ONE IDENTITY™

One Identity Safeguard for Privileged Sessions 5 LTS

Installation Guide

Contents

Preface

Welcome to the One Identity Safeguard for Privileged Sessions 5 LTS Installation Guide.

This document describes how to set up the One Identity Safeguard for Privileged Sessions (SPS) hardware, and how to install SPS on certified hardware or as a virtual appliance.

Summary of contents

Chapter 1, *Introduction* provides background information and describes the main purpose of the One Identity Safeguard for Privileged Sessions Installation Guide.

Chapter 2, *Package contents inventory* lists the contents of the package you receive with the One Identity Safeguard for Privileged Sessions (SPS).

Chapter 3, *One Identity Safeguard for Privileged Sessions Hardware Installation Guide* describes how to set up the SPS hardware.

Chapter 4, *Hardware specifications* describes the hardware specifications of the SPS appliance.

Chapter 5, *One Identity Safeguard for Privileged Sessions Software Installation Guide* describes how to install SPS on certified hardware.

Chapter 6, *One Identity Safeguard for Privileged Sessions VMware Installation Guide* describes how to install SPS as a VMware virtual appliance.

Chapter 7, *One Identity Safeguard for Privileged Sessions Hyper-V Installation Guide* describes how to install One Identity Safeguard for Privileged Sessions (SPS) as a Hyper-V virtual appliance.

Chapter 8, *Installing One Identity Safeguard for Privileged Sessions as a Kernel-based Virtual Machine* describes how to install One Identity Safeguard for Privileged Sessions (SPS) as a Kernel-based Virtual Machine.

Chapter 9, *Deploying One Identity Safeguard for Privileged Sessions from the Azure Marketplace* describes how to install One Identity Safeguard for Privileged Sessions (SPS) from the Microsoft Azure Marketplace.

For details on the End User License Agreement applicable to SPS products, see Software Transaction, License and End User License Agreements.

Introduction

The aim of this guide is to provide detailed, step-by-step instructions on how to set up and install One Identity Safeguard for Privileged Sessions on unpacking it and any subsequent occasions that might require the re-installation of the product.

Note that the contents of this document were previously included in the One Identity Safeguard for Privileged Sessions - Technical Documentation. This standalone guide was created to:

- Improve how information is organized in the One Identity Safeguard for Privileged Sessions documentation set.

- Make it easier for users to find information relevant to their roles, context, and how they use the product.

Package contents inventory

Carefully unpack all server components from the packing cartons. The following items should be packaged with the One Identity Safeguard for Privileged Sessions:

- A One Identity Safeguard for Privileged Sessions appliance, pre-installed with the latest One Identity Safeguard for Privileged Sessions firmware.
- One Identity Safeguard for Privileged Sessions accessory kit, including the following:
  - One Identity Safeguard for Privileged Sessions 5 LTS Packaging Checklist (this document).
  - GPL v2.0 license.
- Rack mount hardware (depending on appliance type).
- Power cable.

The default BIOS and IPMI passwords are in the documentation.

One Identity Safeguard for Privileged Sessions Hardware Installation Guide

This document describes how to set up the One Identity Safeguard for Privileged Sessions (SPS) hardware. Refer to the following documents for step-by-step instructions:

- *One Identity Safeguard for Privileged Sessions T-1*: see the *SC512 Chassis Series User's Manual, Chapter 6: Rack Installation*, available online at http://www.supermicro.com/manuals/chassis/1U/SC512.pdf.

- *One Identity Safeguard for Privileged Sessions T-4*: see the *SC815 Chassis Series User's Manual, Chapter 6: Rack Installation*, available online at http://www.supermicro.com/manuals/chassis/1U/SC815.pdf.

- *One Identity Safeguard for Privileged Sessions T-10*: see the *SC219 Chassis Series User's Manual, Chapter 5: Rack Installation*, available online at http://www.supermicro.com/manuals/chassis/2U/SC219.pdf.

- For details on how to install a single SPS unit, see Installing the SPS hardware.

- For details on how to install a two SPS units in high availability mode, see Installing two SPS units in HA mode.

Installing the SPS hardware

Purpose:

To install a single SPS unit, complete the following steps.

Steps:

1. Unpack SPS.
2. *Optional step*: Install SPS into a rack with the slide rails. Slide rails are available for all SPS appliances.
3. Connect the cables.

a. Connect the Ethernet cable facing your LAN to the Ethernet connector labeled as *1*. This is physical interface 1 of SPS. This interface is used for the initial configuration of SPS, and for monitoring connections. (For details on the roles of the different interfaces, see One Identity Safeguard for Privileged Sessions - Technical Documentation.)

b. *Optional step:* To use SPS across multiple physical (L1) networks, you can connect additional networks using physical interface 2 (Ethernet connector *2*) and physical interface 3 (Etherner connector *3*).

c. Connect an Ethernet cable that you can use to remotely support the SPS hardware to the *IPMI* interface of SPS. For details, see the following documents:

For SPS T4 and T10, see the X9 SMT IPMI User's Guide. For SPS T1, see the SMT IPMI User's Guide.

> ⚠ **CAUTION:**
>
> **Connect the IPMI before plugging in the power cord. Failing to do so will result in IPMI failure.**

It is not necessary for the IPMI interface to be accessible from the Internet, but the administrator of SPS must be able to access it for support and troubleshooting purposes in case vendor support is needed. The following ports are used by the IMPI interface:

- Port 623 (UDP): IPMI (cannot be changed)
- Port 5123 (UDP): floppy (cannot be changed)
- Port 5901 (TCP): video display (configurable)
- Port 5900 (TCP): HID (configurable)
- Port 5120 (TCP): CD (configurable)
- Port 80 (TCP): HTTP (configurable)

Access to information available only via the IPMI interface is not mandatory, but highly recommended to speed up the support and troubleshooting processes.

d. *Optional step:* Connect the Ethernet cable connecting SPS to another SPS node to the Ethernet connector labeled as *4*. This is the high availability (HA) interface of SPS. (For details on the roles of the different interfaces, see One Identity Safeguard for Privileged Sessions - Technical Documentation.)

e. *Optional step:* The T-10 appliance is equipped with a dual-port SFP+ interface card labeled A and B. Optionally, connect a supported SFP+ module to these interfaces.

> ⓘ NOTE:
>
> For a list of compatible connectors, see Linux Base Driver for 10 Gigabit Intel Ethernet Network Connection. Note that SFP transceivers encoded for non Intel hosts may be incompatible with the Intel 82599EB host

chipset found in SPS.

4. Power on the hardware.

5. Change the BIOS password on the One Identity Safeguard for Privileged Sessions. The default password is **ADMIN** or **changeme**, depending on your hardware.

6. Change the IPMI password on the One Identity Safeguard for Privileged Sessions. The default password is **ADMIN** or **changeme**, depending on your hardware.

   🛈 NOTE:

   Ensure that you have the latest version of IPMI firmware installed. If you need assistance, contact our Support Team.

   To change the IPMI password, connect to the IPMI remote console.

