SWsoft, Inc.

# Virtuozzo

## Installation Guide

Version 3.0

*ISBN: N/A*
*SWsoft Inc*
*13755 Sunrise Valley Drive*
*Suite 325*
*Herndon, VA 20171*
*USA*
*Tel: +1 (703) 815 5670*
*Fax: +1 (703) 815 5675*

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CHAPTER 1

# Preface

## In This Chapter

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## About This Guide

This guide provides exhaustive information on the process of installing, configuring, and deploying your Virtuozzo for Linux system including the pre-requisites and the stages you shall pass.

## Who Should Read This Guide

The primary audience for this book is anyone interested in installing and putting Virtuozzo 3.0 in operation on their computers. To fully understand the guide, you should have strong Linux system administration habits. Still, no more than superficial knowledge of Linux OS is required in order to learn to perform the basic installation operations.

# Organization of This Guide

Chapter 2, Preliminary Operations, explains the fundamentals of planning your Virtuozzo system, describes hardware and software requirements your system should meet, and sketches out the steps required to successfully install Virtuozzo 3.0.

Chapter 3, Installing Virtuozzo on Hardware Node, familiarizes you with the way to install Virtuozzo on the Hardware Node including the installation and configuration of both the root operating system and Virtuozzo software itself.

Chapter 4, Installing Virtuozzo Management Console, teaches you to install the Virtuozzo Management Console to monitor your Hardware Nodes and Virtual Private Servers residing on them.

Chapter 5, Setting VZCC/VZPP to Work, provides information on how to set up Virtuozzo Control Center and Virtuozzo Power Panels - tools for managing a particular Hardware Node and/or individual Virtual Private Servers with the help of a standard Web browser.

Chapter 6, Setting Up Monitor and Backup Nodes, contains instructions on the way to install and configure a serial console to improve the accuracy of problem reports and log the kernel activity, to set up the Monitor Node to check the state of your Hardware Node(s), and to prepare the Backup Node for backing up and restoring one or several Virtual Private Servers located on remote Hardware Nodes.

Chapter 7, Setting Up Repository for EZ Templates, covers those operations that you are to perform to set up one or several repositories for managing your EZ templates.

Chapter 8, Updating Virtuozzo Software, shows you the way to update your Virtuozzo software.

# Documentation Conventions

Before you start using this guide, it is important to understand the documentation conventions used in it. For information on specialized terms used in the documentation, see the Glossary at the end of this document.

## Typographical Conventions

The following kinds of formatting in the text identify special information.

| Formatting convention | Type of Information | Example |
|---|---|---|
| Triangular Bullet(➢) | Step-by-step procedures. You can follow the instructions below to complete a specific task. | *To create a VPS:* |

| | | |
|---|---|---|
| Special Bold | Items you must select, such as menu options, command buttons, or items in a list. | Go to the QoS tab. |
| | Titles of chapters, sections, and subsections. | Read the Basic Administration chapter. |
| *Italics* | Used to emphasize the importance of a point, to introduce a term or to designate a command line placeholder, which is to be replaced with a real name or value. | These are the so-called *EZ templates*.<br>To destroy a VPS, type `vzctl destroy` *`vpsid`*. |
| `Monospace` | The names of commands, files, and directories. | Use `vzctl start` to start a VPS. |
| `Preformatted` | On-screen computer output in your command-line sessions; source code in XML, C++, or other programming languages. | `Saved parameters for VPS 101` |
| **`Monospace Bold`** | What you type, contrasted with on-screen computer output. | **`# rpm –V virtuozzo-release`** |
| CAPITALS | Names of keys on the keyboard. | SHIFT, CTRL, ALT |
| KEY+KEY | Key combinations for which the user must press and hold down one key and then press another. | CTRL+P, ALT+F4 |

## Shell Prompts in Command Examples

Command line examples throughout this guide presume that you are using the Bourne-again shell (bash). Whenever a command can be run as a regular user, we will display it with a dollar sign prompt. When a command is meant to be run as root, we will display it with a hash mark prompt:

| | |
|---|---|
| Bourne-again shell prompt | $ |
| Bourne-again shell root prompt | # |

## General Conventions

Be aware of the following conventions used in this book.

- Chapters in this guide are divided into sections, which, in turn, are subdivided into subsections. For example, Documentation Conventions is a section, and General Conventions is a subsection.
- When following steps or using examples, be sure to type double-quotes ("), left single-quotes (`), and right single-quotes (') exactly as shown.
- The key referred to as RETURN is labeled ENTER on some keyboards.

The root path usually includes the `/bin`, `/sbin`, `/usr/bin` and `/usr/sbin` directories, so the steps in this book show the commands in these directories without absolute path names. Steps that use commands in other, less common, directories show the absolute paths in the examples.

# Feedback

If you spot a typo in this guide, or if you have thought of a way to make this guide better, we would love to hear from you!

If you have a suggestion for improving the documentation (or any other relevant comments), try to be as specific as possible when formulating it. If you have found an error, please include the chapter/section/subsection name and some of the surrounding text so we can find it easily.

Please submit a report by e-mail to userdocs@swsoft.com.

CHAPTER 2

# Preliminary Operations

This chapter familiarizes you with the basics of planning your Virtuozzo system, describes hardware and software requirements your system should meet, and sketches out the stages you should pass to successfully install Virtuozzo 3.0 on your computer.

## In This Chapter

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# Planning Your Virtuozzo System

Before installing the product, you should carefully plan the structure of your Virtuozzo network and the role(s) the individual computers are performing in it. This will help you avoid many problems related to the Virtuozzo support maintenance and to successfully solve the problems that will still pop up.

The principal roles of computers in a Virtuozzo system are the following:

1. Hardware Node. It is a computer with the Virtuozzo software installed that houses a certain number of Virtual Private Servers in accordance with the loaded license.
2. Serial Monitor Node. It is a computer running a Linux OS which is used to collect kernel messages (including oopses) from the Hardware Nodes.
3. Remote Monitor Node. It is a computer running a Linux OS for monitoring the general state of the Hardware Nodes (running or down), a set of parameters vital for the operation of the Hardware Nodes and sending alerts to the Virtuozzo administrator via e-mail, ICQ, or SMS if a Hardware Node is down, or a critical parameter is violated.
4. Backup Node. It is a computer running a Linux OS for connecting to the Hardware Nodes, backing up the existing Virtual Private Servers and storing the backups on its hard disk(s). This backing up should be regular and automatic. The Backup Node also provides the functionality of restoring the VPSs previously backed up.
5. VZMC workstation. It is a computer running either Windows or Linux with the VZMC (Virtuozzo Management Console) installed. It may be located virtually everywhere on the Internet and serves for the remote administration of the Hardware Nodes. The functionality of VZMC is similar to that of the Virtuozzo command-line interface.

Hardware Nodes are usually more than 1 in number, whereas all the remaining 4 types need not usually be dedicated to more than 1 computer per type. Moreover, it is advisable to use one computer both as the Serial Monitor Node and the Remote Monitor Node. That is why, it can be referred to as simply the Monitor Node. In many cases, this computer may also perform the functions of the Backup Node. On the other hand, any Hardware Node may perform the functions of the Serial/Remote Monitor Node and of the Backup Node. You may even consider the variant of uniting all the Hardware Nodes of your system into pairs, with each Node acting as the Serial Monitor Node for the other member of the pair. This will save you the necessity of setting up a dedicated Serial Monitor Node with a multiport serial card and increase the overall reliability of the system, but deprive you of a single place of collecting the logs.

Graphically, a typical Virtuozzo system may be represented as follows:

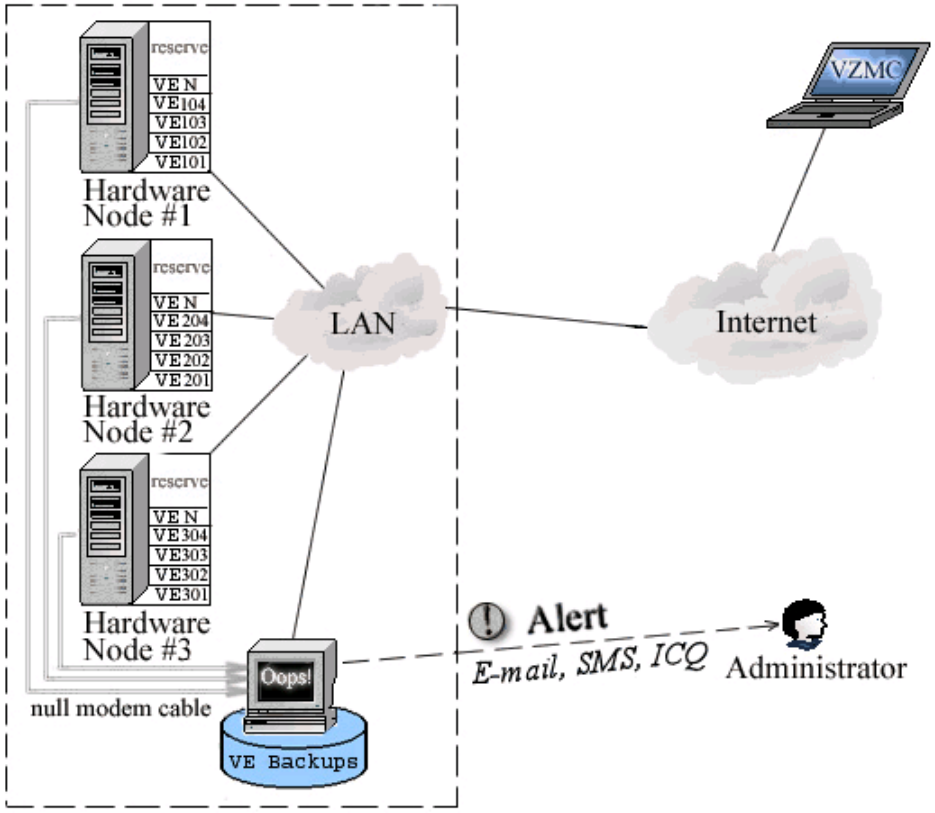


*Figure 1: Virtuozzo System Configuration Variant*

This picture shows the configuration with a network consisting of a number of Hardware Nodes and a computer performing the functions of the Monitor Node and the Backup Node. All the Hardware Nodes have a license loaded into the kernel, but they do not usually make a full use of the possibilities provided by the license, i.e. new VPSs can be successfully created on a Node, or its CPU may be upgraded without violating the license. This is done to facilitate the Hardware Nodes upgrade and maintenance. For example, you can migrate all the Virtual Private Servers from the Node which is to be upgraded to the other Nodes with little downtime. You may also think of having a completely spare Hardware Node for the same purposes. In addition, you can use this Node for balancing critical services like DNS. Keep two Virtual Private Servers with DNS servers on different Hardware Nodes, so a hardware failure will not bring your network down.

It is recommended to keep all the Hardware Nodes in one subnet. In this case you will be able to transparently migrate VPSs from one Node to another without having to modify the VPSs IP addresses or the HN routing tables.

The Monitor Node has a multiport serial card and is connected to all the Hardware Nodes with null-modem cables to serve as the serial console catching the kernel messages from the Hardware Nodes. It also has a standard network interface to periodically check up the state of the Hardware Nodes and to send an alert to the administrator if a Node is down, or a critical parameter is violated. No special requirements are set for the Monitor Node – it just has to be able to run a standard Linux system.

This very computer may also serve as the Backup Node (which is shown in the picture above), or you can set up a dedicated Backup Node. The Backup Node shall have high network throughput and high-capacity hard drives to be able to quickly back up remote VPSs and store them. In most cases, it is enough to run a standard Linux system on the Backup Node; however, if you wish to be able to work with VPSs on the Backup Node itself, you should install Virtuozzo onto it.

Apart from these computers united into a network, a Virtuozzo administrator is supposed to have a dedicated computer with VZMC installed for the tasks of remote administration. This workstation must only have an Internet access, it does not have to comprise the Virtuozzo local network. To underline the mobility of this computer, it is shown as a notebook in the picture above.

# Installation Requirements

After deciding on the structure of your Virtuozzo system, you should make sure that all the Hardware Nodes where you are going to deploy Virtuozzo for Linux meet the following system (hardware and software) and network requirements.

## System Requirements

This section focuses on the hardware and software requirements for the Virtuozzo for Linux software product.

### Hardware Compatibility

The Hardware Node requirements for the standard 32-bit edition of Virtuozzo are the following:

- IBM PC-compatible computer;
- Intel Celeron, Pentium II, Pentium III, Pentium 4, Xeon, or AMD Athlon CPU;
- At least 128 MB of RAM;
- Hard drive(s) with at least 4 GB of free disk space;
- Network card (either Intel EtherExpress100 (i82557-, i82558- or i82559-based) or 3Com (3c905 or 3c905B or 3c595) are recommended).

  A complete list of network cards supported in Virtuozzo 3.0 can be found at http://www.swsoft.com/en/products/virtuozzo/hcl/network/. This list is constantly updated, so you may check back periodically.

- SCSI controllers, for example:
  - Adaptec7xxx SCSI controller (including AHA 2940/3940/3944/29160);
  - RAID controller based on the AMI MegaRAID chips (including DELL PowerRAID PERC2/PERC3);

  A complete list of SCSI controllers supported in Virtuozzo 3.0 can be found at http://www.swsoft.com/en/products/virtuozzo/hcl/other/. This list is constantly updated, so you may check back periodically.

The exact computer configuration depends on how many Virtual Private Servers you are going to run on the computer and what load these VPSs are going to produce. Thus, in order to choose the right configuration, please follow the recommendations below:

- CPUs. The more Virtual Private Servers you plan to run simultaneously, the more CPUs you need.
- Memory. The more memory you have, the more Virtual Private Servers you can run. The exact figure depends on the number and nature of applications you are planning to run in your Virtual Private Servers. However, on the average, at least 1 GB of RAM is recommended for every 100 Virtual Private Servers;
- Disk space. Each Virtual Private Server occupies 40–150 MB of hard disk space for system files in addition to the user data inside the Virtual Private Server (for example, web site content). You should consider it when planning disk partitioning and the number of Virtual Private Servers to run.

A typical 2–way Dell PowerEdge 1650 1u–mountable server with 1 GB of RAM and 36 GB of hard drives is suitable for hosting 100 Virtual Private Servers.

## Software Compatibility

Virtuozzo 3.0 can be installed on the Hardware Node running one of the following Linux distributions with the 2.6 kernel:

- Red Hat Enterprise Linux 4;
- Fedora Core 2;
- Fedora Core 4;
- CentOS 4;
- Suse Linux Enterprise Server 9.

This requirement does not restrict the ability of Virtuozzo to provide other Linux versions as an operating system for Virtual Private Servers. The Linux distribution installed in a Virtual Private Server may differ from that of the host OS.

If you are already running one of previous Virtuozzo versions (e.g. 2.6.1 or 2.6.2), the following updates to Virtuozzo 3.0 are possible (with or without updating to the 2.6 kernel):

- Red Hat 9;
- Red Hat Enterprise Linux 3;
- Fedora Core 1;
- Fedora Core 2;
- CentOS 3;
- Suse Linux Enterprise Server 9.

## Network Requirements

The network pre-requisites enlisted in this subsection will help you avoid delays and problems with making Virtuozzo for Linux up and running. You should take care in advance of the following:

- Local Area Network (LAN) for the Hardware Node;
- Internet connection for the Hardware Node;
- Valid IP address for the Hardware Node as well as other IP parameters (default gateway, network mask, DNS configuration);
- At least one valid IP address for each Virtual Private Server. The total number of addresses should be no less than the planned number of Virtual Private Servers. The addresses may be allocated in different IP networks;
- If a firewall is deployed, check that IP addresses allocated for Virtual Private Servers are open for access from the outside.

# Installation Process Overview

Depending on the scope of your business needs, you might use the Virtuozzo 3.0 software on any number of PCs (provided you have the corresponding number of licenses). In any case, we assume that Virtuozzo is installed on dedicated computers, only. This is but natural bearing in mind the all-importance of Virtuozzo-based systems for your network.

The basic installation and preliminary operations for any Virtuozzo system include the following steps:

**1** Installing and configuring the root Linux operating system on the Hardware Node;

**2** Installing the Virtuozzo 3.0 software on the Hardware Node:

**a** Installing the Virtuozzo packages;

**b** Installing the OS (and application) templates.

Then, it is strongly recommended that you create the so-called Service VPS on every Hardware Node. Service VPSs run VZagents which are responsible for processing all kinds of requests from VZMC client computers and for some other Virtuozzo tasks as well:

**c** Creating a Service Virtual Private Server.

Steps 2b and/or 2c may be performed at Step 2a at your desire. In case they are not, the instructions on how to perform them manually are provided in the following sections.

It is very probable that you will want to have a central management workstation for the remote control of all the Hardware Nodes of your network by means of VZMC. This workstation may run under either Windows 2000/XP/2003 or Linux (Red Hat 9; Fedora Core 1, 2, 3, and 4; Red Hat Enterprise Linux 3 and 4; CentOS 3 and 4). In the latter case, it may theoretically coincide with a certain Hardware Node, but this should be avoided. So, there is another step to be performed before you can start the administration proper of your Virtuozzo systems:

**3** Installing Virtuozzo Management Console and registering the needed Hardware Node(s);

You may also wish to put Virtuozzo Control Center (VZCC) and Virtuozzo Power Panels (VZPP) into operation. These tools are intended for managing a particular Hardware Node and/or individual Virtual Private Servers residing on it with the help of a standard Web browser. Thus, your next step is:

4. Setting VZCC/VZPP to work.

Finally, it is recommended to set up a dedicated Monitor Node and Backup Node:

5. Setting up the Monitor Node.
6. Setting up the Backup Node.

The following chapters concentrate on all these steps. We assume that you are installing Red Hat Enterprise Linux 4.0 on the Hardware Node. If you are using another Linux operating system (e.g. Fedora Core 4 or CentOS 4), please consult the corresponding installation guides about the installation specifics. Red Hat Enterprise Linux 4.0 is used as an example throughout this guide.

# Installation Checklist

We provide this checklist for your convenience. It contains the steps required to install Virtuozzo 3.0 successfully. Mark checkboxes as you finish the corresponding steps.

### Installing/ Configuring Root OS

- ❑ Start Red Hat Enterprise Linux 4.0 installation
- ❑ Partition disk
- ❑ Select "No Firewall"
- ❑ Select "Disabled" for the "Enable SELinux" field
- ❑ Select "Customize software packages ..." and clear the checkboxes of all package groups offered to be installed on the Hardware Node
- ❑ Reboot your system and login as root
- ❑ Install the `rpmbuild` package on the Hardware Node

### Installing Virtuozzo

- ❑ Install Virtuozzo software (CD 1 and 2 or another location)
- ❑ Reboot the Hardware Node
- ❑ Install Virtuozzo license
- ❑ Install OS and application template(s) (CD 3 and/or CD 4 or another location)
- ❑ Verify your installation
- ❑ Create the Service VPS

**Note:** The steps of installing a valid Virtuozzo license and of creating the Service VPS are omitted, in case they were performed during the Virtuozzo software installation.

### Installing VZMC and Registering Hardware Node

- ❑ Install VZMC for Windows or Linux
- ❑ Register all the Hardware Nodes with Virtuozzo installed

### Configuring Virtuozzo Control Center

- ❑ Log in to Virtuozzo Control Center
- ❑ Install a VZCC license
- ❑ Set up the HN mail relay server

**Note:** The step of installing a valid VZCC license is omitted, in case the corresponding license was uploaded to the Hardware Node during the Virtuozzo software installation.

### Configuring Monitor Node

- ❑ Connect the HN and Monitor Node with a null-modem cable
- ❑ Prepare the Hardware Node for sending messages via the null-modem cable
- ❑ Prepare the Monitor Node for receiving messages via the null-modem cable
- ❑ Configure the Monitor Node so that you will be able to subscribe for alerts

### Setting Up Backup Node

- ❑ Install the necessary packages on the Backup Node
- ❑ Upload the Backup Node ssh keys to the Hardware Nodes

CHAPTER 3

# Installing Virtuozzo on Hardware Node

The given chapter provides information on how to install Virtuozzo 3.0 on your Hardware Node. Along with the information on installing the Virtuozzo software itself, it explains the way to install the root operating system on the Node and to configure it for Virtuozzo 3.0.

## In This Chapter

Installing and Configuring Root Operating System on Hardware Node..... 17
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## Installing and Configuring Root Operating System on Hardware Node

This section explains how to install Red Hat Enterprise Linux 4 on the Hardware Node and how to configure it for Virtuozzo 3.0. If you are using another Linux OS (e.g. CentOS 4 or Fedora Core 4), please consult the corresponding installation guides about the installation specifics.

**Note:** You should choose custom installation and manual disk partitioning during the operating system installation irrespective of the Linux OS distribution you are going to install on your computer.

# Disk Partitioning

Please follow the instructions from your Red Hat Enterprise Linux 4.0 Installation Guide when installing the OS on your Hardware Node. After the first several screens, you will be presented with the Disk Partitioning Setup window where you are supposed to select the Manual partition with Disk Druid checkbox. Do not choose automatic partitioning since this type of partitioning will create a disk layout intended for systems running multiple services. In case of Virtuozzo, all your services shall run inside Virtual Private Servers.

