



Hewlett Packard
Enterprise

Technical Reference

HPE Serviceguard for Linux Certification Matrix A.15.xx.xx

Sept 2023

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How to use this document

This document comprises of two main sections

- Serviceguard for Linux Foundation Edition

This section describes OS, Server, Storage and Virtualization technologies support with the listed version of HPE Serviceguard for Linux (SG/LX) and refers to HPE Serviceguard for Linux support only. All other hardware and software components must be supported together independent of HPE Serviceguard for Linux. This matrix lists certified configurations for HPE Serviceguard for Linux versions A.15.00.00 and its updates

- Serviceguard for Linux Flex Storage Edition

This section describes various functionalities and versions of Serviceguard for Linux Flex Storage Add-on Edition. It also describes the compatible Serviceguard for Linux Foundation and OS versions.

Some browsers may cache a copy of this file, so if data seems to not be up to date, please refresh the page. The most recent version of this matrix can be found at <https://www.hpe.com/info/linux-serviceguard-docs>.

Other Resources

- HPE Serviceguard for Linux website: www.hpe.com/servers/sglx. Visit this site for access to all technical information, commercial information, manuals, white papers, data sheets, and customer references.
- Before upgrading to a higher version of Serviceguard for Linux please, read the target Serviceguard for Linux **version's** release notes (*HPE Serviceguard for Linux XX.YY.ZZ Release Notes*) at <https://www.hpe.com/info/linux-serviceguard-docs>
- For HPE Serviceguard for Linux (SGLX) support lifecycle, release, update mechanisms and product versions, please refer "HPE Serviceguard for Linux(SGLX) Support Letter" at https://support.hpe.com/hpesc/public/docDisplay?docId=emr_na-a00042064en_us
- 60 days FREE trial of HPE Serviceguard for Linux Edition Software available at <https://www.hpe.com/us/en/resources/servers/serviceguard-linux-trial.html>

Serviceguard For Linux Foundation Edition

1 HPE Serviceguard for Linux A.15.xx.xx

1.1 Linux Distributions and Errata

The following Operating System distributions and kernel errata are supported with Serviceguard for Linux. The following conditions apply:

- Only x86_64 bit Operating Systems supported.
- Support for Secure Boot on RedHat and SUSE Linux Enterprise Server.
- All the kernel erratas are supported unless explicitly specified within one month of its release.
- Support for Live Kernel Patching of Operating Systems.
- All cluster nodes must have the same OS distribution.

Note:

If the underlying OS or hypervisor or application or storage are out of regular support phase by the vendor then supporting those environment will only be on the best effort basis. HPE is not obliged to support such versions or provide proactive fixes on those unsupported versions. Some vendors offer extended support phases and those are excluded in the definition of “regular support”.

1.1.1 Red Hat Enterprise Linux

The following Red Hat Enterprise Linux OS versions are supported with Serviceguard for Linux.

Table 1 Supported Red Hat Enterprise Linux OS Versions

Serviceguard for Linux	Linux (x86_64)	JAVA Runtime Environment	Volume Managers & File Systems
A.15.10.00	RHEL 9* 9.0 to 9.2	Open Java 8, update up to 362	LVM, VxVM ext3, ext4 NFS, XFS, VxFS
	RHEL 8 8.1 to 8.8		
A.15.00.01	RHEL 9 9.1	Open Java 8, update up to 345	
A.15.00.00	RHEL 9* 9.0	Open Java 8, update up to 362	
	RHEL 8 8.1 to 8.8		

* RHEL 9.0 is supported upto kernel version 5.14.0-70.30.1 only

¹ Serviceguard Manager and Serviceguard Manager+ require minimum screen resolution of 1024 x 768 pixels for best experience.

² Chrome and Firefox are the supported browsers. All versions are supported unless called otherwise.

³ VxVM and VxFS supported only on physical cluster nodes

⁴ IPv6 only mode is not supported.

1.1.2 SUSE Linux Enterprise Server

The following SUSE Linux Enterprise Server OS versions and kernel errata are supported with Serviceguard for Linux.

Table 2 Supported SUSE Linux Enterprise Server OS Versions

Serviceguard for Linux	Linux (x86_64)	JAVA Runtime Environment	Volume Managers & File Systems
A.15.10.00	SLES 15 <i>up to SP5</i>	Open Java 8 Update up to 362	LVM, VxVM ext3, ext4, NFS, XFS, btrfs, VxFS
	SLES 12 <i>up to SP5</i>		
A.15.00.00	SLES 15 <i>up to SP4</i>	Open Java 8 Update up to 322	
	SLES 12 <i>up to SP5</i>	Open Java 8 Update up to 222	

¹ Serviceguard Manager and Serviceguard Manager+ requires minimum screen resolution of 1024 x 768 pixels for best experience.

² Chrome and Firefox are the supported browsers. All versions are supported unless called otherwise.

³ VxVM and VxFS supported only on physical cluster nodes

⁴ IPv6 only mode is not supported on virtual machines.

1.1.3 Oracle Linux

The following Oracle Linux (OL) OS version with unbreakable enterprise kernel (UEK) is supported with Serviceguard for Linux.