   🛈 NOTE:

   If you encounter issues when connecting to the IPMI remote console, add the DNS name or the IP address of the IPMI interface to the exception list (whitelist) of the Java console. For details on how to do this, see the Java FAQ entry titled How can I configure the Exception Site List?.

7. Following boot, SPS attempts to receive an IP address automatically via DHCP. If it fails to obtain an automatic IP address, it starts listening for HTTPS connections on the *192.168.1.1* IP address.

   To configure SPS to listen for connections on a custom IP address, complete the following steps:

   a. Access SPS from the local console, and log in with username *root* and password *default*.

   b. In the Console Menu, select **Shells > Core shell**.

   c. Change the IP address of SPS:

      `ifconfig eth0 <IP-address> netmask 255.255.255.0`

      Replace **<IP-address>** with an IPv4 address suitable for your environment.

   d. Set the default gateway using the following command:

      `route add default gw <IP-of-default-gateway>`

      Replace **<IP-of-default-gateway>** with the IP address of the default gateway.

   e. Type `exit`, then select **Logout** from the Console Menu.

8. Connect to the SPS web interface from a client machine and complete the Welcome Wizard as described in One Identity Safeguard for Privileged Sessions - Technical Documentation.

   🛈 NOTE:

   The One Identity Safeguard for Privileged Sessions - Technical Documentation is available on the One Identity Documentation page.

Procedure 3.2. Installing two SPS units in HA mode

Purpose:

To install SPS with high availability support, complete the following steps.

Steps:
1. For the first SPS unit, complete Installing the SPS hardware.

2. For the second SPS unit, complete Steps 1-3 of Installing the SPS hardware.

3. Connect the two units with an Ethernet cable via the Ethernet connectors labeled as *4*.

4. Power on the second unit.

5. Change the BIOS and IPMI passwords on the second unit. The default password is `ADMIN` or `changeme`, depending on your hardware.

6. Connect to the SPS web interface of the first unit from a client machine and enable the high availability mode. Navigate to **Basic Settings > High Availability** . Click **Convert to Cluster**, then reload the page in your browser.

7. Click **Reboot Cluster**.

8. Wait until the slave unit synchronizes its disk to the master unit. Depending on the size of the hard disks, this may take several hours. You can increase the speed of the synchronization via the SPS web interface at **Basic Settings > High Availability > DRBD sync rate limit**.

Installing two SPS units in HA mode

Purpose:

To install SPS with high availability support, complete the following steps.

Steps:
1. For the first SPS unit, complete Installing the SPS hardware.

2. For the second SPS unit, complete Steps 1-3 of Installing the SPS hardware.

3. Connect the two units with an Ethernet cable via the Ethernet connectors labeled as *4*.

4. Power on the second unit.

5. Change the BIOS and IPMI passwords on the second unit. The default password is `ADMIN` or `changeme`, depending on your hardware.

6. Connect to the SPS web interface of the first unit from a client machine and enable the high availability mode. Navigate to **Basic Settings > High Availability** . Click **Convert to Cluster**, then reload the page in your browser.

7. Click **Reboot Cluster**.

8. Wait until the slave unit synchronizes its disk to the master unit. Depending on the size of the hard disks, this may take several hours. You can increase the speed of the

synchronization via the SPS web interface at **Basic Settings > High Availability > DRBD sync rate limit**.

Hardware specifications

SPS appliances are built on high performance, energy efficient, and reliable hardware that are easily mounted into standard rack mounts.

Table 4.1. Hardware specifications

Product	Redundant PSU	Processor	Memory	Capacity	RAID	IPMI
SPS T-1	No	Intel(R) Xeon(R) X3430 @ 2.40GHz	2 x 4 GB	2 x 1 TB	Software RAID	Yes
SPS T-4	Yes	Intel(R) Xeon(R) E3-1275V2 @ 3.50GHz	2 x 4 GB	4 x 2 TB	LSI MegaRAID SAS 9271-4i SGL	Yes
SPS T-10	Yes	2 x Intel(R) Xeon(R) E5-2630V2 @ 2.6GHz	8 x 4 GB	13 x 1 TB	LSI 2208 (1GB cache)	Yes

One Identity Safeguard for Privileged Sessions Software Installation Guide

This document describes how to install the One Identity Safeguard for Privileged Sessions (SPS) software on a certified hardware. The list of certified hardware is available at One Identity.

Note that installing and reinstalling SPS can take a long time, especially for a HA cluster. There are no supported workarounds for reducing the necessary downtime. One Identity recommends testing SPS in a virtual environment, and using physical hardware only for verifying HA functionality and measuring performance.

Installing the SPS software

Prerequisites:

When installing SPS on a physical hardware, make sure that you use a One Identity-supported appliance, and that every hard disk required for the particular appliance is inserted. Installing SPS without the required number of hard disks can cause erroneous behavior.

Purpose:

To install a new SPS on a server, complete the following steps:

Steps:

1. Login to your MyDownloads account and download the latest One Identity Safeguard for Privileged Sessions installation ISO file. Note that you need to have partner access to download One Identity Safeguard for Privileged Sessions ISO files. If you are a partner but do not see the ISO files, contact our Support Team.

2. Mount the ISO image, or burn it to a CD-ROM.

3. Connect your computer to the *IPMI* interface of SPS. For details, see the following

documents:

For SPS T4 and T10, see the X9 SMT IPMI User's Guide. For SPS T1, see the SMT IPMI User's Guide.

4. Power on the server.

5. Login to the IPMI web interface, and boot the One Identity Safeguard for Privileged Sessions installation CD on the server using a virtual CD-ROM. For details, see the following documents:

   For SPS T4 and T10, see the X9 SMT IPMI User's Guide. For SPS T1, see the SMT IPMI User's Guide.

6. When the One Identity Safeguard for Privileged Sessions installer starts, select **Installer**, press Enter, and wait until the server finishes the boot process.

   > **TIP:**
   >
   > For testing purposes, you can speed up installation at the expense of slowing down RAID synchronization. Add the following kernel parameter to **Installer** in GRUB:
   >
   > `lazy_itable_init=true`
   >
   > This option defers full filesystem initialization, requiring the kernel to finish it during RAID synchronization, which slows that process down considerably. This is not recommended in a production environment.

7. Installing SPS will completely delete the contents of the hard disks. If you want to proceed installing SPS, enter **YES** to start the installation process. Depending on the size of the disks, the installation process takes from a few minutes to an hour to complete.

   > **CAUTION:**
   >
   > **Hazard of data loss! All data on the disks will be deleted.**

8. The installer displays the following message: **Waiting for RAID sync...**, and starts to synchronize the disks of SPS.

   - You are recommended to wait until the synchronization finishes. RAID synchronization is a two-step process, the progress of the active step is indicated on the progress bar. Wait until both steps are completed. Note that this synchronization takes several hours, depending on the size of the hard disks (about 8 hours on the average).

   - To skip the RAID synchronization, press **Ctrl+Alt+Delete** to reboot SPS. Note that the system will automatically perform the synchronization after the first boot, but in this case the process will take several days.