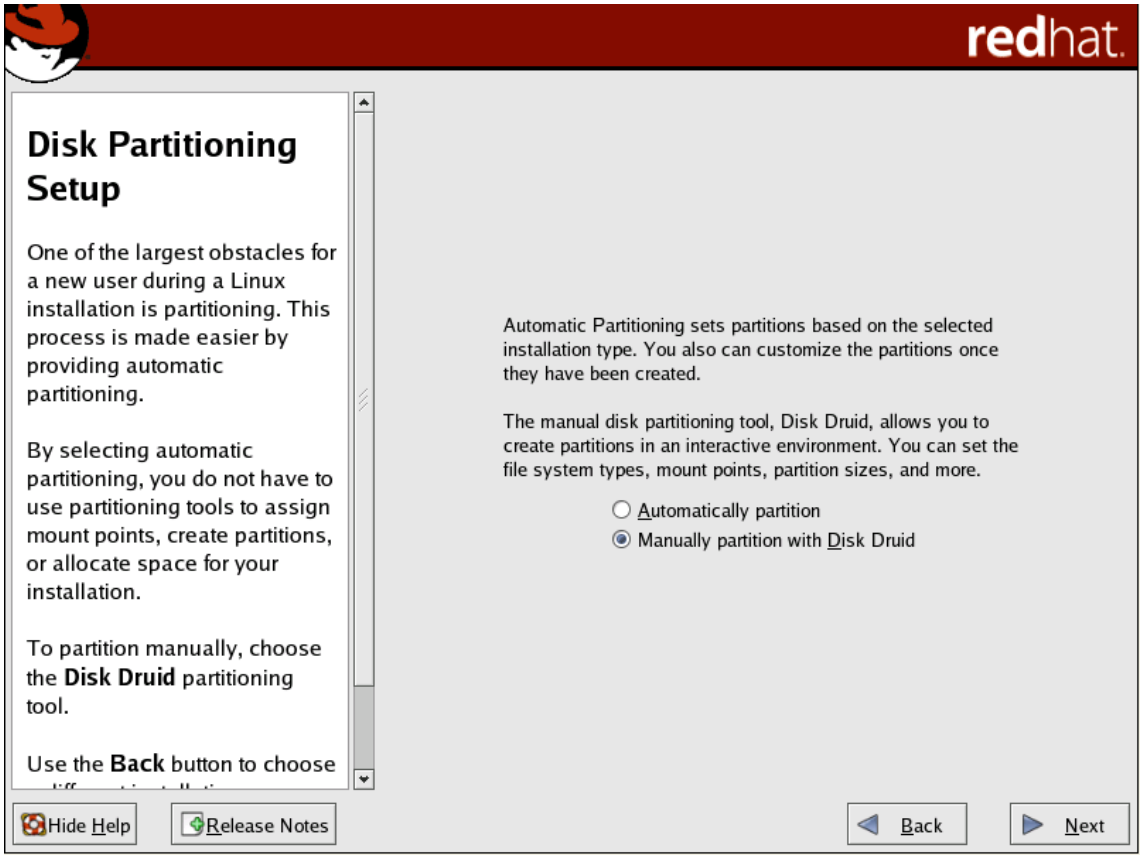


*Figure 2: Red Hat Enterprise Linux Installation - Choosing Manual Partitioning*

Create the following partitions on the Hardware Node:

| Partition | Description | Typical size |
|---|---|---|
| / | Root partition containing all Hardware Node operating system files | 2-4 Gb |
| swap | Paging partition for the Linux operating system | 2 times RAM |
| /vz | Partition to host Virtuozzo templates and Virtual Private Servers | all the remaining space on the hard disk |

We recommend that you use the Ext3FS file system for the `/vz` partition. This partition is used for holding all data of the Virtual Private Servers existing on the Hardware Node. Allocate as much disk space as possible to this partition.

**Note:** The `reiserfs` file system is not supported in Virtuozzo 3.0.

The root partition will host the Red Hat Enterprise Linux 4 operating system files. The system files to be installed on the Hardware Node occupy approximately 700 Mb of disk space, so 800-900 Mb is the minimal size of the root partition. The size of the swap partition shall be two times the size of physical RAM installed on the Hardware Node.

The figure below presents a system with a 6 Gb SCSI hard drive.

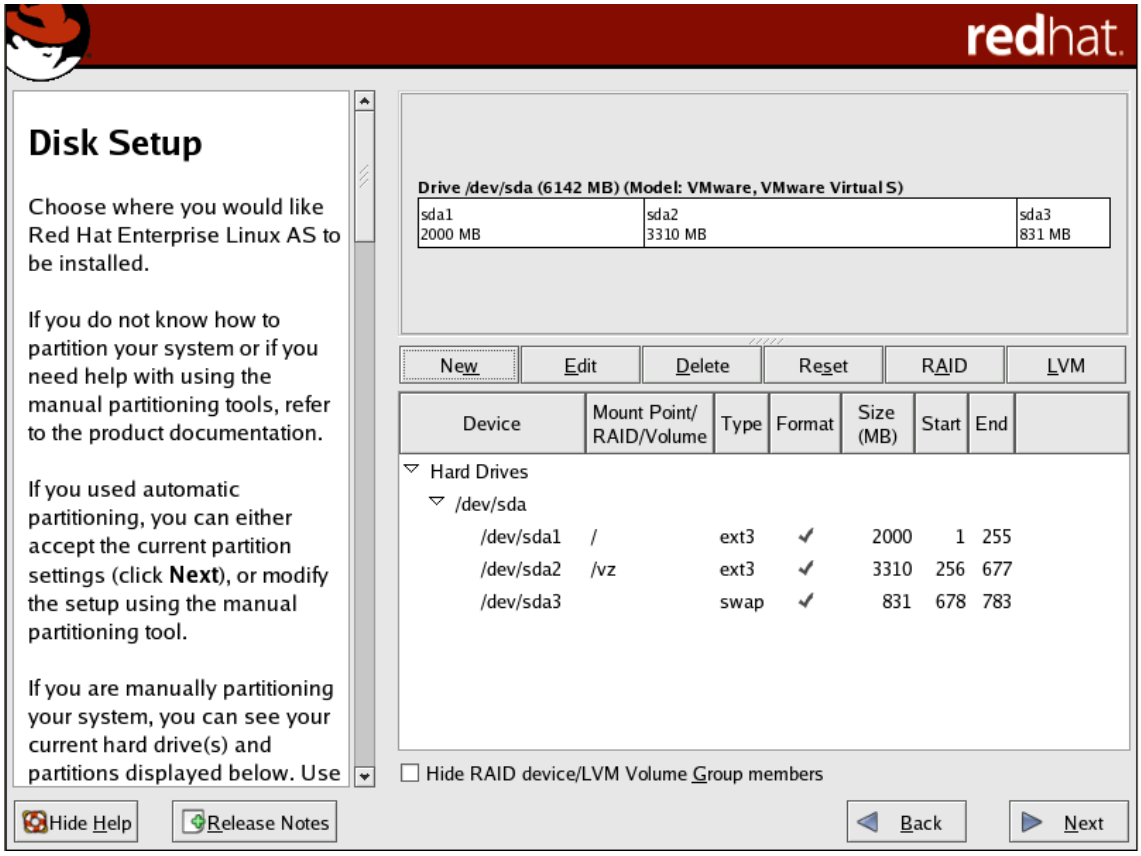


*Figure 3: Red Hat Enterprise Linux Installation - Disk Druid*

Please keep in mind that Virtual Private Server private areas, containing all data of the Virtual Private Servers shall reside on this single `/vz` disk partition together with all the templates installed.

# Finishing OS Installation

After the proper partitioning of your hard drive(s), proceed in accordance with your Red Hat Enterprise Linux 4.0 Installation Guide. Please follow the following recommendations:

- While on the Network Configuration screen, you should ensure the correctness of the Hardware Node's IP address, host name, DNS, and default gateway information. If you are using DHCP, make sure that it is properly configured. If necessary, consult your network administrator.
- On the Firewall Configuration screen:
  - Select the No firewall radio button. The reason for this is that Virtuozzo uses specific services for its operation.

- Select Disabled on the drop-down menu opposite the Enable SELinux field. The reason for this is that Virtuozzo currently does not support SELinux functionality; so, selecting Active on the drop-drown menu does not have any effect.

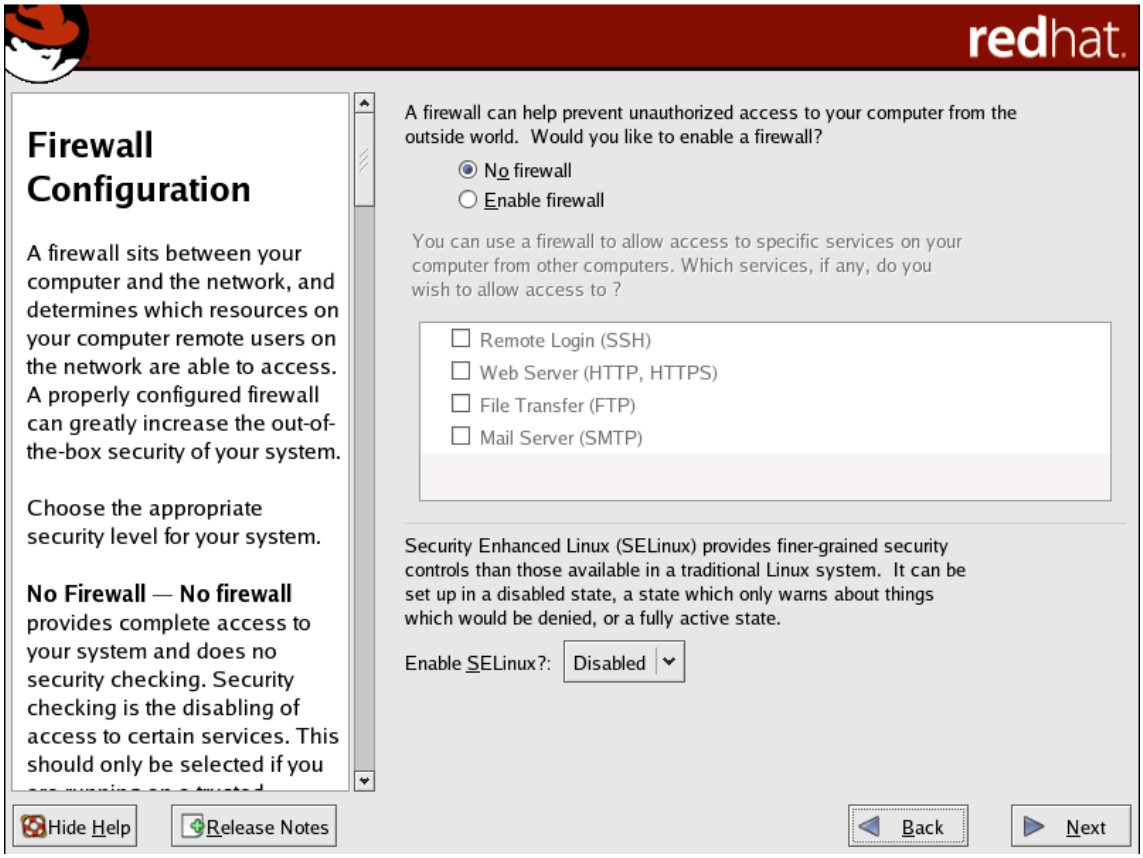


*Figure 4: Red Hat Enterprise Linux Installation - Disabling Firewalling*

- In the Package Installation Defaults window, select the Customize software packages ... radio button and, on the next screen, clear the checkboxes of all package groups offered to be installed on your computer. For its functioning, Virtuozzo does not need any additional packages to be installed on the Hardware Node.

After finishing the installation and rebooting your computer, you are also supposed to perform the following operations before starting with the Virtuozzo installation:

- Install the `rpmbuild` package on the Hardware Node. For example, you can issue the following command

```
# rpm -ihv rpm-build-4.3.3-7_nonptl.i386.rpm
```

to install the `4.3.3-7` version of the `rpmbuild` package on the Node.

- Make sure that the `/vz` partition is empty; otherwise, it will not be reformatted during the Virtuozzo installation to ensure optimal performance.

# Installing Virtuozzo Software

The Virtuozzo distribution includes two sets of packages (the prerequisite set and Virtuozzo packages) and a number of OS and application templates. If you have received your Virtuozzo distribution on CD-ROMs, then the prerequisite set is located on CD 1 and the Virtuozzo packages – on CD 2. All the remaining CD(s) (beginning with CD 3) contain(s) templates shipped by SWsoft. You might also have downloaded the Virtuozzo distribution from the Internet to a local directory.

In order to install Virtuozzo, you should be familiar with basic Linux administration commands. For example, you should be able to mount and dismount CD-ROMs. On fresh Red Hat systems, it is enough to issue the following command:

```
# mount /mnt/cdrom
```

To dismount and eject the CD-ROM, the `eject` command should be used. For additional information and troubleshooting, consult your Linux administration manual.

# Running Virtuozzo Installation Program

To install the Virtuozzo prerequisite packages, log in as root and run the `install` utility located at the `HW` directory of your Virtuozzo 3.0 CD 1 or your distribution directory. Typically, your session will look like below:

```
# mount /mnt/cdrom
# /mnt/cdrom/HW/install
```

**Note:** Please do NOT change the working directory (with the `cd` command or the like) to `/mnt/cdrom/`… because in this case the install will not be able to automatically dismount and eject the Virtuozzo CDs for their manual changing during the installation.

The installation program will greet you with the following screen:

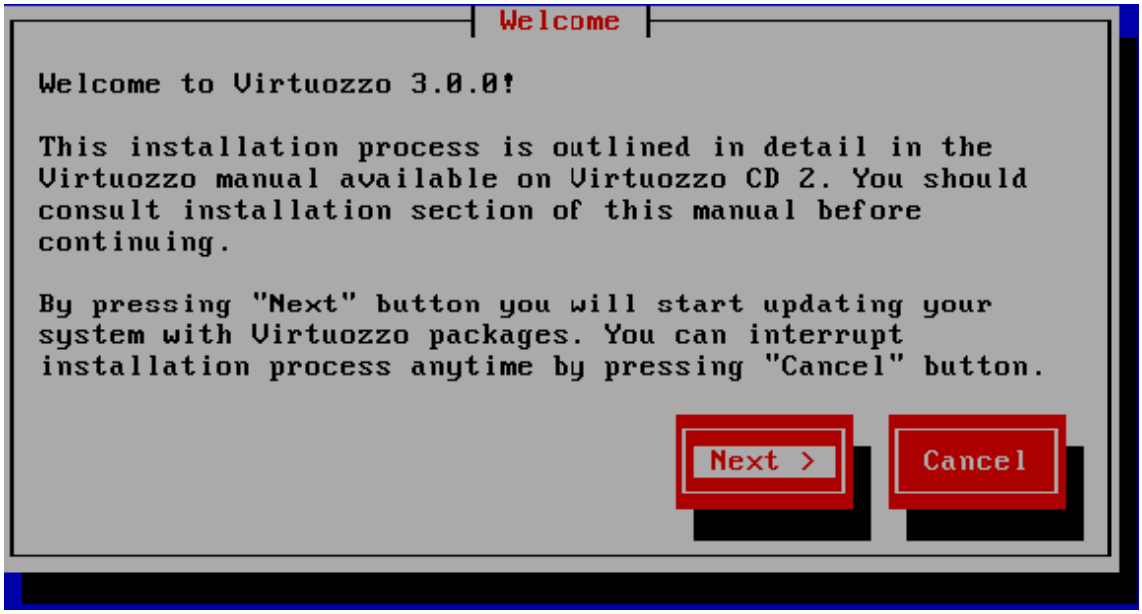


*Figure 5: Virtuozzo Installation - Welcome*

Pressing the Next > button will display the SWsoft end user license agreement that you must accept to be able to install Virtuozzo 3.0 on the computer. Use either the PgDn key or the down arrow on your keyboard to read all the text of the agreement, then press the Accept button.

After accepting the license agreement, you will be presented with the Select kernel window allowing you to choose the kernel version - either 2.4 or 2.6:

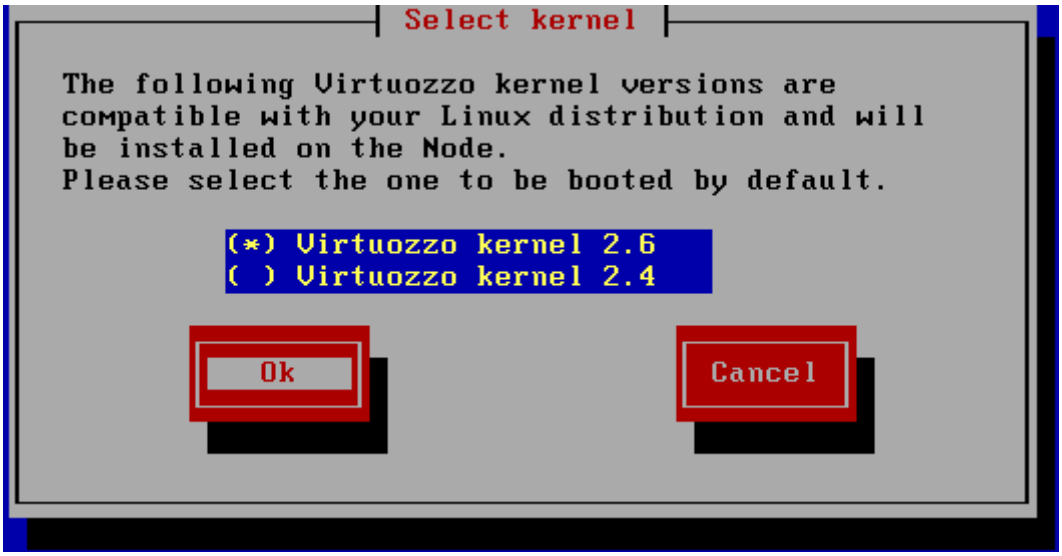


*Figure 6: Virtuozzo Installation - Choosing Kernel Version*

**Note:** This screen is displayed only if you are updating your previous Virtuozzo installation to Virtuozzo 3.0 (e.g. during the update from Virtuozzo 2.6.2 running under Red Hat Enterprise Linux 3 to Virtuozzo 3.0). If you are installing Virtuozzo on a clean system, this step is skipped and the 2.6 kernel is automatically selected and installed on your Hardware Node.

Both kernels - 2.4 and 2.6 - are installed on the Hardware Node during the Virtuozzo update; however, on this screen you should decide on what kernel will be loaded on the system startup by default. We recommend that you select the 2.6 kernel because it provides a number of improvements (e.g. the zero downtime migration support) against the 2.4 Virtuozzo kernel.

On the next screen, you will be offered to choose the proper installation type for your hardware:

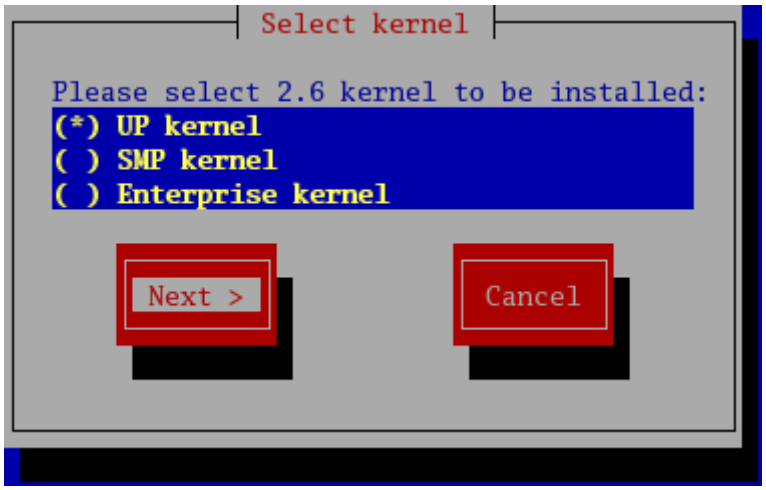


*Figure 7: Virtuozzo Installation - Choosing Installation Type*

In this window, you can select one of the following kernel types:

- UP kernel should be chosen if you have a uni-processor system;
- SMP kernel should be chosen if you have a symmetrical multi-processing system;

- Enterprise kernel should be chosen if you have a symmetrical multi-processing system with more than 4 Gb of RAM available.

If you are not sure what type of Virtuozzo kernel you should choose for installation, press F1 here to learn about the hardware requirements for installing this or that type of kernel.

Pressing Next > in this window starts installing packages from Virtuozzo CD 1 or your local distribution directory. In case you did not follow completely the operating system installation instructions as was described earlier, the installation program can report unresolved dependencies in system package database. Review these dependencies and, if they are not critical for your system operation, you can continue with the installation.

After completing the installation of all the packages from Virtuozzo CD 1, the installation program will prompt you to change the CD as is illustrated by the picture below:

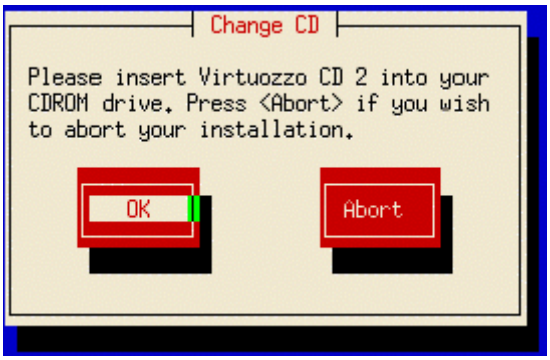


*Figure 8: Virtuozzo Installation - Change CD*

**Note:** It goes without saying that this prompt will not be displayed if you are installing Virtuozzo from a local directory on your computer.

Replace the CD and press the OK button. CD 2 is the final CD required to perform the Virtuozzo installation. The installation program will continue to install Virtuozzo packages. After all the packages are installed, you will see the services configuration screen:

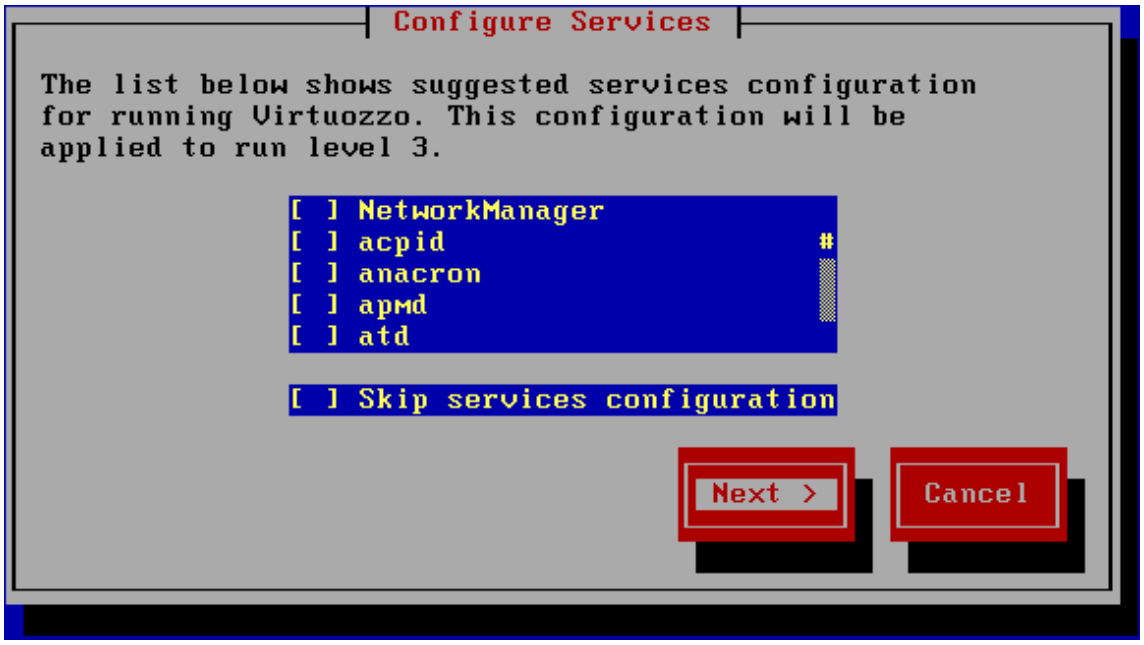


*Figure 9: Virtuozzo Installation - Configuring Services*

This screen lists all the services installed on the Hardware Node. If you select a service, it is automatically started on the next Hardware Node booting up. It is important to remember that this screen displays the proposed services configuration rather than the current services configuration.