Table 3 Supported OLOS Version with UEK

Serviceguard for Linux	Linux (x86_64)	JAVA Runtime Environment	Volume Managers & File Systems
A.15.10.00	OL 9.2 UEK7 5.15.0-101.103.2.1.el9uek.x86_64 onwards	Open Java 8 update up to 382	LVM, ext3, ext4, NFS, XFS
	OL 9.1 UEK7 kernel-uek-5.15.0-3.60.5.1.el9 onwards	Open Java 8 update up to 362	
	OL 9.0 UEK7 kernel-uek-5.15.0-0.30.19.el9uek onwards	Open Java 8 update up to 362	
	OL 8.8 UEK 7 kernel-uek-5.15.0-101.103.2.1 onwards	Open Java 8 update up to 382	
	OL 8.8 UEK 6 kernel-uek-5.4.17-2136.307.3.1.el8uek onwards		
	OL 8.7 UEK 7 kernel-uek-5.15.0-3.60.5.1.el8uek onwards	Open Java 8 update up to 352	
	OL 8.7 UEK 6 kernel-uek-5.4.17-2136.307.3.1.el8 uek onwards	Open Java 8 update up to 332	
	OL 8.6 UEK 7 kernel-uek-5.15.0-0.30.19.el8uek onwards	Open Java 8 update up to 345	
	OL 8.6 UEK 6 Kernel-5.4.17-2136.307.3. el8uek onwards	Open Java 8 update up to 332	
	OL 8.5 UEK 6 Kernel-5.4.17-2136.304.4.1 el8uek onwards	Open Java 8 update up to 322	
	OL 8.4 UEK 6 kernel-5.4.17-2102.201.3.el8uek onwards	Open Java 8 update up to 302	
	OL 8.3 UEK 6 kernel-uek-5.4.17-2011.7.4.el8uek onwards		
OL 7 7.9 UEK5 kernel-uek-v4.14.35-1902.6.1 (UEK R5U2) onwards UEK6 kernel-uek-5.4.17- 2011.6.2.el7uek onwards			
A.15.00.00	OL 8.7 UEK 7 kernel-uek-5.15.0-3.60.5.1.el8uek onwards	Open Java 8 update up to 352	
	OL 8.7 UEK 6 kernel-uek-5.4.17-2136.307.3.1.el8 uek onwards	Open Java 8 update up to 332	

OL 8.6 UEK 7 <i>kernel-uek-5.15.0-0.30.19.el8uek onwards</i>	Open Java 8 update up to 345
OL 8.6 UEK 6 <i>Kernel-5.4.17-2136.307.3.el8uek onwards</i>	Open Java 8 update up to 332
OL 8.5 UEK 6 <i>Kernel-5.4.17-2136.304.4.1.el8uek onwards</i>	Open Java 8 update up to 322
OL 8.4 UEK 6 <i>kernel-5.4.17-2102.201.3.el8uek onwards</i>	Open Java 8 update up to 302
OL 8.3 UEK 6 <i>kernel-uek-5.4.17-2011.7.4.el8uek onwards</i>	
OL 7 7.9 UEK5 <i>kernel-uek-v4.14.35-1902.6.1 (UEK R5U2) onwards</i> UEK6 <i>kernel-uek-5.4.17- 2011.6.2.el7uek onwards</i>	

¹ Serviceguard Manager and Serviceguard Manager+ requires minimum screen resolution of 1024 x 768 pixels for best experience.

² Chrome and Firefox are the supported browsers. All versions are supported unless called otherwise.

³ Serviceguard Manager+ is not supported on OL.

⁴ IPv6 only mode is not supported.

1.2 Servers

The following section provides details of x86 servers that are supported and compatible with Serviceguard for Linux 15.xx.xx with the following conditions:

- Servers must be of architecture x86_64.
- Only Linux OS supported by both the server and Serviceguard for Linux must be used.
- Unless specifically stated, all configurations of any server listed are supported as long as the general Serviceguard configuration requirements are met. For configuration requirements and other details refer to “HPE Serviceguard for Linux Concepts Guide” in www.hpe.com/info/linux-serviceguard-docs

1.3 Hyperconverged Systems

Hyperconverged System	Serviceguard Version	Remarks
HPE SimpliVity 380 Gen10 G	A.15.00.00 and later	<ul style="list-style-type: none">• Supported only with VMware hypervisor with VMFS volumes• Quorum Server is the only supported arbitration method

1.4 Storage

The following section provides details of Storage **Array's** that are supported and compatible with Serviceguard for Linux with the following conditions:

HPE Serviceguard recommends that customers check the Linux/Storage vendor's latest hardware specification and/or hardware compatibility matrix as appropriate to ensure compatibility and optimum functionality. Certification of storage will only be valid till the published support life of the arrays itself.

1. Storage array has to be SCSI-3 Compliant. Refer to Storage Vendor documentation to verify and enable SCSI-3 compatibility.
2. Serviceguard automatically configures SCSI-3 Persistent Reservation Type 5 (WERO) based IO fencing for all shared storages in a package. The only exception is a cluster that comprises only VMware virtual machines as nodes and uses VMware VMFS datastore volumes for shared storage (*Dynamically linked storage*). Customers must never disable SCSI-3 Persistent Reservation from cluster/package configuration or on the storage without prior agreement from HPE. If disabled without prior agreement with HPE, the configuration is unsupported.
3. Only Block Storage and NFS is supported, Object Storage is not supported.
4. HPE FlexFabric is supported for shared storage access with following conditions:
 - a. FlexFabric Mezzanine adapter, FlexFabric LOM and FlexFabric CNA ports supported
 - b. Fibre Channel (FC) and Fibre Channel (FCoE) protocols are supported
 - c. iSCSI on FlexFabric ports are supported only on physical nodes in the cluster.
5. iSCSI devices are supported as shared storage with following conditions:
 - a. iSCSI Software Initiator is supported in clusters with virtual machines and/or physical server nodes.
 - b. iSCSI Hardware Initiator is supported in clusters with only physical server nodes
6. Device Mapper (DM-Multipath) storage multi-pathing is supported for shared storage with following conditions:
 - a. DM-Multipath is not supported with VMware ESXi guests in a cluster, however other physical nodes in the cluster can use DM-Multipath.
 - b. DM-Multipath is supported with KVM guests using FC devices for shared storage.
 - c. On RHEL8, RHEL9, OL7, OL8 only user-friendly named mapper device are supported.
 - d. Device Mapper Multipathing is supported with HPE 3PAR iSCSI devices only when there are 2 iSCSI ports on the array.