9. When the installation is finished, the `Installation finished successfully` message is displayed. Unmount the installation media, then press **Ctrl+Alt+Delete** to reboot SPS. Wait until the system reboots and displays the IP address it accepts management connections on.

10. **If you are installing the slave node of a SPS cluster, skip this step.** Enter

the IP address displayed in the previous step into your browser and verify that the Welcome Wizard of the One Identity Safeguard for Privileged Sessions is available. (If you have to create an alias IP address for your computer that falls into the *192.168.1.0/24* subnet (for example *192.168.1.10*), see One Identity Safeguard for Privileged Sessions - Technical Documentation.)

> ℹ NOTE:
>
> For details on the supported web browsers and operating systems, see One Identity Safeguard for Privileged Sessions - Technical Documentation.

Figure 5.1. The Welcome Wizard
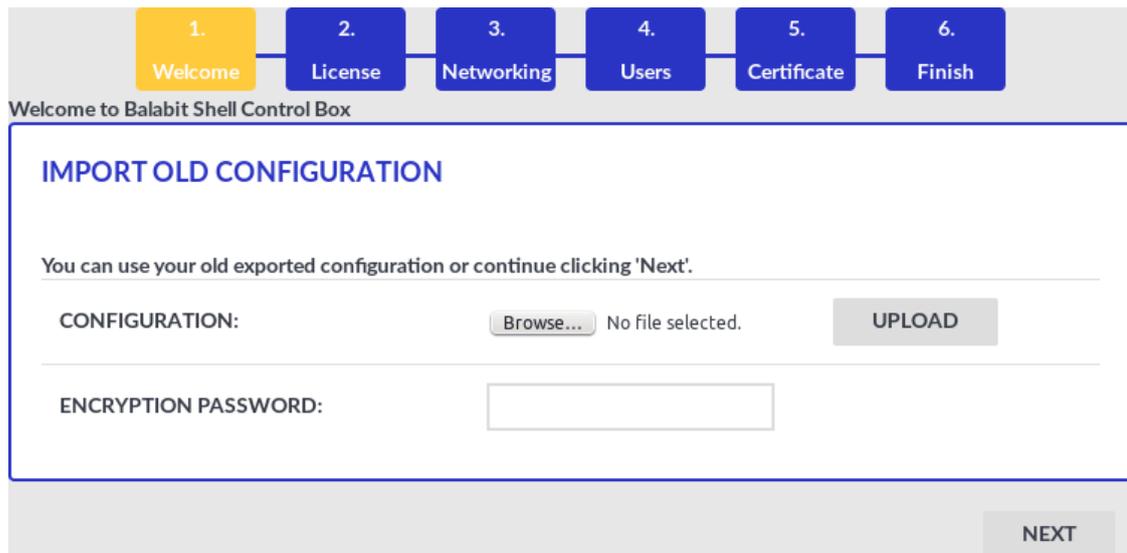
11. Power off the system.

One Identity Safeguard for Privileged Sessions VMware Installation Guide

This tutorial describes the possibilities and limitations of installing One Identity Safeguard for Privileged Sessions (SPS) 5 LTS as a virtual appliance under a VMware ESXi server.

Limitations of SPS under VMware

The following limitations apply to running version 5 LTS of SPS under VMware:

- SPS can be installed under the following VMware versions:
    - VMware ESXi 5.5 or later.
    - VMware ESXi 6.0 or later.
    - VMware ESXi 6.5 or later.
- SPS can only use fixed disk space assigned to the virtual host, it is not possible to use on-demand disk allocation scenarios. To increase the size of the virtual disk, see Procedure 10.1, "Modifying the disk size of a SPS virtual appliance".
- If High Availability (HA) operation mode is required in a virtual environment, use the HA function provided by the virtual environment.
- Hardware-related alerts and status indicators of SPS may display inaccurate information, for example, display degraded RAID status.

Installing SPS under VMware ESXi/ESX

Purpose:

To install a new SPS under VMware ESXi or ESX, complete the following steps:

Steps:

1. Create the virtual machine for SPS using the following settings. Note that these settings are suitable for evaluation purposes. To test SPS under significant load, contact One Identity for recommendations.

   - Guest operating system: **Linux/Ubuntu 64-bit**

   - Allocate memory for the virtual machine. SPS requires a minimum of 4 GiB of memory. The recommended size for the memory depends on the exact environment, but consider the following:

     - The base system requires 4 GiB of memory.

     - SPS requires about 1-5 MiB of memory for every active connection, depending on the type of the connection — graphical protocols require more memory.

   - The hard disk controller must be **LSI Logic Parallel**.

   - Do not use RAID for the hard disk, use the data duplication features of your virtual environment instead. That way, a single hard disk is sufficient for the system. If you need to use the built-in RAID support of SPS for some reason, use two hard disks, and SPS will automatically use them in software RAID.

     > ⚠ **CAUTION:**
     >
     > **Hazard of data loss! When you install or reinstall SPS in a virtual environment, always create new hard disks. Using existing hard disks can cause unexpected behavior and operational problems.**

   - Configure a fixed size disk with at least 8 GiB space. About 5 GiB is required for the base system, the remaining disk space is used to store data. To increase the initial disk size, see Procedure 10.1, "Modifying the disk size of a SPS virtual appliance".

   - SPS requires 4 network cards, all of them must be **VMXNET3**.

     > ⓘ NOTE:
     >
     > SPS will use the network card with the lowest PCI ID as eth0 (`Physical interface 1`), the card with the second lowest PCI ID as eth1 (the `Physical interface 2`), and so on. In some cases, this might differ from the labels in the VMWare management interface, for example, it is possible that eth0 will be labeled as `Network adapter 4`, and as a result, the SPS Welcome Wizard will not be available on `Network adapter 1`.

     Enable, but do not attach the fourth (eth3) network card to a network.

   - To index connections without significant delay, add two CPU cores to the virtual machine. Note that these settings are suitable for evaluation purposes. To test SPS under significant load, contact One Identity for recommendations. The resource requirements of indexing depend heavily on the amount and type of the indexed traffic, and can also require using external indexer hosts (for details on external indexers, see One Identity Safeguard for Privileged

Sessions - Technical Documentation).

2. After creating the virtual machine, edit the settings of the machine. Set the following options:

    a. Under **Options > VMware Tools** enable the **Shutdown, Suspend, Reset** options, otherwise the SPS administrator will not be able to access these functions from the SPS web interface.

    b. Under **Options > Boot options** enable the **Force BIOS Setup** option. This is required to be able to check the system time (and modify it if needed) before installing SPS.

3. Login to your MyDownloads account and download the latest One Identity Safeguard for Privileged Sessions installation ISO file. Note that you need to have purchased SPS as a virtual appliance or have partner access to download One Identity Safeguard for Privileged Sessions ISO files. If you are a partner but do not see the ISO files, contact our Support Team.