Selecting a service and pressing F1 will bring in the help window with the corresponding service description. Use the description to decide whether you need the service running.

---

**Note:** In general, avoid changing the proposed configuration unless necessary. An incorrect services configuration can lead to a non-working Virtuozzo installation.

---

The Skip services configuration checkbox instructs the installation program to not apply the suggested services configuration to the Hardware Node. Do not select this checkbox unless you fully understand the consequences.

On the following two screens, the installation program will load two licenses to the Hardware Node and display their parameters:

- A trial Virtuozzo license. If the installation program finds a valid Virtuozzo 3.0 license, it does not load the trial license and notifies you with a message window.
- A trial VZCC license. If the installation program finds a valid VZCC license, it does not load the trial license and notifies you with a message window.

Next, you will be asked to provide the IP address and the password of the `vzagent0` user for the Service VPS. This VPS is needed for running `vzagent`, which provides an interface to the given Hardware Node for other Hardware Nodes, Virtuozzo Management Console (VZMC), Virtuozzo Control Center (VZCC), and Virtuozzo Power Panels (VZPP):

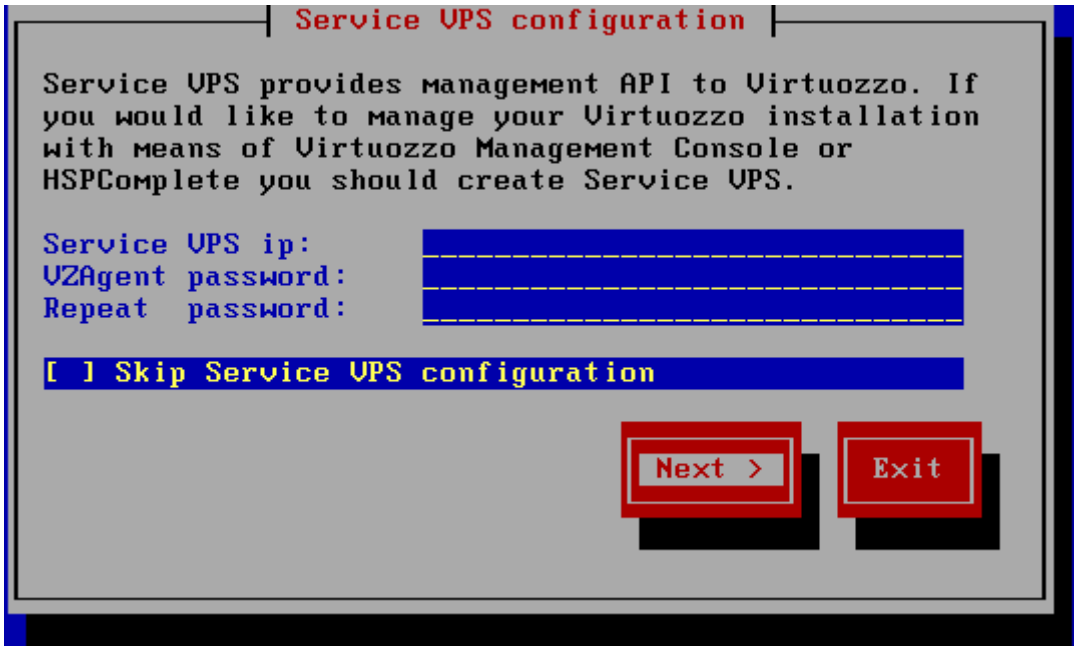


*Figure 10: Virtuozzo Installation - Configuring Service VPS*

The Service VPS will be created with the parameters you specify after the computer is rebooted.

---

**Notes:** 1. The Service VPS IP address should be different from that of the Hardware Node and all the other VPSs.

2. If you have skipped the Service VPS creation on this step, you can manually create it with the `vzsveinstall` utility later on. Detailed information on how to manually create the Service VPS is provided in the Creating Service Virtual Private Server subsection (on page 39).

---

If you have created a separate `/vz` partition when installing the Host Linux OS, the installation program will offer to reformat the partition with Virtuozzo specific options and will offer to install the templates available on Virtuozzo CDs 3 and 4 or in the `templates` subdirectory of your Virtuozzo distribution:

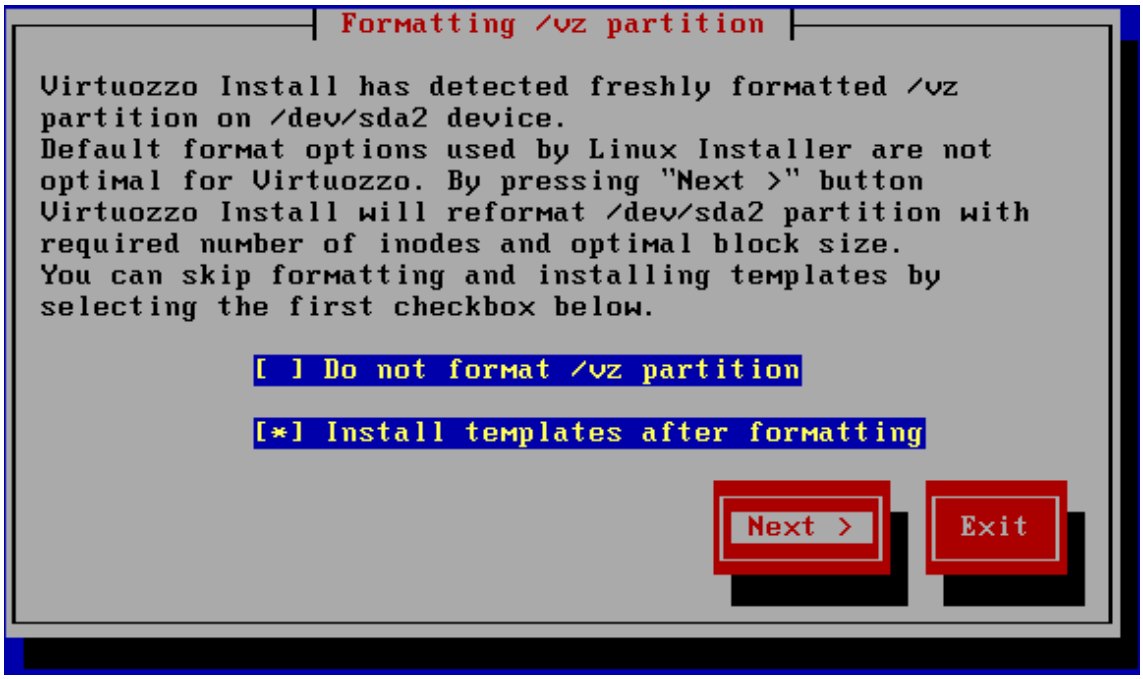


*Figure 11: Virtuozzo Installation - Formatting /vz Partition*

The Red Hat Enterprise Linux installation formats the partitions you created to the Ext2FS or Ext3FS file system with the default block size of 4096 bytes. It also allocates one inode per every two blocks. Each Virtual Private Server created has approximately 40,000 of Virtuozzo File System symbolic links. The majority of VZFS symbolic links fits in 1024 bytes, and creating a file system with a bigger block size can lead to disk space wastage. In addition, with the default settings, the number of inodes may prove insufficient, and the Hardware Node may experience a shortage of inodes on the `/vz` partition even if there is still disk space available. Therefore, we strongly recommend you reformat the file system on the `/vz` partition. The Virtuozzo installation program reformats the partition with the block size of 1024 bytes and reserves one inode per every block.

If you choose not to install any Virtuozzo templates, you may install the necessary templates manually later. Note that the OS template necessary for the Service VPS creation is located on CD 2 and is installed whatever your choice for this option. This template is not installed only if you skipped Service VPS configuration on the previous step.

If you do choose to install the templates, the installation program will review the templates subdirectory of your CD-ROM and suggest you select the templates located in this directory that you wish to be installed. For example:

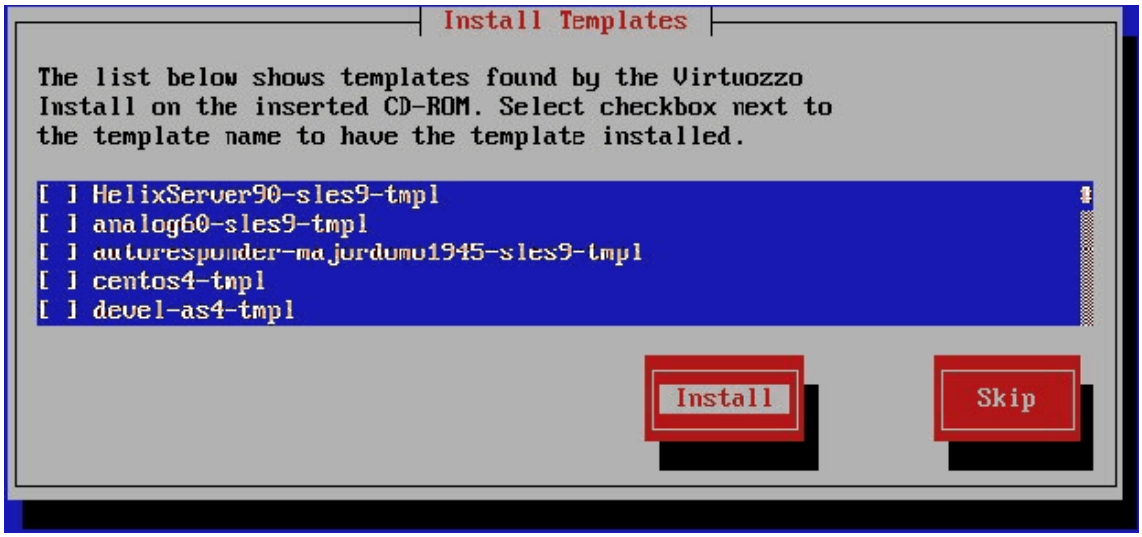


*Figure 12: Virtuozzo Installation - Selecting Templates*

If the templates directory is not found, you will be presented with a warning and no templates will be installed.

Finally, the installation program will greet you with a success message:

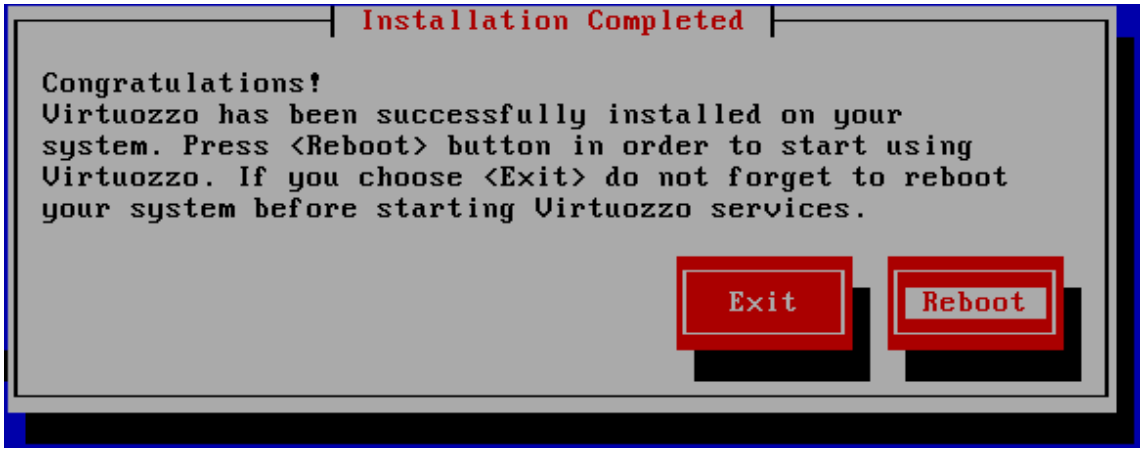


*Figure 13: Virtuozzo Installation - Completed*

If you want to do a manual check of the Hardware Node, choose the Exit button. Otherwise, press Reboot. The installation program will eject Virtuozzo CD 2 and reboot the Hardware Node.

After reboot, the Service VPS will be automatically created, which takes some time. Before you are able to create common Virtual Private Servers, you should make sure that you have a correct Virtuozzo license and have installed at least one OS template. Please see the following sections for details.

# Using vzlicreq for Generating License Request

The `vzlicreq` utility is found in the `vzlicutils-keygen` RPM package located on Virtuozzo CD 2 in the `HW/RPMS` subdirectory. This utility is already installed as `/usr/sbin/vzlicreq` if you have installed Virtuozzo on the Hardware Node. If you do not have Virtuozzo installed on the Hardware Node, ask your SWsoft representative to send you the `vzlicutils-keygen` RPM. You should install this RPM on the computer where you want to run Virtuozzo.

`vzlicreq` has two modes of execution — full screen and command line. By default, the utility starts in the full screen mode; however, you can force it to run in the command line mode by specifying the `-c` command line switch.

In the full screen mode, the utility is a six-step wizard application. It will prompt you for all the necessary information to generate a license request file for you to send it to the SWsoft sales department. The first question you are asked to answer is your company name:

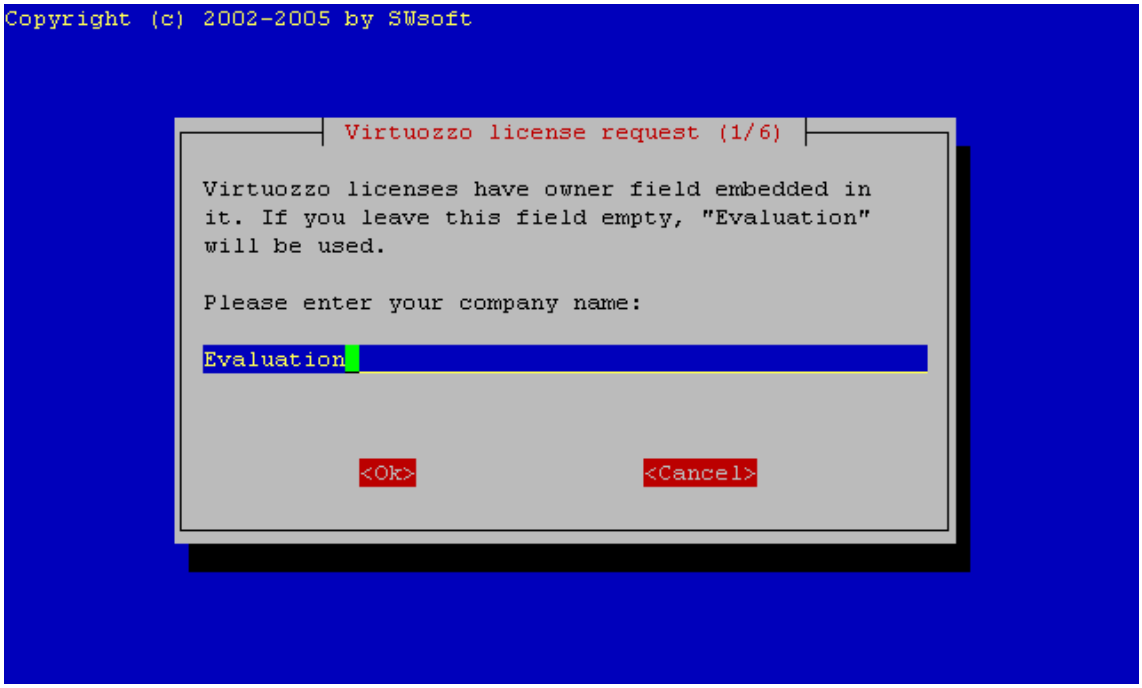


*Figure 14: Generating License Request - Enter Company Name*

All Virtuozzo licenses have an “owner” field in them. This field is purely informational and can help track the license history if needed.

The next two screens will prompt you for your name and e-mail address:

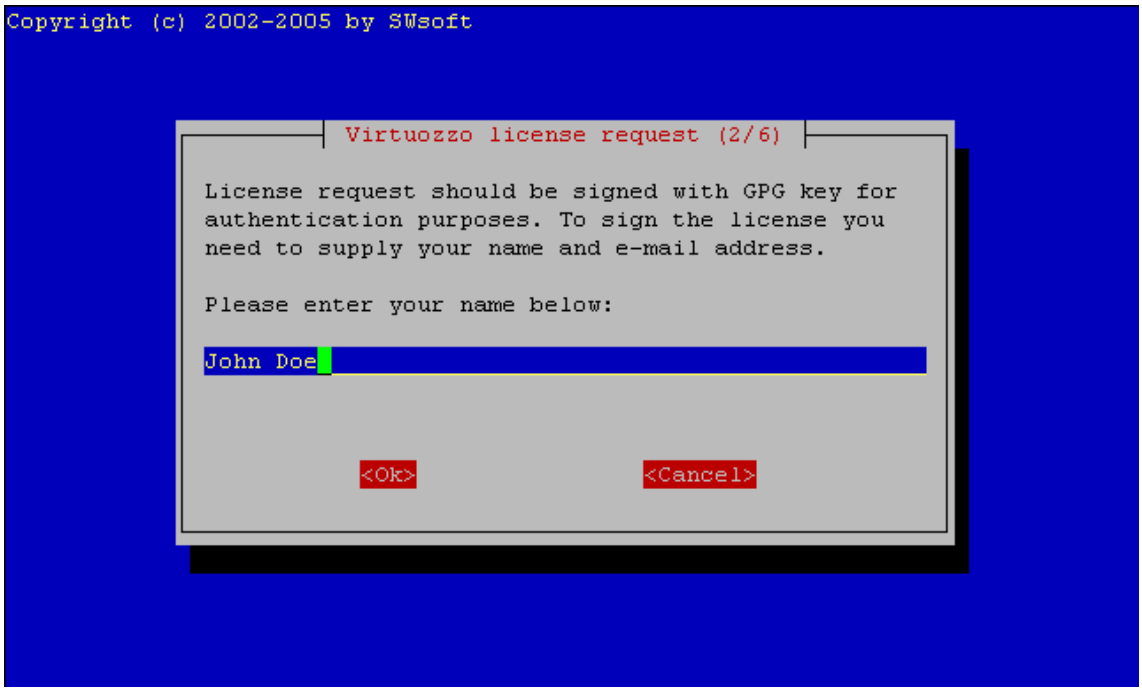


*Figure 15: Generating License Request - Enter Your Name*

The next screen asks you for the number of Virtual Private Servers you are planning to have:

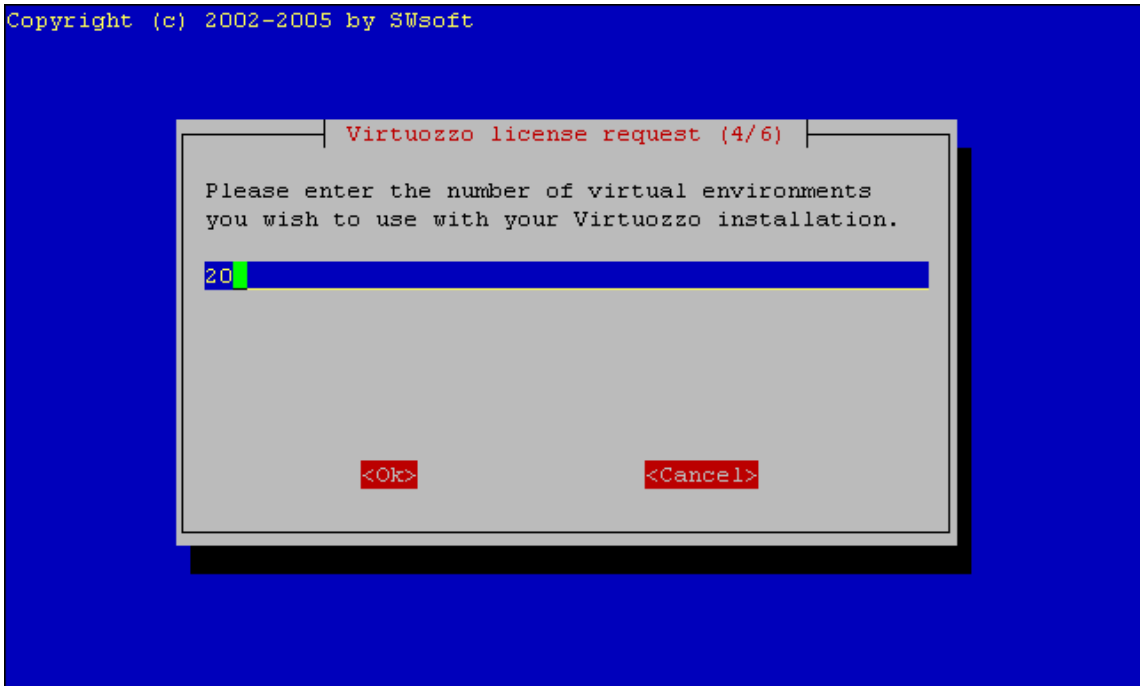


*Figure 16: Generating License Request - Enter Number of Virtual Private Servers*

Please note that you should specify a non-zero number here; otherwise, you will not be able to run any Virtual Private Servers on your machine. The utility will display an error if you specify the value as zero and will ask you to enter the number again.

