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SWsoft

# Virtuozzo for Windows

Templates Management Guide

Version 4.0



**SWSOFT™**

(c) 1999-2007

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# Preface

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## About This Guide

This guide is meant to provide complete information on Virtuozzo templates - an exclusive SWsoft Virtuozzo technology allowing you to efficiently deploy standard Windows applications inside your Virtual Environments and to greatly save your Hardware Node resources (physical memory, disk space, etc.). In particular, you will learn how to create your own application templates and manage them in a number of different ways.

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## Who Should Read This Guide

The primary audience for this guide is anyone who is intended to deploy one or several applications inside their Virtual Environments and looking for ways to do it with the maximal level of efficiency. To complete all the operations described in this guide, no more than basic Windows administration habits is required.

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## Organization of This Guide

Chapter 2, *Templates Overview*, introduces you to the concept of Virtuozzo OS and application templates.

Chapter 3, *Creating Application Template*, provides information on how to create your own application templates by using the *Virtuozzo Template Creation Wizard*.

Chapter 4, *Managing Templates*, centers on all those operations you can perform on your application templates by using *Virtuozzo Management Console (VZMC)*.

# 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
<code>Preformatted</code>	On-screen computer output in your command-line sessions; source code in XML, C++, or other programming languages.	<code>Saved parameters for VE 101</code>
<b>Preformatted Bold</b>	What you type, as contrasted with on-screen computer output.	<b>C:\Documents and Settings\Administrator&gt;vzlist</b>
Monospace	The names of commands, files, and directories.	Use <code>vzctl start</code> to start a VE.
<i>Monospace Italics</i>	Designates a command line placeholder, which is to be replaced with a real name or value.	To delete a VE, type <code>vzctl delete VE_ID</code> .
Special Bold	All elements of the graphical user interface (GUI): menu items, menu options, menu buttons, etc.  Titles of chapters, sections, and subsections.	Go to the <b>Resources</b> tab.  Read the <b>Basic Administration</b> chapter.
<i>Italics</i>	Used to emphasize the importance of a point or to introduce a term.	<i>Host Operating System</i> is an operating system installed on the Hardware Node.
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

## Prompts in Command Examples

Command line examples throughout this guide presume that you are using the standard Windows command line that can be launched by entering `cmd` in the standard Windows **Run** dialog window (displayed on clicking **Start --> Run**). Inasmuch as you are supposed to work with Virtuozzo with an administrator's privileges, the commands presented in this guide are prepended with the following command line prompt: `C:\Documents and Settings\Administrator>`.

## 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 (") and single-quotes (') exactly as shown.

---

## 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](mailto:userdocs@swsoft.com).

# Templates Overview

A template in Virtuozzo is a set of application files and registry settings installed on the Host operating system in such a way as to be usable by any VE by mounting over Virtuozzo File System. Virtuozzo provides tools for creating templates, installing and removing them on/from the Hardware Node, adding them to a Virtual Environment, etc. Using templates lets you:

- Securely share the RAM among similar applications running in different VEs to save hundreds of megabytes of memory;
- Securely share the files comprising a template among different VEs to save gigabytes of disk space;
- Install applications and patches simultaneously in many VEs.

There are two types of templates in Virtuozzo. These are OS templates and application templates. An OS template is an operating system and the standard set of applications to be found right after the installation. Virtuozzo uses OS templates to create new Virtual Environments with a preinstalled operating system. An application template is a set of files and registry settings pertaining to this or that application. Virtuozzo uses application templates to add extra software to the existing Virtual Environments. For example, you can create a Virtual Environment on the basis of the Windows Server 2003 OS template and add the Microsoft SQL server application to it with the help of the MSSQL template.

You may perform the following operations with templates:

- Create your own application templates;
- Upload new templates to the Hardware Node;
- List the templates currently installed on the Hardware Node;
- Install templates on and remove them from the Hardware Node;
- Add templates to any number of Virtual Environments;
- Remove templates from the Hardware Node;
- Remove templates that are not needed any more from VEs.

All these operations are described in the following chapters in detail.

## CHAPTER 3

# Creating Application Template

You may wish to use special software inside your Virtual Environment(s) to perform a specific task or function, such as word-processing, creating spreadsheets, generating graphics, sending and receiving electronic mail, etc. However, installing an application inside every VE where you wish to use it may be a time-consuming operation and require many megabytes of disk space inside each VE. At the same time, adding an application to your VEs by using the technology of Virtuozzo templates helps you avoid these problems:

- Thanks to the fact that the real application files are written to the HN hard disk only once, gigabytes of disk space are saved that would be lost if the application were installed separately into each and every VE.
- The application is loaded only once into the Node memory, so memory savings are also tangible.

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## Launching Virtuozzo Template Creation Wizard

Before you can start making use of the benefits provided by the Virtuozzo templates technology, you should first create one or more application templates. Virtuozzo provides you with a special wizard for creating Virtuozzo application templates. The **Virtuozzo Template Creation Wizard** will guide you through the process, gather all the necessary information, and make an application template for you. In order to invoke the wizard, select **Programs --> SWSOFT --> Virtuozzo --> Virtuozzo Template Creation Wizard** on the Windows Start menu.

After you have launched the wizard, you will be presented with the **Welcome to Virtuozzo Template Creation Wizard** window:



*Figure 1: Creating Template - Welcome Screen*

In this window you can choose one of the following types of the application template creation:

- Select the **Create a template on the basis of an installed application** check box to create your application template on the basis of the corresponding application installed in a special temporary VE and customized, if necessary. In this case only the files and registry settings that will result from the application installation inside the temporary VE will be included in the template.
- Select the **Create a template from manually selected data** check box to manually specify the files and registry settings out of which your application template is to be created. In this case you will be able to choose and edit any available application files and registry keys for making the template.

Both ways of the template creation are described in the following sections in detail.

## Creating Template From Installed Application Data

After you have selected the Create a template on the basis of an installed application check box and clicked Next in the Welcome to Virtuozzo Template Creation Wizard window, you will be presented with the Specify VE Settings window:

Figure 2: Creating Application Template - Defining VE Settings

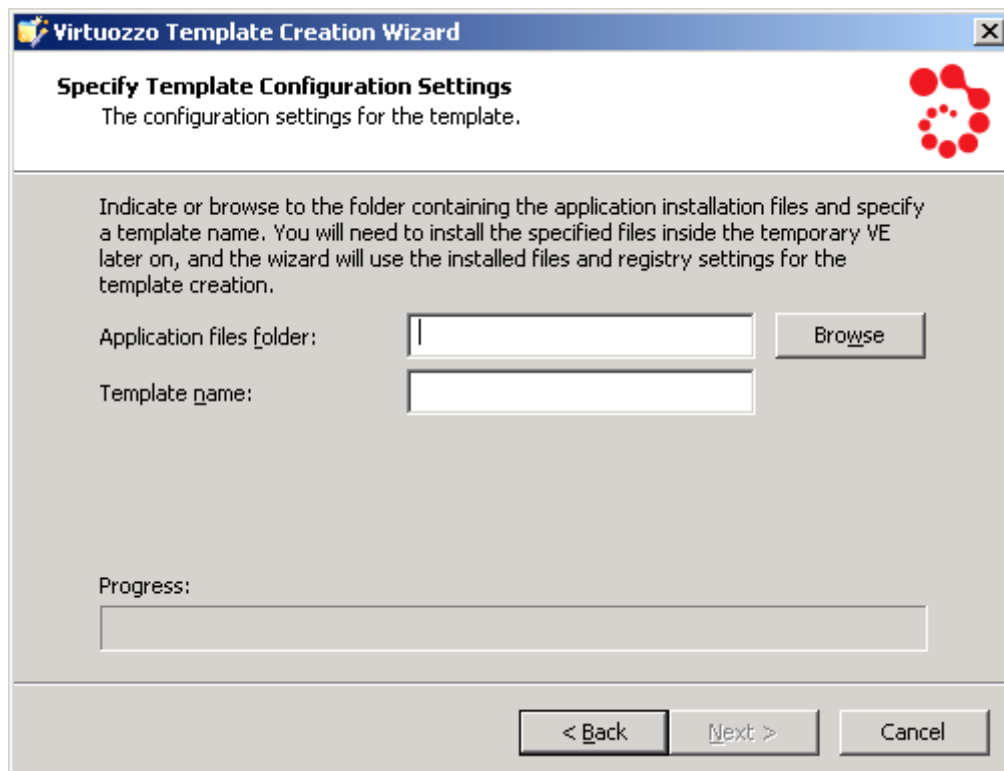
In the Specify VE Settings window, you are asked to set the parameters for a special Virtual Environment which is automatically created by the wizard for the period necessary for making the application template. You will need to install the application installation files inside this VE later on, and the wizard will use the installed files and registry settings for the template creation. After the template has been successfully created and copied to the Hardware Node, the temporary VE will be removed from the Hardware Node (until the Do not remove VE after template creation check box is selected).

The fields you should fill in on the Specify VE Settings screen are explained below:

- In the VE ID field, specify the ID to be assigned to the temporary Virtual Environment. Make sure that the VE with the specified ID does not exist on your Node. Otherwise, you will be warned with a message asking you to choose another VE ID.

- In the **VE disk space limit** field, type the amount of disk space to be allocated to the temporary Virtual Environment, in megabytes. Make sure that the size of the application installation files you wish to use for creating the template does not exceed the size of the specified disk space. Otherwise, a warning will be displayed notifying you that the allocated disk space is not enough for installing the application files.
- Select the **Do not remove VE after template creation** check box to leave the temporary VE intact after the template creation.
- In the **VE IP address** field, enter the IP address (it should be unique within your network) to be assigned to the temporary Virtual Environment. You should specify a valid IP address to be able to connect to the VE via RDP at a later time.
- Indicate a DNS server that the temporary Virtual Environment is supposed to use in the **DNS server** field or select the **Use DNS server of Hardware Node** check box under the **DNS server** field to set the same DNS server as the one used by the Hardware Node.
- In the **OS template** field, specify the OS template to be used for the temporary VE creation by clicking the down arrow and selecting the needed OS template on the drop-down menu.

On the next step of the wizard, you will be asked to specify the path to the application installation files and the name of the template:



*Figure 3: Creating Application Template - Specifying Template Parameters*

- In the **Application files folder** field, you should enter the full path to the folder on the Hardware Node where the application installation files are located. Afterwards, the files from the folder specified in this field will be copied to and manually installed inside the created temporary VE, and the files and registry settings resulting from the files installation in the VE will be included in the template. You can also use the **Browse** button to the right of the **Application files folder** field to point to the desired folder. The folder may contain any number of files with any extensions (.exe, .vbs, .txt, etc.).

- In the **Template name** field, you should specify an arbitrary name for the resulting file that will contain the template; you can type any alphanumeric identifier you consider reasonable for the template file.

When you are ready with setting the necessary template configuration parameters, click the **Next** button to create the temporary Virtual Environment.

After the VE has been created and started, the **Connect to VE** window is displayed. In this window you are supposed to click **Next** to establish an RDP connection to the Virtual Environment. This is needed to copy the source application files from the Hardware Node to the temporary VE; later on, these source application files will be manually installed inside this VE and the application template will be created on the basis of the files and registry settings resulting from the files installation. After an RDP connection window is opened, minimize it and proceed with the wizard.

