPP.

For more information about SUM and other installation methods, see the Smart Update Manager User Guide available at hpe.com/info/hpsum/documentation.

RESOURCES

For additional information, see the resources listed in the following.

TABLE 4. Resource link list

Resource description	Web address
HPE and Red Hat partnership	hpe.com/us/en/product-catalog/detail/pip.5393115.html
Red Hat	redhat.com
Red Hat software and downloads	access.redhat.com/downloads
Red Hat product documentation	access.redhat.com/products
Red Hat Customer Portal/Knowledgebase	access.redhat.com/knowledgebase
Red Hat Hardware Catalog	access.redhat.com/ecosystem
HPE Servers support and certification matrices; technical exception matrices	hpe.com/servers/rhelcert
OS Support tool for HPE Synergy	techhub.hpe.com/us/en/enterprise/docs/index.aspx?doc=/eginfolib/synergy/sw_release_info/OS_Support.html
HPE operating system services	hpe.com/info/proliantlinux
Industry-standard server technology training and communications	hpe.com/docs/servertechnology

NEXT STEPS

Contact your HPE representative or visit hpe.com/us/en/contact-hpe.html

You can also send comments about this white paper to hpe.com/info/proliantlinux

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