The next screen will prompt you for the license expiration date:

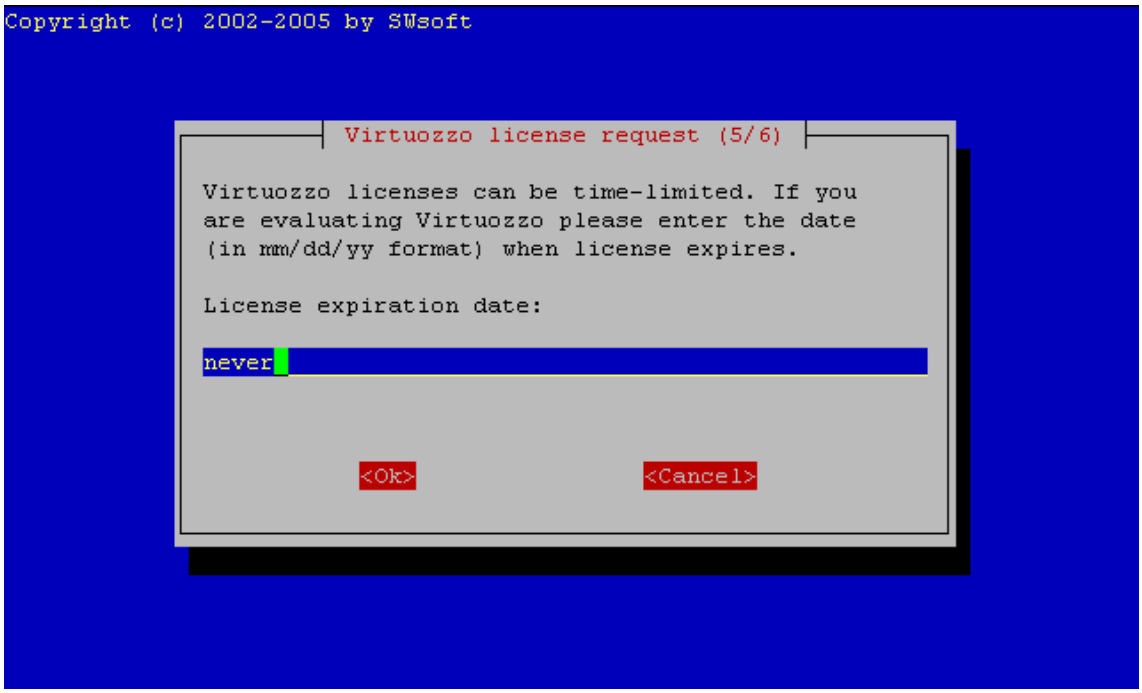


*Figure 17: Generating License Request - Enter License Expiration Date*

Time-limited licenses might be suitable for you if you are going to evaluate Virtuozzo over a long period of time. If you need a permanent license, just set the value of the field to “never”.

The following screen will ask you to enter your Hardware Node CPU power in MHz (in other words, the sum of the CPU speeds for all the CPUs installed):

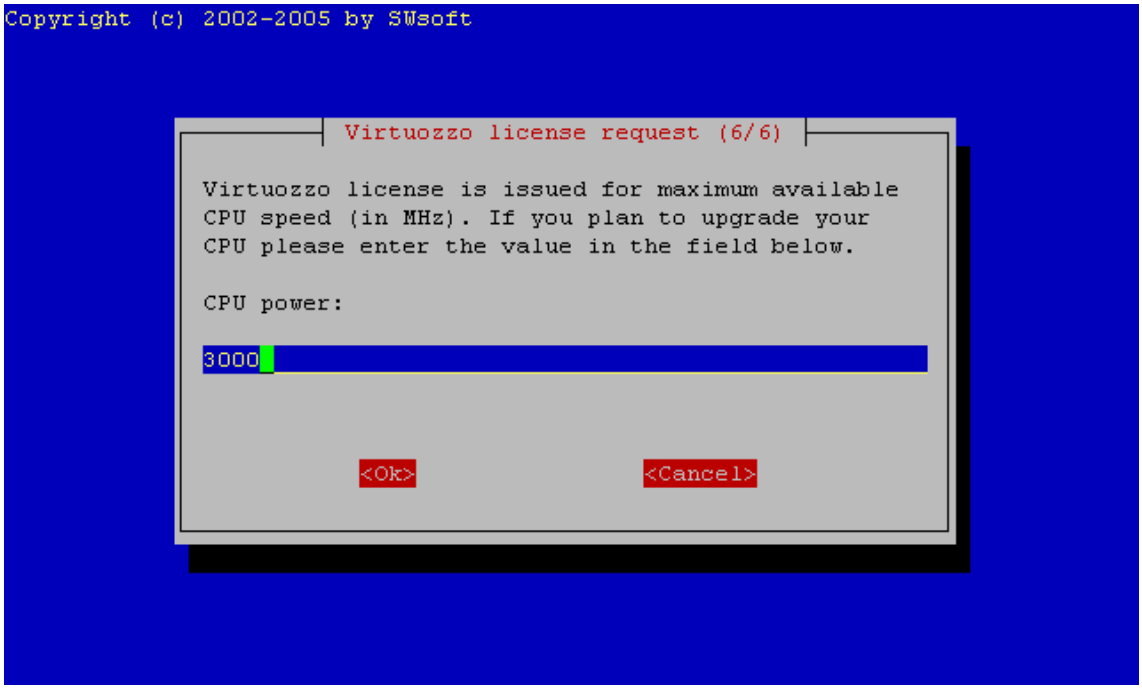


*Figure 18: Generating License Request - Enter Maximal CPU Power*

By default, the utility displays the current CPU power. However, if you are planning a CPU upgrade or if you are going to install additional processors, then, please enter the total CPU speed you are going to have. Please also note that if you are running a uniprocessor Linux kernel, then the utility will see and display the speed of only one CPU.

After `vzlicreq` exits, you can find the license request as the `vzLicRequest` file in the current directory. Since we do not recommend running a mail server on the Hardware Node, you should transfer the file to your workstation and send it to sales@swsoft.com. Please consult your Red Hat manual on transferring files from a Linux computer.

## Installing License on Hardware Node

As soon as you obtain a proper license file(s) from SWsoft, copy it to the `/etc/hspc/licenses/` directory on the Hardware Node and run the `vzlicload` utility to load the Virtuozzo license into the kernel with an already enabled Virtuozzo support.

**Note:** The license file should have the name of `vzlicense`; in case it has another name, please rename the file before copying it to `/etc/hspc/licenses/` directory and running `vzlicload`.

In order to find out the status of your Virtuozzo system in respect of the license loaded, SWsoft ships a special `vzlicview` utility. This utility scans the license directory (`/etc/hspc/licenses`) and prints the license found in the `vzlicense` file along with its status obtained from the kernel. The corresponding man page `vzlicview (8)` describes the full set of `vzlicview` options. A sample output of `vzlicview` is below:

```
# vzlicview
Processing file “/etc/hspc/licenses/vzlicense”
HW
         owner_name=”SWsoft”
         target_OS="Linux"
         status=”ACTIVE”
         version=2.5
         owner_id=11.2
         serial=F6E2.224E.E200.DC9E.A82B.E8FF.D991.86B6
         expiration=”unlimited”
         start_date=”unlimited”
         issue_date=”09/30/2005 10:41:37”
         graceperiod=300
         cpu_power=2000
         used_cpu_power=1728
         ve_total=100
         used VE=16
         CLASS
                 class name=”Unlimited VE”
                 VE in class=100
                 used VE=16
                 class id=2
```

There are a number of license statuses. They are listed below:

| | |
|---|---|
| ACTIVE | The license file is valid and has been successfully loaded into the kernel. |
| VALID | The license file contains a valid license for this Hardware Node; however, no license is loaded into the kernel. |

| | |
|---|---|
| INACTIVE | The license file the utility parses is valid; however, another license is currently active in the kernel. |
| INVALID | The license file is invalid (for example, because of the Hardware Node ID mismatch) or corrupted. |
| EXPIRED | The license file matches the Hardware Node ID but has expired and, therefore, could not be loaded into the kernel. |
| GRACED | The license file has been successfully loaded into the kernel; however, it has expired and is currently on the grace period (i.e. it is active till the end of the grace period). |
| UNKNOWN | No Virtuozzo support has been detected in the running kernel. |

It is important to understand that both `vzlicload` and `vzlicview` operate on license files either specified on the command line with the `–f` switch or located in the default directory. That is why after the license has been successfully loaded with `vzlicload`, say, from a file located in other than the default directory, you can receive the INACTIVE status from `vzlicview` that looks for the license file in the default directory when called without parameters. Currently, you can also read the active license from the `/proc/vz/active_license` file, but its format is optimized for application parsing rather than for human reading.

# Updating Virtuozzo License Automatically

Virtuozzo 3.0 comes with a `vzkeytools` package, the installation of which allows you to arrange for the automatic updating of your time-limited Virtuozzo license. This package is installed together with the Virtuozzo 3.0 installation on your Node. You may also install this package manually. For example:

```
# rpm -ihv vzkeytools-3.0.0-2.swsoft.i386.rpm
```

What this package essentially does is adding the `vzkeyupdate` utility to your system and setting it to be launched twice a day as a `cron` job. The utility tries to connect to the SWsoft Key Authentication (KA) server and retrieve a new license in order to install it on the Hardware Node. It goes without saying that the utility should provide enough information to the KA server about the Node where it is running, on the one hand, and the KA server must recognize the credentials supplied by the `vzkeyupdate` utility to be able to issue a license, on the other hand. Generally, there are two ways to make the KA server aware of its responsibility to issue a new license to the given Node:

1. Contacting your SWsoft sales representative in order to have them add the information on your Node to the KA server database.
2. Getting the so-called "master key" - a special file containing a key to receive an initial SWsoft license - and installing it on the Node with the help of the `vzkeyinstall` utility:

```
# vzkeyinstall <master_key_file_name>
```

Either of these two courses of action is intended to ensure that your Node is registered with the Key Authentication server, so you will be able to receive license updates thru it.

Another thing that you should take care of is entering the veritable information into the `vzkeytools` configuration file - `/etc/vzkeytools/vzkeytools.conf` - located on the given Hardware Node. Detailed information on the `vzkeytools` configuration file is provided in the Configuring Virtuozzo chapter of the Virtuozzo Reference Guide.

After the configuration file has been correspondingly modified and the other preliminary operations indicated above have been performed, the `vzkeyupdate` utility starts connecting to the KA server on a regular basis to ensure that the Virtuozzo license of the given Node does not expire all of a sudden.

The utility begins its requests for a new license at the time when this license may already be available on the KA server (usually 10 days before the old license expires) and continues so until it gets and installs a new license. However, if it does not get a new license from the KA server (for example, if no payment has been provided) during the first five days after the expiration date, it stops its attempts altogether. If there is no Virtuozzo license on the Node yet, the utility will be trying to get and install the first license also for five days only.

**Note:** The vital identification information about the given Hardware Node and its licenses is stored in the `/var/lib/vzkeytools/keyHistory.xml` file on the Hardware Node. You should not tamper with this file in any way to ensure the faultless automatic updating of your Virtuozzo licenses.

# Unattended Virtuozzo Installation

Unattended installation is available since the Virtuozzo 2.6 release. While running in the unattended mode, the installation program uses the default values for all the parameters asked in the interactive mode. This means that:

- The default list of services will be started on the corresponding runlevels;
- If `/vz` is a separate partition and it is empty, it will be reformatted with the optimal block size and number of inodes;
- If the `/vz` partition was reformatted on the step above, the default set of templates will be installed. This set includes all the Red Hat and "minimal" templates (i.e. all the templates having “redhat” or “minimal” as part of their name).

Please note: if your Virtuozzo distribution is on CDs, you should copy all the CDs one by one to a single directory, with the commands like:

```
# cp -a /mnt/cdrom/* /tmp/virtuozzo/
```

The following command line parameters control the installation in the unattended mode:

| Parameter | Description |
|---|---|
| `-a, --auto` | Install Virtuozzo in the automatic (unattended) mode. |
| `-i, --ip` *`IP_ADDRESS`* | Use this IP address for the Service VPS. |
| `--ktype up\|smp\|enterprise` | Determines the type of Virtuozzo kernel to be installed. |

| | |
|---|---|
| `-n, --nodeps` | Ignore dependencies during the unattended installation. You may consider using this option if the installation fails because of broken RPM dependencies. |
| `-o, --all-templates` | Install all the OS and application templates the installation program finds, not only the default set. Note that this process can be very time-consuming. |
| `-t,--templates-file <`*`file`*`>` | The path to the file containing the names of the templates to be installed during the Virtuozzo unattended installation. |
| `-p, --passwd PASSWD` | `vzagent` root user password. This is the password you should supply to register a newly installed Hardware Node in Virtuozzo Management Console (VZMC). |
| `-r,--rpmdir <`*`dir`*`>` | The path to the directory containing Virtuozzo RPM files. By default, the `./RPMS` directory is used. |
| `--skip-reboot` | Do not reboot the Hardware Node during the Virtuozzo unattended installation. |
| `-s, --skip-services` | Do not optimize for Virtuozzo the set of services to be run on the Hardware Node, i.e. leave the services configuration intact during the Virtuozzo installation. It is not recommended to use this option because Virtuozzo has a number of requirements for the Hardware Node services, and the Virtuozzo installer takes care of meeting them. |
| `-v, --version` | Print the version of the Virtuozzo `install` utility. |

Thus, you may run, for example, the following command:

```
# ./install -a -i 10.0.0.1 -p MyPasswd123
```

# Verifying Your Virtuozzo Installation

Virtuozzo includes a special package named `virtuozzo-release` that can help you check up that all Virtuozzo packages have been successfully installed. Run the following command:

```
# rpm –V virtuozzo-release
```

The command exits silently if all required Virtuozzo packages are available. If some packages are missing, then the output will look like below:

```
# rpm -V virtuozzo-release
Unsatisfied dependencies for virtuozzo-release-3.0.0-1.swsoft:
vzctl = 3.0.0-1.swsoft
```

This output shows that the required version of the `vzctl` package is not installed on the system.

# Installing OS Templates

Operating system templates are used to create new Virtual Private Servers with a pre-installed operating system. Therefore, you are bound to install at least one OS template from Virtuozzo CD 3 and/or 4 or your Virtuozzo distribution directory before creating VPSs.

OS templates are located in the `templates` subdirectory of your Virtuozzo CD 3 and 4. You have to specify an OS template on the VPS creation, so you need to install at least one OS template. Virtuozzo templates are delivered in the standard RPM format and their installation does not differ from the installation of any other RPM package.

Virtuozzo 3.0 allows you to use one of the following OS template types for the VPS creation:

- Standard OS templates containing a set of original application files repackaged for mounting over Virtuozzo File System. Let us assume that you have not installed any OS templates during the Virtuozzo installation and have also skipped the creation of the Service VPS. So, you wish to install the `redhat-as3-minimal` template on the Hardware Node to create the Service VPS on its basis:
  - Log in as root and install the `redhat-as3-minimal` template on the Node:

```
# rpm –ihv templates/redhat-as3-minimal-p2-tmpl-2.6.0-6.swsoft.i386.rpm
Preparing...        ########################################### [100%]
   1: redhat-as3-min########################################### [100%]
```

  - Create an archive of the pre-installed Red Hat Advanced Server 3 operating system to make the subsequent Virtual Private Server creations significantly faster. Note that it takes up to 15 minutes for `vzpkgcache` to archive the installation of an OS template.

```
# vzpkgcache
Checking: version 20040119 of redhat-as3-minimal.
Creating cache for redhat-as3-minimal/20040119
Wrote cache for redhat-as3-minimal/20040119
```

  **Note:** The `redhat-as3-minimal` OS template is used to create the Service VPS only. You should install other OS templates on the Hardware Node to create regular Virtual Private Servers on their basis.

- EZ OS templates providing significant technology enhancements over standard Virtuozzo templates. Before you can start using OS EZ templates to base your Virtual Private Servers on, you should perform the following operations:
  - Install the OS EZ template on the Hardware Node by using the `rpm -i` command. For example, to install the Red Hat Enterprise Linux 4 OS EZ template on the Node:

```
# rpm -ihv templates/redhat-as4-x86-tmpl-3.0.0-1.swsoft.noarch.rpm
Preparing...                ################################### [100%]
   1:redhat-as4-x86-tmpl    ################################### [100%]
```

  - Cache the installed OS EZ template by using the `vzpkg create cache` command:

```
# vzpkg create cache redhat-as4-x86
...
Complete!
Packing cache file redhat-as4-x86.tar.gz ...
```

Cache file redhat-as4-x86.tar.gz [14M] created.

**Notes:** 1. To be able to cache your OS EZ templates, you may need to set up a package repository for them. So, you have to build a special repository for all commercial versions of the Linux distributions (e.g. Red Hat Linux Enterprise 4). Detailed information on how to manage package repositories is provided in the Setting Up Repository for EZ Template chapter (on page 59).

2. Detailed information on how to manage standard OS templates and OS EZ templates is provided in the Managing Templates and Managing EZ Templates chapters of the Virtuozzo User's Guide, respectively.

# Creating Service Virtual Private Server

In order for you to be able to use VZMC for managing your Hardware Node(s), you should create a Service VPS with a running `vzagent` (Virtuozzo management interface) on every Node you are going to manage.

In case you have not created the Service VPS during the Virtuozzo installation, there is a special utility shipped with Virtuozzo for creating a Service VPS: `vzsveinstall`. This utility is not used for creating standard VPSs; please refer to the next chapter for the information on how to create user VPSs. The `vzsveinstall` utility takes the Service VPS IP address and the path to RPM packages from your Virtuozzo distribution as parameters and does all the necessary installation tasks. By default, `vzsveinstall` uses the `redhat-as3-minimal` OS template to create the Service VPS; so, you should have this OS template installed on the Hardware Node and cached. The utility will also prompt you for the password of a special `vzagent0` user, for authenticating clients connecting to the Service VPS from the computer where VZMC is installed.

Let us assume that you wish to create the Service VPS with the IP address of `10.100.105.1` and the Virtuozzo distribution is located in the `/root/vz_download/` directory on your Hardware Node. To create the Service VPS, you should execute the following commands:

---

**Note:** The Virtuozzo and VZMC packages needed for the Service VPS creation are located on CD-ROMs 1 and 2 shipped with Virtuozzo. So, if you are installing Virtuozzo 3.0 from CD-ROMs, you should first copy RPM packages located in the `HW/RPMS` directory on CD-ROMs 1 and 2 and the `client` directory from CD-ROM 2 to a local directory on the Hardware Node and then run the `vzsveinstall` utility.

---

```
# cd /root/vz_download/
# vzsveinstall -d HW/RPMS -c client -s 10.100.105.1
Creating VPS private area
[skipping most of vzsveinstall output…]
Now you must set password for user vzagent0
Enter vzagent0 password:
Re-type vzagent0 password:
Changing password for user vzagent0
passwd: all authentication tokens updated successfully
```

Now you can connect to the Service VPS as `vzagent0` and start managing the Hardware Node over the VZagent protocol. The VZMC client program provides a user-friendly interface to its functionality.

CHAPTER 4

# Installing Virtuozzo Management Console

Virtuozzo Management Console (VZMC) is a graphical user interface client that allows you to remotely manage a multitude of Virtuozzo Hardware Nodes and their Virtual Private Servers.

## In This Chapter

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Licensing ..... 42
Registering Hardware Node ..... 43

# Installing Graphical Client

The Virtuozzo Management Console shall be installed on a special workstation for the remote administration of the existing Hardware Nodes. The VZMC installation files are located on CD-ROM 2 in the `client` subdirectory. There are three subdirectories there containing the VZMC builds for Microsoft Windows 2000/XP and Linux (Red Hat 9; Fedora Core 1, 2, 3, and 4; Red Hat Enterprise Linux 3 and 4; CentOS 3 and 4):

- `win32`: the VZMC build for Windows workstations. To install VZMC for Windows, launch the `setup_vzmc_admin_pro.exe` file and follow the instructions of the VZMC setup wizard.
- `linux.rh9`: the VZMC build for Linux workstations. The VZMC packets contained in this subdirectory end in `rh9.swsoft.i386.rpm` and can be installed on Red Hat 9, Fedora Core 1 and 2, RHEL 3, and CentOS 3.
- `linux.rhel4`: the VZMC build for Linux workstations. The VZMC packets contained in this subdirectory end in `rhel4.swsoft.i386.rpm` and can be installed on Fedora Core 3 and 4, RHEL 4, and CentOS 4.

To install VZMC for Linux, install all the RPM packets you are shipped with by using the `rpm –ihv` command. For example, to install VZMC on Fedora Core 2, you should install the `swmc`, `swcp_helper`, and `vzmc-pro` packets from the `client/linux.rh9` directory on CD-ROM 2:

```
# rpm -ihv swmc-3.0.0-2.rh9.swsoft.i386.rpm \
      swcp_helper-3.0.0-2.rh9.swsoft.i386.rpm \
      vzmc-pro-3.0.0-2.rh9.swsoft.i386.rpm
```

Mind that you might have different versions of these RPM files, therefore, the actual command line will look a bit different.

After the installation is complete, you can start VZMC by running the `vzmc_pro` command on Linux or by selecting Programs --> SWsoft --> VZMC Pro --> Virtuozzo Management Console on the Start menu in Windows.

# Licensing

The first time you start VZMC, you will be asked to enter the VZMC license number. The VZMC licensing model does not allow concurrent connections to the same Hardware Node from two clients with the identical license. In order to start VZMC, you will need to enter a valid license serial number. After this, you can proceed with the normal course of work.

**Note**: The VZMC license differs from the Virtuozzo license that should be installed on the Hardware Node. Detailed information on how to install Virtuozzo licenses is provided in the Uploading License to Hardware Node section.

VZMC serial numbers can be of two types:

- A serial number allowing the given VZMC client to connect to an unlimited number of Virtuozzo Nodes and to manage Node clusters;
- A serial number allowing the given VZMC client to connect to no more than a pre-defined number of Nodes and not providing the ability of managing Node clusters.

While entering the license serial number, you may be logged in as any user - not necessarily as `root` for Linux-based installations or as `Administrator` for Windows-based installations. Mind though that the serial number will be stored in the home directory of the currently logged in user unless you select the Store in the shared storage available for all users radio button in the Virtuozzo Management Console License window to keep it in the common directory.