---

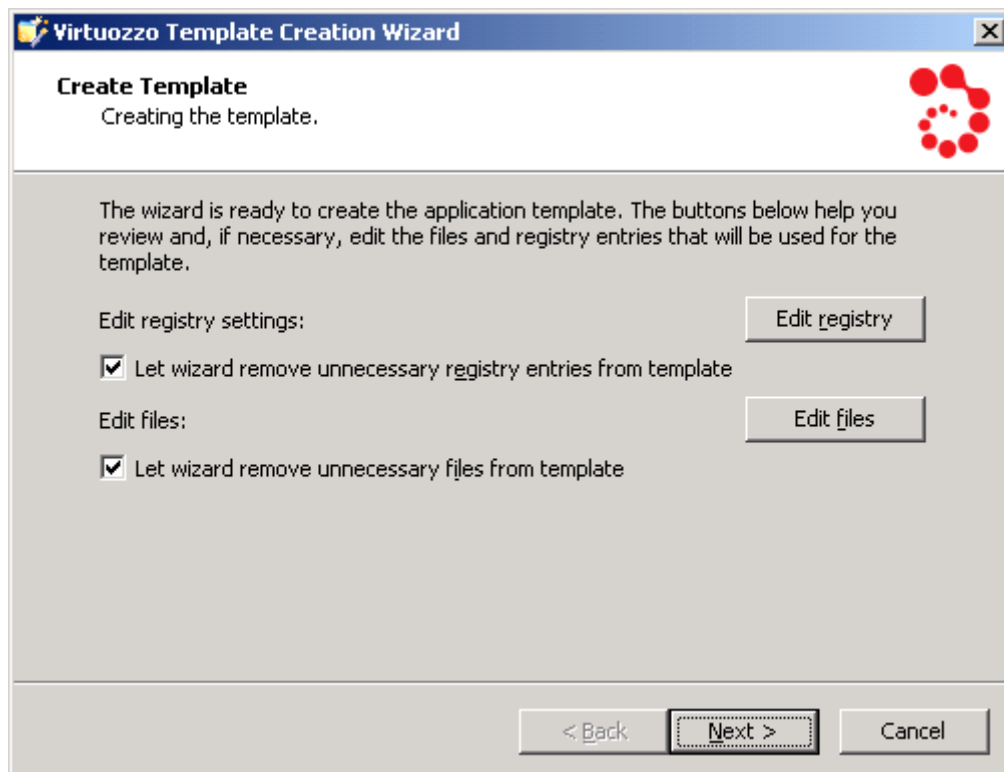
**Note:** Please do not close the RDP connection window manually.

---

The **Prepare to Install Application Files** screen allows you to perform the final preparations before installing the application files inside the temporary Virtual Environment. So, you may wish to open the minimized RDP connections window and locate the source application installation files that have been copied inside the VE. The source application files are located in the root directory of the Virtual Environment (e.g. `C:\My_application.exe`). When you are ready, click **Next**.

When the **Install Application Files** window is opened, switch to the minimized RDP connection window and manually install your source application files inside the temporary VE. You can also customize the installed application to meet your demands; the files and registry settings of this installed and customized application will be used to create the template. Please do not perform any operations that are not related to the application installation and customization since all registry and file system changes made inside the VE will be recorded and included in the application template. When you are ready, switch back to the **Install Application Files** window and click **Next**.

The next screen of the wizard helps you configure, if necessary, the files and registry settings to be used for the template creation:



*Figure 4: Creating Application Template - Making Final Preparations*

In this window you can use the **Edit registry** and **Edit files** buttons to review and edit the registry entries and files that you selected on the previous step of the wizard and are meant for making the application template.

You can also make use of the **Let wizard remove unnecessary registry entries from template** and **Let wizard remove unnecessary files from template** check boxes. These check boxes, if selected, let the **Virtuozzo Template Creation Wizard** look thru and analyze all registry settings and folders/files resulted from the application files installation inside the VE and to be used for the application template creation. As a result of this operation, the wizard may select one or several registry entries and/or folders/files which are, in its opinion, of no use for the template or may even cause the template to malfunction and exclude them from the template creation process. You can easily find out what registry entries and folder/files will not be included in the template by clicking the **Edit registry** and **Edit files** buttons, respectively, and exploring the contents of the displayed windows; unnecessary and suspicious items will be marked in red. For example:

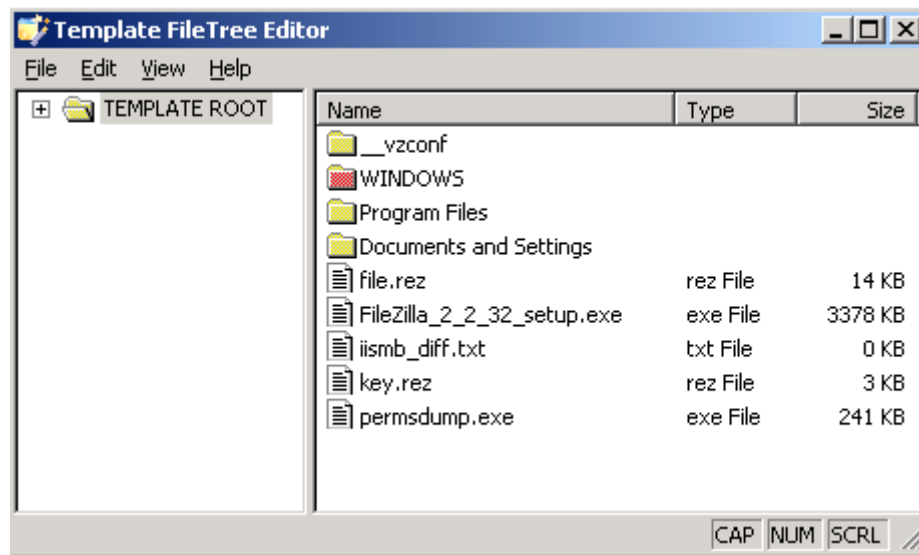


Figure 5: Modifying Template - Viewing Files/Folders to Remove

If you do not wish to exclude any registry settings and folders/files from the template creation, just clear the corresponding check boxes on the Create Template screen and click Next.

On the next step of the wizard, you should provide additional information on the template being created:

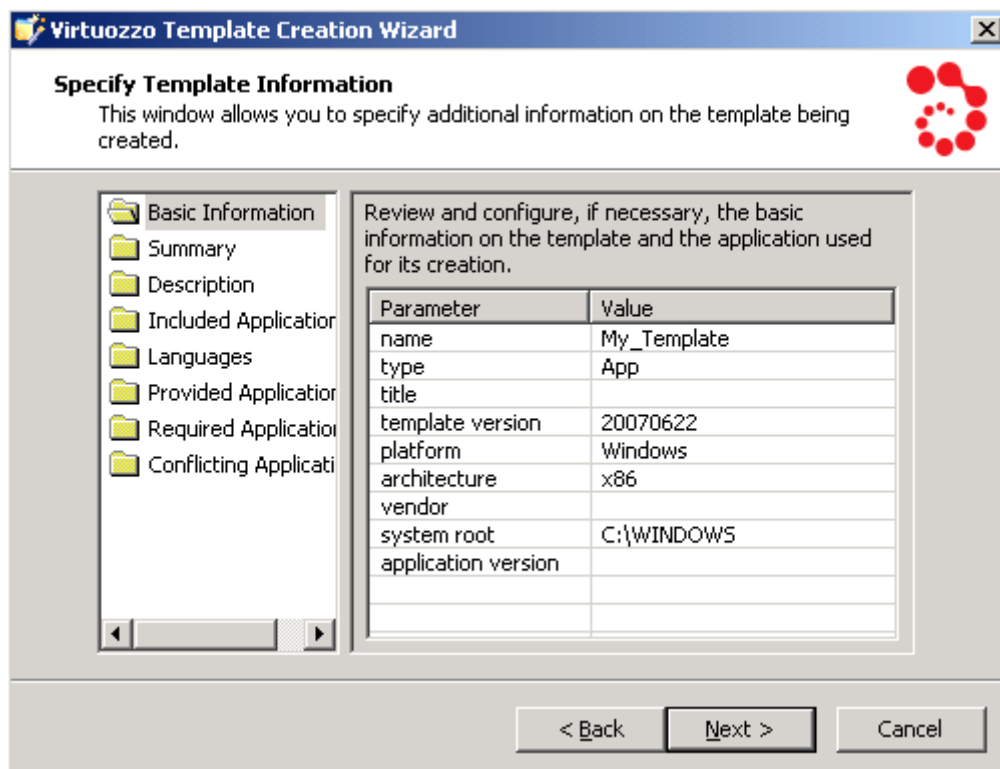


Figure 6: Creating Template - Providing Template Information

First of all, you are prompted to review and configure, if necessary, the basic information on the template. To this effect, select the **Basic Information** folder in the left part of the **Provide Application Information** window and fill in the following fields:

---

Field Name	Description
name	Mandatory. The name to be assigned to the template. You can type any alphanumeric identifier that you consider reasonable for the template and that will be used to refer to this template when performing all template-related operations (e.g. installing the template on the Node or adding it to a VE).
type	Optional. The type of the template being created: <ul style="list-style-type: none"><li>▪ OS: should be indicated when creating OS templates;</li><li>▪ App: should be indicated when making application templates;</li><li>▪ MUI: should be indicated when making the Multilingual User Interface (MUI) pack of the Windows Server 2003 (x64 Edition) OS.</li></ul>
title	Optional. The title of the template; it will be displayed by Virtuozzo tools (e.g. VZMC) along with the template name.
version	Mandatory. The template version in the <i>YYYYMMDD</i> format where <i>YYYYMMDD</i> denotes the year, month, and day of the template creation (e.g. 20070411 meaning that the template was created on the 11-th of April, 2007).
platform	Optional. The operating system under which the template is to be run.
arch	Optional. The system architecture type under which the template is to be run. You can choose one of the following alternatives: <ul style="list-style-type: none"><li>▪ select <code>x86</code> if your template will be used on 32-bit platforms only;</li><li>▪ select <code>x64_86</code> if your template will be used on x86-64-bit platforms only (e.g. on servers with the AMD Opteron and Intel Pentium D processors installed);</li><li>▪ select <code>IA64</code> if your template will be used on IA64-bit platforms only (i.e. on servers with the Intel® Itanium® 2 processor installed);</li><li>▪ select <code>All</code> if you are going to use the template on both 32-bit, x86-64-bit, and IA64-bit platforms.</li></ul>
vendor	Optional. Indicate the name of the application vendor (the company or the author).
system_root	Optional. The directory where the Windows Server 2003 OS is installed (e.g. <code>C:\WINDOWS</code> ).
vendor_version	Mandatory. The version of the application used as the basis for the template creation.

The **Summary** and **Description** folders allow you to provide brief and detailed information on the template. Just select the corresponding folder and type the necessary information in the field in the right part of the window.

---

**Note:** The information on the **Applications** folder is provided in the **Modifying Existing Template** section (on page 29) since it is relevant for the Windows Server 2003 OS template only and enables you to modify the information on the applications included in this OS template.