4. Mount the ISO image and boot the virtual machine. Follow the on-screen instructions to install SPS.

One Identity Safeguard for Privileged Sessions Hyper-V Installation Guide

This tutorial describes the possibilities and limitations of installing One Identity Safeguard for Privileged Sessions (SPS) 5 LTS as a virtual appliance under a Hyper-V server.

Limitations of SPS under Hyper-V

Version 5 LTS of SPS has no special support for running under Hyper-V. While the basic functionality of SPS is not affected by running as a virtual appliance, the following limitations apply:

- If High Availability (HA) operation mode is required in a virtual environment, use the HA function provided by the virtual environment.

- Hardware-related alerts and status indicators of SPS may display inaccurate information, for example, display degraded RAID status.

- When running SPS under Microsoft Hyper-V, ensure that the network interfaces are actually connected to the network. When running under Hyper-V, SPS indicates on the **Basic Settings > Network > Ethernet links** page that there is a link even if the network interface is configured and enabled, but not connected to the network.

- When rebooting SPS in Hyper-V, the following critical error message may appear in the event log of the Hyper-V host:

  `<Virtual machine name>` was reset because an unrecoverable error occurred on a virtual processor that caused a triple fault.

  This is normal, there is no problem with SPS. For details, see Triple fault in event log shows reset of Linux virtual machines.

Installing SPS under Hyper-V

Purpose:

To install a new SPS under Hyper-V, complete the following steps:

Steps:

1. Create the virtual machine for SPS using the following settings. Note that these settings are suitable for evaluation purposes. To test SPS under significant load, contact One Identity for recommendations.

   - Choose **Generation 1** for the virtual machine.

   - Allocate memory for the virtual machine. SPS requires a minimum of 4 GiB of memory. The recommended size for the memory depends on the exact environment, but consider the following:

     ○ The base system requires 4 GiB of memory.

     ○ SPS requires about 1-5 MiB of memory for every active connection, depending on the type of the connection — graphical protocols require more memory.

   - Configure a fixed size disk with at least 8 GiB space. About 5 GiB is required for the base system, the remaining disk space is used to store data. To increase the initial disk size, see Procedure 10.1, "Modifying the disk size of a SPS virtual appliance".

   - Do not use RAID for the hard disk, use the data duplication features of your virtual environment instead. That way, a single hard disk is sufficient for the system. If you need to use the built-in RAID support of SPS for some reason, use two hard disks, and SPS will automatically use them in software RAID.

     > ⚠ **CAUTION:**
     >
     > **Hazard of data loss! When you install or reinstall SPS in a virtual environment, always create new hard disks. Using existing hard disks can cause unexpected behavior and operational problems.**

   - SPS requires 4 network cards. After completing the steps of the **New Virtual Machine Wizard**, add three additional network cards in the **Settings** of the virtual machine.

     Enable, but do not attach the fourth (eth3) network card to a network.

   - To index connections without significant delay, add two CPU cores to the virtual machine. Note that these settings are suitable for evaluation purposes. To test SPS under significant load, contact One Identity for recommendations. The resource requirements of indexing depend heavily on the amount and type of the indexed traffic, and can also require using external indexer hosts (for details on external indexers, see One Identity Safeguard for Privileged Sessions - Technical Documentation).

2. Login to your MyDownloads account and download the latest One Identity Safeguard for Privileged Sessions installation ISO file. Note that you need to have purchased

SPS as a virtual appliance or have partner access to download One Identity Safeguard for Privileged Sessions ISO files. If you are a partner but do not see the ISO files, contact our Support Team.

3. Mount the ISO image and boot the virtual machine. Follow the on-screen instructions to install SPS.

Installing One Identity Safeguard for Privileged Sessions as a Kernel-based Virtual Machine

This tutorial describes the possibilities and limitations of installing One Identity Safeguard for Privileged Sessions (SPS) 5 LTS as a virtual appliance using the Kernel-based Virtual Machine (KVM) solution.

Limitations of SPS under KVM

The following limitations apply to running version 5 LTS of SPS under KVM:

- SPS can be installed under KVM on most modern Linux distributions. One Identity currently tests the following KVM version:

  ```
  # virsh version
  Compiled against library: libvirt 1.2.17
  Using library: libvirt 1.2.17
  Using API: QEMU 1.2.17
  Running hypervisor: QEMU 1.5.3
  ```

- SPS can only use fixed disk space assigned to the virtual host, it is not possible to use on-demand disk allocation scenarios.

- If High Availability (HA) operation mode is required in a virtual environment, use the HA function provided by the virtual environment.

- Hardware-related alerts and status indicators of SPS may display inaccurate information, for example, display degraded RAID status.

Installing SPS as a Kernel-based Virtual

Machine

Purpose:

To install a new SPS as a Kernel-based Virtual Machine, complete the following steps:

Steps:

1. Create the virtual machine for SPS using the following settings. Note that these settings are suitable for evaluation purposes. To test SPS under significant load, contact One Identity for recommendations.

   - Guest operating system: **Linux/Ubuntu 64-bit**

   - Allocate memory for the virtual machine. SPS requires a minimum of 4 GiB of memory. The recommended size for the memory depends on the exact environment, but consider the following:

     ○ The base system requires 4 GiB of memory.

     ○ SPS requires about 1-5 MiB of memory for every active connection, depending on the type of the connection — graphical protocols require more memory.

   - The hard disk controller must be **virtio**.

   - Do not use RAID for the hard disk, use the data duplication features of your virtual environment instead. That way, a single hard disk is sufficient for the system. If you need to use the built-in RAID support of SPS for some reason, use two hard disks, and SPS will automatically use them in software RAID.

     > ⚠ **CAUTION:**
     >
     > **Hazard of data loss! When you install or reinstall SPS in a virtual environment, always create new hard disks. Using existing hard disks can cause unexpected behavior and operational problems.**

   - Configure a fixed size disk with at least 8 GiB space. About 5 GiB is required for the base system, the remaining disk space is used to store data. To increase the initial disk size, see Procedure 10.1, "Modifying the disk size of a SPS virtual appliance".

   - SPS requires 4 network cards, all of them must be **virtio**.

     > ℹ **NOTE:**
     >
     > SPS will use the network card with the lowest PCI ID as eth0 (`Physical interface 1`), the card with the second lowest PCI ID as eth1 (the `Physical interface 2`), and so on. In some cases, this might differ from the labels in the VMWare management interface, for example, it is possible that eth0 will be labeled as `Network adapter 4`, and as a result, the SPS Welcome Wizard will not be available on `Network adapter 1`.

Configure unused network cards — at least the fourth (eth3) — to use internal NAT.

- To index connections without significant delay, add two CPU cores to the virtual machine. Note that these settings are suitable for evaluation purposes. To test SPS under significant load, contact One Identity for recommendations. The resource requirements of indexing depend heavily on the amount and type of the indexed traffic, and can also require using external indexer hosts (for details on external indexers, see One Identity Safeguard for Privileged Sessions - Technical Documentation).