Cluster Lock LUN

1. Cluster Lock LUN is supported only when all the nodes in the cluster have read write access to a common disk (shared disk), being presented from a single, non-virtualized, and non-replicated array.
2. Cluster Lock LUN is not supported with any other array-based technologies that do not satisfy above the criteria (point 4 mentioned above). Including but not limited to Multi array virtualization, Multi array-based replication.
Ex: HPE XP7/XP8 HA mode, HPE 3PAR- Peer Persistence, DELL EMC VPLEX etc.
3. The cluster will fail if the time it takes to acquire the disk lock exceeds 0.2 times the MEMBER_TIMEOUT. This means that if you use a disk-based quorum device (Lock LUN), you must be certain that the nodes in the cluster, the connection to the disk, and the disk itself can respond quickly enough to perform 10 disk writes within 0.2 times the MEMBER_TIMEOUT
4. VMFS Volumes are not supported for Lock LUN
5. Device Mapper (DM-Multipath) storage multi-pathing is supported for Lock LUN with following conditions:
 - a. DM-Multipath must be used for Lock LUN access on all nodes in the cluster.
 - b. When using DM Device Alias Names for Lock LUN, the alias name must be the same on all nodes.
 - c. On RHEL8, RHEL9, OL7, OL8 only user-friendly named mapper device are supported
 - d. On RHEL8, RHEL9, OL7, OL8 the cluster Lock LUN cannot have an alias name ending with a number

The following tables depict the requirements that satisfy Serviceguard High Availability and Extended Distance Cluster (XDC) needs.

Table 4 Supported Storage Connectivity Models for Cluster Shared Storage and Lock LUN

Purpose / Supported Connectivity	FC	FCOE	iSCSI	NFS	SAS
Cluster Shared Storage	Yes	Yes	Yes	Yes	No
Cluster Lock LUN	Yes	Yes	No	No	No
Non Shared storage <ul style="list-style-type: none"> SAP HANA System Replication * 	Yes	Yes	Yes	Yes	Yes
Non Shared storage <ul style="list-style-type: none"> Oracle Data guard 	Yes	Yes	Yes	Yes	Yes
Non Shared storage <ul style="list-style-type: none"> SQL Server on Linux AOAI 	Yes	Yes	Yes	NA	Yes

* All the SAP supported connectivity for Non-shared storage is supported.

1.4.1 HPE Storage

HPE Serviceguard for Linux is supported with any Hewlett Packard Enterprise Storage Array that satisfy the criteria listed out in [1.4 Storage](#) with below mentioned conditions

Table 5 Supported HPE Storage for Cluster Shared Storage and Lock LUN

Type of Storage	Array	Model	Cluster Shared Storage	Cluster Lock LUN
Any HPE Block Storage (XP, 3PAR, Primera, MSA, Store Virtual, Nimble)	Any	Any	Yes	Yes
NFS Filer	Any	Any	Yes	No
Others (Ex: Object)	Any	Any	No	No

Table 6 Supported Software based virtual storage solutions for Cluster shared storage

Vendor	Software	Cluster Shared Storage	Cluster Lock LUN	Remarks
Hewlett Packard Enterprise	Store Virtual VSA Software	Yes	No	Supported only with iSCSI Supported with Network RAID 10 Configuration. Multi-Site configuration is not supported

1.4.2 Non HPE Storage

HPE Serviceguard for Linux is compatible with any Storage Array that satisfy the criteria listed out in [1.4 Storage](#) with below mentioned conditions:

- HPE will resolve defects that are reproducible on HPE storage.
- HPE does not test Serviceguard products on 3rd party hardware. HPE may not be able to resolve issues that have a dependency on access to 3rd party hardware

Table 6 Compatible Non HPE Storage for Cluster Shared Storage and Lock LUN

Type of Storage	Vendor	Array	Model	Cluster Shared Storage	Cluster Lock LUN
Block	Any	Any	Any	Yes	Yes
NFS Filer	Any	Any	Any	Yes	No
Others (Ex: Object)	Any	Any	Any	No	No

1.5 Virtualization Hypervisors

HPE Serviceguard for Linux supports configuring Virtual machines, software-defined server (SD Server) as cluster nodes. Virtual Machines created using VMware ESXi, Red Hat KVM, Red Hat Enterprise Virtualization and Hyper-V hypervisors are supported. The SD Servers configured using HPE Scalable Compute Software (HPE-SCS) or HyperKernel are supported. HPE Serviceguard for Linux can be installed on virtual machines (guests), SD servers running Red Hat Enterprise Linux or SUSE Linux Enterprise Server or Oracle Linux operating systems.

HPE Serviceguard recommends that customers check the Hypervisor vendor's latest compatibility matrix as appropriate to ensure compatibility and optimum functionality.

The following conditions apply:

- Cluster with Virtual Machines as nodes from different types of hypervisors is not supported
- Hybrid Clusters with mix of both physical servers as nodes and virtual machines as nodes are supported

1.5.1 VMware

Table 7 Supported VMware ESX/ESXi Versions

SG/LX Version required	Supported ESX/ESXi Version	Supported Guest OS
A.15.00.00 and later. For VMware feature and Serviceguard Version compatibility refer the below table.	7.0, 8.0	All Linux OS supported by Serviceguard for Linux as listed in Linux Distributions and Errata are supported.