---

Selecting the **Languages** folder on the **Provide Application Information** screen enables you to determine the template policy in respect of the localized version(s) of the Windows Server 2003 operating system:

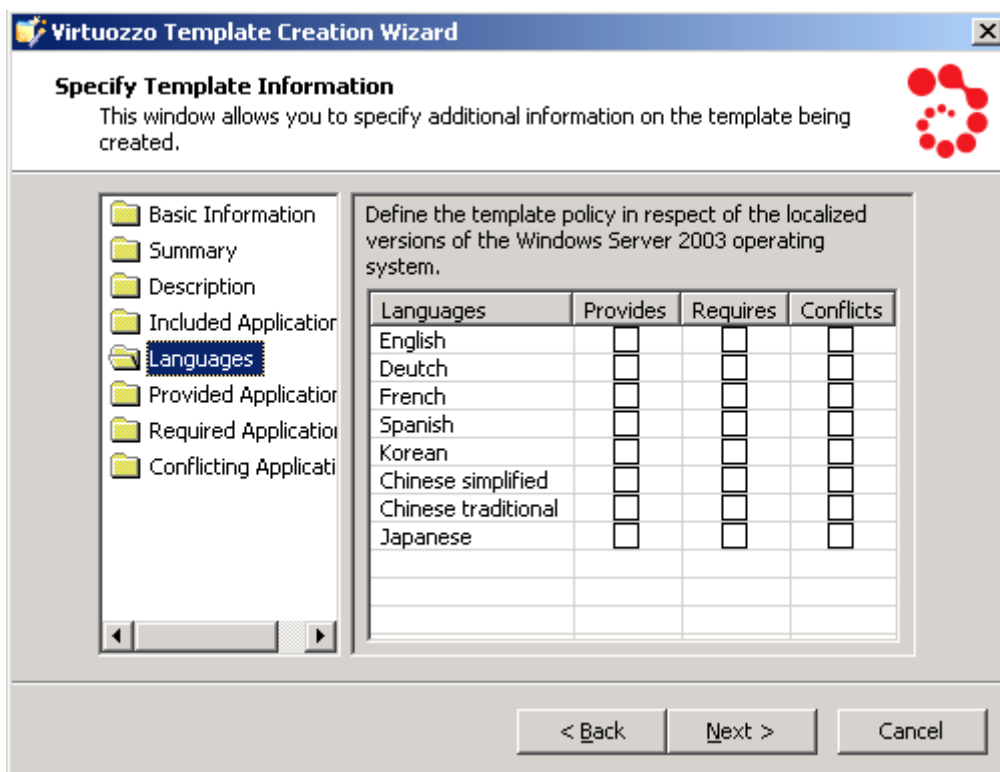


Figure 7: Creating Application Template - Choosing Languages to Support

In this window you can:

- Specify the localized version(s) of the Windows Server 2003 OS that should used as the basis for a VE for the template to be successfully installed inside this VE. To this effect, select the check box in the **Requires** column opposite the corresponding language(s).
- Specify the localized version(s) of the Windows Server 2003 OS that will be incompatible with the template being created (i.e. the template installation inside VEs based on this version of the Windows Server 2003 OS template will always fail). To this effect, select the check box in the **Conflicts** column opposite the corresponding language(s).

---

**Note:** The **Provides** column is relevant for the Windows Server 2003 OS template and MUI templates only and specifies the language(s) provided by the corresponding OS templates.

---

The other folders in the **Provide Application Information** window allow you to configure the following template configuration settings:

- Select the **Provides** folder and specify the names of the applications which will be installed inside the Virtual Environment together with the application template being created.
- Select the **Requires** folder and indicate the names of the applications which will have dependencies with the template you are creating and which should be pre-installed inside the Virtual Environment to successfully add the template to this VE.
- Select the **Conflicts** folder and enter the names of the applications which may have conflicts with the template and needed to be removed from the Virtual Environment before adding the template to this VE.

The process of working with the three aforementioned folders is identical and described below:

- To add a new application to any folder, click the ... button in the right part of the **Provide Application Information** window:

*Figure 8: Creating Application Template - Entering Information on Application*

In the displayed window, you can do the following:

- In the **Application Name** field, specify the name of the application that will be provided/required by or conflict with the template being created.
- Select one or several check boxes to include the following information in the template:
  - a Application vendor:** this check box, if selected, allows you to specify the information on the application vendor by following the 'click here to enter the application vendor' link at the bottom of the window and typing the necessary information in the **Vendor** field.
  - b Application version:** this check box, if selected, allows you to specify the information on the version of the template that will provide/require or conflict with the application by following the 'click here to enter the application version' link at the bottom of the window, typing the template version in the **Version number** field, and selecting one of the radio buttons under this field.

- c Vendor version:** this check box, if selected, allows you to specify the information on the application version by following the 'click here to enter the vendor version' link at the bottom of the window and typing the right application version in the Vendor field.
- To configure the parameters of any existing application, click the application name and, in the displayed window, change the corresponding parameters as shown above.
- To remove an application from a folder, select the name of the application to be deleted and click the Remove button.

On the last step of the wizard, you can specify what operations are to be performed inside a Virtual Environment after removing the application template from this VE.

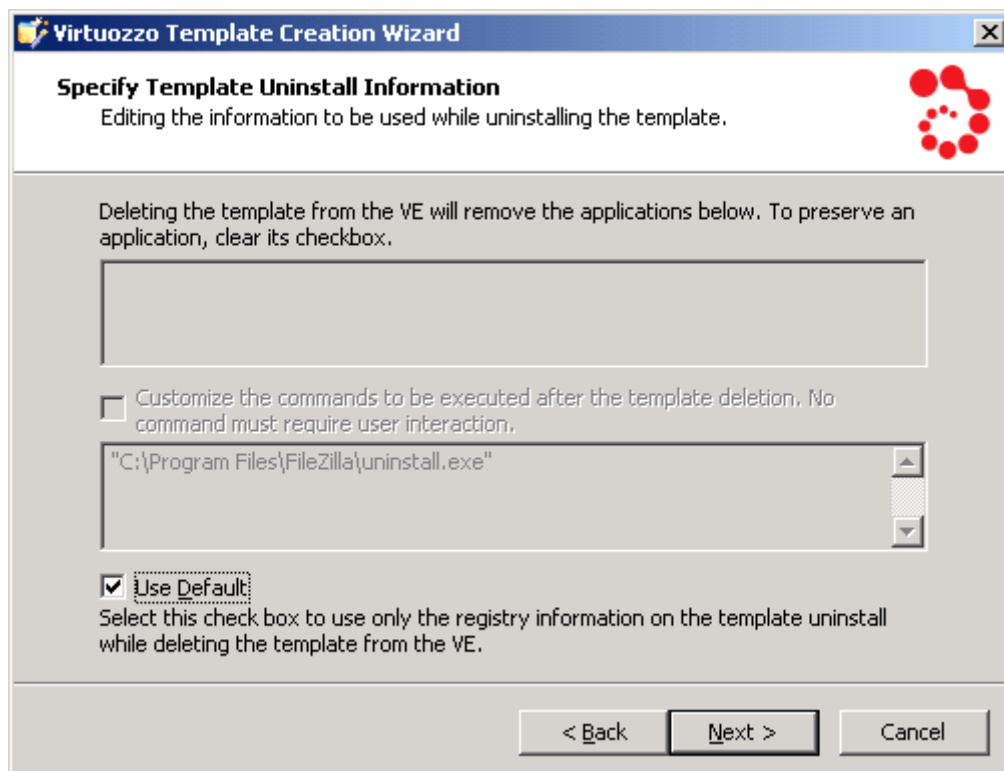


Figure 9: Creating Application Template - Entering Template Uninstall Information

By default, the uninstall information from the registry is used to decide on the actions to be taken during the template removal from the Virtual Environment. As a rule, these actions include the uninstall of the applications and the execution of the commands listed in the tables on the **Specify Template Uninstall Information** screen. However, you can customize the operations to be performed when uninstalling the template by doing the following:

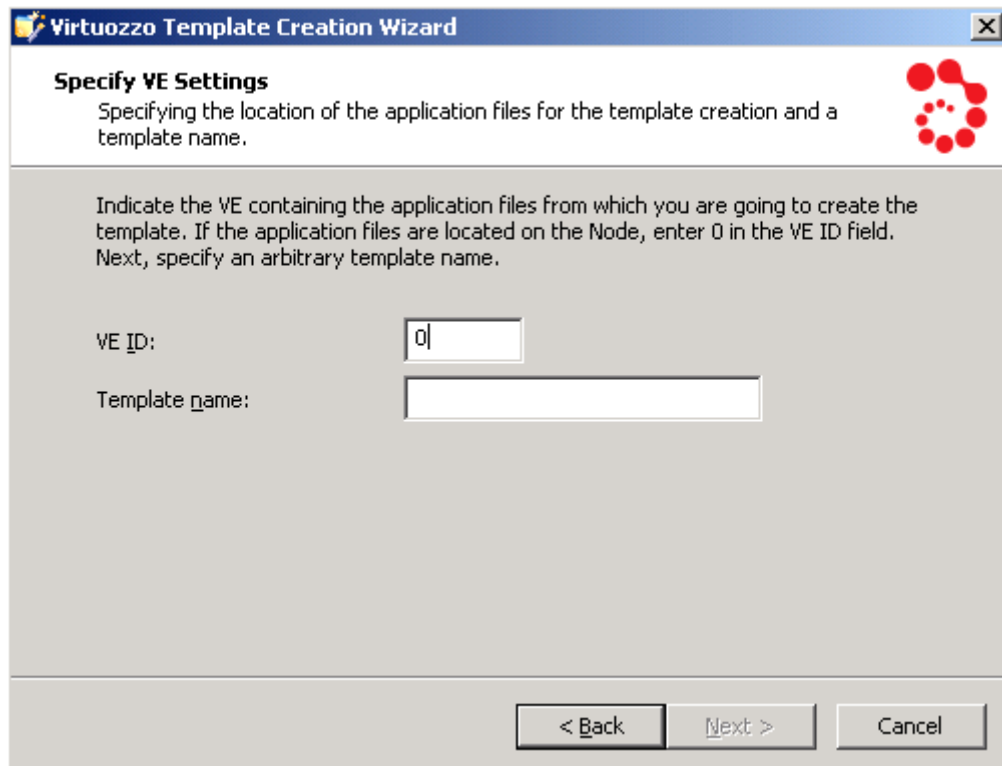
- Clear the **Use Default** check box and then clear the check boxes of the applications, if any, to be preserved during the application removal.
- Clear the **Use Default** check box, select the **Customize the commands to be executed ...** check box, and edit the commands to be executed during the template removal from the VE to meet your demands. While customizing the commands, please make sure that all the commands do not require any user interaction during their execution.

Click **Next** to start creating the template. After a while, the **The Application Template Creation Completed** window is displayed notifying you that your application template has been successfully made. Click **Finish** to exit the wizard. The template is placed to the `X:\vz\Templates\__cache` directory on the Hardware Node where *X* denotes the disk drive set for storing Virtuozzo program files. However, before starting to use the newly created template, you should install it on the Node by means of VZMC or the `vzpkgdeploy` utility. Please consult the **Uploading and Installing New Virtuozzo Templates on Hardware Node** section (on page 27) and **Virtuozzo for Windows Reference Guide**, respectively, to learn how you can install your application templates on the Node.