2. Login to your MyDownloads account and download the latest One Identity Safeguard for Privileged Sessions installation ISO file. Note that you need to have purchased SPS as a virtual appliance or have partner access to download One Identity Safeguard for Privileged Sessions ISO files. If you are a partner but do not see the ISO files, contact our Support Team.

3. Mount the ISO image and boot the virtual machine. Follow the on-screen instructions to install SPS.

Chapter 9. Deploying One Identity Safeguard for Privileged Sessions from the Azure Marketplace

This guide provides detailed descriptions for deploying One Identity Safeguard for Privileged Sessions (SPS) from the Microsoft Azure Marketplace.

Before you start:

Before you start evaluating SPS, make sure you understand what SPS is and how it works. This information can greatly help you get SPS operational. Read the following:

- One Identity Safeguard for Privileged Sessions - Technical Documentation
- One Identity Safeguard for Privileged Sessions - Technical Documentation

Prerequisites

The following prerequisites must be met to deploy SPS in Microsoft Azure:

- You have a valid One Identity Safeguard for Privileged Sessions license. When deployed from the Microsoft Azure Marketplace, the One Identity Safeguard for Privileged Sessions uses the "Bring your own license" model. Note that to deploy two active SPS nodes as an availability set, you must purchase two standalone SPS licenses. To purchase a license, contact your One Identity sales representative.

- Microsoft recommends to use the Azure Resource Manager (ARM) deployment model. When you install SPS from the Azure Marketplace, SPS supports only this deployment method. If you need to deploy SPS into and infrastructure that uses the Classic deployment model, contact your One Identity sales representative.

- You have a Microsoft Azure account.

Limitations

The following limitations apply to SPS when you deploy it from the Microsoft Azure Marketplace.

⚠ **CAUTION:**

Do not export or import configuration between a physical SPS deployment and a virtual one. Because of the differences and limitations between physical and virtual appliances, configure the virtual appliance from scratch to ensure proper functionality. When you migrate a virtual SPS to another one, you can export and import the configuration.

- Root login is not available on the console.
- SSH access is only available after you have completed the Welcome Wizard.
- Currently, the data that is entered during the provisioning phase (for example username, IP address) of creating the virtual machine in Azure is not transferred to SPS. Therefore, only the data entered in the Welcome Wizard will be used.
- By default, you can only use Physical interface 1 (eth0) of SPS, with a single IP address. Aside from changing the IP address of SPS, do not modify other interface-related settings (additional logical interfaces, IP forwarding, and so on) on the **Basic Settings > Network** page of SPS.

  The number of interfaces you can use depends on the size of your Azure VM. If your VM allows you to use multiple interfaces, you can configure multiple interfaces in SPS. For details, see VM with multiple NICs.
- The **Seal the box** functionality is not available.
- The High Availability support of SPS was designed to work between two physical SPS appliances. This feature is not available in Azure environments. For further details, see the the section called "High Availability and redundancy in Microsoft Azure".
- Due to Azure requirements, an additional 5-minute delay has been added to the boot process. This ensures that the root device appears in the system.
- The size of the hard disk in Azure is 100 Gb. You cannot extend this virtual disk size later, nor can you write to Samba or other disks. In case you run out of disk space, either configure a **Backup policy** and an **Archive policy** if you have a server for this purpose, or configure a **Cleanup policy** that deletes the audit trails at certain time intervals. For details, see One Identity Safeguard for Privileged Sessions -

Technical Documentation and One Identity Safeguard for Privileged Sessions - Technical Documentation.

- SPS currently cannot receive its IP address using DHCP. Make sure that:
  - The IP address you have configured in Azure and the IP address that you configure for SPS for the **Physical interface 1** on the Networking settings part of the Welcome Wizard are the same. Otherwise, you will not be able to access SPS.
  - You set the internal IP static on the Network Interfaces tab of the Virtual Machine.
  - Do not assign a public IP address to SPS, use SPS as a component of your internal infrastructure. If you absolutely must configure Welcome Wizard from a publicly accessible IP address, note that SPS will be publicly accessible. If you assign a public IP to the web management interface, consider the following:
    - Select a complex passphrase.
    - Limit access to the management interface based on the source IP address, and make sure that brute-force protection for the administrator web login is enabled (they are enabled by default). For details, see One Identity Safeguard for Privileged Sessions - Technical Documentation.
    - Configure an email alert or SNMP trap for administrator logon events. For details, see One Identity Safeguard for Privileged Sessions - Technical Documentation and One Identity Safeguard for Privileged Sessions - Technical Documentation.
    - Forward the logs of SPS to a log server (for example, to a syslog-ng server, or an syslog-ng Store Box appliance) so that if the local logs are compromised, you still have an authentic copy of the original logs.
    - For security reasons, disable SSH access to SPS when it is not needed. Accessing the SPS host directly using SSH is not recommended or supported, except for troubleshooting purposes. If you enable SSH access, restrict the clients that can access SPS based on their source IP address, and make sure that brute-force protection is enabled (they are enabled by default). For details, see One Identity Safeguard for Privileged Sessions - Technical Documentation.
    - To prevent unauthorized access to the audit trail files recorded on SPS, configure proper access control rules for the user groups and encrypt every audit trail. If you use encryption, store your keys in the personal or in the temporary key store. For details, see One Identity Safeguard for Privileged Sessions - Technical Documentation,
- Upgrading SPS in Azure is the same as upgrading a physical appliance: you have to upload the firmware on the SPS web interface. For detailed instructions, see One Identity Safeguard for Privileged Sessions - Technical Documentation.

Deploy One Identity Safeguard for

Privileged Sessions from the Microsoft Azure Marketplace

Purpose:

To have a One Identity Safeguard for Privileged Sessions running in Microsoft Azure, complete the following steps.

Steps:

1. **Deploy One Identity Safeguard for Privileged Sessions from the Microsoft Azure Marketplace.**

   Create and configure a One Identity Safeguard for Privileged Sessions virtual machine (VM) in the Azure portal. For details, see the Microsoft Azure documentation, here we just describe the SPS-specific settings.

   a. Login to the Azure portal, select **Shell Control Box** from the Azure Marketplace, then click **Create**.

   b. Fill the required fields of the **Basics** blade. Note that you must fill the **User name** and **Authentication Password/SSH public key** fields, but SPS will not actually use these settings (SPS will use the parameters you configure in the SPS Welcome Wizard).

   c. Choose a size for the VM. If you want to use this machine in production and need help about sizing or architecture design, contact your One Identity sales representative.

   The number of interfaces you can use depends on the size of your Azure VM. If your VM allows you to use multiple interfaces, you can configure multiple interfaces in SPS. For details, see VM with multiple NICs.

   d. On the **Settings** blade, disable monitoring.

   e. When the deployment is finished, navigate to the network settings of the new VM in the Azure portal. Change the IP address of the SPS network interface to Static, and note down the IP address and the hostname (you will need it in the SPS Welcome Wizard).

   f. If you want to backup or archive data from SPS into Azure, create an Azure File Share. Note down the following information of the file share, because you will need it to configure SPS backups and archiving: `URL`, `Username`, `Password`.