Table 8 Supported VMware Features and Versions

VMware Features	Minimum SG/LX Version required	Supported SGLX Quorum Mechanism	Notes
RDM - Statically linked storage with Multipath ^{1,2} . (SLS)	A.15.00.00	Quorum Server Cluster Lock LUN	<ol style="list-style-type: none"> VMware NMP and DRS is not supported with RDM - Statically linked Storage only. For more details on using Clustered VMDK, SLS with Multipathing support, RDM with storage array-based replication and vVol Storage Configurations with SGLX, refer to the VMware KB articles: for vSphere 8.x KB 92611, for vSphere 7.x KB 89510 and for vSphere 6.x KB 85901. For VMFS volumes the supported JRE versions can be referred at Linux Distributions and Errata Serviceguard depends on JAVA to communicate with vCenter/ESXi. Please check the VMware documents to verify the supported JAVA versions for a given ESXi/ vCenter version. Serviceguard supports VMware vVols, Clustered VMDK in all the deployments except the array-based replication environments.
VMFS Volumes ^{3,4} - Dynamically linked storage (DLS)		Quorum Server Cluster Lock LUN (RDM Devices Only)	
Clustered VMDK ^{2,5}		Quorum Server Cluster Lock LUN	
vVols ^{2,4}		Quorum Server Cluster Lock LUN (RDM and vVol Devices only)	
VMware NMP		Quorum Server Cluster Lock LUN (RDM Devices & Clustered VMDK Only)	
vMotion		Quorum Server Cluster Lock LUN	
DRS		Quorum Server	
SRM		Quorum Server Cluster Lock LUN (RDM Devices only)	

- iSCSI device is also one of the supported shared storage. iSCSI devices can be directly presented to guests.
- For more details on using SG/LX in VMware environments please refer to **"Using Serviceguard for Linux with VMware Virtual Machines"** Whitepaper at <https://www.hpe.com/info/linux-serviceguard-docs>.
- To configure shared storage with VMware virtual machines please refer to "HPE Serviceguard for Linux Concepts Guide", available at <https://www.hpe.com/info/linux-serviceguard-docs>

1.5.2 Linux Virtualization

Table 9 Supported Red Hat KVM, SLES KVM and RHEV Versions

Minimum SG/LX Version required on Guest	Linux Virtualization	Supported Host OS Version	Supported Guest OS as Serviceguard Nodes	Supported Shared Storage	Quorum Mechanism	Multipathing
A.15.00.00	Red Hat KVM Version	RHEL 9 ² 9.0 to 9.2	All Linux OS supported by Serviceguard ¹ , except SLES 12	iSCSI	Quorum Server	No
		RHEL 8 ² 8.1 to 8.8				
	SLES KVM Version	SLES 12 <i>SP5 and later</i>	All Linux OS supported by Serviceguard ¹	iSCSI, FC		
		SLES 15 <i>SP4 and later</i>				
		SLES 12 <i>up to SP5</i>		iSCSI		
		SLES 15 <i>up to SP4</i>				
	Red Hat Enterprise Virtualization	3.x, 4.x	All Linux OS supported by Serviceguard ¹			
	Red Hat OpenShift	4.12, 4.13				
	Oracle Linux KVM	OL 7 7.9				
		OL 8 8.3 to 8.7				

¹ For list of all Linux OS supported by Serviceguard for Linux refer [Linux Distributions and Errata](#).

² Only Cluster Across Box (host exclusive) mode is supported i.e., only one guest per host can participate in a Serviceguard cluster. For more information refer to [KVM whitepaper](#)

- Supported with application/software based replications. Example Oracle Data Guard, DRBD, etc.
- Only "Hypervisor default, e1000, rtl8139 and virtio" are supported as Guest Network Interface "Device Model"
- Live Migration is not supported
- Please refer to whitepaper "HPE Serviceguard for Linux with Red Hat, SUSE Linux Enterprise Server KVM and RHEV guests" at www.hpe.com/info/linux-serviceguard-docs for installation and configuration details

1.5.3 Windows Virtualization

Table 10 Supported Hyper-V Versions

Supported Host OS Version	Supported Guest OS as Serviceguard Nodes	Minimum SG/LX Version required on Guest	Supported Shared Storage	Quorum Mechanism	Multipathing
Windows Server 2019	All Linux OS supported by Serviceguard ¹ .	A.15.00.00	iSCSI	Quorum Server	No

¹ For list of all Linux OS supported by Serviceguard for Linux refer [Linux Distributions and Errata](#).

1.5.4 HPE Scalable Compute Software (Software Defined Server)

Supported HPE SCS Versions

Supported SCS Version	Supported Guest OS as Serviceguard Nodes	Minimum SG/LX Version required on Guest	Supported Shared Storage	Quorum Mechanism	Multipathing
HPE Scalable Compute Software (SCS)	All Linux OS supported by Serviceguard ¹ .	A.15.00.00	iSCSI	Quorum Server	N/A

¹ Ensure the Guest OS is supported by HPE SCS platform, and For list of all Linux OS supported by Serviceguard for Linux refer [Linux Distributions and Errata](#).

Note:

HPE Serviceguard recommends that customers check the HPE SCS/HyperKernel latest compatibility matrix as appropriate to ensure compatibility with application support. If an application is not supported on SCS platform then the corresponding Addon will also not be supported with SGLX.

1.6 Deployments in Cloud

HPE Serviceguard for Linux supports configuring cloud instances as cluster nodes. Cloud Instances created using Amazon Web Services (AWS), Microsoft Azure and Google Cloud Platform (GCP) are supported. HPE Serviceguard for Linux can be installed on cloud instances running Red Hat Enterprise Linux or SUSE Linux Enterprise Server or Oracle Linux operating systems.

HPE Serviceguard recommends that customers check the Cloud vendor's latest compatibility matrix as appropriate to ensure compatibility and optimum functionality.