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## Creating Template From Manually Added Data

If you have selected the Create a template from manually selected data check box and clicked Next in the Welcome to Virtuozzo Template Creation Wizard window, the following window is displayed:



The screenshot shows a window titled "Virtuozzo Template Creation Wizard" with a close button in the top right corner. The main heading is "Specify VE Settings". Below the heading is a sub-heading "Specify the location of the application files for the template creation and a template name." and a red logo consisting of several red circles of varying sizes arranged in a circular pattern. The main text reads: "Indicate the VE containing the application files from which you are going to create the template. If the application files are located on the Node, enter 0 in the VE ID field. Next, specify an arbitrary template name." There are two input fields: "VE ID:" with a text box containing the number "0", and "Template name:" with an empty text box. At the bottom of the window are three buttons: "< Back", "Next >", and "Cancel".

*Figure 10: Creating Template - Specifying VE ID and Template Name*

In this window you should provide information in the following fields:

- **VE ID:** specify the ID of the Virtual Environment where the application files and registry entries are stored which will be used for the template creation. If they are stored on the Hardware Node itself, you should specify 0 as the value of this field.

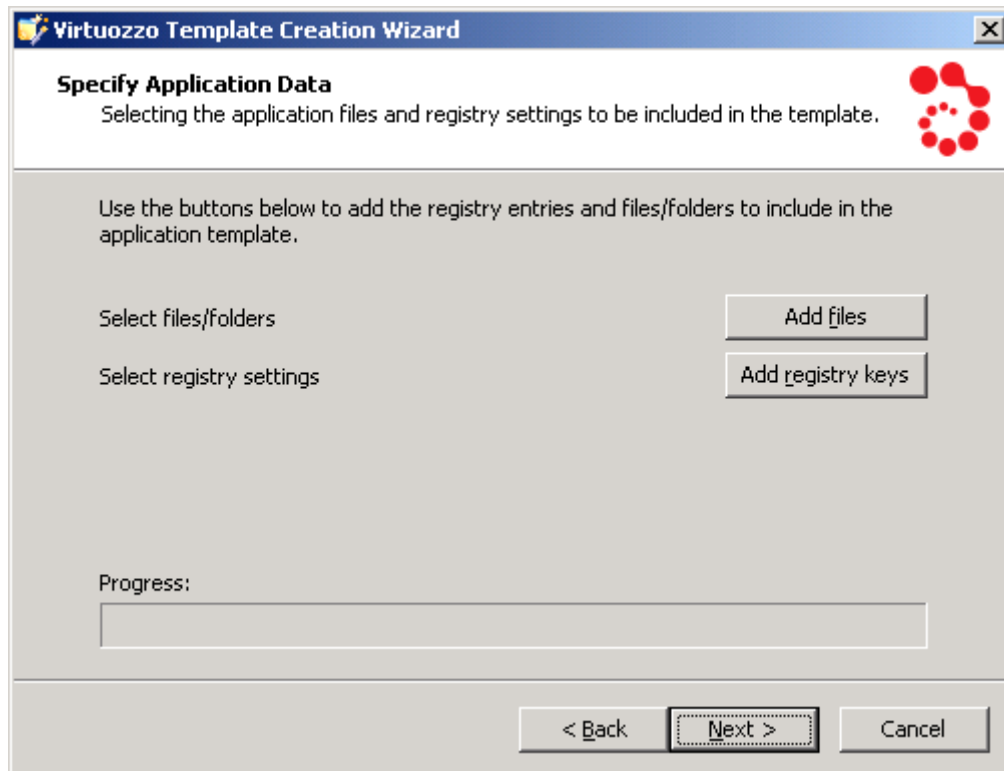
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**Note:** Make sure the Virtual Environment where the application files and registry entries are located is running; otherwise, you will be warned with a message informing you that the corresponding VE is currently stopped.

---

- **Template name:** choose an arbitrary name for the resulting file that will contain the template; you can type any alphanumeric identifier that you consider reasonable for the template file. When you are ready, click the **Next** button.

In the **Specify Application Data** window, you should specify what application files and registry entries are to be added to the application template:

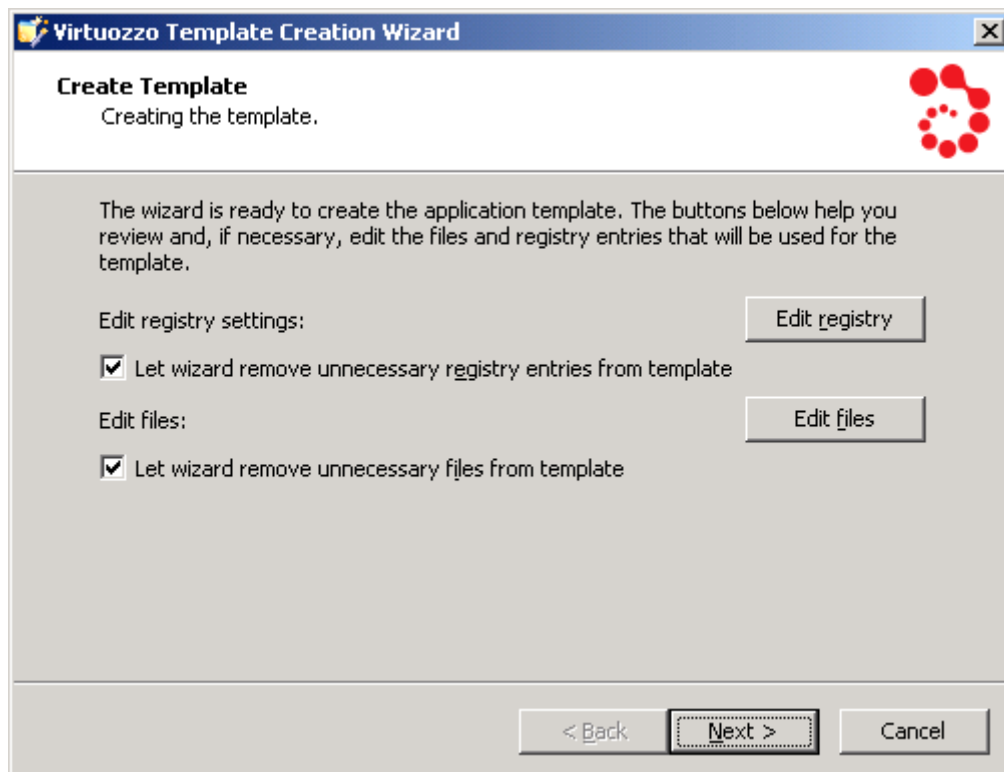


*Figure 11: Creating Template - Adding Files and Registry Entries*

In this window you can do the following:

- Click the **Add files** button to open the **Template configuration** window where you can choose the application files out of which the application template will be created. You may select any number of files with any extensions (.exe, .vbs, .txt, etc.). After you have chosen the needed files, click on the **Save** button in the **Template configuration** window to confirm your selection.
- Click the **Add reg\_keys** button to open the **Template configuration** window where you can select those registry entries that will be added to the application template. After you have chosen the needed entries, click on the **Save** button in the **Template configuration** window to confirm your selection.

After you have selected the necessary files and registry entries and clicked the **Next** button, the **Create Template** window is shown:



*Figure 12: Creating Application Template - Making Final Preparations*

In this window you can use the **Edit registry** and **Edit files** buttons to review and edit the registry entries and files that you selected on the previous step of the wizard and are meant for making the application template.

You can also make use of the **Let wizard remove unnecessary registry entries from template** and **Let wizard remove unnecessary files from template** check boxes. These check boxes, if selected, let the **Virtuozzo Template Creation Wizard** look thru and analyze all registry settings and folders/files resulted from the application files installation inside the VE and to be used for the application template creation. As a result of this operation, the wizard may select one or several registry entries and/or folders/files which are, in its opinion, of no use for the template or may even cause the template to malfunction and exclude them from the template creation process. You can easily find out what registry entries and folder/files will not be included in the template by clicking the **Edit registry** and **Edit files** buttons, respectively, and exploring the contents of the displayed windows; unnecessary and suspicious items will be marked in red. For example:

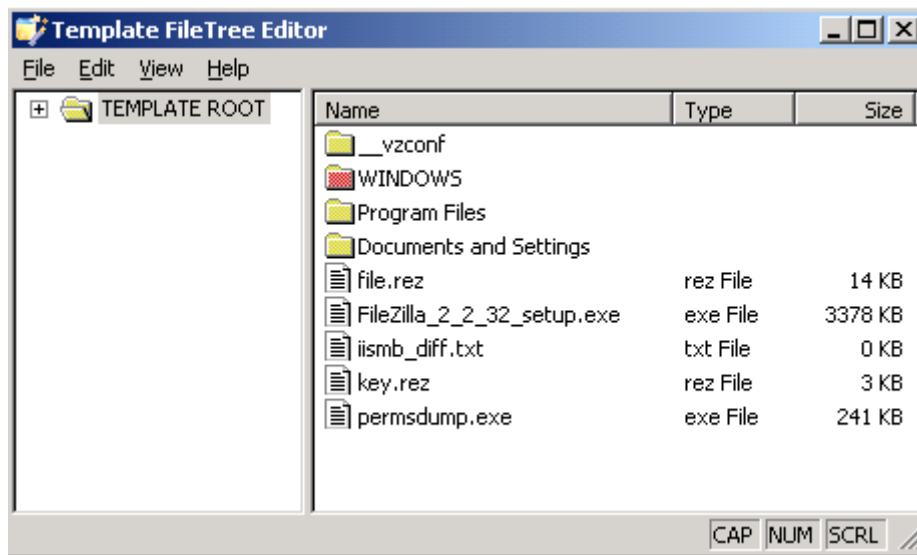


Figure 13: Modifying Template - Viewing Files/Folders to Remove

If you do not wish to exclude any registry settings and folders/files from the template creation, just clear the corresponding check boxes on the Create Template screen and click Next.

On the next step of the wizard, you should provide detailed information on the application from which are creating the template and the template itself.