   > ⚠️ **CAUTION:**
   >
   > **If you have multiple SPS VMs, make sure to use a separate file share for each SPS.**

2. **Complete the SPS Welcome Wizard.**

Complete the SPS Welcome Wizard (for details, see One Identity Safeguard for Privileged Sessions - Technical Documentation). Note the following points specific for Azure deployments. When configuring the network settings of SPS note the following points.

> ⚠ **CAUTION:**
>
> **Do not export or import configuration between a physical SPS deployment and a virtual one. Because of the differences and limitations between physical and virtual appliances, configure the virtual appliance from scratch to ensure proper functionality. When you migrate a virtual SPS to another one, you can export and import the configuration.**

a. Into the **Physical interface EXT or 1 — IP address** field, enter the static IP address of the SPS VM that you set on the Azure portal.

b. **Default GW**: The default gateway is usually the first address in a subnet (for example, if your subnet is `10.7.0.0/24`, then the gateway will be `10.7.0.1`).

c. **Hostname**: Use the hostname you have configured for the SPS VM on the Azure portal.

d. **DNS server**: You can use any DNS server that the SPS VM can access, even public ones.

3. **Configure SPS.**

Login to SPS and configure it.

a. Configure backups for SPS. For backup and archiving purposes One Identity recommends the built-in file shares of Azure. For details on configuring backups, see One Identity Safeguard for Privileged Sessions - Technical Documentation.

b. Configure archiving for SPS. For backup and archiving purposes One Identity recommends the built-in file shares of Azure. For details on configuring backups, see One Identity Safeguard for Privileged Sessions - Technical Documentation. Configuring Archiving policy is highly recommended: because if the disk of the VM fills up, SPS stops working.

c. Configure a server: set up a host that is on the same subnet as SPS, and enable Remote Desktop (RDP) or Secure Shell (SSH) access to it.

d. Configure a connection on SPS to forward the incoming RDP or Secure Shell (SSH) connection to the host and establish a connection to the host. See One Identity Safeguard for Privileged Sessions - Technical Documentation for details.

e. Replay your session in the browser. See One Identity Safeguard for Privileged Sessions - Technical Documentation for details.

In case you have questions about SPS, or need assistance, contact your One Identity representative.

High Availability and redundancy in Microsoft Azure

In a Microsoft Azure deployment, the high-availability and redundancy of the SPS appliance is provided by the Microsoft Azure infrastructure, according to the Azure Storage SLA.

Redundancy

The data in your Microsoft Azure storage account is always replicated to ensure durability and high availability, meeting the Azure Storage SLA. The exact type of replication depends on your storage account settings, but every disk is stored in 3 copies.

For details, see Locally redundant storage in the *Azure Storage replication* document, and Service Healing - Auto-recovery of Virtual Machines.

High Availability

If a hardware failure occurs, Azure moves the Virtual Machine to another location and restarts it in 5-15 minutes. In case you require higher SLA, you are recommended to deploy two standalone SPS nodes into an availability set. Note that to deploy two active SPS nodes as an availability set, you must purchase two standalone SPS licenses.

For details, see Locally redundant storage in the *Azure Storage replication* document, and Service Healing - Auto-recovery of Virtual Machines.

Chapter 10. Virtual appliance maintenance

Modifying the disk size of a SPS virtual appliance

Modifying the disk size of a SPS virtual appliance

Purpose:

SPS can only use fixed disk space assigned to the virtual host. If you must increase the size of the virtual disk, complete the following steps. Online disk resize can grow the filesystem up to 1024x size of the original size.

Prerequisites:

You can resize the disk that way only if you originally installed SPS version 5 LTS or later. This method will not work if you upgraded to 5 LTS from an earlier version.

Steps:

1. **Warning! Hazard of data loss!**

   Create a full system backup (configuration and data backup). For detailed instructions, see One Identity Safeguard for Privileged Sessions - Technical Documentation.

2. Power down the virtual machine.

3. Increase the storage size.

4. Power on the SPS virtual machine.

5. Login to SPS as root locally (or remotely using SSH) to access the Console menu.

6. Select **Shells > Boot Shell**.

7. Issue the following command: `parted /dev/Xda resizepart`

   Letter **x** might vary on different systems. Usually it is 's' or 'v'. Check your system before issuing this command.

8. Answer the on-screen questions with the following answers:

   - `Fix/Ignore? >` **`fix`**

   - `Partition number? >` **`4`**

   - `Warning: Partition /dev/sda4 is being used. Are you sure you want to continue? Yes/No? >` **`yes`**

   - `End? >` **`-0`**

   - `Fix/Ignore? >` **`fix`**

   For example:

   ```
   (boot/master/ip99)root@sps1:~# parted /dev/sda resizepart
   Warning: Not all of the space available to /dev/sda appears to be used, you can
   fix the GPT to use all of the space (an extra 4194304 blocks) or continue with
   the current setting?
   Fix/Ignore? fix
   Partition number? 4
   Warning: Partition /dev/sda4 is being used. Are you sure you want to continue?
   Yes/No? yes
   End?  [22.5GB]? -0
   Information: You may need to update /etc/fstab.
   ```

9. Issue the following command: `resize2fs /dev/Xda4`

   Letter **x** might vary on different systems. Usually it is 's' or 'v'. Check your system before issuing this command.

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For example, if you distribute copies of the library, whether gratis or for a fee, you must give the recipients all the rights that we gave you. You must make sure that they, too, receive or can get the source code. If you link a program with the library, you must provide complete object files to the recipients so that they can relink them with the library, after making changes to the library and recompiling it. And you must show them these terms so they know their rights.

Our method of protecting your rights has two steps: (1) copyright the library, and (2) offer you this license which gives you legal permission to copy, distribute and/or modify the library.

Also, for each distributor's protection, we want to make certain that everyone understands that there is no warranty for this free library. If the library is modified by someone else and passed on, we want its recipients to know that what they have is not the original version, so that any problems introduced by others will not reflect on the original authors' reputations.

Finally, any free program is threatened constantly by software patents. We wish to avoid the danger that companies distributing free software will individually obtain patent licenses, thus in effect transforming the program into proprietary software. To prevent this, we have made it clear that any patent must be licensed for everyone's free use or not licensed at all.

Most GNU software, including some libraries, is covered by the ordinary GNU General Public License, which was designed for utility programs. This license, the GNU Library General Public License, applies to certain designated libraries. This license is quite different from the ordinary one; be sure to read it in full, and don't assume that anything in it is the same as in the ordinary license.

The reason we have a separate public license for some libraries is that they blur the distinction we usually make between modifying or adding to a program and simply using it. Linking a program with a library, without changing the library, is in some sense simply using the library, and is analogous to running a utility program or application program. However, in a textual and legal sense, the linked executable is a combined work, a derivative of the original library, and the ordinary General Public License treats it as such.

Because of this blurred distinction, using the ordinary General Public License for libraries did not effectively promote software sharing, because most developers did not use the libraries. We concluded that weaker conditions might promote sharing better.