The following conditions apply:

- Nodes of a cluster when deployed in cloud should be from a single cloud vendor and cannot be mixed with instances from other cloud vendors or those that are situated on premise.
- Layer 4 Load Balancer provided by the cloud vendor is used to support Relocatable IP or Virtual IP in a Serviceguard package for clients to connect with the applications protected by Serviceguard.
- When cluster nodes span across different regions, Serviceguard requires Cloud Based DNS load balancing service to support Relocatable IP or Virtual IP in a Serviceguard package for clients to connect with the applications. In Azure it is supported with Traffic Manager, in AWS it is supported with Route53 and in GCP it is supported with Global Load Balancer.
- Supported only with Non-shared storage:
 - Applications with in-built data replications
 - SAP HANA scale-up with HANA System Replication
 - Oracle with Oracle Data Guard
 - Microsoft SQL Server Always On Availability groups
 - Applications using Serviceguard for Linux Flex Storage Add-on that provides HPE Software based storage replication solution using DRBD for non-shared storages.

Table 11 Supported Cloud Vendors

Supported Cloud Vendor	Minimum SG/LX Version required on cloud instance	Quorum Mechanism	Notes
Amazon Web Services	A.15.00.00	Quorum Server	1 SAP HANA scale-out is not supported.
Microsoft Azure			2 To use Quarantine without relocatable/virtual IP, the HANA data access network must be configured as a hdb_replication_subnet in the package configuration. This prevents simultaneous usage of a cross-subnet configuration.
Google Cloud Platform			3 Easy deployment of Microsoft SQL Server workloads in not supported 4 For list of all Linux OS supported by Serviceguard for Linux in a cloud environment refer Linux Distributions and Errata .

2 Quorum Server

The following section provides compatibility information for the Serviceguard Quorum Server (QS) software. This software is bundled with Serviceguard for Linux software bundle.

- One QS can provide arbitration services for multiple Serviceguard for Linux and Serviceguard for HP-UX clusters (300 Nodes).
- The QS software can run on any x86_64 Server and x86_64 Hypervisor based Virtual Machine running in Traditional Data Center and Cloud (Private or Public).

NOTE: When deploying Quorum Server in public/private cloud:

1. Ensure that the Quorum Server network latency parameters are configured appropriately. Refer Quorum Server specific parameters under “**Cluster Configuration Parameters**” section in HPE Serviceguard for Linux Concepts Guide available at <https://www.hpe.com/info/linux-serviceguard-docs>
 2. Ensure that the Quorum Server IP address(es) remain same across reboots
-

Table 12 Quorum server compatibility

Serviceguard Quorum Server (QS) Version	Compatible Base OS	Notes
A.15.00.00	RHEL 9.x RHEL 8.x SLES 15 SP0 and later SLES 12 SP0 and later OL 8.3 and later OL 7.9	<ul style="list-style-type: none">• Following are the compatible Serviceguard versions,<ul style="list-style-type: none">• Serviceguard for Linux A.12.xx.xx and A.15.xx.xx• Serviceguard for HPUX A.11.20

3 Licensing with HPE Serviceguard for Linux A.15.00.00 and later

HPE Serviceguard for Linux 15.00.00 and later is available in two simplified, easy-to-order editions:

- SGLX High Availability (HA) E5, and
- SGLX High Availability (HA) plus Disaster Recovery (DR) E7

One can order the 'out of the box ready' application integrations through application specific Add-ons. Add-ons are available for the following enterprise databases and business software:

- SAP (includes SAP NetWeaver, SAP S/4 HANA (application tier), and NFS)
- Oracle
- Microsoft SQL Server on Linux
- NFS
- Flex Storage

Note that the Add-ons for IBM Db2, Sybase, EnterpriseDB, need not be ordered separately and these can be used free of cost with E5 or E7.

For more details, please refer HPE Serviceguard for Linux Quick Specs at https://www.hpe.com/psnow/doc/c04154488.pdf?jumpid=in_pdp-psnow-qs

4 Serviceguard Addons

Serviceguard provides out-of-box addons to deploy different workloads in Serviceguard cluster. Following addons are available with Serviceguard,

- Addons for Databases
 - [SAP HANA](#)
 - [Oracle](#)
 - [Microsoft SQL Server](#)
 - [Sybase ASE and SAP Sybase Replication](#)
 - Enterprise DB Postgres Advanced Server (EPAS)
 - [IBM Db2](#)
- Addons for Network File System
 - [Network File System \(NFS\)](#)
- Addons for Virtualization
 - [KVM \(Kernel-based Virtual Machine\)](#)
- Addons for Business Applications
 - [SAP NetWeaver](#)

4.1 Serviceguard Addon for SAP

4.1.1 SAP NetWeaver-based Applications

SAP kernel versions	Serviceguard E5/E7 and SAP Add-On	Supported Linux Distro	Notes
7.81, 7.85, 7.89 7.73, 7.77 7.50, 7.51, 7.52, 7.53, 7.54 7.40, 7.41, 7.42, 7.45, 7.49 7.20, 7.20_EXT, 7.21, 7.22	A.15.00.00 and later	SLES 15 <i>uptoSP5</i> SLES 12 <i>uptoSP5</i> RHEL 9 <i>9.0 to 9.1</i> RHEL 8 <i>8.1 to 8.8</i>	<ul style="list-style-type: none"> • Serviceguard Extension for SAP for Linux (HPE SGeSAP/LX) clusters SAP NetWeaver-based SAP applications based on the NetWeaver kernel versions mentioned to the left. In particular, coverage includes but is not restricted to support for clusters with S/4 HANA 1809, 1909, 2020, 2021 and 2022 applications. • SAP Enqueue Server Architecture (ENSA) 1 and 2 are supported. • The combination with HPE Serviceguard Flex Storage Add-on is supported for NetWeaver Instance directories. • All NetWeaver directories can be based on the HPE Serviceguard NFS Add-On in combination with or without the HPE Serviceguard Flex Storage Add-On. • The Linux Distro listed is applicable for the respective SUSE Linux Enterprise Server for SAP Applications (SLES4SAP) and Red Hat Enterprise Linux for SAP Applications (RHEL4SAP).