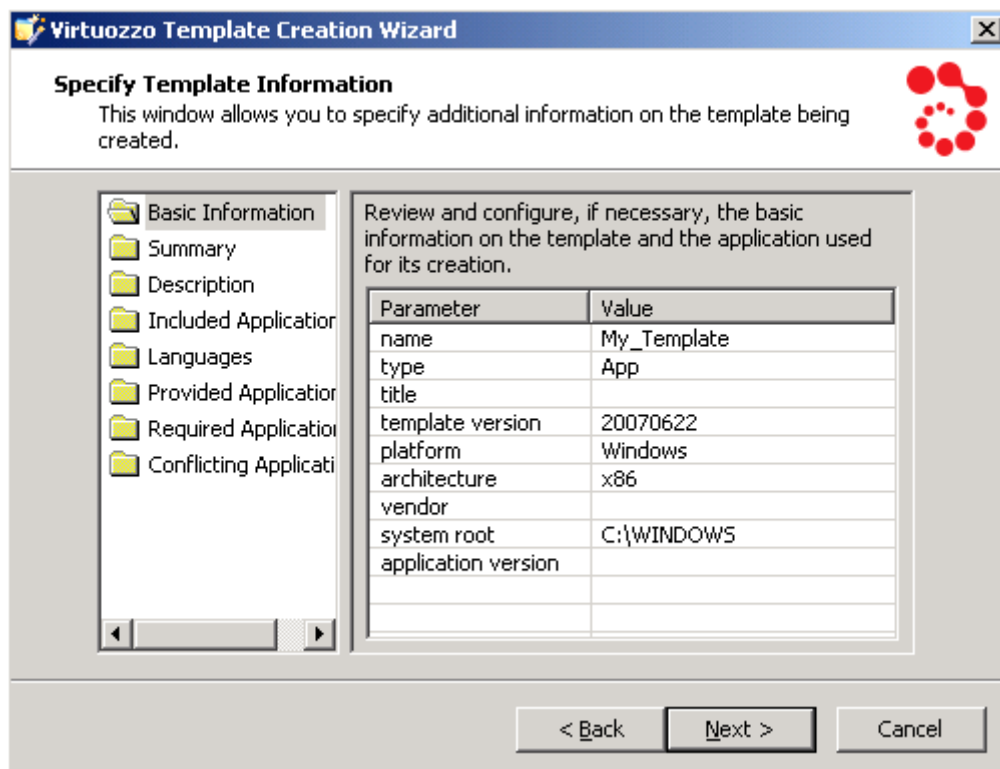


Figure 14: Creating Template - Providing Template Information

All template settings that you can define on this screen are explained in the previous section in detail.

On the last step of the wizard, you can specify what operations are to be performed inside a Virtual Environment after removing the application template from the VE.

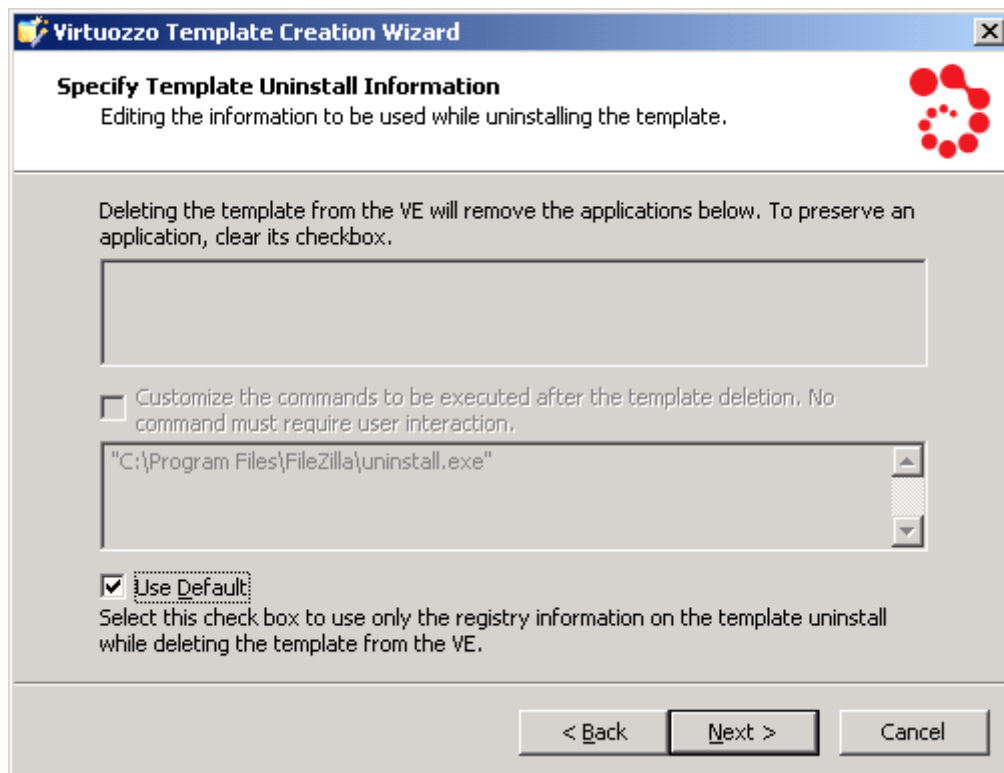


Figure 15: Creating Application Template - Entering Template Uninstall Information

By default, the uninstall information from the registry is used to decide on the actions to be taken during the template removal from the Virtual Environment. As a rule, these actions include the uninstall of the applications and the execution of the commands listed in the tables on the **Specify Template Uninstall Information** screen. However, you can customize the operations to be performed when uninstalling the template by doing the following:

- Clear the **Use Default** check box and then clear the check boxes of the applications to be preserved during the application removal.
- Clear the **Use Default** check box, select the **Customize the commands to be executed ....** check box, and edit the commands to be executed during the template removal from the VE to meet your demands. While customizing the commands, please make sure that all the commands do not require any user interaction during their execution.

Click **Next** to start creating the template. After a while, the **The application template creation completed!** window is displayed notifying you that your application template has been successfully made. Click **Finish** to exit the wizard. The template is placed to the `X:\vz\Templates\__cache` directory on the Hardware Node where `X` denotes the disk drive set for storing Virtuozzo program files. However, before starting to use the newly created template, you should install it on the Node by means of VZMC or the `vzpkgdeploy` utility. Please consult the **Uploading and Installing New Virtuozzo Templates on Hardware Node** section (on page 27) and **Virtuozzo for Windows Reference Guide**, respectively, to learn how you can install your application templates on the Node.

## CHAPTER 4

# Managing Templates

The given chapter concentrates on the tasks you can perform on your Virtuozzo application templates.

## In This Chapter

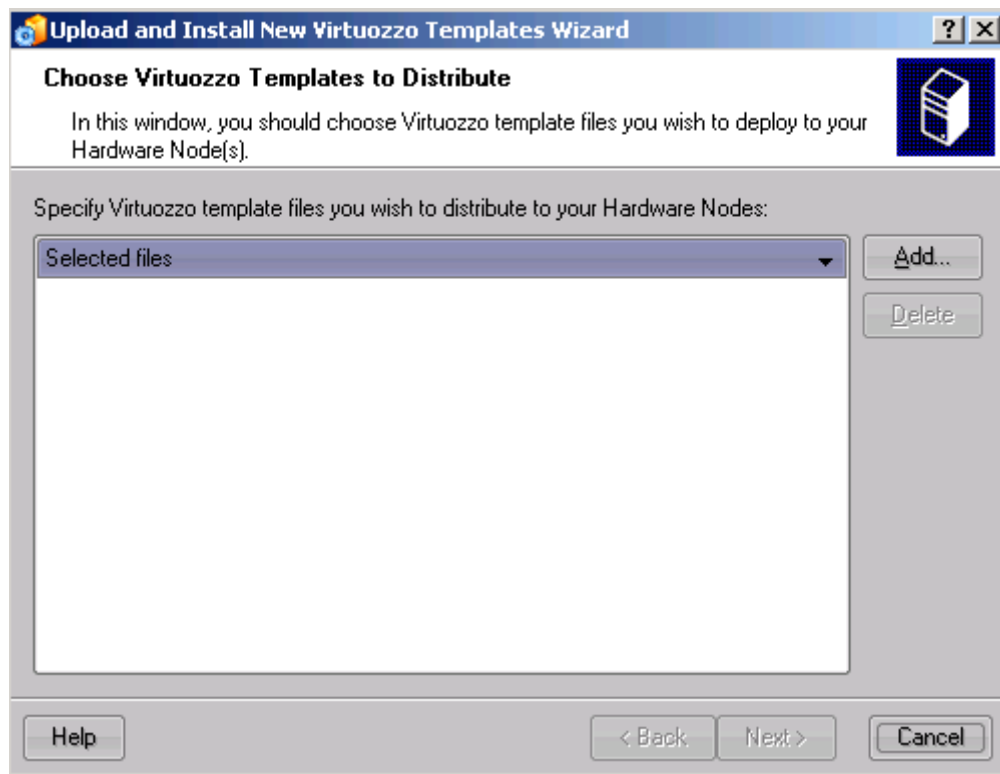
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## Uploading and Installing New Virtuozzo Templates on Hardware Node

In case you have one or more new Virtuozzo templates that you would like to upload and install on your Hardware Node(s), you should first have these files accessible from the computer where VZMC is installed (e.g. insert the CD-ROM with the template(s) into the computer CD-ROM drive or copy the templates to the computer hard disk) and then launch the **Upload and Install New Virtuozzo Templates** wizard.

To invoke the wizard, right-click on the **Templates** item under any Hardware Node registered in VZMC and select the **Upload and Install New Virtuozzo Templates** option. The **Choose Virtuozzo Templates to Distribute** window opens:

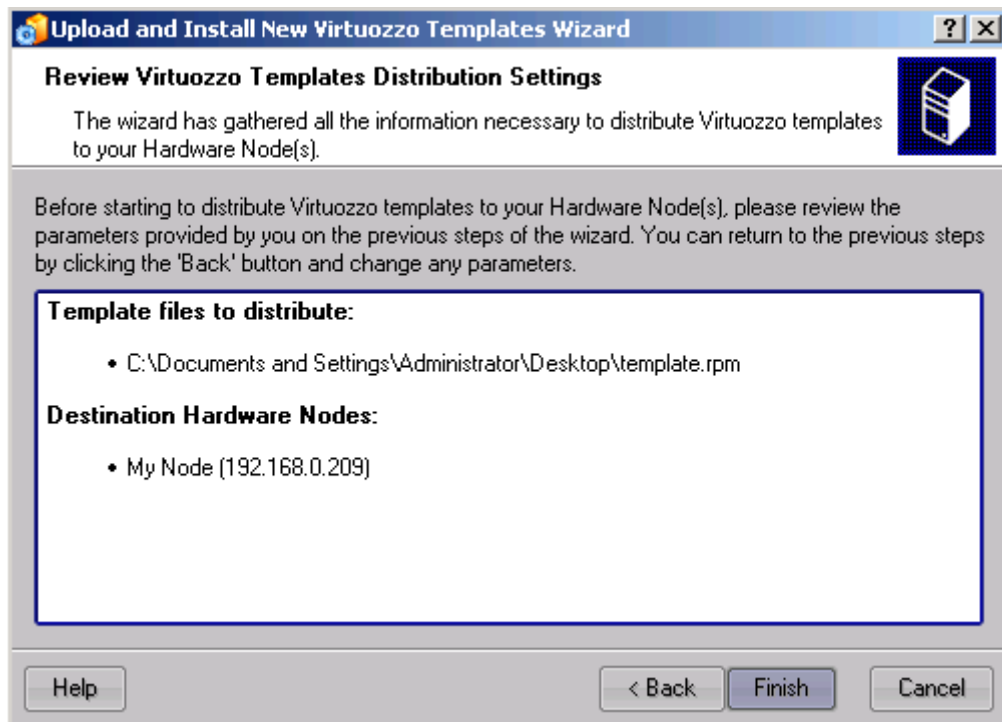


*Figure 16: VZMC - Choosing Templates for Uploading*

In this window you should choose the Virtuozzo templates to be deployed to your Hardware Node(s). To this effect, click the **Add** button and provide the path to the necessary template(s); then click **Next**.