# Registering Hardware Node

Before you can manage a Hardware Node by means of VZMC, you must register it there. A special wizard will guide you through the registration process. To start the Node registration wizard, click on the Register Virtuozzo Hardware Node link in the right pane of the VZMC main window or select the Register Hardware Node item on the Action menu. You will be presented with the Specify Virtuozzo Hardware Node Address window:

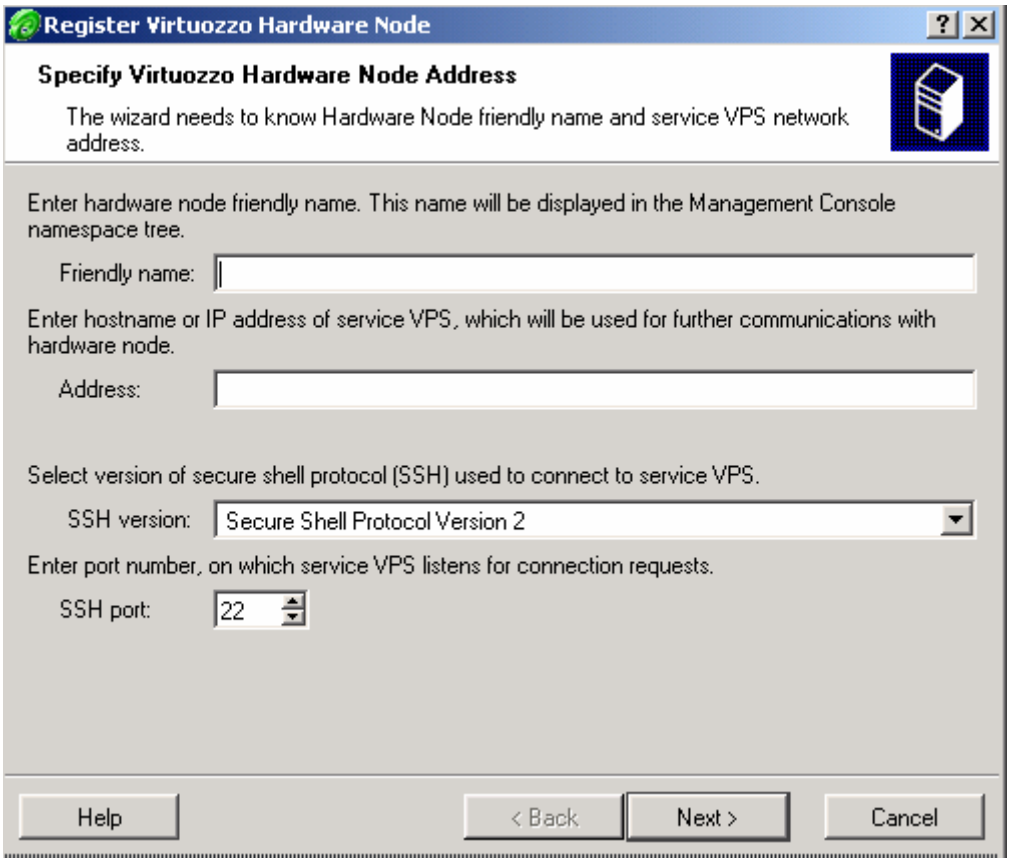


*Figure 19: VZMC - Registering Virtuozzo Hardware Node Wizard*

In this window, you should specify:

- A friendly name for the Hardware Node which will be displayed in the VZMC left pane and help you easily find your Node among other Hardware Nodes registered in VZMC. You may specify any name you consider suitable for the Node.
- The IP address of the Service VPS. You should have already created the Service VPS during the Virtuozzo configuration. Instead of the IP address, you may enter the hostname of your Service VPS.

You can also choose a version of Secure Shell Protocol (SSH) and change the port number to be used to connect to the Service VPS via SSH. The default port where the SSH service is listening is 22; you may modify it if necessary. You have an option to use SSH version 1 instead of default SSH version 2; however, we recommend using SSH version 2 because it provides a better security level.

After providing the necessary information and clicking Next, the program will try to establish a secure connection to the Service VPS with default SSH keys. If you are registering the Node for the first time, VZMC will ask you for the password of the `vzagent0` user having access to the Service VPS. Use the password you entered for `vzagent0` while configuring your Virtuozzo installation. You also need to provide valid SSH keys to enable SSH access to the Node. You can choose between two possibilities:

- Select the Generate SSH key and store in default location option to generate the corresponding public and secret keys for the supplied `vzagent0` user credentials.
- If you already have valid SSH keys stored on your computer, you can select the Use the following SSH keys option and specify the path to the keys.

The Specify Registration Information window displayed after establishing the SSH connection to the Service VPS allows you to review all the parameters entered on the previous steps of the wizard. You can use the Back button to return to any step and change the corresponding parameter, if needed. Press the Finish button to register the Hardware Node in VZMC.

After your Node has been successfully registered in VZMC, its name is displayed in both parts of the VZMC main window - the tree pane on the left and the view pane on the right.

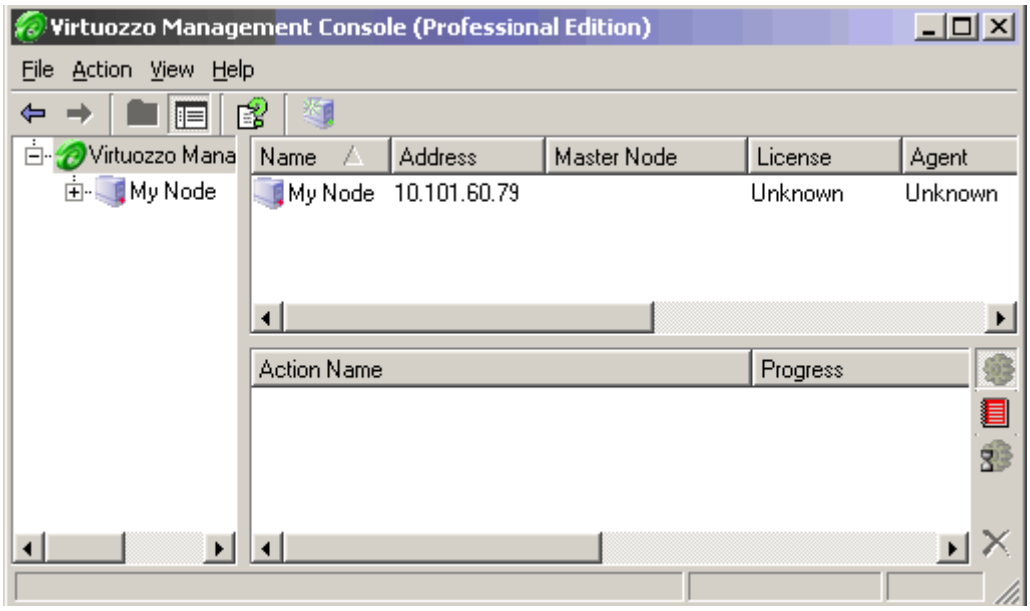


*Figure 20: VZMC - Viewing Registered Node*

CHAPTER 5

# Setting VZCC/VZPP to Work

Along with VZMC, you can make use of the following tools intended for managing your computers running Virtuozzo:

- Virtuozzo Control Center (VZCC). This tool is designed for Hardware Node administrators and provides you with the ability to manage a particular Hardware Node and all Virtual Private Servers residing on it with the help of a standard Web browser on any platform. Detailed information on VZCC is given in the VZCC online help system shipped with Virtuozzo.
- Virtuozzo Power Panels (VZPP). This tool provides the most part of the VZCC functionality in respect of managing individual Virtual Private Servers. However, as distinct from VZCC, it does not allow you to manage Hardware Nodes, adjust VPS resources, and has some other restrictions. Therefore, VZPP is primarily regarded as a means for individual VPS customers to manage their personal Virtual Private Servers. Detailed information on all VZPP functionality is provided in the VZPP online help system shipped with Virtuozzo.

## In This Chapter

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Installing VZCC License ..... 46
Managing VZCC/VZPP Access Rights ..... 46
Configuring Mail for VZCC/VZPP ..... 50

# Logging In to VZCC

To log in to VZCC, you can use one of the following ways:

1. By using the IP address (or hostname) of the Virtuozzo Service VPS and the TCP port specified in Virtuozzo offline services (by default, this port is 4643). When connecting to the Service VPS, you should enter the user name and password of a Service VPS user (for example, `vzagent0`) who is entitled to manage the given Hardware Node and press Login. Let us assume that your Service VPS has the IP address of `192.168.20.1`. In this case you should enter

   ```
   https://192.168.20.1:4643
   ```

   in the address line of your browser and log in with the credentials of a Service VPS user.

2. By using the IP address (or hostname) of any VPS residing on the given Hardware Node and the TCP port specified in Virtuozzo offline services (by default, this port is 4643). If you are connecting to one of your personal VPSs, you should enter the user name and password of a Service VPS user who is entitled to manage the given VPS and press Login. For example, if you have assigned the IP address of `192.168.20.112` to one of your Virtual Private Servers, you can type

   ```
   https://192.168.20.112:4643
   ```

   and provide the credentials of a Service VPS user to log in to VZCC.

**Note**: Detailed information on Service VPS users and Virtuozzo offline services is provided in the Creating Service VPS Users (on page 47) and Configuring VPS Offline Management (on page 49) subsections, respectively.

# Installing VZCC License

The VZCC licensing model envisages the necessity of having a proper VZCC license loaded on the Hardware Node for this Node to be manageable thru VZCC/VZPP.

To install a VZCC license on the Node, you should do the following:

1. Open the license file obtained from SWsoft and copy its contents to the clipboard.
2. Paste the copied contents to the VZCC License field.
3. Click Install.

Alternatively, you can copy your VZCC license to the `etc/hspc/licenses/` directory on the Hardware Node where VZCC licenses are stored.

A VZCC license contains information on whether you can use either Virtuozzo Power Panels (VZPP) or Virtuozzo Control Center (VZCC), or both tools to manage your Hardware Node and Virtual Private Servers residing on it.

After you have successfully installed the VZCC license, you can proceed with the normal course of work.

# Managing VZCC/VZPP Access Rights

As the Hardware Node administrator, you can use the credentials of the `vzagent0` user (you specified the password for this user while creating the Service VPS) who has a full administrative access to the Service VPS to manage your Node and all Virtual Private Servers residing on it by means of VZCC. However, you may want to grant the rights to other users to manage certain VPSs only without having access to the remaining Virtual Private Servers on the Node and to the Node itself. There are two ways of achieving this:

- Creating a Service VPS user who would have access to certain Virtual Private Servers by means of VZCC.
- Using the offline management feature for a Virtual Private Server to be directly managed by its administrator from any browser with the help of VZPP.

These two methods are virtually identical as regards the functionality of managing VPSs. Their only difference consists in that the first method allows the VPS administrator to connect to the Service VPS as its user and manage all their personal VPSs without having to log in to each particular VPS. If using the second method, the VPS administrator will have to log in each time when connecting to a new VPS.

# Creating Service VPS Users

VZMC lets you create new users of the Service VPS and allows them to access certain Virtual Private Servers by means of VZCC.

To open the table of Service VPS users, select Personal Edition Manager -> Service VPS Users in the tree below the Hardware Node name. The columns of the users table contain the login name of the user, user ID, group ID, the description of the user (or comment), and information on the home directory and shell (if any).

Use the New User toolbar button to create a new user or double–click the name of an existing one (or select Properties on the context menu) to change the settings for this user:


*Figure 21: VZMC - Creating Service VPS User*

In the New User window, you can perform the following operations:

- Use the General tab to define the general settings like the name and the description of the user and the password to log in to VZMC or VZCC. User names are often an abbreviation of the user's full name, which makes it easier for the user to remember.
- Use the Member Of tab to add/remove the user to/from any existing groups. Groups are designed to help you organize your users, making it easier to grant access to several users in one step.
- Use the VPS Access tab to grant the user the permission to use VZMC or VZCC to manage certain Virtual Private Servers.

To change the password of an existing user, right-click it in the table of Service VPS users, select Set Password on the menu, then enter the password in the fields provided.

Now you should inform the VPS administrator of the user name and password of the newly-created user and of the IP address (or hostname) and TCP port of the Service VPS to enter in the address line of their browser. The TCP port should be the value of the `PORT` parameter in the `/etc/vzredirect.d/vzpp.conf` configuration file. Instead of manually editing this file, you can make use of VZMC:

1. Right-click the Node name and select Tasks --> Manage Offline Services Configuration to display the Offline Services Configuration dialog window.
2. Select `vzpp` in the list of offline services and press the Edit button.
3. In the Offline Service "vzpp" Properties window, edit the number of the destination TCP port as needed. By default, this value is 4643, but you may change it at your discretion.

After this the VPS administrators will be able to enter

```
https://<Service_VPS_IP_address_or_hostname>:<TCP_port>
```

in the address line of their browser, log in with the credentials of a Service VPS user and manage all their personal VPSs without having to log in as root to each VPS.

If you do not wish to inform the VPS administrators of the Service VPS IP address, they may also enter

```
https://<VPS_IP_address_or_hostname>:<TCP_port>
```

in the address line of their browser and log in with the credentials of a Service VPS user entitled to manage the corresponding VPS.

For the ways to manage one's VPSs thru VZCC, turn to the VZCC online help.

---

**Note:** VZCC can also be used by the Hardware Node administrator for managing all the Virtual Private Servers on the given Node. To this effect, it is necessary to log in with the credentials of the `vzagent0` Service VPS user.

---

# Configuring VPS Offline Management

The second way to ensure a browser access to this or that Virtual Private Server is to use the offline management feature of the corresponding VPS. By default, it is enabled.

When the offline management feature is enabled for a particular Virtual Private Server, this VPS is said to be subscribed to one or more offline services, which means that one or more ports of its IP address are permanently active whatever the VPS state. This is needed to ensure the VPS manageability in its down state. These active ports are each defined by the `PORT` parameter in the Virtuozzo offline services configuration files located in the `/etc/vzredirect.d` directory. The currently supported services are `vzpp` and `vzpp-plesk` (for managing VPSs with the Plesk control panel installed in them). The names of the accessible services should be given as the value of the `OFFLINE_SERVICE` parameter in the global Virtuozzo configuration file. As is described in the previous section, you may use VZMC to indicate what offline services are accessible on the given Hardware Node and to edit their properties - change their TCP ports and the IDs of the VPSs where these services are installed.

You should also make sure that you have enabled the root account for the given VPS; if not, turn to the Setting VPS User Password subsection of the Operations on Virtual Private Servers chapter in the Virtuozzo User's Guide for instructions on how to do it.

To start using the offline management feature, inform the VPS administrator of the TCP port that is the value of the `PORT` parameter in the `/etc/vzredirect.d/vzpp.conf` or `vzpp-plesk.conf` file and of the root password. It will be enough to enter

**`https://<VPS_IP_address_or_hostname>:<TCP_port>`**

in the address line of any browser and to log in as root with the appropriate password to start to remotely manage the corresponding Virtual Private Server.

In case the Plesk control panel application is installed in a Virtual Private Server and this VPS is subscribed to the `vzpp-plesk` service, the Plesk admin account can also be used by the VPS administrator for logging in to Virtuozzo Power Panels. Besides, if the `vzpp-plesk` service is enabled for the VPS, the VPS administrator can enter its IP address and the TCP port of the `vzpp-plesk` service to log in to the VPS irrespective of whether the Plesk control panel is installed in the VPS or not. The Plesk control panel is integrated with VZPP in such a way that the Virtuozzo menu item on the Plesk menu allows the VPS administrator to access the standard VZPP functionality, whereas all the other menu items on the Plesk menu ensure the standard Plesk functionality. If the VPS administrator has logged in to the VPS by using the TCP port of the `vzpp-plesk` service and Plesk is not added to their Virtual Private Server, they will be offered to do so by clicking on any link (except for the Virtuozzo link) on the Plesk main menu in the displayed window and following the instructions on the screen.

Enabling VPS offline management has the following advantages:

- The VPS administrator needs to know only the IP address/hostname of their VPS and its root credentials to be able to manage the VPS. No additional information (e.g. the Service VPS IP address) is required.

- The VPS can be managed by the administrator regardless of its state. For example, the VPS administrator can connect to the VPS when it is down and start it. Even if the VPS is corrupted and cannot be booted, the VPS admin can connect to it and try to repair. The only requirement for the VPS is to have its `/etc/passwd` file intact. If this file is corrupted, it is possible to connect to the VPS only thru the Service VPS with the credentials of a Service VPS user.

At any time, you can disable the offline management feature. You may do it in this way:

```
# vzctl set 101 --offline_management no --save
Delete port redirection
Saved parameters for VPS 101
```

You can also disable/enable the offline management feature of a particular VPS in VZMC:

1. Right-click on the name of the Virtual Private Server in the VPS list and select Properties;
2. Go to the Offline Services tab;
3. Remove the flag from the Enable offline management checkbox;
4. Press OK.

# Configuring Mail for VZCC/VZPP

There may happen situations when a VZCC/VZPP user needs to establish contact or be contacted via e-mail. For example:

- A user is unable to reach their Virtual Private Server(s) thru VZCC/VZPP due to password-related problems and follows the Forgot your password? link on the login page in order to receive a URL at their e-mail address informing the user how to change their password.
- The Hardware Node administrator wishes to obtain a new Virtuozzo or VZCC license from SWsoft and, therefore, has to generate a license request and send it to their SWsoft sales contact.

However, before you can benefit from the e-mail usage and establish an e-mail connection to your users or SWsoft, you should perform the following operations:

1. Specify an IP address of the mail relay server to send e-mail messages thru. You should do it by means of VZMC:
   - Click on the Manage Alert Subscription link on the Hardware Node dashboard to display the Manage Alert Templates window;
   - On the Configuration tab of the Manage Alert Templates window, enter an IP address to be used as the mail relay server in the E-mail relay IP address field;
   - Click OK.

   You can also use VZCC to set your mail relay server:
   - On the Hardware Node dashboard, click the Configuration link and, in the displayed window, the Email & Notifications link;
   - In the Relay Server IP field, enter the IP address of the mail relay server.
2. Specify an e-mail address that will be shown in the From: field of the message and used to identify you as the message sender by a person asking for their forgotten password. To this effect, you should do the following:

- Open the `/etc/vzcp/vzcpcon.conf` file inside the Service VPS for editing:

```
# vi /etc/vzcp/vzcpcon.conf
```

- Search for the following strings in the file

```
<restore_password>
      <from-email></from-email>
      <signature>Your VPS</signature>
</restore_password>
```

and enter an e-mail address as the value of the `<from-email>` element. Make sure that you have typed a valid address. Otherwise, the user will not be able to contact you. While specifying an e-mail address, you can choose between two variants:

**a** You can type your e-mail address in the form of `name@domain_name`, where `name` identifies the sender's ID (e.g. `peter`) and `domain_name` denotes the actual domain where the mail sender resides. In this case the address will be shown in the From: field in exactly the same way as is specified in the `<from-email>` element.

**b** You can type your e-mail address in the form of `name` only. In this case the address will be displayed in the From: field as `name@Service_VPS_domain_name` where `name` identifies the sender's ID (e.g. `peter`) and `Service_VPS_domain_name` denotes the domain name of your Service VPS. For example, if the Service VPS has a domain name of `swsoft.com` and you specified `peter` as the value of the `<from-email>` element, the From: field in your messages will read: `peter@swsoft.com`.

**Note:** You can choose the latter variant only in case the domain name for the Service VPS is specified.

- Save the file and restart `vzcp` for the changes to take effect:

```
# /etc/init.d/vzcp restart
Stopping vzcp:                                             [  OK  ]
Starting vzcp:                                             [  OK  ]
```

**Important:** While setting up and configuring your mail relay server, make sure that it can accept messages from the domain where your e-mail address is hosted!

CHAPTER 6

# Setting Up Monitor and Backup Nodes

This chapter contains instructions for experienced administrators on the way to install and configure a serial console to improve the accuracy of problem reports and log the kernel activity, to set up the Monitor Node to remotely check up the state of the Hardware Node(s), and to prepare the Backup Node for backing up and restoring one or several Virtual Private Servers located on remote Hardware Nodes.

## In This Chapter

Setting Up Monitor Node ..... 52
Setting Up Backup Node ..... 58

# Setting Up Monitor Node

A regular monitoring of Hardware Nodes is an important part of their maintaining and administering. Virtuozzo enables you to check the state of your Nodes in one of the following ways:

- By using the Monitor Node as a serial console to log the kernel state of the Hardware Node;
- By running the `vzrmond` daemon on the Monitor Node. This daemon provides the remote monitoring of the Hardware Node(s) by constantly checking up the current state of the Node(s), verifying that the main HN parameters do not exceed their specified limits, and sending instant alerts via e-mail, ICQ, or SMS if anything goes wrong on the Node.
- By running the `vzstatrep` utility on the Monitor Node. This utility periodically analyzes the main resources consumption of one or several Hardware Nodes, generates statistic reports and graphics based on the analyzed information, and sends these reports and graphics at your e-mail address. You can then examine the received e-mail message to find out whether the Hardware Node is functioning trouble-free or a number of corrective actions should be performed in relation to some of its components.

The following subsections describe each of these ways in detail.

# Configuring Serial Console on Monitor Node

To set up a serial console on the Monitor Node, you have to complete the following tasks:

- Install Linux on a dedicated computer. This computer shall meet one requirement: you must be able to install a Linux distribution on it. Logging messages even from several Hardware Nodes requires neither a powerful CPU nor a large amount of RAM. However, if you plan to be connected to more than two Hardware Nodes, you may need a special multi-port serial card. Among the popular makes of multi-port serial cards are Cyclades-Z, Digiboard, Specialix, and Stallion. Consult your Linux distribution vendor on multi-port serial card compatibility issues.
- Connect the Hardware Nodes to the Monitor Node via a null-modem cable;
- Configure serial parameters on the Monitor Node and the Hardware Node;
- Configure the Hardware Node to send kernel messages to the Monitor Node;
- Start the message collector on the Monitor Node;
- Reboot the Hardware Node.

## Configuring Serial Parameters on Monitor Node and Hardware Node

First, find out the serial port number used on the Monitor Node. The first serial port (COM1 in DOS) is represented by `/dev/ttyS0`, the second one (COM2 in DOS) – by `/dev/ttyS1`, and so on. If you are not sure about which serial port the cable is connected to, you may try on your own risk different ports in the commands given in this and next subsections. It may not be completely safe if you have some other hardware attached to a different serial port.

If you have the null-modem cable connected to the `/dev/ttyS1` port, issue the following command on the Monitor Node:

```
# stty 115200 cs8 -hupcl -cstopb cread clocal -crtscts -icrnl ixon \
       ixoff -opost -isig -icanon -iexten -echo \
       </dev/ttyS1 >/dev/ttyS1
```

This command will correctly configure the second serial port (`/dev/ttyS1`). Use the appropriate serial terminal name instead of `/dev/ttyS1` if the actual configuration differs.

Start the following command on the Monitor Node:

```
# cat /dev/ttyS1
```

Now find out which serial port is connected on the Hardware Node side. Issue the following commands to configure the serial line parameters on the Hardware Node and to send a message to the Monitor Node:

```
# stty 115200 cs8 -hupcl -cstopb cread clocal -crtscts ixon ixoff \
       -opost </dev/ttyS0 >/dev/ttyS0
# echo 123 > /dev/ttyS0
```

The commands above assume that `/dev/ttyS1` is used on the Monitor Node and `/dev/ttyS0` is used on the Hardware Node. Change the commands appropriately if the actual configuration differs.