4.1.2 SAP HANA Two-Instance Scale-Up System Replication (2nsu)

SAP HANA SPS / revisions	Serviceguard E5/E7 and SAP Add-On	Supported Linux Distro	Notes
SAP HANA2 SPS05 revisions SAP HANA2 SPS06 revisions SAP HANA2 SPS07 revisions	A.15.00.00 and later	SLES 15 <i>uptoSP5</i> SLES 12 <i>uptoSP5</i> RHEL 8 <i>8.1 to 8.8</i> RHEL 9 <i>9.0</i>	<ul style="list-style-type: none"> • The Linux Distro listed is applicable for the respective SUSE Linux Enterprise Server for SAP Applications (SLES4SAP) and Red Hat Enterprise Linux for SAP Applications (RHEL4SAP).

4.1.3 SAP HANA Multi-Target Scale-Up System Replication (3nsu/4nsu)

SAP HANA SPS / revisions	Serviceguard E7 and SAP Add-On	Supported Linux Distro	Notes
<p>SAP HANA2 SPS05 revisions¹</p> <p>SAP HANA2 SPS06 revisions¹</p> <p>SAP HANA2 SPS07 revisions¹</p>	A.15.00.00 and later	<p>SLES 15 <i>uptoSP5</i></p> <p>SLES 12 <i>uptoSP5</i></p> <p>RHEL 8 <i>8.1 to 8.8</i></p> <p>RHEL 9 <i>9.0</i></p>	<ul style="list-style-type: none"> • Serviceguard Extension for SAP for Linux (HPE SGeSAP/LX) clusters three (or four) SAP HANA scale-up instances of the same SAP System using two tier-2 HANA System Replications. The optional fourth instance will be added in tier-3. • The Linux Distro listed is applicable for the respective SUSE Linux Enterprise Server for SAP Applications (SLES4SAP) and Red Hat Enterprise Linux for SAP Applications (RHEL4SAP).

Notes:

¹Does not support the features Multi-SID and Safesync.

4.1.4 SAP HANA Two-Instance Scale-Out System Replication (2nsu)

SAP HANA SPS / revisions	Serviceguard E7 and SAP Add-on	Supported Linux Distro	Notes
<p>SAP HANA2 SPS05 revisions¹</p> <p>SAP HANA2 SPS06 revisions¹</p> <p>SAP HANA2 SPS07 revisions¹</p>	A.15.00.00 and later	<p>SLES 15 <i>uptoSP5</i></p> <p>SLES 12 <i>uptoSP5</i></p> <p>RHEL 8 <i>8.1 to 8.8</i></p> <p>RHEL 9 <i>9.0</i></p>	<ul style="list-style-type: none"> • The SAP Add-on handles complete scale-out instance failures for DR purposes. It can be combined with SAP auto host failover to also provide HA via redundancy to instance nodes. • The Linux Distro listed is applicable for the respective SUSE Linux Enterprise Server for SAP Applications (SLES4SAP) and Red Hat Enterprise Linux for SAP Applications (RHEL4SAP).

Notes:

¹ Does not support more than one clustered HANA scale-out system per cluster. Multiple HANA scale-up systems can be combined with a single scale-out system as part of the same cluster.

4.1.5 Legacy Databases for SAP NetWeaver

Database Version	Serviceguard E5/E7 and SAP Add-on	Notes
SAP Sybase ASE 16.0 SP4, SP3	A.15.00.00 and later	<ul style="list-style-type: none">• SAP use case-specific implementations of cluster packages for several legacy database technologies can optionally be used for the single-instance database technologies listed to the left. No additional Serviceguard database add-on is required.
IBM DB/2 11.1, v11.5		
Oracle RDBMS 12cR1, 12cR2, 19c		
SAP MAXDB/liveCache 7.9		

4.2 Serviceguard Addon for Oracle

Application Version	Serviceguard E5/E7 and Oracle Add-on	Notes
<p>12c, 18c, 19c, 21c</p>	<p>A.15.00.00 and later</p>	<p>Supported Features</p> <ul style="list-style-type: none"> • Oracle Single Instance • Oracle ASM • Oracle ASM Mirroring • Oracle Dataguard. <ul style="list-style-type: none"> • Two standby solution • Protected DB replica • Farsync monitoring • Read IP management • HPE Application Tuner Express (ATX) version 1.0.1-84 or later. • Failover of Oracle Multitenant Container Database (CDB) on failure of specified critical Pluggable databases configured in CDB. • Multitenant Container Database (CDB). • Support for Zerto tagging. <p>Note: The CDB can have multiple Pluggable Databases (PDB). Serviceguard will start, stop and monitor the PDB's. In case of PDB failure Serviceguard will only issue log warnings and e-mail alerts (if configured). No failover will be initiated. Failover will be initiated only in case of CDB failure.</p>

4.3 Serviceguard Addon for Microsoft SQL Server on Linux

Application Version	Serviceguard E5/E7 and MSSQL Add-on	Notes
SQL Server 2019 on Linux, SQL Server 2022 on Linux	A.15.00.00 and later	<ul style="list-style-type: none">• Support for Always ON Availability Groups (AG) and Always ON Failover Cluster Instance (FCI) for SQL Server on Linux <p>NOTE:</p> <ul style="list-style-type: none">• Not supported on OL.