The next screen will prompt you to define target Hardware Nodes where you wish to install new Virtuozzo templates. VZMC may upload and install the specified template(s) to any registered Hardware Node. By default, the current Hardware Node is selected. Select all the Nodes where you want the template(s) to be installed and click **Next**. In case of a large number of Nodes, it is reasonable to make use of the **Select All** or **Deselect All** buttons.

The last page of the wizard allows you to review Virtuozzo templates deploying settings:



*Figure 17: VZMC - Reviewing Virtuozzo Templates Distribution Settings*

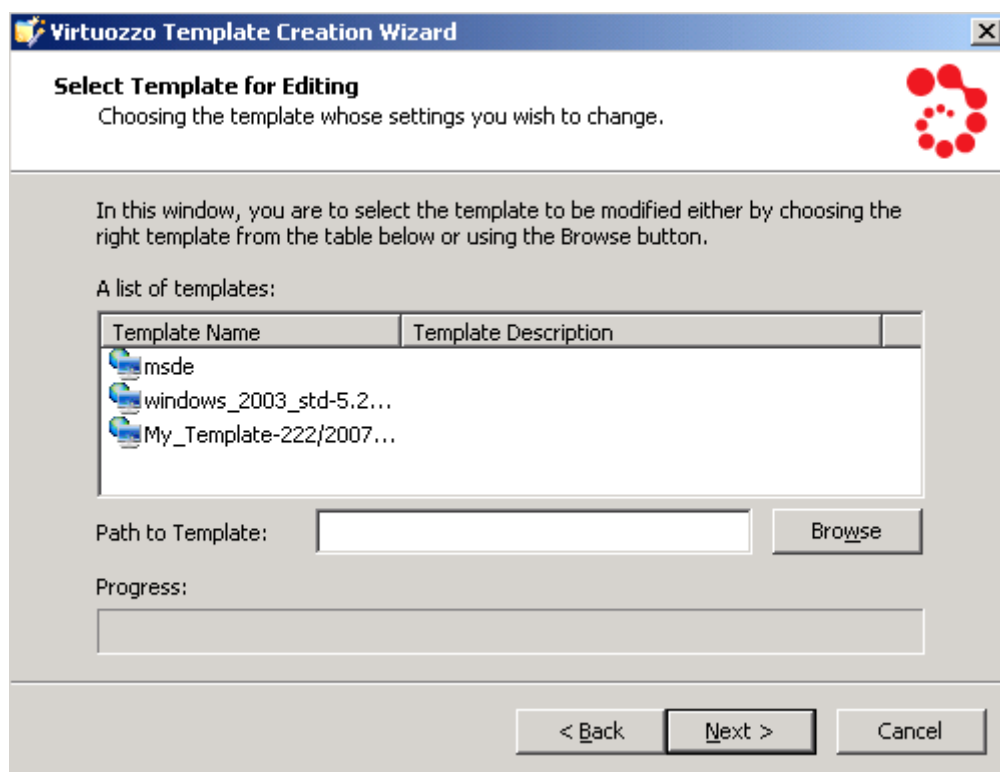
It summarizes the information provided by you on the previous steps, namely, what Virtuozzo templates to install and where to install them. If you are satisfied with the settings, click the **Finish** button. This will launch the upload and installation process. Otherwise, click **Back** to make the necessary changes to the information entered.

You can also install application templates by using the `vzpkgdeploy` utility. Please consult the *Virtuozzo 4.0 for Windows Reference Guide* for complete information on this utility and its options.

## Modifying Template

Virtuozzo allows you to customize any of your existing templates using the **Virtuozzo Template Creation Wizard**. For example, this may be useful if you wish to improve the behavior of an application by adding a new feature to it or removing an existing one, which you do not need any more, from this application. In order to invoke the wizard, select **Programs --> SWsoft --> Virtuozzo --> Virtuozzo Template Creation Wizard** on the Windows Start menu. You will be presented with the **Welcome to Virtuozzo Template Creation Wizard** window where you should select the **Modify existing template** check box and click **Next** to proceed with the wizard.

On the first step of the wizard, you will be asked to choose the template you wish to modify:

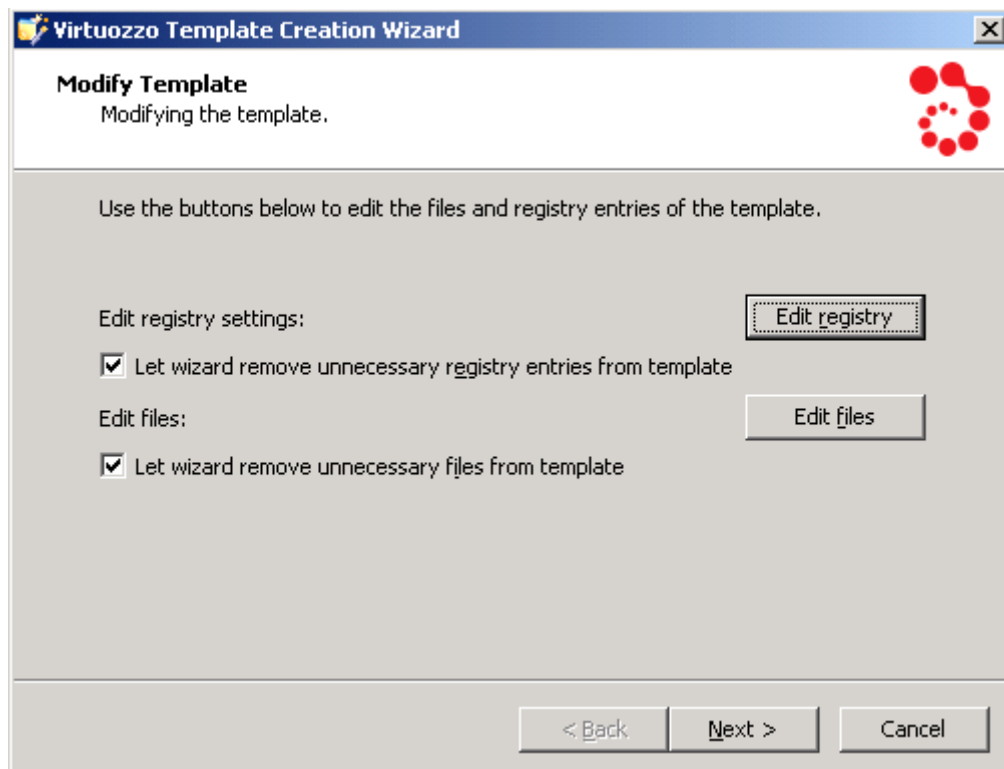


*Figure 18: Modifying Template - Choosing Application Template*

In the **Select Template for Editing** window, you can:

- Choose the template to be modified from a list of templates in the **Cached templates** list table. This table shows all application, OS, and MUI templates stored in the `X:\vz\Templates\_cache` folder on the Hardware Node where `X` denotes the disk drive set for storing Virtuozzo program files.
- Type the path to your template in the **Manual select** field or click the **Browse** button and, in the displayed dialog box, specify the path to your template. This way of choosing templates can be used if the template you are going to alter is located in a folder other than `X:\vz\Templates\_cache`.

After choosing the right template or specifying the path to it, click **Next** to display the **Modify Template** window:



*Figure 19: Modifying Template - Editing Files and Registry*

In this window you can perform the following operations:

- Click the **Edit registry** button to open the **Template Registry Data Editor** window where you can change any registry entries for your template or add new ones using the menu bar at the top of the window.
- Click the **Edit files** button to open the **Template File Tree Editor** window where you can change the contents of any existing files and folders, create new files and folders, and complete a number of other tasks using the menu bar at the top of the window.
- You can also make use of the **Skip exception keys and values** and **Skip exception directories and files** check boxes. These check boxes, if selected, let the wizard look thru and analyze all registry settings and folders/files you are going to include in your application template. As a result of this operation, the wizard may select one or several registry entries and/or folders/files which are, in its opinion, of no use for the template or may even cause the template to malfunction and exclude them from the template creation process. You can easily find out what registry entries and folder/files will not be included in your template by clicking the **Edit registry** and **Edit files** buttons, respectively, and exploring the contents of the displayed windows; unnecessary and suspicious items will be marked in red:

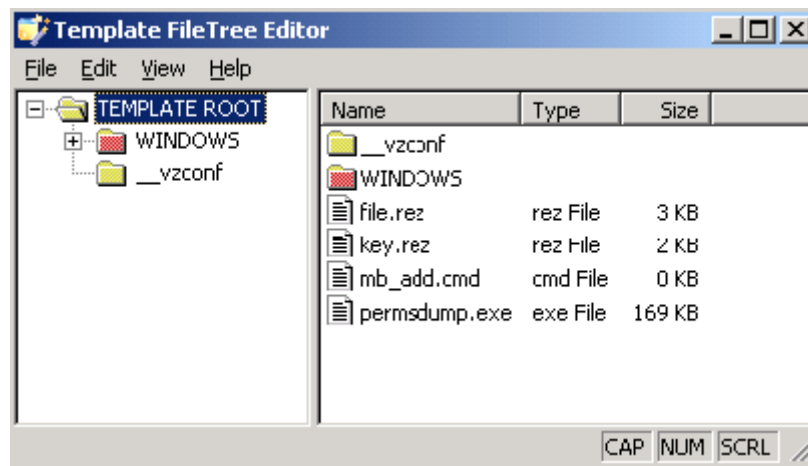


Figure 20: Modifying Template - Viewing Files/Folders to Remove

If you do not wish to exclude any registry settings and folders/files from the template creation, just clear the corresponding check boxes on the Editing Template Data screen.

On the next step of the wizard, you can review and configure, if necessary, a number of additional template parameters:

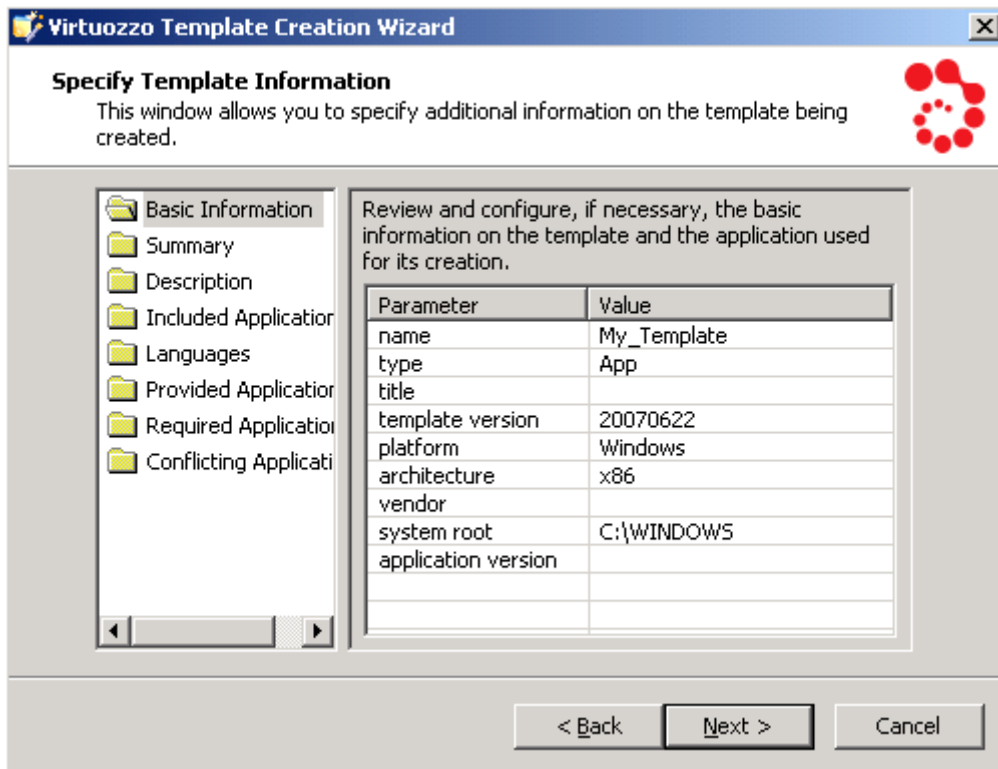


Figure 21: Creating Template - Providing Template Information

All template parameters (except for the Applications folder) that you can configure on this screen are explained in the Creating Template From Manually Added Data section (on page 21) in detail.