If you did everything right, you shall see “123” on the Monitor Node now.

## Preparing Hardware Node for Sending Messages

Now you should pass the `console=ttyS0,115200 console=tty` parameters to the kernel on each start of the Hardware Node. In case you are using the LILO boot loader, add the following line into the Virtuozzo section of the `/etc/lilo.conf` configuration file:

```
append="console=ttyS0,115200 console=tty"
```

and run `/sbin/lilo` to activate the changes.

With the GRUB loader, it is enough to modify the `/boot/grub/grub.conf` configuration file by adding the needed parameters to the line beginning with `kernel` inside the Virtuozzo section of the file. For example:

```
kernel /vmlinuz-2.4.20-stab21.2.777 ro console=ttyS0,115200
console=tty
```

Virtuozzo 3.0 includes a special Virtuozzo watchdog module, which is off by default. However, if you set up a Monitor Node, it is very important to have this module running since it logs the kernel state every minute. In order to make Virtuozzo load this module automatically, edit the `/etc/sysconfig/vz` file and change the value of the `VZWDOG` parameter from `no` to `yes`. The corresponding line should look like the following:

```
# grep ^VZWDOG /etc/sysconfig/vz
VZWDOG=yes
```

## Starting Messages Collection on Monitor Node

The kernel messages from the Hardware Node may be collected by reading from the serial terminal on the Monitor Node. The simplest way to collect and to store them is by executing the following command:

```
# cat /dev/ttyS1 > /var/log/vzmessages.hn1 &
```

on the Monitor Node. This way the messages will be stored in the `/var/log/vzmessages.hn1` file.

However, it is recommended to use the `ttylogd` serial console daemon to maintain serial log files. This daemon is launched by the `/etc/init.d/ttylogd` script on the system startup and uses the `/etc/ttylogd.conf` file for the correct parameters. Thus, all you need to do to automate the messages collection on the Monitor Node is to install `ttylogd` and edit appropriately its configuration file.

First, install the daemon on the Monitor Node. The corresponding package can be found on Virtuozzo CD 2 in the `/HW/RPMS` subdirectory:

```
# rpm -ihv ttylogd-3.0.0-2.swsoft.i386.rpm
Preparing...                ########################################### [100%]
   1:ttylogd                ########################################### [100%]
```

Now, take a look at the `/etc/ttylog.conf` file. It must comprise a number of string sections of the following type:

```
# Settings for ttyS0
# PORT1=/dev/ttyS0
# HOST1=ts2
# LOG1="/var/log/console-${HOST1}.log"
```

The value of the `PORT`*X* parameter is the serial console device on the Monitor Node;

The value of the HOST*X* parameter is the name of the Hardware Node to be monitored. This parameter is optional, it is used for convenience.

The value of the LOG*X* parameter is the path to the file that will accumulate messages coming to the specified serial console from the Hardware Node. You may use the ${HOST*X*} variable to synchronize the name of the file with the name of the Hardware Node.

You must have as many such sections as the number of Nodes you wish to monitor. Copy and paste the needed number of these sections in the ttylogd.conf configuration file. Apply one and the same number after "PORT", "HOST", and "LOG" throughout each section, and increment this number with each new section. Edit the values of the "PORT", "HOST", and "LOG" parameters appropriately for each and every Hardware Node to be monitored and remove the hash marks before them. Then modify the DAEMONS="1 2" line to include all the numbers (separated by spaces) you used in your sections after the "PORT", "HOST", and "LOG" parameters. Save the file.

You may also consult the ttylogd(8) and ttylog.conf(5) manual pages.

## Checking that Logging Works

Now reboot the Hardware Node. After the Hardware Node is up, check the file on the Monitor Node where the messages are stored (for example, /var/log/vzmessages.hn1). The file should contain the messages printed by the kernel during the boot-up.

Upon loading, the Virtuozzo watchdog module should produce to the log file the output similar to the one below:

```
MODULES="$PRELOAD_MODULES vzfs vzmon vzdquota vzdev vzwdog"
*** VZWDOG: time 1034715427.628385 uptime 994993 \
CPU 0 $Revision: 1.1.2.1 $ ***
           CPU0
  0:     994995    IO-APIC-edge  timer
  1:          2    IO-APIC-edge  keyboard
  8:          1    IO-APIC-edge  rtc
 14:          2    IO-APIC-edge  ide0
 21:       1999   IO-APIC-level  eth0
 26:      11037   IO-APIC-level  aic7xxx
 27:         16   IO-APIC-level  aic7xxx
[a lot of lines suppressed]
```

# Preparing Monitor Node for Sending Alerts

Apart from serving as the serial console for one or more Hardware Node(s), the Monitor Node can be configured to remotely check up the state of the Hardware Node(s) – if they are running or down, as well as a number of vital parameters – and to send instant alerts via e-mail, ICQ, or SMS if anything goes wrong.

To this effect, it is necessary to install two packages on the Monitor Node, which are located on Virtuozzo CD 2 in the RPMS subdirectory: `micq` and `vzrmon`. The `micq` package is used for sending alerts via ICQ. SMS alerts also use the ICQ gateway. Your session might look like the following:

```
# rpm -ihv micq-0.4.10.3-1.3.swsoft.i386.rpm \
vzrmon-3.0.0-2.swsoft.i386.rpm
Preparing...            ########################################### [100%]
   1:micq               ########################################### [ 50%]
   2:vzrmon             ########################################### [100%]
```

**Note:** You might also need to install the `gnuplot` and `mutt` packages, if they are not already installed. If this is the case, you will receive the corresponding notification. These packages are not included with Virtuozzo, as they are part of a standard Red Hat Linux distribution.

After the `vzrmon` package is installed, the `vzrmond` daemon is started on the Monitor Node. You should manually edit the `vzrmond` configuration file (see the Subscribing for vzrmond Alerts subsection of the Real-Time Monitoring in Virtuozzo chapter in the Virtuozzo User's Guide for instructions) to define the list of Nodes to monitor and the way the alerts are sent. However, `vzrmond` needs to be able to remotely log in to the specified Node(s) without having to provide a root password. Therefore, you should provide each Node to be monitored with your authorized public SSH RSA key. It can be done in the following way. First, you should generate a pair of SSH keys – public and private:

```
# ssh-keygen -t rsa
Generating public/private rsa key pair.
Enter file in which to save the key (/root/.ssh/id_rsa):
/root/.ssh/id_rsa already exists.
Overwrite (y/n)? y
Enter passphrase (empty for no passphrase):
Enter same passphrase again:
Your identification has been saved in /root/.ssh/id_rsa.
Your public key has been saved in /root/.ssh/id_rsa.pub.
The key fingerprint is:
c6:19:a8:2c:67:31:15:e6:30:23:2b:8a:b0:63:77:8f \
root@dhcp-130.asplinux.ru
```

Note that you should leave an empty passphrase in the above procedure.

Next, transfer your public key to each Hardware Node you are going to monitor to the `/root/.ssh` directory (use some intermediary name for the file not to overwrite the corresponding file on the Hardware Node):

```
# scp /root/.ssh/id_rsa.pub \
root@dhcp-129.asplinux.ru:/root/.ssh/temp_name
The authenticity of host 'dhcp-129.asplinux.ru (192.168.1.129)' \
can't be established.
RSA key fingerprint is 01:fc:b6:e9:26:40:1f:1a:41:5f:7a:fb:cf:14:51.
Are you sure you want to continue connecting (yes/no)? yes
Warning: Permanently added 'dhcp-129.asplinux.ru,192.168.1.129' \
```

```
(RSA) to the list \
of known hosts.
root@dhcp-129.asplinux.ru's password:
id_rsa.pub       100% |*****************************|   235      00:00
```

Finally, you should add the contents of the transferred file to the `authorized_keys` file in this very directory of the Hardware Node. Log in to the Hardware Node, go to the `/root/.ssh` directory and issue the following command in it:

```
# cat temp_name >> authorized_keys
```

Now the Monitor Node should be able to log in to this Hardware Node as root without having to provide the root password. You should copy the public RSA file of the Monitor Node to every Hardware Node to be monitored and add its contents to the `authorized_keys` file in the `/root/.ssh` directory.

## Using vzstatrep to Monitor Hardware Nodes

The `vzstatrep` utility allows you to analyze the main resources consumption of one or several Hardware Nodes and to receive information on this consumption in the form of statistic reports and graphics at your e-mail address(es). `vzstatrep` is included in the `vzrmon` package and automatically installed on the Monitor Node during the `vzrmon` package installation. For more information on how to install `vzrmon`, please see the previous subsection.

To start using `vzstatrep`, you should manually edit the `vzstatrep.conf` configuration file located in the `/etc` directory on the Monitor Node to define a list of Hardware Nodes whose resources consumption is to be analyzed and specify one or several e-mail addresses where the HN statistic reports and graphics are to be sent. In this file, you can also set a number of other parameters (e.g. the resources the usage of which will be presented in the graphical form with the help of the `gnuplot` utility or the path to the directory on the Hardware Node where `vzstatrep` will search for the logs to be analyzed). Detailed information on the `vzstatrep.conf` file and all its options is provided in the Configuring Virtuozzo chapter of the Virtuozzo Reference Guide.

By default, the `vzstatrep` utility is scheduled as a `cron` job to automatically run once a day. When launched, the `vzstatrep` utility performs the following operations:

- Connects to the Hardware Node(s) to be monitored;
- Downloads the logs collected by the `vzlmond` utility and stored in the `/var/log/vzstat` directory on the Hardware Node by default;
- Analyzes the downloaded logs and generates the statistic report and graphics on the basis of these logs;
- Sends the generated statistic report and graphics at the specified e-mail address(es).

Let us assume that you wish to analyze the resources statistics from the Hardware Node having the hostname of `my_hardware_node.com` and to periodically (i.e. once a day) receive this statistics report at the `peter@my_domain.com` e-mail address. To this effect, you should do the following:

1. On the Monitor Node, open the `/etc/vzstatrep.conf` file for editing:

```
# vi /etc/vzstatrep.conf
```

2. In the file, set the `STATS_EMAIL` and `NODES` parameters as follows:

```
NODES="my_hardware_node.com"
STATS_EMAIL="peter@my_domain.com"
```

**3** Save the `/etc/vzstatrep.conf` file.

From now on, an e-mail message containing information on the Hardware Node resources consumption will be sent every day at the `peter@my_domain.com` e-mail address. However, if you wish to get the HN statistic report at the current moment, you can manually run the `vzstatrep` command on the Monitor Node:

```
# vzstatrep --plot --sendmail
```

As a result of this command, an e-mail message will be instantly sent to the `peter@my_domain.com` address containing the text information on the Hardware Node resources consumption (on the memory and CPU consumption on the Node, network statistics, etc.). Besides, you will get a number of attached files where the resources usage is presented in the form of graphics generated by the `gnuplot` utility. Detailed information on all `vzstatrep` options (including the `--plot` and `--sendmail` options used in the example above) is provided in the Virtuozzo Command Line Interface chapter of the Virtuozzo Reference Guide.

**Note:** To be able to receive e-mail messages from your Hardware Node to external e-mail addresses, you should set up the relay mail server to send messages thru. Detailed information on how to set up a relay mail server is provided in the Configuring Mail for VZCC/VZPP section (on page 50).

# Setting Up Backup Node

To use the Backup Node for the remote connection to your Hardware Node(s) and storing the backups, you need to install the `vzbackup` package from Virtuozzo CD 2. This RPM installs the `vzbackup` and `vzrestore` utilities on the Backup Node for backing up and restoring the VPSs located on the remote Hardware Nodes. The package is automatically installed when you install Virtuozzo on the Backup Node. In this case `vzbackup` will be able to back up the VPSs of the Backup Node itself, and `vzrestore` – to restore the VPSs on the Backup Node.

To be able to connect to the Hardware Nodes from the Backup Node without having to specify the root password (which is needed in case of regular scheduled backups), you should provide each Hardware Node you are going to back up or to restore with your SSH RSA keys. The procedure of doing it is described in detail in the previous section. If you use one computer both as the Monitor Node and as the Backup Node, you might have already done it when configuring the Monitor Node and need not repeat it.

The very process of using the `vzbackup` and `vzrestore` utilities is described in the Backing Up and Restoring Virtual Private Server section of the Operations on Virtual Private Servers chapter in the Virtuozzo User's Guide.

CHAPTER 7

# Setting Up Repository for EZ Templates

If you are going to use OS and application EZ templates inside your Virtual Private Servers, you should first have one or several repositories with RPM packages prepared for your EZ templates. RPM repositories are required for the EZ templates functioning due to the fact that these templates do not carry all the necessary package files inside themselves like Virtuozzo standard templates. They contain only information about what packages are included in the corresponding EZ template and from what repository they should be downloaded. Detailed information on EZ templates is provided in the Managing EZ Templates chapter of the Virtuozzo User's Guide.

In Virtuozzo 3.0, you can make use of the following package repositories:

- Default repositories. When you install an EZ template on the Hardware Node, it is preconfigured to use official vendor's file sources (e.g. RPMs from the Fedora Core web site) and a number of packages provided by SWsoft and needed for the correct EZ template functioning. So, you can start using the default repositories right after the EZ template installation on the Node. Please note that the default repositories are provided for non-commercial versions of Linux distributions only.
- Local repositories. You can build your own local repositories, which allows you:
  - To greatly save on network bandwidth when deploying package updates to several Hardware Nodes in your network.
  - To organize your own RPM package repository if public repositories provided by Linux OS and application vendors are not compatible with a `vzpkg` tool used to manage Virtuozzo EZ templates.

  **Note:** The `vzpkg` tool supports all the repositories that can be used by the `yum` utility version 2.4.0 and higher.
- Special repositories used to store RPM packages for commercial Linux distributions (e.g. Red Hat Enterprise Linux 4).

The following sections describe these ways in detail.

## In This Chapter

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Managing Repositories for Commercial Linux Distributions ..... 65

# Managing Default Repository

When you install an OS EZ template on the Hardware Node, it is preconfigured to use one or several package repositories storing Linux OS vendor's file sources. The path to the repositories for the corresponding OS EZ template and all its application EZ templates is automatically set during the EZ template installation in the `mirrorlist` or `repositories` files located in the `/vz/template/<os_name>/<os_version>/<arch>/config/os/default/` directory on the Node. Thus, you do not have to perform any additional operations to start using an installed OS EZ template (i.e. cache it and create Virtual Private Servers on its basis). The only requirement that your system should meet is to have an Internet connection to access the servers where the specified repositories are located.

**Note:** Non-base OS EZ templates and application EZ templates can have their own repositories differing from those of the corresponding base OS EZ template. For more information on non-base OS EZ and application EZ templates, please see the Managing EZ Templates chapter of the Virtuozzo User's Guide.

Let us assume that you wish to use the Fedora Core 4 OS EZ template to base your Virtual Private Servers on. To this effect, you should install the `fedora-core-4-x86-tmpl-3.0.0-1.swsoft.noarch.rpm` EZ template on the Hardware Node:

```
# rpm -ihv fedora-core-4-x86-tmpl-3.0-1.swsoft.noarch.rpm
Preparing...                ########################################### [100%]
   1:fedora-core-4-x86-tmpl ########################################### [100%]
```

After the OS EZ template has been successfully installed on the Node, you can see the path to the default repositories storing the Fedora Core OS packages in the `/vz/template/fedora-core/4/x86/config/os/default/mirrorlist` file. For example:

```
# cat /vz/template/fedora-core/4/x86/config/os/default/mirrorlist
$SW_SERVER/download/mirrors/fedora-core-4
$SW_SERVER/download/mirrors/updates-released-fc4
$FC_SERVER/download/mirrors/fedora-core-4
$FC_SERVER/download/mirrors/updates-released-fc4
```

where `$SW_SERVER` and `$FC_SERVER` denote the variables whose values are specified in the `/etc/vztt/vztt.conf` file on the Hardware Node. In our case these values will be the IP addresses or hostnames of the SWsoft and Fedora Core web servers, respectively. The Fedora Core server stores all RPM packages for the Fedora Core 4 release, whereas the SWsoft server keeps a number of RPM packages needed for the correct `fedora-core-4-x86` EZ template operation. The priority according to which RPM packages are downloaded from the specified servers is determined by the repositories order in the `mirrorlist` file. So, in the example above RPM packages from the SWsoft server will be downloaded first and then - all the packages from the Fedora Core server.

**Note:** If you are going to use a commercial version of the Linux distribution (e.g. Red Hat Enterprise Server 4), the path to the RPM package repository is not set by default and you have to create a special repository which will store RPM packages and their updates for the corresponding OS EZ template. Detailed information on how to manage repositories for commercial Linux distributions is provided in the Managing Repositories for Commercial Linux Distributions subsection (on page 65).

RPM packages will be downloaded and installed on the Hardware Node from the repositories specified in the `mirrorlist` or `repositories` files in one of the following cases:

- When you create the cache of the OS EZ template;
- When you add the application EZ template or package to the Virtual Private Server for the first time;
- When you update the EZ templates or RPM packages inside your Virtual Private Server.

Detailed information on how to perform the aforementioned tasks is given in the Managing EZ Templates chapter of the Virtuozzo User's Guide.

You can easily add your own repositories (e.g. storing unofficial RPM packages) to be used by your EZ templates. To this effect, you should only create the `repositories` file in `/vz/template/<os_name>/<os_version>/<arch>/config/os/default/` directory on the Hardware Node, if it is not present, and specify the path to the needed repository. For example, to add the extra repository located at http://mirrors.dotsrc.org/jpackage/ and keeping Java packages for Fedora Core 4, you should perform the following operations:

1. Create the `/vz/template/fedora-core/4/x86/config/os/default/repositories` file on the Hardware Node, if it is not yet present.
2. Add the following string to the file:

```
http://mirrors.dotsrc.org/jpackage
```

3. Save the file.

# Creating Local Repository

You can also set up a local repository where the packages included in EZ templates will be downloaded and stored. Organizing your own local repository results in less bandwidth consumption and rapid software updates inside your Virtual Private Servers. You may also wish to build a local repository if OS vendors or third-party software developers do not provide repositories for their versions of Linux distributions compatible with the `vzpkg` tool; so, you have to manually find and install new applications or updates inside your VPSs.

**Note:** The `vzpkg` tool supports all the repositories that can be used by the `yum` utility version 2.4.0 and higher. For detailed information on this utility, please see its man pages.

The process of setting up your local repository includes the following main stages:

- Obtaining RPM packages comprising the given Linux distribution. This can be done by:
  - Simply copying the needed packages from your distribution disks or the OS vendor's web site.
  - Copying the needed packages from the `up2date` cache. You can use this way only if the OS EZ template for which you are going to create a local repository corresponds to the OS installed on your Hardware Node and you ran the `up2date` utility at least once to update your Host OS. Please consult the documentation for `up2date` to learn about its cache functionality.

- Creating the meta data repository from a set of the copied RPM packages with the `createrepo` utility. This step can be omitted if you are going to create a repository which will be a mirror of a public repository.
- Making your repository accessible for Virtual Private Servers users. You can let VPS users access your repository in one of the following ways:
  - By using the `http` protocol. In this case the repository should represent a web site containing RPM packages for the EZ template.
  - By using the `ftp` protocol. In this case the repository should represent an FTP site containing RPM packages for the EZ template.
  - By using the `file` protocol. In this case the repository should represent a directory path (e.g. on your local Hardware Node) containing RPM packages for the EZ template.

While the first two protocols allow you to remotely (i.e. from Hardware Nodes located in other networks) access the created repository, the last way can be used within your local Hardware Node only.

Let us assume that you wish to build a local package repository for the Fedora Core 4 EZ template where the RPM packages for Fedora Core 4 will be downloaded and stored. The repository will be used by Hardware Nodes from both your local network and other networks, and it will deliver packages download for users thru the `http` protocol. In our example below, we presume the following:

- The RPM repository will be located inside VPS 101. You can use any standard Virtuozzo OS template (e.g. `redhat-as3`) to base the VPS on.

  **Note:** We recommend that you always place your local repositories inside separate Virtual Private Servers to not compromise the Hardware Node security. In particular, it is of significant importance if you are going to provide access to your repositories thru the `http` and `ftp` protocols.

- VPS 101 is started. It has the IP address of `123.145.145.123` assigned to it and can be accessed from other networks.
- The `apache` web server is running inside VPS 101 and the default document root for `apache` is `/var/www/html`, i.e. the `apache` web server stores its sites in the `/vz/root/101/var/www/html` directory on the Hardware Node.
- The `apache` user and group inside VPS 101 are `apache`.

To create a local repository for Fedora Core 4 (FC 4), you should perform the following operations:

1. Install the `fedora-core-4-x86` OS EZ template shipped with Virtuozzo 3.0:

```
# vzpkg list
redhat-as4-x86
# rpm -ihv fedora-core-4-x86-tmpl-3.0.0-1.swsoft.noarch.rpm
Preparing...                ########################################### [100%]
   1:fedora-core-4-x86-tmpl ########################################### [100%]
# vzpkg list
fedora-core-4-x86
redhat-as4-x86
```

2. Change to the `/vz/root/101/var/www/html` directory and create two subdirectories within it:
   - The subdirectory where the base RPM packages for Fedora Core 4 will be stored:

```
# mkdir -p download/fedora/core/4/i386/os/Fedora/RPMS
```

- The subdirectory where the updated versions of RPM packages for Fedora Core 4 will be stored:

```
# mkdir -p download/fedora/core/updates/4/i386
```

3. Copy all the packages comprising the Fedora Core 4 distribution (e.g. from your FC 4 distribution disks or the http://download.fedora.redhat.com/pub/fedora/linux/core/4/i386/os/Fedora/RPMS/ web site) to the `download/fedora/core/4/i386/os/Fedora/RPMS` directory on the Hardware Node. For example, you can run the following commands for each of the Fedora Core CDs to get the source files for the repository:

```
# mount /mnt/cdrom
# cp /mnt/cdrom/Fedora/RPMS/*.rpm download/fedora/core/4/\
    i386/os/Fedora/RPMS
```

4. Get a copy of updates for FC 4 which can be found on the Fedora Download Server (at http://download.fedora.redhat.com/pub/fedora/linux/core/updates/4/i386/) or your friendly neighbourhood mirror, and put it to the `download/fedora/core/updates/4/i386` directory on the Hardware Node. You can simply grab the updated RPMs with your favorite download tool and place them in the updates folder.