4.4 Serviceguard Addon for Sybase ASE and SAP Sybase Replication

Application Version	Serviceguard E5/E7	Notes
Sybase ASE 16.x Sybase Replication Server 16.x Sybase ASE 15.7.0, 15.7.1 ESD#2 ESD#3 or ESD#4 or SP110 and SP120 Sybase Replication Server 15.7.1 ESD#2	A.15.00.00 and later	<ul style="list-style-type: none">• Sybase ASE Standalone (single instance, non-Cluster Edition) supported.• Sybase Replication Server is supported only with SGeSAP and Sybase ASE. NOTE: <ul style="list-style-type: none">• Not supported on OL

4.5 Serviceguard Addon for Enterprise DB Postgres Advanced Server (EPAS)

Application Version	Serviceguard E5/E7	Notes
15.x 14.x 13.x 12.x 11.x	A.15.00.00 and later	NOTE: <ul style="list-style-type: none">• Not supported on OL

4.6 Serviceguard Addon for IBM Db2

Application Version	Serviceguard E5/E7	Notes
11.x 10.x	A.15.00.00 and later	NOTE: <ul style="list-style-type: none">• Not supported on OL

4.7 Serviceguard Addon for NFS

Application Version	Serviceguard E5/E7 and NFS Add-on	
v2, v3, v4	A.15.00.00 and later	

4.8 Serviceguard Addon for KVM

Application Version	Serviceguard E5/E7	Notes
RHEL8	A.15.00.00 and later	<ul style="list-style-type: none">• Live Migration not supported NOTE: <ul style="list-style-type: none">• Not supported on OL.
RHEL9		
SLES12		
SLES15		

5 Serviceguard Storage Extensions

Serviceguard supports several High Availability / Disaster Recovery solutions to deploy different applications in Serviceguard cluster. Following solutions are available with Serviceguard,

- DR Solutions based on Host Based Mirroring
 - [MD \(Multiple Devices\) device driver](#)
 - [LVM mirroring](#)
 - [VxVM mirroring](#)
- HA/DR solutions based on Array based replication
 - [3PAR Remote Copy](#)
 - [Primer Remote Copy](#)
 - [XP Continuous Access](#)
- DR solutions based on Backup and Recovery Software
 - [Zerto](#)

Notes:

The only supported cluster arbitration mechanism is Quorum Server or arbitrator nodes at the Third Site. Cluster Lock LUN, Cluster Lock Disk, Dual Lock Disk is not supported.

5.1 Extended Distance Clusters (XDC)

The following section provides compatibility information about various host-based mirroring software that can be used for replication in a Serviceguard Extended Distance Cluster (XDC).

Mirroring Technology	Serviceguard E5/E7	Notes
MD RAID RAID 1	A.15.00.00 and later	<ul style="list-style-type: none">• VxVM RAID1 is supported only on physical systems.
LVM RAID 1		
VxVM RAID 1		

5.2 HA/DR solutions with 3PAR Remote Copy

3PAR Inform OS	Serviceguard E5/E7	Notes
3.3.x	A.15.00.00 and later	<p>Supported HPE 3PAR features</p> <ul style="list-style-type: none"> • 3PAR Synchronous Long Distance (SLD) replication with Inform OS 3.3.x • 3PAR Peer Persistence • 3PAR Asynchronous Streaming Mode • Synchronous Replication mode • Fully Provisioned and Thinly Provisioned Virtual Volumes • 3PAR Virtual Domains • Support for Asynchronous Periodic Replication mode • N-1 or 1-N Remote Copy Configuration with below mentioned condition: • In a N-1 or 1-N Remote Copy topology, 3PAR allows only one of the pairs to be bi-directional, rest of the pairs will be unidirectional. 3Par recommends not to use the unidirectional pairs for Disaster Recovery. So, one can configure Automatic or Push Button DR only between the arrays that are in a bidirectional configuration within a N-1 or 1-N Remote Copy setup. • 3PAR Remote Copy Failsafe mode is supported from Inform OS version
3.2.x	A.15.00.00 and later	<p>Restrictions & Unsupported Configurations</p> <ul style="list-style-type: none"> • Asynchronous streaming remote copy mode not supported with Inform OS 3.2.2 & earlier. • Unidirectional Remote Copy configuration • 3PAR Remote Copy volume groups configured with fail_wrt_on_err policy. • Command preview "cmdprev" not supported

1. This table represents what has been certified and is supported. If other storage, firmware or software versions are available but not indicated in this table, it is currently not supported. The table will be updated when new versions are certified.
2. Refer to 3PAR documentation to get information on supported versions of HP 3PAR Inform OS CLI on respective Operating Systems.
3. Note: mu refers to maintenance update.
4. Note: 3PAR arrays allow a maximum 64 to 256 CLI connections based on array model and InformOS version. Serviceguard uses CLI for array communication. Each package needs at least one CLI session. Please refer to your 3PAR array documentation for maximum supported CLI sessions. Ensure that sufficient CLI sessions will be available for packages during failover. Refer to the section "**Managing CLI Connections to 3PAR array**" in the manual for more information.

5.3 HA/DR Solutions with Primera Remote Copy

Alletra 9000/ Primera Inform / OS	Serviceguard E5/E7	Notes
<p>Primera 4.2, 4.3, 4.4, 4.5</p> <p>Alletra 9000 9.3, 9.4, 9.5</p>	<p>A.15.00.00 and later</p>	<p>Supported HPE Primera/ HPE Alletra 9000</p> <ul style="list-style-type: none"> • A package can be configured with Remote Copy replication with mixed storage arrays i.e., HPE Primera, HPE Alletra 9000, HPE 3PAR storage arrays. Refer to support matrix of respective storage arrays for specific details • Synchronous Long Distance (SLD) replication • Peer Persistence • Asynchronous periodic mode • Fully Provisioned and Thinly Provisioned Virtual Volumes • Virtual Domains • Support for Asynchronous Periodic Replication mode <p>Restrictions & Unsupported Configurations</p> <ul style="list-style-type: none"> • Unidirectional Remote Copy configuration • DRR feature is not supported with Inform OS 4.3 for Primera, and Alletra OS 9.3 for Alletra 9000 (due to defect 332839)