The Applications folder in the Provide Application Information window is relevant for the Windows Server 2003 OS template and MUI templates only and enables you to modify the information on the applications included in this OS template:

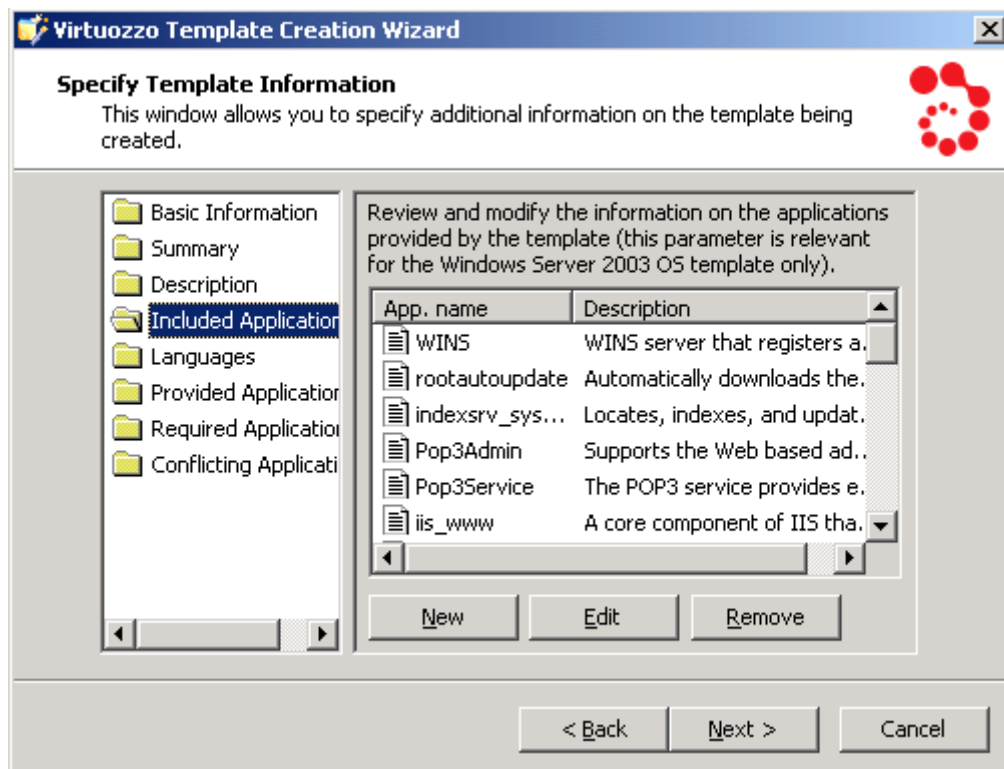
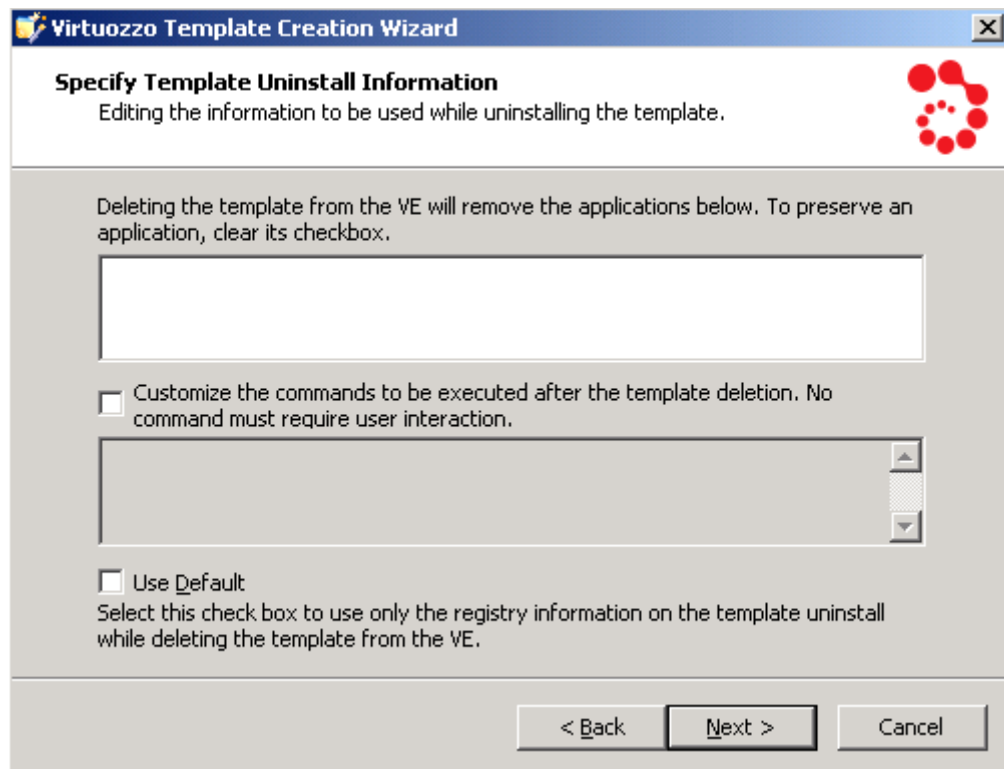


Figure 22: Modifying Template - Configuring OS Template Applications

When you select this folder, you will be presented with a list of applications (with or without their description) provided by the Windows Server 2003 OS template or the corresponding MUI template. The names of the listed applications coincide with the names of standard Windows components (you can view the whole list of Windows Server 2003 components in the Components table of the Windows Components window in the Windows Components Wizard) and will be automatically installed inside all Virtual Environments during their creation. In this window you can:

- configure the name and description of any application by selecting this application in the table, clicking the **Edit** button, and making the necessary changes in the displayed window;
- delete the application that you do not wish to have installed inside VEs right after their creation by selecting the application name and clicking the **Remove** button.

On the last step of the wizard, you can change the operations to be performed inside a Virtual Environment after removing the application template from the VE.



*Figure 23: Modifying Template - Entering Template Uninstall Information*

The **Specify Template Uninstall Information** screen allows you to customize the operations to be performed when uninstalling the template by doing the following:

- Clear the **Use Default** check box and then clear the check boxes of the applications to be preserved during the application removal.
- Clear the **Use Default** check box, select the **Customize the commands to be executed ....** check box, and edit the commands to be executed during the template removal from the VE to meet your demands. While customizing the commands, please make sure that all the commands do not require any user interaction during their execution.

After you click the **Next** button, the changes will be applied to your template.

## Listing Templates

You may want to list the templates installed on the Hardware Node. They may be already used or not used by certain VEs. To list templates in VZMC, it is sufficient to choose consecutively the Templates --> Application Templates or OS Templates items under the name of the corresponding Node to see a list of the application or OS templates installed on the Node. For example:

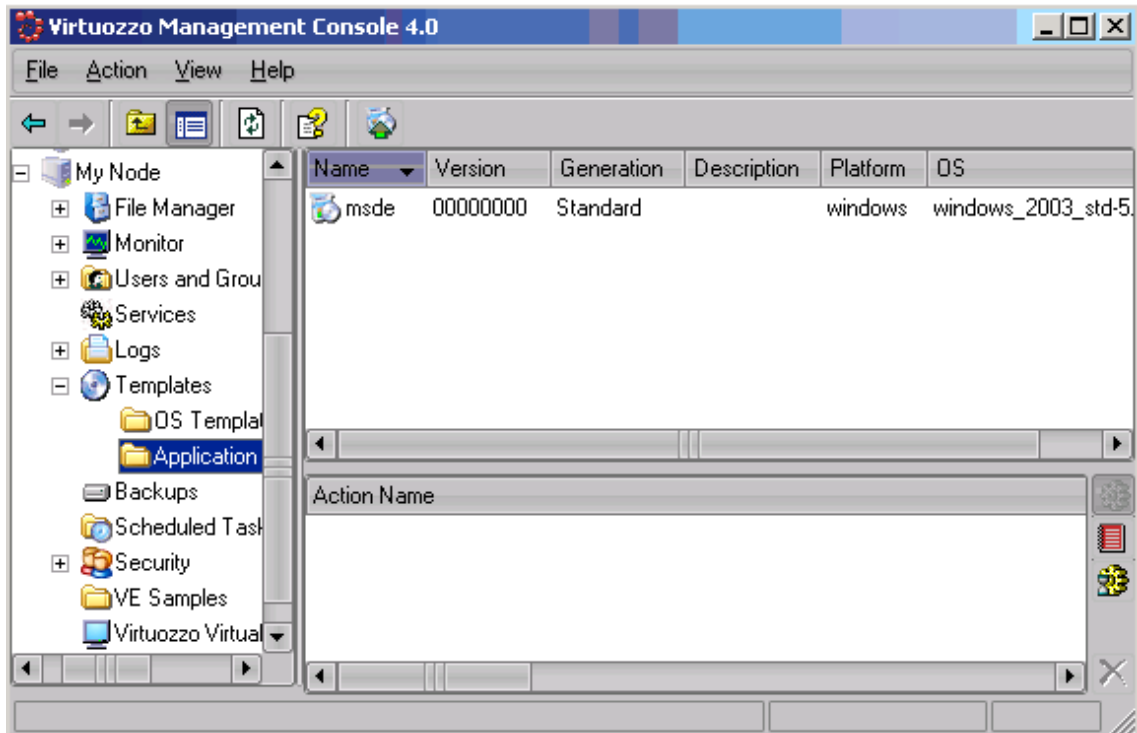


Figure 24: VZMC - Listing Templates

To see the templates used by a particular VE, double-click the needed Virtual Environment in the VE list in the right pane to open this VE management window, and then again choose Templates --> Application Templates or OS Templates in the left pane of the new window.

In the command line, you can use the `vzpkgls` utility to list the templates installed on the Hardware Node and applied to your Virtual Environments. Detailed information on this utility can be found in the *Virtuozzo 4.0 for Windows Reference Guide*.