However, unrestricted linking of non-free programs would deprive the users of those programs of all benefit from the free status of the libraries themselves. This Library General Public License is intended to permit developers of non-free programs to use free libraries, while preserving your freedom as a user of such programs to change the free libraries that are incorporated in them. (We have not seen how to achieve this as regards changes in header files, but we have achieved it as regards changes in the actual functions of the Library.) The hope is that this will lead to faster development of free libraries.

The precise terms and conditions for copying, distribution and modification follow. Pay close attention to the difference between a "work based on the library" and a "work that uses the library". The former contains code derived from the library, while the latter only works together with the library.

Note that it is possible for a library to be covered by the ordinary General Public License rather than by this special one.

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A "library" means a collection of software functions and/or data prepared so as to be conveniently linked with application programs (which use some of those functions and data) to form executables.

The "Library", below, refers to any such software library or work which has been distributed under these terms. A "work based on the Library" means either the Library or any derivative work under copyright law: that is to say, a work containing the Library or a portion of it, either verbatim or with modifications and/or translated straightforwardly into another language. (Hereinafter, translation is included without limitation in the term "modification".)

"Source code" for a work means the preferred form of the work for making modifications to it. For a library, complete source code means all the source code for all modules it contains, plus any associated interface definition files, plus the scripts used to control compilation and installation of the library.

Activities other than copying, distribution and modification are not covered by this License; they are outside its scope. The act of running a program using the Library is not restricted, and output from such a program is covered only if its contents constitute a work based on the Library (independent of the use of the Library in a tool for writing it). Whether that is true depends on what the Library does and what the program that uses the Library does.

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2. You may modify your copy or copies of the Library or any portion of it, thus forming a work based on the Library, and copy and distribute such modifications or work under the terms of Section 1 above, provided that you also meet all of these conditions:

- **a)** The modified work must itself be a software library.
- **b)** You must cause the files modified to carry prominent notices stating that you changed the files and the date of any change.
- **c)** You must cause the whole of the work to be licensed at no charge to all third parties under the terms of this License.
- **d)** If a facility in the modified Library refers to a function or a table of data to be supplied by an application program that uses the facility, other than as an argument

passed when the facility is invoked, then you must make a good faith effort to ensure that, in the event an application does not supply such function or table, the facility still operates, and performs whatever part of its purpose remains meaningful.

(For example, a function in a library to compute square roots has a purpose that is entirely well-defined independent of the application. Therefore, Subsection 2d requires that any application-supplied function or table used by this function must be optional: if the application does not supply it, the square root function must still compute square roots.)

These requirements apply to the modified work as a whole. If identifiable sections of that work are not derived from the Library, and can be reasonably considered independent and separate works in themselves, then this License, and its terms, do not apply to those sections when you distribute them as separate works. But when you distribute the same sections as part of a whole which is a work based on the Library, the distribution of the whole must be on the terms of this License, whose permissions for other licensees extend to the entire whole, and thus to each and every part regardless of who wrote it.

Thus, it is not the intent of this section to claim rights or contest your rights to work written entirely by you; rather, the intent is to exercise the right to control the distribution of derivative or collective works based on the Library.

In addition, mere aggregation of another work not based on the Library with the Library (or with a work based on the Library) on a volume of a storage or distribution medium does not bring the other work under the scope of this License.

3. You may opt to apply the terms of the ordinary GNU General Public License instead of this License to a given copy of the Library. To do this, you must alter all the notices that refer to this License, so that they refer to the ordinary GNU General Public License, version 2, instead of to this License. (If a newer version than version 2 of the ordinary GNU General Public License has appeared, then you can specify that version instead if you wish.) Do not make any other change in these notices.

Once this change is made in a given copy, it is irreversible for that copy, so the ordinary GNU General Public License applies to all subsequent copies and derivative works made from that copy.

This option is useful when you wish to copy part of the code of the Library into a program that is not a library.

4. You may copy and distribute the Library (or a portion or derivative of it, under Section 2) in object code or executable form under the terms of Sections 1 and 2 above provided that you accompany it with the complete corresponding machine-readable source code, which must be distributed under the terms of Sections 1 and 2 above on a medium customarily used for software interchange.

If distribution of object code is made by offering access to copy from a designated place, then offering equivalent access to copy the source code from the same place satisfies the requirement to distribute the source code, even though third parties are not compelled to copy the source along with the object code.

5. A program that contains no derivative of any portion of the Library, but is designed to work with the Library by being compiled or linked with it, is called a "work that uses the Library". Such a work, in isolation, is not a derivative work of the Library, and therefore falls outside the scope of this License.

However, linking a "work that uses the Library" with the Library creates an executable that is a derivative of the Library (because it contains portions of the Library), rather than a "work that uses the library". The executable is therefore covered by this License. Section 6 states terms for distribution of such executables.

When a "work that uses the Library" uses material from a header file that is part of the Library, the object code for the work may be a derivative work of the Library even though the source code is not. Whether this is true is especially significant if the work can be linked without the Library, or if the work is itself a library. The threshold for this to be true is not precisely defined by law.

If such an object file uses only numerical parameters, data structure layouts and accessors, and small macros and small inline functions (ten lines or less in length), then the use of the object file is unrestricted, regardless of whether it is legally a derivative work. (Executables containing this object code plus portions of the Library will still fall under Section 6.)

Otherwise, if the work is a derivative of the Library, you may distribute the object code for the work under the terms of Section 6. Any executables containing that work also fall under Section 6, whether or not they are linked directly with the Library itself.

6. As an exception to the Sections above, you may also compile or link a "work that uses the Library" with the Library to produce a work containing portions of the Library, and distribute that work under terms of your choice, provided that the terms permit modification of the work for the customer's own use and reverse engineering for debugging such modifications.

You must give prominent notice with each copy of the work that the Library is used in it and that the Library and its use are covered by this License. You must supply a copy of this License. If the work during execution displays copyright notices, you must include the copyright notice for the Library among them, as well as a reference directing the user to the copy of this License. Also, you must do one of these things:

- **a)** Accompany the work with the complete corresponding machine-readable source code for the Library including whatever changes were used in the work (which must be distributed under Sections 1 and 2 above); and, if the work is an executable linked with the Library, with the complete machine-readable "work that uses the Library", as object code and/or source code, so that the user can modify the Library and then relink to produce a modified executable containing the modified Library. (It is understood that the user who changes the contents of definitions files in the Library will not necessarily be able to recompile the application to use the modified definitions.)

- **b)** Accompany the work with a written offer, valid for at least three years, to give the same user the materials specified in Subsection 6a, above, for a charge no more than the cost of performing this distribution.

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- **d)** Verify that the user has already received a copy of these materials or that you have already sent this user a copy.

For an executable, the required form of the "work that uses the Library" must include any data and utility programs needed for reproducing the executable from it. However, as a special exception, the source code distributed need not include anything that is normally distributed (in either source or binary form) with the major components (compiler, kernel, and so on) of the operating system on which the executable runs, unless that component itself accompanies the executable.