5. Install the `createrepo` package on the Hardware Node:

```
# rpm -Uhv createrepo-0.4.3-1.2.el4.rf.noarch.rpm
Preparing...                ########################################### [100%]
   1:createrepo             ########################################### [100%]
```

6. Change to the `/vz/root/101/var/www/html` directory and create the following meta data repositories:

   - For the FC 4 base RPM packages:

```
# createrepo download/fedora/core/4/i386/os/
```

   - For the updated versions of the FC 4 RPM packages:

```
# createrepo download/fedora/core/updates/4/i386/
```

   Creating the RPM meta data repository may take some time depending on the speed of your processor(s) and hard disk drive(s).

7. Create a directory for storing mirror site lists. In our case, we will keep them in the `/vz/root/101/var/www/html/download/mirrors` directory:

```
# mkdir -p download/mirrors
```

8. Create the mirror list files and set the path to your local repository. For example, you can do it in the following way:

   - For the FC 4 base RPM packages:

```
# echo 'http://123.145.145.123/download/fedora/core/4/i386/os/'\
     > download/mirrors/fedora-core-4
```

   - For the updated versions of the FC 4 RPM packages:

```
# echo 'http://123.145.145.123/download/fedora/core/updates/4/i386' >\
     download/mirrors/updates-released-fc4
```

   The aforementioned commands create the `fedora-core-4` and `updates-released-fc4` files in the `/vz/root/101/var/www/html/download/mirrors` directory on the Hardware Node and add the `http://123.145.145.123/download/fedora/core/4/i386/os/Fedora/RPMS` and `http://123.145.145.123/download/fedora/core/updates/4/i386` strings to them, respectively.

**9** Open the `/etc/vztt/vztt.conf` file on the Hardware Node for editing (e.g. by using `vi`) and change the value of the `FC_SERVER` variable as follows:

```
FC_SERVER=http://123.145.145.123
```

**10** Grant the `apache` user and the `apache` group access to the created repositories inside VPS 101 by executing the following command on the Hardware Node:

```
# vzctl exec 101 chown -R apache.apache /var/www/html/download
```

So, our local repository is created. From now on, the `vzpkg` tool will obtain RPM packages for the Fedora Core 4 EZ template and their updates from your local repositories inside VPS 101. You can connect to these repositories thru the `http` protocol from both remote and local Hardware Nodes. However, you can speed up the process of managing RPM files in your repository (e.g. update EZ templates and RPM packages) for those Virtual Private Servers that reside on your local Hardware Node (i.e. the Node where the repositories are stored). This can be done by specifying the `file` protocol to be used instead of the `http` one to connect to your created repositories:

**1** Open the `/vz/template/fedora-core/4/x86/config/os/default/mirrorlist` file on the Hardware Node and comment the strings containing `FC_SERVER`:

```
#$FC_SERVER/download/mirrors/fedora-core-4.0
#$FC_SERVER/download/mirrors/updates-released-fc4.0
```

**2** Execute the following commands to create the repository files:

- To create the `/vz/template/fedora-core/4/x86/config/os/default/repositories` file on the Node and to make it point to the FC 4 base RPM packages from your local repository:

```
# echo 'file:///vz/root/101/var/www/html/download/fedora/core/4/\
      i386/os/Fedora/RPMS' > /vz/template/fedora-core/4/x86/\
      config/os/default/repositories
```

- To create the `/vz/template/fedora-core/4/x86/config/os/default/repositories` file on the Node and to make it point to the updated versions of the FC 4 RPM packages from your local repository:

```
# echo file:///vz/root/101/var/www/html/download/fedora/core/\
      updates/4/i386" >> /vz/template/fedora-core/4/x86/config/os/\
      default/repositories
```

# Managing Repositories for Commercial Linux Distributions

If you are going to run a commercial version of the Linux distribution (e.g. Red Hat Enterprise Linux 4) inside your VPS(s), you should create a special repository which will store the RPM packages for the corresponding distribution and enable you to update the existing RPM packages inside your Virtual Private Server(s).

Currently, there is only one commercial Linux OS EZ template - `redhat-as4-x86` - which can be used to base your Virtual Private Servers on. So, in the example below, we will create the repository which will store the RPM packages included in the Red Hat Enterprise Linux 4 distribution. Besides, we will consider the situation explaining to you how to keep your repository up-to-date by getting the updated RPM packages from the Red Hat Enterprise Linux 4 web site. In our example, we presume the following:

- The Hardware Node where the repository will be located is running Red Hat Enterprise Linux 4 (RHEL 4).
- The RPM repository will be stored inside VPS 111.
- VPS 111 can be accessed from other networks.
- The `apache` web server is running inside VPS 111 and the default document root for `apache` is `/var/www/html`, i.e. the `apache` web server stores its sites in the `/vz/root/111/var/www/html` directory on the Hardware Node.
- The `apache` user and group inside VPS 111 are `apache`.
- The `http` protocol will be used to access the RHEL 4 packages repository.

To create a repository for RHEL 4, you should perform the following operations:

1. Install the `redhat-as4-x86` OS EZ template on the Hardware Node, if it is not yet installed:

```
# vzpkg list
fedora-core-4-x86
fedora-core-3-x86
# rpm -ihv redhat-as4-x86-tmpl-3.0.0-1.swsoft.noarch.rpm
Preparing...                ########################################### [100%]
   1:redhat-as4-x86-tmpl    ########################################### [100%]
# vzpkg list
fedora-core-4-x86
fedora-core-3-x86
redhat-as4-x86
```

2. Create the VPS where the repository storing the RHEL 4 packages will be located and assign an IP address and hostname to it. Let us use the `fedora-core-4-x86` OS EZ template to base your VPS on. For example, to create VPS 111 having the IP address of `144.134.134.144` and the hostname of `my_repo` for housing the repository, you can execute the following commands:

```
# vzpkg list
fedora-core-4-x86
fedora-core-3-x86
redhat-as4-x86
# ls /vz/template/cache
fedora-core-4-x86.tar.gz
fedora-core-3-x86.tar.gz
# vzctl create 111 fedora-core-4-x86 --ipadd 144.134.134.144 \
              --hostname my_repo --save
Creating VPS private area (fedora-core-4-x86)
VPS is mounted
Postcreate action done
VPS is unmounted
VPS private area was created
Delete port redirection
Adding port redirection to VPS(1): 4643 8443
```

**3** Make sure that VPS 111 is running and the `httpd` service is started inside the VPS:

```
# vzlist -a
   VEID      NPROC STATUS  IP_ADDR         HOSTNAME
     1         42  running 10.163.163.1    localhost
    111         -  stopped 144.134.134.144 my_repo
    ...
# vzctl start 111
Starting VPS ...
VPS is mounted
Adding port redirection to VPS(1): 4643 8443
VPS start in progress...
# vzctl exec 111 service httpd status
httpd is running...
```

VPS 111 should be running to be able to perform the commands listed below.

**4** Inside VPS 111, create a directory where the RPM packages for Red Hat Enterprise Linux 4 will be stored:

```
# mkdir -p /vz/root/111/var/www/html/download/redhat/as4/i386/os/ \
          RedHat/RPMS
```

**5** Copy the RPM packages from the RHEL 4 distribution disks to the `/vz/root/111/var/www/html/download/redhat/as4/i386/os/RedHat/RPMS` directory by executing the following command for each of the RHEL 4 CDs:

```
# cp /media/cdrom/RedHat/RPMS*.rpm /vz/root/111/var/www/html/ \
     download/redhat/as4/i386/os/RedHat/RPMS
```

**6** Install the `createrepo` package on the Hardware Node:

```
# rpm -Uhv createrepo-0.4.3-1.2.el4.rf.noarch.rpm
Preparing...                ########################################### [100%]
   1:createrepo             ########################################### [100%]
```

**7** Create the meta data repository for the RHEL 4 packages with the `createrepo` command:

```
# createrepo /vz/root/111/var/www/html/download/redhat/as4/ \
                i386/os/RedHat/RPMS
```

Creating the RPM meta data repository may take some time depending on the speed of your processor(s) and hard disk drive(s).

**8** Create a directory for keeping mirror site lists. In our case, mirror site lists will be stored in the `/vz/root/111/var/www/html/download/mirrors` directory on the Hardware Node:

```
# mkdir -p /vz/root/111/var/www/html/download/mirrors
```

9 Create the /vz/root/111/var/www/html/download/mirrors/redhat-as4 mirror list file and make it point to the repository inside VPS 111 where RPM packages for RHEL 4 are stored:

```
# echo "http://144.134.134.144/download/redhat/as4/i386/os/RedHat/ \
      RPMS/" > /vz/root/111/var/www/html/download/mirrors/redhat-as4
```

This command makes the /vz/root/111/var/www/html/download/mirrors/redhat-as4 file on the Node and adds the http://144.134.134.144/download/redhat/as4/i386/os/RedHat/RPMS string to the file.

So, we have just created a special repository for your RHEL 4 OS EZ template. Now you can cache the redhat-as4-x86 EZ template and start creating Virtual Private Servers on its basis. However, if you wish to receive package updates from the RHEL 4 web site, you should additionally perform the following steps:

1 On the Hardware Node, run the up2date utility and register your up2date account with RHEL 4. Please consult the up2date documentation to complete this task.

2 Inside VPS 111, create a directory where the updated versions of the RHEL 4 packages will be stored:

```
# mkdir -p /vz/root/111/var/www/html/download/redhat/updates/as4/i386
```

3 Create the /vz/root/111/var/www/html/download/mirrors/updates-released-as4 mirror list file and make it point to the repository inside VPS 111 where the updated versions of the RHEL 4 packages are stored:

```
# echo "http://144.134.134.144/download/redhat/updates/as4/i386/" > \
      /vz/root/111/var/www/html/download/mirrors/updates-released-as4
```

This command makes the /vz/root/111/var/www/html/download/mirrors/updates-released-as4 file on the Node and adds the http://144.134.134.144/download/redhat/updates/as4/i386 string to the file.

4 On the Hardware Node, create an empty RPM database. For example:

```
# mkdir -p /var/repo/redhat-as4
# rpm --initdb --dbpath /var/repo/redhat-as4
# rpm --dbpath /var/repo/redhat-as4 --import /usr/share/ \
              rhn/RPM-GPG-KEY
```

5 Install the RPMs from the official RHEL 4 disks in the created database:

```
# find /vz/root/111/var/www/html/download/redhat/as4/i386/os/ \
      RedHat/RPMS -name '*.rpm' | xargs rpm -ihv --justdb\
      --dbpath /var/repo/redhat-as4 --ignoresize --force --nodeps
```

Installing all RPM packages for the RHEL 4 distribution may take a rather long run; please wait until the installation process completes. After that, you can start using the up2date utility to update the created repository.

For example, the following session updates the RPM packages in your local repository inside VPS 111:

- Obtain a list of RPM packages

```
# up2date -l --tmpdir=/tmp/up2date --dbpath /var/repo/redhat-as4/ | \
          awk 'BEGIN { stage = 0; } \
          stage == 0 && /^--*$/ {stage = 1; next; } \
          stage == 1 && /^$/ { stage = 2; next } \
          stage == 1 { print \$1; }' \
          > /tmp/pkgs-list
```

- Download them:

```
# cat /tmp/pkgs-list | xargs up2date -d --tmpdir=/tmp/up2date \
      --dbpath /var/repo/redhat-as4/
# rpm -ivh --justdb --dbpath /var/repo/redhat-as4/ --ignoresize \
      --force --nodeps /tmp/up2date/*.rpm
# mv /tmp/up2date/*.rpm /vz/root/111/var/www/html/download/redhat/ \
     updates/as4/i386/
# createrepo /vz/root/111/var/www/html/download/redhat/updates \
             /as4/i386
```

You can also make a script to automatically perform the aforementioned operations and set this script to be run as a `cron` job.

CHAPTER 8

# Updating Virtuozzo Software

This section provides information on how you can update your Virtuozzo software and templates and keep them at the most recent version. Virtuozzo allows you to update your Virtuozzo software in one of the following ways:

- By using the `vzup2date` utility. This utility can be used to update the Virtuozzo standard templates installed on the Hardware Node or applied to your Virtual Private Servers.
- By using the `vzpkg` tool. This tool should be used to update the Virtuozzo EZ templates inside your Virtual Private Servers and the tarballs (caches) of all OS EZ templates installed on the Hardware Node.

Both ways are described below in detail.

## In This Chapter

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# Updating Virtuozzo With vzup2date

Virtuozzo for Linux is constantly developing: there appear new versions of the Virtuozzo core and of existing Virtuozzo utilities, OS and application templates are perfected, new templates and utilities are also added from time to time. Thus, Virtuozzo as a single product may often be repackaged to include the latest changes in any of its parts. As these changes grow in number, new Virtuozzo versions with incremented major and/or minor numbers are released.

The `vzup2date` utility, introduced in Virtuozzo 2.6.1, is intended to relieve Virtuozzo administrators of the necessity to manually update existing Virtuozzo installations. It provides a single information channel for learning if updated Virtuozzo versions are available. In other words, a regular launching of this utility helps ensure that you always have the latest Virtuozzo release available.

The `vzup2date` utility can be launched in two modes:

- Graphical mode representing the Virtuozzo updating wizard allowing you to update either the Virtuozzo system files or the Virtuozzo templates depending on the options passed to `vzup2date`.
- Command line mode containing two submodes:
  - the batch submode and
  - the messages submode.

In comparison with the graphical mode, the command line mode provides more inclusive possibilities for the Virtuozzo updates management (e.g. the ability to use special filters while selecting updates for your system).

Both modes are described in the following subsections in detail.

# Updating in Graphical Mode

In the graphical mode, the `vzup2date` utility can be launched in two submodes. If invoked without any parameters or with the `-s` switch, it is supposed to check and, if necessary, download and install Virtuozzo system files, i.e newest versions of the Virtuozzo core and utilities. On the other hand, the `-t` switch provided when invoking the utility tells it to perform the same operations for Virtuozzo OS and application templates. There is no single interface for checking Virtuozzo system files and templates at once, as these operations are different in nature, so you should consecutively call the `vzup2date` utility with and without the `-t` switch, if you wish to check both.

**Note:** You can explicitly specify that the `vzup2date` utility is to be run in the graphical mode by passing the `-m interactive` switch to it.

The `vzup2date` utility is implemented as a wizard, the first few steps of which are common for both modes. After you launch the utility from the command line, you will be presented with a greeting screen. Press Next to go to the page where you will be able to indicate the repository supposed to house Virtuozzo updated packages and templates:

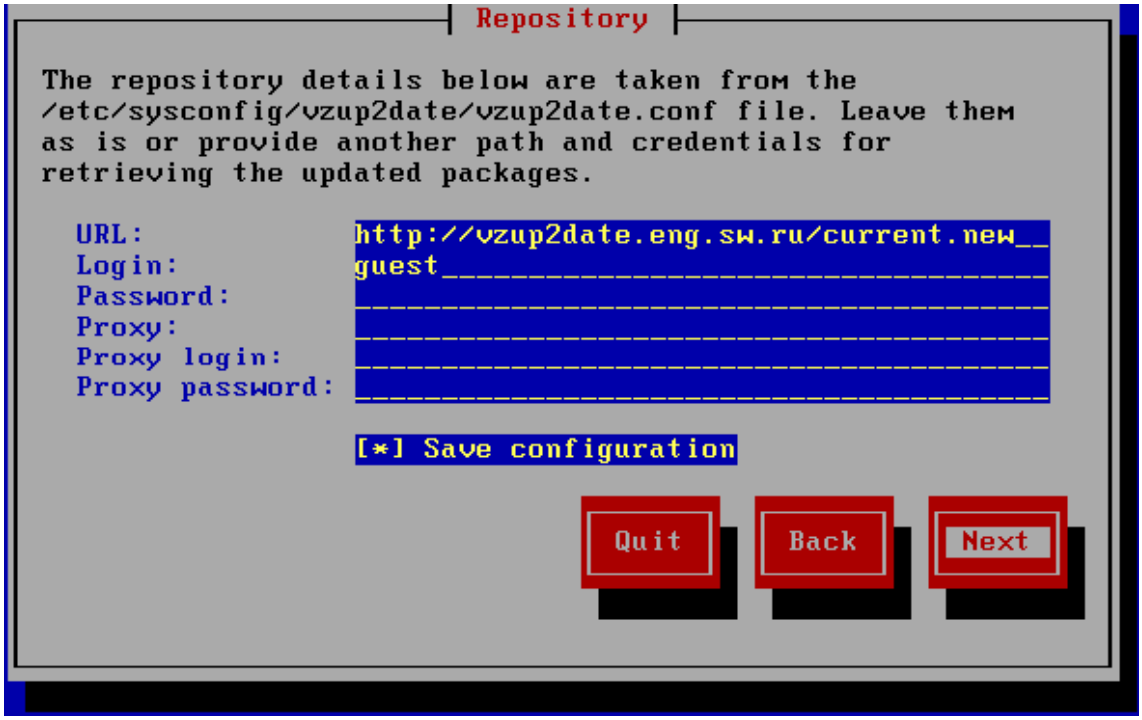


*Figure 22: Updating Virtuozzo - Specifying Repository*

The information on this screen is taken from the `/etc/sysconfig/vzup2date/vzup2date.conf` file. If you wish to change this information and save the changes to the configuration file, enter the correct settings into the fields provided and leave the Save configuration checkbox selected, then press Next. If you do not know what information should be provided on this screen, contact your SWsoft representative. As soon as you press Next, the utility will try to connect to the specified repository and, if the connection is successful, display the next screen, which will vary depending on the mode of the `vzup2date` invocation. First, we will describe the mode of updating Virtuozzo system files and then proceed with updating Virtuozzo templates.

## Updating Virtuozzo System Files

After the repository is checked for updates availability, it may happen that no updates are available for your system, in which case the utility will duly inform you thereof. If there are updates, please distinguish between major and minor Virtuozzo updates. A major Virtuozzo update is indicated by a higher version of the available Virtuozzo release. For example, with the current Virtuozzo version of 3.0, this will be a major update for Virtuozzo 2.6.2, 2.6.1, 2.6.0, and earlier Virtuozzo releases. Minor updates happen within the same Virtuozzo release. Minor updates may be available not only for the latest Virtuozzo release but for previous releases as well. So, in case there are both major and minor updates for your current Virtuozzo installation, you will be presented with a screen like the following:

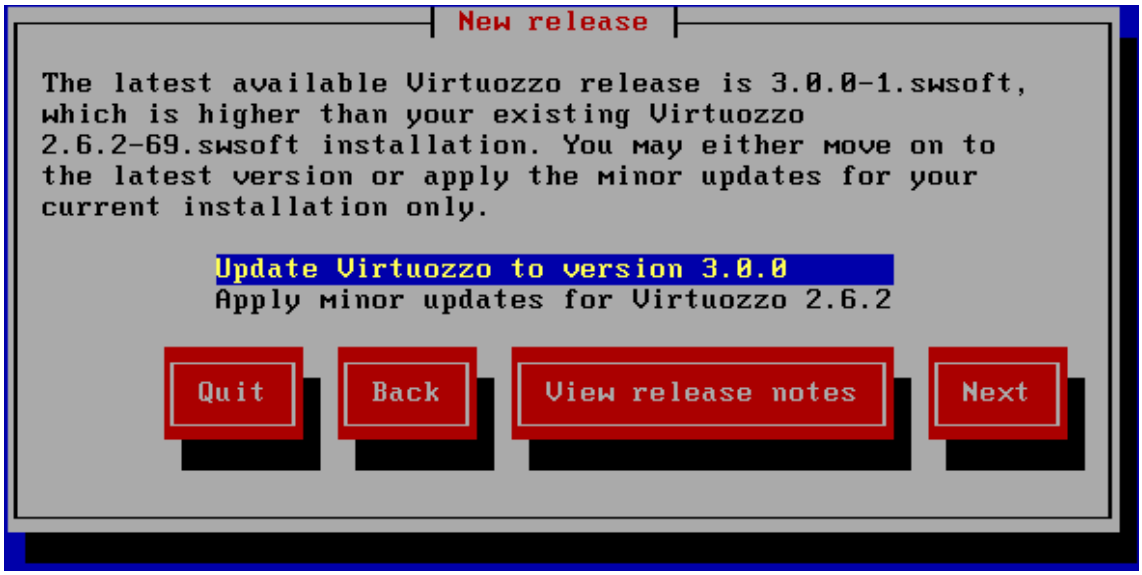


*Figure 23: Updating Virtuozzo - Selecting Update Type*

Bear in mind that the latest Virtuozzo release you are updating to might also already have available minor updates. However, they will not be applied during this invocation of the `vzup2date` utility. So, in order to install the latest Virtuozzo version and then to apply minor updates for it, you will need to launch the utility twice.

Depending on the kind of update you choose on this screen, the further steps will differ. Mind also that if there is only a major update or there are only minor updates available, the above screen will be skipped and you will be taken to the corresponding branch of the wizard directly after the repository configuration screen.

**Note:** The `vzup2date` utility might see that the selected Virtuozzo update includes an updated version of the `vzup2date` utility itself. In this case, you will first have to perform an update of this utility and then to re-launch it and select the desired Virtuozzo system update once again.

### Updating to Latest Release

After you have chosen to update your current Virtuozzo installation to the latest release, you will go thru the following steps of the wizard:

- Read the Release Notes for the new Virtuozzo release.
- Confirm the downloading of the new release, the size of which will be indicated. You will also be notified if rebooting the computer is needed after the updating. You will be able to choose whether to reboot automatically or manually.
- After the updated packages have been downloaded, you might need to reconfigure your boot loader. The `vzup2date` utility automatically recognizes and reconfigures the Lilo and Grub boot loaders, so simply leave the Automatically configure bootloader checkbox selected and press Next on the Configure bootloader screen.
- After the boot loader reconfiguration, press Install to begin installing the latest release. Mind that the Virtuozzo service will be stopped during the updating, and then the Hardware Node will be rebooted, so all the VPSs will not be functional all this time.

**Note:** If you are updating to Virtuozzo 3.0 with kernel 2.6 on a Host operating system that also supports kernel 2.4, then both kernels (2.4 and 2.6) are installed on the Hardware Node during the Virtuozzo update. By default, Virtuozzo boots with the 2.6 kernel upon the update completion; however, you have the possibility to switch (back) to kernel 2.4 in case you are not satisfied with the new kernel. This can be done by rebooting your Node and selecting kernel 2.4 in the boot loader.