5.4 HA/DR Solutions with XP Continuous Access

RAID Manager Version ¹	Serviceguard E5/E7	Notes
XP Arrays: - 01.22.06 or later	A.15.00.00 and later	<ul style="list-style-type: none"> • Continuous Access Synchronous replication • Continuous Access Journal replication • Continuous Access Asynchronous replication with XP arrays • Device Group Monitor • Data Replication Storage Failover Preview (cmdrprev command) • Remote Command Device • Virtual Command Device
P9500 arrays: - 01.24.13 or later ²		<p>Not supported:</p> <ul style="list-style-type: none"> • Site Controller packages • Three Data Center Disaster Recovery (3DC DR) solution • VxVM and VxFS

Notes:

¹This table represents what has been certified and is supported. If other storage, microcode or Raid Manager versions are available but not indicated in this table, it is currently not supported by Serviceguard with Continuous Access for P9000 and XP. Following XP/P9000 Platform are supported and refer to HPE XP storage documents for certified version of Raid Manager & Microcode version details.

- XP20000/XP24000
- P9500
- XP7, XP8

²The following features introduced in HP Storage P9000 RAID Manager are not supported with Serviceguard: Virtual Command Device via LAN, Copy Group configuration based on RAID, User Authentication based on Command Device. The User Authentication for the Command Device Security must be disabled in Serviceguard DR environment with XP.

5.5 DR Solutions with Zerto

Zerto Version	Serviceguard E7	Notes
9.0	A.15.00.00 and later	Supported Features <ul style="list-style-type: none"> • Push Button Recovery

6 Serviceguard Manager +

HPE Serviceguard for Linux supports single pane of view for workloads using a new GUI Serviceguard Manager +(SGMGR+). This new UI enables management, rehearsal, recovery, mobility, and monitoring of workloads.

The following conditions apply:

Supported Linux OS Versions

SGMGR+ Version	Linux ¹ (x86_64)	Supported Node.js & npm Version	Supported PostgreSQL Version
15.10.00 15.00.00	RHEL 8	<i>8.6 and later</i>	12 or later
	RHEL 9	<i>9.1 and later</i>	
	SLES 12	<i>SP5</i>	
	SLES 15	<i>SP2 and later</i>	
		Node.js 12.20 and later npm 6 and later	

¹In case of OS listed in [Linux Distributions and Errata](#) and not part of this table, as long as the required versions of Node.js, npm and PostgreSQL are installed, SGMGR+ will function properly.

Serviceguard For Linux Flex Storage Add-on Edition

The following section provides compatibility information for HPE Serviceguard for Linux Flex Storage Add-on. HPE Serviceguard for Linux Flex Storage Add-on provides HPE Software based storage replication solution using DRBD for non-shared storages. DRBD is a software-based, shared-nothing, replicated storage solution for replicating data on block devices (hard disks, partitions, logical volumes etc.) between SGLX cluster nodes.

HPE Serviceguard for Linux Flex Storage Add-on B.1.x.y

The following sections describes the compatible SGLX versions, Operating System distributions and kernel errata supported with Serviceguard for Linux Flex Storage Add-on. The following conditions apply:

- Only x86_64 bit Operating Systems supported
- For the listed Operating systems distribution versions (major and minor), all the kernel erratas are supported unless explicitly specified within one month of its release
- All cluster nodes must have the same OS distribution
- Supports up to three DRBD replicas

Note:

If the underlying OS or hypervisor or application or storage are out of regular support phase by the vendor then supporting those environment will only be on the best effort basis. HPE is not obliged to support such versions or provide proactive fixes on those **unsupported versions. Some vendors offer extended support phases and those are excluded in the definition of "regular support"**.

Flex Storage Add-On Ver. B.1.10.0

Minimum SGLX Version	Supported Linux Distro	DRBD Versions
A.15.00.00	RHEL 9.0	9.2.2 9.1.13
	RHEL 8.7 ²	9.2.2 9.1.13
	RHEL 8.6	9.2.2 9.1.13
	RHEL 8.5	9.2.2 9.1.13
	RHEL 8.4 ¹	9.2.2 9.1.13 9.0.30
	RHEL 8.3	9.2.2 9.1.13 9.0.30
	RHEL 8.2	9.2.2 9.1.13 9.0.30
	RHEL 8.1	9.2.2 9.1.13 9.0.30
	SLES 15 SP4	9.2.3 9.1.14
	SLES 15 SP3	9.2.3 9.1.14 9.0.30
	SLES 15 SP2	9.2.3 9.1.14 9.0.30
	SLES 15 SP1	9.2.3 9.1.14 9.0.30
	SLES 15 SP0	9.2.3 9.1.14 9.0.30
	SLES 12 SP5	9.2.3 9.1.14 9.0.30
	SLES 12 SP4	9.2.3 9.1.14 9.0.30
	SLES 12 SP3	9.2.3 9.1.14 9.0.30

²Minimum kernel version required is 4.18.0_425.10.1

¹Minimum kernel version required is 4.18.0-305.72.1

Flex Storage Add-On Ver. B.1.0.0

Minimum SGLX Version	Supported Linux Distro	DRBD Versions
A.15.00.00	RHEL 8.4 ¹	9.0.30 9.1.3
	RHEL 8.3	9.0.30 9.1.3
	RHEL 8.2	9.0.30 9.1.3
	RHEL 8.1	9.0.30 9.1.3
	SLES 15 SP3	9.0.30 9.1.3
	SLES 15 SP2	9.0.30 9.1.3
	SLES 15 SP1	9.0.30 9.1.3
	SLES 15 SP0	9.0.30 9.1.3
	SLES 12 SP5	9.0.30 9.1.3
	SLES 12 SP4	9.0.30 9.1.3
	SLES 12 SP3	9.0.30 9.1.3

¹Minimum kernel version required is 4.18.0-305.72.1