It may happen that this requirement contradicts the license restrictions of other proprietary libraries that do not normally accompany the operating system. Such a contradiction means you cannot use both them and the Library together in an executable that you distribute.

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signature of Ty Coon, 1 April 1990
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Version 2.1, February 1999

Preamble

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We protect your rights with a two-step method:

1. we copyright the library, and
2. we offer you this license, which gives you legal permission to copy, distribute and/or modify the library.

To protect each distributor, we want to make it very clear that there is no warranty for the free library. Also, if the library is modified by someone else and passed on, the recipients should know that what they have is not the original version, so that the original author's reputation will not be affected by problems that might be introduced by others.

Finally, software patents pose a constant threat to the existence of any free program. We wish to make sure that a company cannot effectively restrict the users of a free program by obtaining a restrictive license from a patent holder. Therefore, we insist that any patent license obtained for a version of the library must be consistent with the full freedom of use specified in this license.

Most GNU software, including some libraries, is covered by the ordinary GNU General Public License. This license, the GNU Lesser General Public License, applies to certain designated libraries, and is quite different from the ordinary General Public License. We use this license for certain libraries in order to permit linking those libraries into non-free programs.

When a program is linked with a library, whether statically or using a shared library, the combination of the two is legally speaking a combined work, a derivative of the original library. The ordinary General Public License therefore permits such linking only if the entire combination fits its criteria of freedom. The Lesser General Public License permits more lax criteria for linking other code with the library.

We call this license the *Lesser* General Public License because it does Less to protect the user's freedom than the ordinary General Public License. It also provides other free software developers Less of an advantage over competing non-free programs. These disadvantages are the reason we use the ordinary General Public License for many libraries. However, the Lesser license provides advantages in certain special circumstances.

For example, on rare occasions, there may be a special need to encourage the widest possible use of a certain library, so that it becomes a de-facto standard. To achieve this, non-free programs must be allowed to use the library. A more frequent case is that a free library does the same job as widely used non-free libraries. In this case, there is little to gain by limiting the free library to free software only, so we use the Lesser General Public License.

In other cases, permission to use a particular library in non-free programs enables a greater number of people to use a large body of free software. For example, permission to use the GNU C Library in non-free programs enables many more people to use the whole GNU operating system, as well as its variant, the GNU/Linux operating system.

Although the Lesser General Public License is Less protective of the users' freedom, it does ensure that the user of a program that is linked with the Library has the freedom and the wherewithal to run that program using a modified version of the Library.

The precise terms and conditions for copying, distribution and modification follow. Pay close attention to the difference between a "work based on the library" and a "work that uses the library". The former contains code derived from the library, whereas the latter must be combined with the library in order to run.

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"Source code" for a work means the preferred form of the work for making modifications to it. For a library, complete source code means all the source code for all modules it contains, plus any associated interface definition files, plus the scripts used to control compilation and installation of the library.

Activities other than copying, distribution and modification are not covered by this License; they are outside its scope. The act of running a program using the Library is not restricted, and output from such a program is covered only if its contents constitute a work based on the Library (independent of the use of the Library in a tool for writing it). Whether that is true depends on what the Library does and what the program that uses the Library does.

Section 1

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Section 2

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  a. The modified work must itself be a software library.

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  d. If a facility in the modified Library refers to a function or a table of data to be supplied by an application program that uses the facility, other than as an argument passed when the facility is invoked, then you must make a good faith effort to ensure that, in the event an application does not supply such function or table, the facility still operates, and performs whatever part of its purpose remains meaningful.

     (For example, a function in a library to compute square roots has a purpose that is entirely well-defined independent of the application. Therefore, Subsection 2d requires that any application-supplied function or table used by this function must be optional: if the application does not supply it, the square root function must still compute square roots.)

These requirements apply to the modified work as a whole. If identifiable sections of that work are not derived from the Library, and can be reasonably considered independent and separate works in themselves, then this License, and its terms, do not apply to those sections when you distribute them as separate works. But when you distribute the same sections as part of a whole which is a work based on the Library, the distribution of the whole must be on the terms of this License, whose permissions for other licensees extend to the entire whole, and thus to each and every part regardless of who wrote it.

Thus, it is not the intent of this section to claim rights or contest your rights to work written entirely by you; rather, the intent is to exercise the right to control the distribution of derivative or collective works based on the Library.

In addition, mere aggregation of another work not based on the Library with the Library (or with a work based on the Library) on a volume of a storage or distribution medium does not bring the other work under the scope of this License.

Section 3

You may opt to apply the terms of the ordinary GNU General Public License instead of this License to a given copy of the Library. To do this, you must alter all the notices that refer to this License, so that they refer to the ordinary GNU General Public License, version 2, instead of to this License. (If a newer version than version 2 of the ordinary GNU General Public License has appeared, then you can specify that version instead if you wish.) Do not make any other change in these notices.

Once this change is made in a given copy, it is irreversible for that copy, so the ordinary GNU General Public License applies to all subsequent copies and derivative works made from that copy.

This option is useful when you wish to copy part of the code of the Library into a program that is not a library.

Section 4

You may copy and distribute the Library (or a portion or derivative of it, under Section 2) in object code or executable form under the terms of Sections 1 and 2 above provided that you accompany it with the complete corresponding machine-readable source code, which must be distributed under the terms of Sections 1 and 2 above on a medium customarily used for software interchange.

If distribution of object code is made by offering access to copy from a designated place, then offering equivalent access to copy the source code from the same place satisfies the requirement to distribute the source code, even though third parties are not compelled to copy the source along with the object code.

Section 5

A program that contains no derivative of any portion of the Library, but is designed to work with the Library by being compiled or linked with it, is called a "work that uses the Library". Such a work, in isolation, is not a derivative work of the Library, and therefore falls outside the scope of this License.

However, linking a "work that uses the Library" with the Library creates an executable that is a derivative of the Library (because it contains portions of the Library), rather than a "work that uses the library". The executable is therefore covered by this License. Section 6 states terms for distribution of such executables.

When a "work that uses the Library" uses material from a header file that is part of the Library, the object code for the work may be a derivative work of the Library even though the source code is not. Whether this is true is especially significant if the work can be linked without the Library, or if the work is itself a library. The threshold for this to be true is not precisely defined by law.

If such an object file uses only numerical parameters, data structure layouts and accessors, and small macros and small inline functions (ten lines or less in length), then the use of the object file is unrestricted, regardless of whether it is legally a derivative

work. (Executables containing this object code plus portions of the Library will still fall under Section 6.)

Otherwise, if the work is a derivative of the Library, you may distribute the object code for the work under the terms of Section 6. Any executables containing that work also fall under Section 6, whether or not they are linked directly with the Library itself.

Section 6

As an exception to the Sections above, you may also combine or link a "work that uses the Library" with the Library to produce a work containing portions of the Library, and distribute that work under terms of your choice, provided that the terms permit modification of the work for the customer's own use and reverse engineering for debugging such modifications.

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