### Updating Current Release

Updating the current Virtuozzo release happens when there are no new Virtuozzo releases or if you are not willing to update to the latest release. The utility will first present you with a default list of updates to be applied to your Node. This default list comprises the latest Virtuozzo updates for the given release:

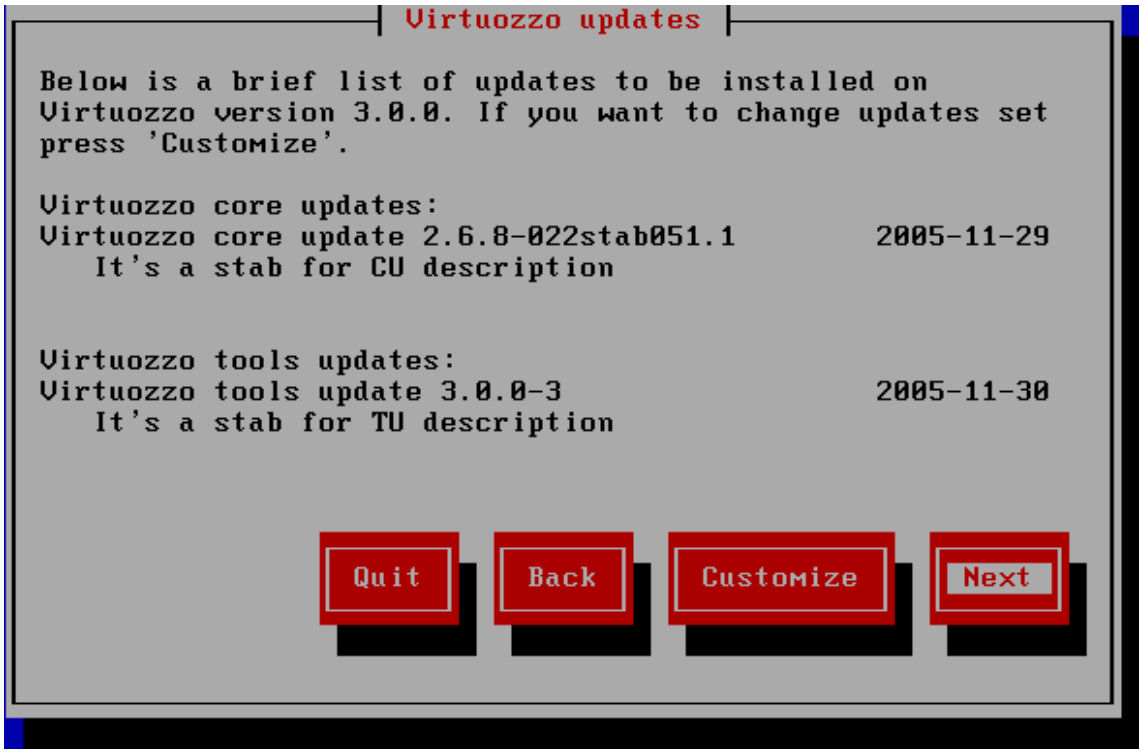


*Figure 24: Updating Virtuozzo - List of Selected Updates*

If you wish to update to the latest Virtuozzo core and utilities versions, just press Next on this screen and the `vzup2date` utility will download and install them asking your confirmation before each action.

On the other hand, if you have a reason not to install the latest updates for both the Virtuozzo core and Virtuozzo utilities, press Customize. Then you will be able to choose whether to perform customization on the Virtuozzo core or on the Virtuozzo tools (utilities). This step will be skipped if updates are currently available either only for the Virtuozzo core or only for the Virtuozzo tools. On the next step, you will be asked to choose the needed Virtuozzo core or utilities update, in case there are many. For example, the available Virtuozzo core updates might be presented like this:

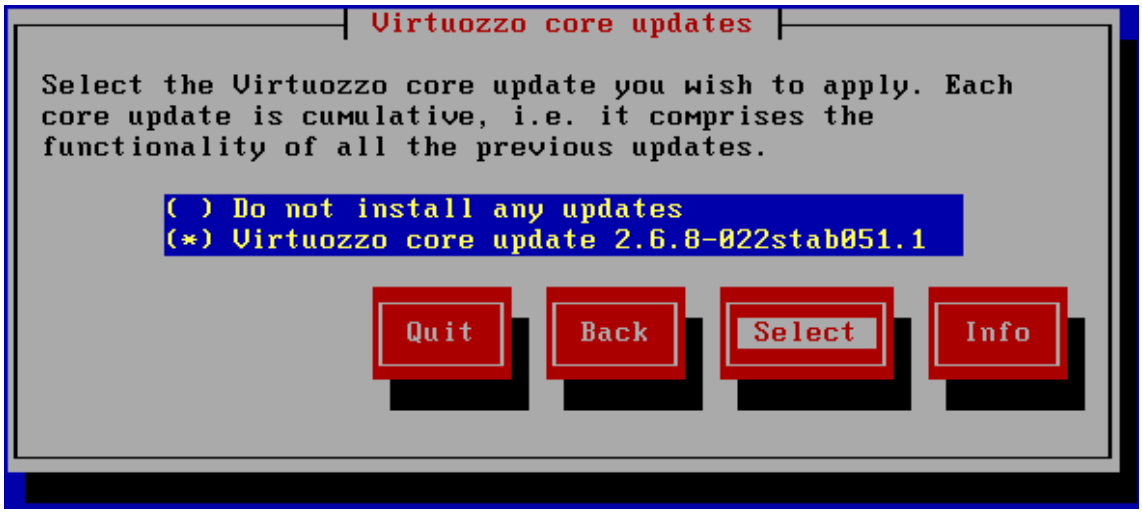


*Figure 25: Updating Virtuozzo - Select Virtuozzo Core Updates*

The bottommost update includes the functionality of all the other updates. You may select any of the intermediary updates and press Select to go back to the List of Selected Updates screen and read the information on this update. You will be able to perform customization more than once until you finally decide on the set of updates to be applied and press Next.

Downloading and installing the necessary updates is straightforward.

## Updating Virtuozzo Templates

Updating Virtuozzo templates takes place if you have launched the `vzup2date` utility with the `-t` option. The first few steps of the wizard were described in the Updating Virtuozzo Software section (see page 69). After the repository has been checked for the availability of updated templates, the utility will present you with a list of OS templates that you may install and/or update on your computer:

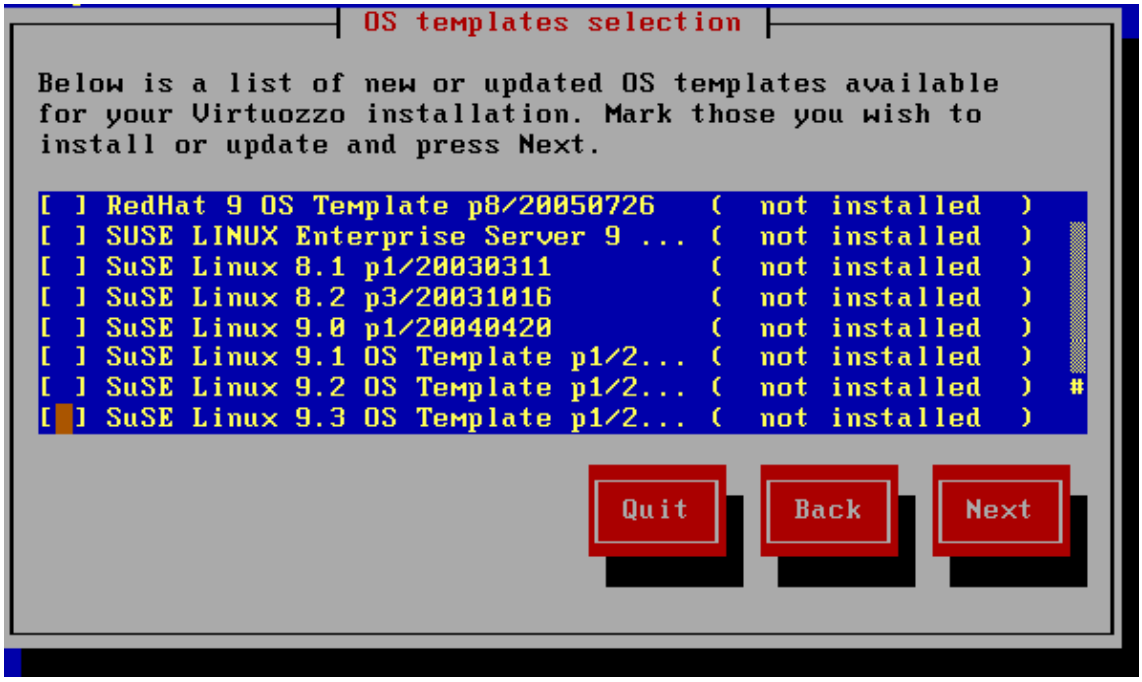


*Figure 26: Updating Virtuozzo - Selecting OS Templates*

All the available templates are shown that fit your Virtuozzo installation. There are two kinds of templates on this list:

1. Templates that are not present on your system. These might be templates that you did not wish to install from the very beginning, so by default they are not selected to be installed this time also. Anyway, you may just as well select them and thus add to your system.
2. Updates to those templates that are already installed with you. By default, these templates are already selected on this screen. It may happen that an update involves the downloading and installing of some intermediary updates, in which case you will see several templates downloaded and installed at the final stages of the wizard. Anyhow, you need to select only the latest update, and all the rest is done automatically.

Review the templates that you wish to install and/or update and click Next to go to the application templates selection screens. You will also have the possibility to select not only those application templates that can update your existing applications but install new templates compatible with a set of OS templates installed on your system. Those application templates that are incompatible with the OS templates you chose to install or update on the previous step will not be offered for selection. To schedule this or that application template for being installed/updated, you should click on the Customize button and, in the displayed window, select the corresponding templates.

The steps of downloading and installing the selected templates are self-evident. By the time the wizard finishes you should have updated OS and application templates on your system.

# Updating in Command Line Mode

Another way of updating your Virtuozzo system files and templates is to run the `vzup2date` utility in the command line mode, which can be done by passing the corresponding commands, switches, and options to `vzup2date`. While executing `vzup2date` in the command line mode, you can choose between the batch and messages submodes. Both submodes can be used to update either the Virtuozzo system files or the Virtuozzo templates and have the identical syntax. However, the output produced by these commands is different. The messages submode output is less user friendly than the batch submode one and is mostly suitable for machine processing.

To run the `vzup2date` utility in the command line mode, you should use either the `-m batch` switch or the `-m messages` switch intended for executing `vzup2date` in the batch and messages submodes, respectively.

Let us assume that you wish to update your Virtuozzo system files by installing the latest Virtuozzo core in the batch submode. To this effect, you can issue the following command on the Hardware Node:

```
# vzup2date -m batch install --core
```

This will check the Virtuozzo repository for the latest Virtuozzo core updates and, in the case of finding any, download and install them on the Hardware Node. However, to be able to update your Virtuozzo installation, you may need to edit the `/etc/sysconfig/vzup2date/vzup2date.conf` file to specify the repository from where the Virtuozzo updates are to be downloaded or configure a number of other parameters. Detailed information on the `vzup2date.conf` file is provided in the Configuring Virtuozzo chapter of the Virtuozzo Reference Guide.

You can also execute the `vzup2date` utility in the batch mode to update Virtuozzo templates installed on the Hardware Node. For example, you can issue the following command

```
# vzup2date -t -m batch install --all-os
```

to update all OS templates installed on your Node. Detailed information on all options that can be passed to the `vzup2date` utility is given in the Virtuozzo Command Line Interface chapter of the Virtuozzo Reference Guide.

---

**Note:** To perform the aforementioned operations in the messages submode, you should pass the `-m messages` option to the `vzup2date` utility instead of `-m batch`.

---

# Updating EZ Templates

If you are using EZ templates (introduced in Virtuozzo 3.0 for the first time) inside your Virtual Private Servers, you should use the `vzpkg` tool to update the Virtuozzo EZ templates inside your Virtual Private Servers and the tarballs (caches) of all OS EZ templates installed on the Hardware Node.

# Updating EZ Templates Inside VPS

You should run the `vzpkg update` utility to update the OS EZ template a Virtual Private Server is based on and any of its application EZ templates. During its execution, `vzpkg update` checks the repository where all RPM packages for the corresponding OS and application EZ templates are stored and updates the RPM packages inside your Virtual Private Server to the latest RPM versions available in the repository. Detailed information on what EZ templates are and how to manage their RPM repositories is provided in the Managing EZ Templates chapter of the Virtuozzo User's Guide.

Let us assume that you wish to update the `redhat-as4-x86` OS EZ template VPS 101 is based on. To this effect, you should issue the following command:

**Note:** A Virtual Private Server has to be running in order to update an EZ template inside this VPS.

```
# vzpkg update 101 redhat-as4-x86
...
  Updating: httpd           ######################### [1/4]
  Updating: vzdev           ######################### [2/4]
  Cleanup : vzdev           ######################### [3/4]
  Cleanup : httpd           ######################### [4/4]

Updated: httpd.i386 0:2.0.54-10.2 vzdev.noarch 0:1.0-4.swsoft
Complete!
Updated:
 httpd                  i386      0:2.0.54-10.2
 vzdev                  noarch    0:1.0-4.swsoft
```

As you can see from the example above, the `httpd` and `vzdev` RPM packages have been updated for the `redhat-as4-x86` OS EZ template. If you wish to update all EZ templates (including the OS EZ template) inside Virtual Private Server 101 at once, you should execute the following command:

```
# vzpkg update 101
...
Running Transaction
  Updating  : hwdata                  ###################### [1/2]
  Cleanup   : hwdata                  ###################### [2/2]

Updated: hwdata.noarch 0:1.0-3.swsoft
Complete!
Updated:
 hwdata                 noarch    0:0.158.1-1
```

In the example above, only the `hwdata` package inside VPS 101 was out of date and updated to the latest version.

In VZMC, you should perform the following operations to update the OS EZ template a Virtual Private Server is based on and/or any of its application EZ templates:

1. Open a list of Virtual Private Servers in the VZMC main window by selecting the Virtual Private Servers item in the Hardware Node tree.
2. Double-click the name of the VPS where you wish to add an EZ template to open the Virtual Private Server Manager.

3. Click on the Templates --> EZ Templates item in the main tree of the opened Virtual Private Server Manager.
4. In the right pane, double-click either the OS Templates or Application Templates folder depending on what EZ template you wish to update.
5. Right-click the corresponding EZ template and select the Update Installed Packages option on the context menu.
6. In the displayed window, select the checkboxes of the packages that are included in the EZ template and that you wish to update and click on the Update button.

## Updating OS EZ Templates Cache

With the release of new updates for the corresponding Linux distribution, the created OS EZ template cache can become obsolete. So, Virtuozzo 3.0 provides the `vzpkg update cache` command allowing you to quickly update the OS EZ template cache.

`vzpkg update cache` checks the `cache` directory in the template area (by default, the template area is located in the `/vz/template/`) on the Hardware Node and updates all existing tarballs in this directory. However, you can explicitly indicate the tarball for what OS EZ template should be updated by specifying the OS EZ template name. For example, to update the tarball for the `fedora-core-4-x86` OS EZ template, you should issue the following command:

```
# vzpkg update cache fedora-core-4-x86
Loading "rpm2vzrpm" plugin
Setting up Update Process
Setting up repositories
base0            100% |=========================|  951 B    00:00
base1            100% |=========================|  951 B    00:00
base2            100% |=========================|  951 B    00:00
base3            100% |=========================|  951 B    00:00
...
```

Upon the `vzpkg update cache` execution, the old tarball is renamed by receiving the `-old` suffix (e.g. `fedora-core-4-x86.tar.gz-old`):

```
# ls /vz/template/cache
fedora-core-4-x86.tar.gz  fedora-core-4-x86.tar.gz-old
```

You can also pass the `-f` option to `vzpkg update cache` to remove an existing tar archive and create a new one instead of it.

If the `vzpkg update cache` command does not find a tarball for one or several OS EZ templates installed on the Node, it creates tar archives of the corresponding OS EZ templates and puts them to the `/vz/template/cache` directory.

# Glossary

*Application template* is a template used to install a set of applications in *Virtual Private Servers*. See also *Template*.

*EZ template* is a template file that points to a repository with the packages that comprise the template. Unlike *standard templates*, EZ templates cannot be updated because the repository stays the same. However, the packages in the repository can be updated.

*Hardware Node* (or *Node*) is a computer where Virtuozzo is installed for hosting *Virtual Private Servers*. Sometimes, it is marked as *VPS 0*.

*HN* is an abbreviation of *Hardware Node*.

*Host Operating System* (or *Host OS*) is an operating system installed on the *Hardware Node*.

*HSPcomplete* is an end-to-end solution for Hosting Service Providers by SWsoft. Is dependent on *Virtuozzo*.

*MAC address* stands for Media Access Control address, a hardware address that uniquely identifies each Node in a network. The MAC layer interfaces directly with the network media. Consequently, each different type of network media requires a different MAC layer.

*Management Node* is a computer used in the *HSPcomplete* solution to control the *Hardware Nodes*. It runs services for a web-based management interface and database containing information about customers and services.

*mlock, mlock'ed page* — `mlock()` (short for memory locking) is a system call. It disables paging out for a specific region of memory. `mlock`'ed pages are guaranteed to stay resident in RAM until they are unlocked by `munlock()` system call. There are two primary applications of memory locking — the real–time applications and high–security data processing. The former require the deterministic response. The latter needs to protect valuable data from paging out into the swap file.

*MN* is an abbreviation of *Management Node*.

*OS template* (or *Operating System template*) is used to create new *Virtual Private Servers* with a preinstalled operating system. See also *Template*.

*Package set* is a synonym for *Template*.

*Private area* is a part of the file system where *VPS* files that are not shared with other *Virtual Private Servers* are stored.

*QoS* is an abbreviation of *Quality of Service*.

*Quality of Service* specifies the performance properties of a VPS. It allows you to provide a fair share of the main system resources among *Virtual Private Servers* and better service quality for preferred VPSs.

*siginfo structure* (or just *siginfo*) is a block of information about signal generation. If a process catches a signal, it may receive siginfo telling why the system generated that signal. If a process monitors its children, it may receive *siginfo* telling why a child has changed its state. In either case, the system returns the information in a structure of the *siginfo_t* type, which includes the following information: signal number, error number, and signal code.

*SSH* stands for Secure Shell. It is a protocol for logging on to a remote machine and executing commands on that machine. It provides secure encrypted communications between two untrusted hosts over an insecure network.

*Service Virtual Private Server* is a special VPS running *VZAgent* which is responsible for managing all the *Virtual Private Servers* of the given *Hardware Node*. You should use the IP address of the Service VPS to connect to a *Hardware Node* by means of *VZMC* or *VZCC*. The Service VPS is always marked as Virtual Private Server 1.

*Service VPS* is an abbreviation of *Service Virtual Private Server*.

*Standard template* is a template file that has inside itself all the re-usable files of all the packages comprising the template. If newer versions of any of these packages appear, a standard template can be correspondingly updated. Compare *EZ template*.

*SVPS* is an abbreviation of *Service Virtual Private Server*.

*TCP* (*TCP/IP*) stands for Transmission Control Protocol/Internet Protocol. This suite of communications protocols is used to connect hosts on the Internet.

*Template* (or *package set*) is a set of original application files (packages) repackaged for mounting over Virtuozzo File System. There are two types of templates. OS Templates are used to create new Virtual Private Servers with a preinstalled operating system. Application templates are used to install an application or a set of applications in *Virtual Private Servers*. See also *Standard template* and *EZ template*.

*UBC* is an abbreviation of *User Beancounter*.

*User Beancounter* is the subsystem of Virtuozzo for managing VPS memory and some system-related resources.

*Virtual Environment* (or *VE*) is an obsolete designation of a virtual private server. See *Virtual Private Server*.

*VPS* is an abbreviation of *Virtual Private Server*.

*VENET device* is a virtual networking device, a gateway from a *VPS* to the external network.

*Virtual Private Server* is a virtual private server, which is functionally identical to an isolated standalone server, with its own IP addresses, processes, files, its own users database, its own configuration files, its own applications, system libraries, and so on. Virtual Private Servers share one *Hardware Node* and one OS kernel. However, they are isolated from each other. Virtual Private Server is a kind of ‘sandbox’ for processes and users. Virtual Private Server 0 is used to designate the Hardware Node itself.

*Virtuozzo* is a complete server automation and virtualization solution allowing you to create multiple isolated *Virtual Private Servers* on a single physical server to share hardware, licenses, and management effort with maximum efficiency.

*Virtuozzo Control Center* is a tool designed for managing a particular Hardware Node and all VPSs residing on it with the help of a standard Web browser on any platform.

*Virtuozzo File System* (*VZFS*) is a virtual file system for mounting to VPS private areas. VZFS symlinks are seen as real files inside *VPS*s.

*Virtuozzo license* is a special license that you should load to the *Hardware Node* to be able to start using *Virtuozzo*. Every *Hardware Node* shall have its own Virtuozzo license file.

*Virtuozzo Management Console* is a Virtuozzo management and monitoring tool with graphical user interface. It uses *VZagent Protocol* to control *Hardware Nodes* and their *VPSs*. VZMC is cross–platform and runs on both Microsoft Windows and Linux workstations.

*Virtuozzo Power Panels* is a means for administering personal Virtual Private Servers with the help of a standard Web browser (Internet Explorer, Mozilla, etc.) on any platform.

*VPS* is an abbreviation of *Virtual Private Server*.

*VPS 0* is used to designate a *Hardware Node* where Virtuozzo is installed.

*VZagent* (or *VZagent Protocol*) is an XML–based protocol used to monitor and manage a *Hardware Node*. The `vzagent` software implements this protocol and is a backend for the *Virtuozzo Management Console*.

*vzagent0* is the user who has a full administrative access to the *Service VPS*. You will need to provide this user name and password when connecting to your *Hardware Node* by means of *VZMC* and *VZCC*.

*VZCC* is an abbreviation of *Virtuozzo Control Center*.

*VZCC license* is a license needed to activate *VZCC*. You should enter it the first time you log in to VZCC.

*VZFS* is an abbreviation of *Virtuozzo File System*.

*VZMC* is an abbreviation of *Virtuozzo Management Console*.

*VZMC license* is a license needed to activate *VZMC*. You should enter it the first time you launch VZMC.

*VZPP* is an abbreviation of *Virtuozzo Power Panels*.

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