---

## Adding Application Templates to VEs

After you have installed a number of application templates on the Hardware Node, you may add them to any number of Virtual Environments. To successfully add a template to a VE, this VE should be running.

In VZMC, you can do it by performing the following operations:

- 1 Expand the **Templates --> Application Templates** item under the name of the Hardware Node where the needed templates are installed.
- 2 Select all the necessary templates holding down the **CTRL** or **SHIFT** keys where necessary.

- 3 Right-click the selection and choose the **Install Into Virtual Environments** option:

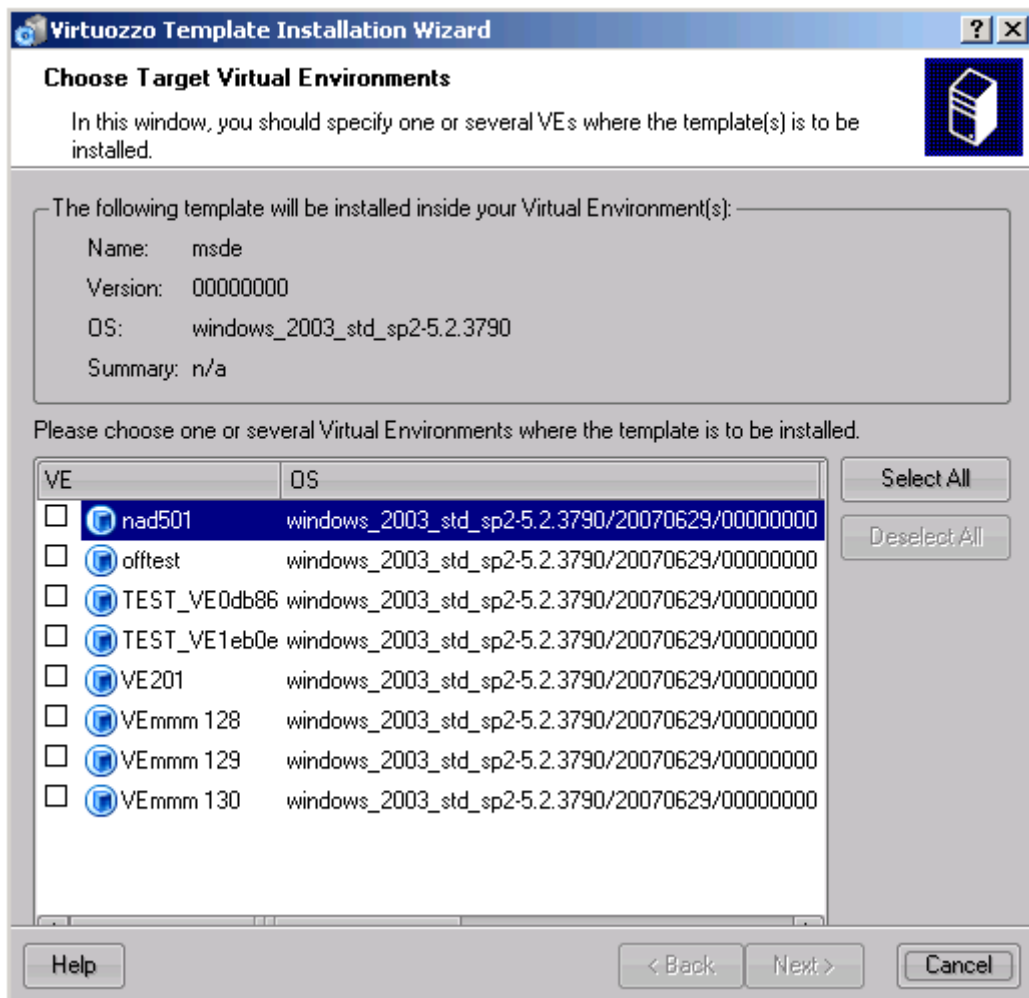


Figure 25: VZMC - Adding Templates to VEs

- 4 Select the check box(es) of the VE(s) where the application template is to be added and click **Next**. You can use the **Select All/Deselect All** buttons to select/deselect all Virtual Environments listed in the **Choose Target Virtual Environments** window. To facilitate working with your application templates, you can select the check box at the bottom of the window to display only the VEs based on the OS template that is compatible with the given application template.

When choosing the VE(s) where your template is to be installed, keep in mind that only running VEs are displayed in the table of the **Choose Target Virtual Environments** window since Virtuozzo allows you to add templates to running Virtual Environments only.

- 5 On the **Set Template Installation Options** screen, click **Next**.
- 6 The last window allows you to review the information provided by you on the previous steps. If you are satisfied with the data entered, click **Finish** to start adding the application template to the VE; otherwise, click **Back** and change the necessary parameters.

If you are adding a template to only one VE, you can as well do the following:

- 1 Open the list of Virtual Environments in the VZMC main window by selecting the **Virtuozzo Virtual Environments** item in the **Hardware Node** tree;

- 2 Double-click the name of the VE where you want to add a template;
- 3 Right-click the **Templates** item in the main tree of the opened Virtual Environment Manager, and select the **Add Virtuozzo Application Template** option on the context menu:

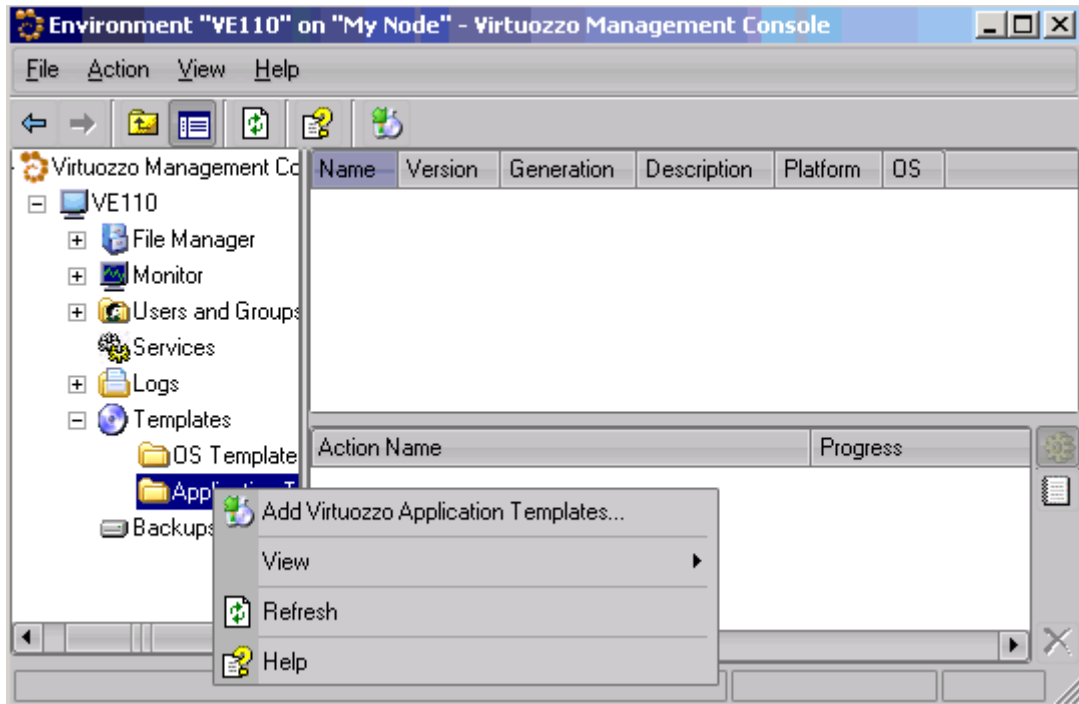


Figure 26: VZMC - Installing Templates in VE Manager

- 4 Follow the instructions of the wizard.

In the command line, the `vzpkgadd` utility is used to add application templates to existing VEs. Detailed information on the `vzpkgadd` utility is provided in the *Virtuozzo 4.0 for Windows Reference Guide*.

**Notes:** 1. You can as well do without templates and install virtually any application directly inside any VE by using the Microsoft Terminal Services Client or Remote Desktop Connection, but this approach limits the scalability of the system.

2. If you are running the 64-bit version of Virtuozzo, you should use only 64-bit application templates to add them to your Virtual Environments.

---

## Copying Templates to Another Hardware Node

VZMC allows you to copy OS and application templates installed on the Hardware Node to any Node registered in VZMC. To this effect, you should perform the following operations:

- 1 Double-click the **Templates** item under the Hardware Node name where the template to be copied is installed and select **OS Templates** or **Application Templates** depending on whether you wish to migrate an OS or application template, respectively.

- 2 In the VZMC right pane, right-click the template and select Tasks --> Copy to Another Hardware Node on the context menu:

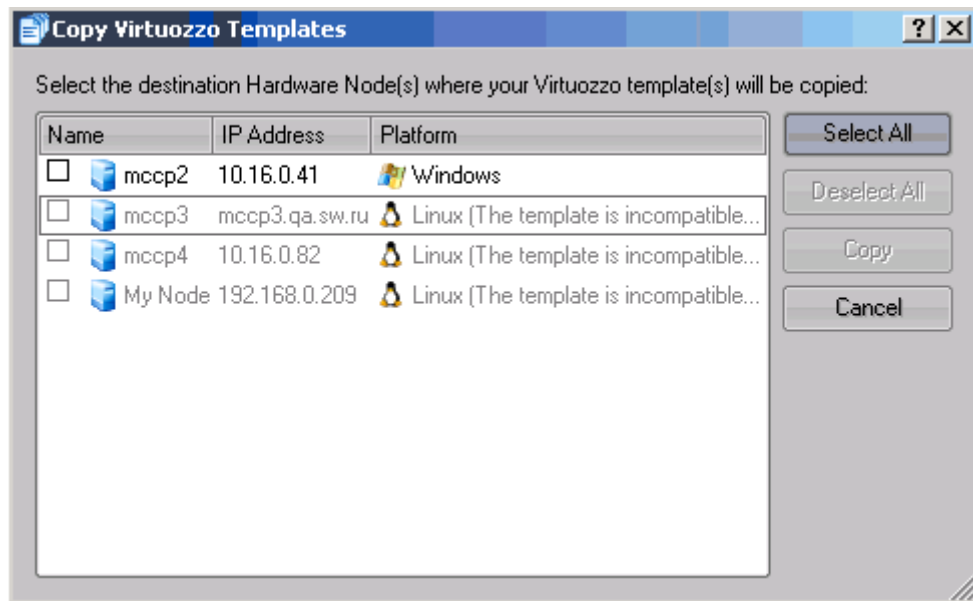


Figure 27: VZMC - Copying Templates

In the displayed window, you can view a list of Hardware Nodes currently registered in VZMC. To copy the template(s) to any of the listed Nodes, select its name and click the Copy button to the right of the table.

## Removing Application Templates From VE

VZMC allows you to remove an application template from a Virtual Environment. To this effect, you should:

- 1 Open a list of Virtual Environments in the VZMC main window by selecting the Virtuozzo Virtual Environments item in the Hardware Node tree.
- 2 Double-click the name of the VE wherefrom you want to delete a template to open the Virtual Environment Manager.
- 3 Expand the Templates item in the main tree of the opened Virtual Environment Manager and select Application Templates.

- 4 Right-click the application template you wish to delete and select the Delete option on the context menu:

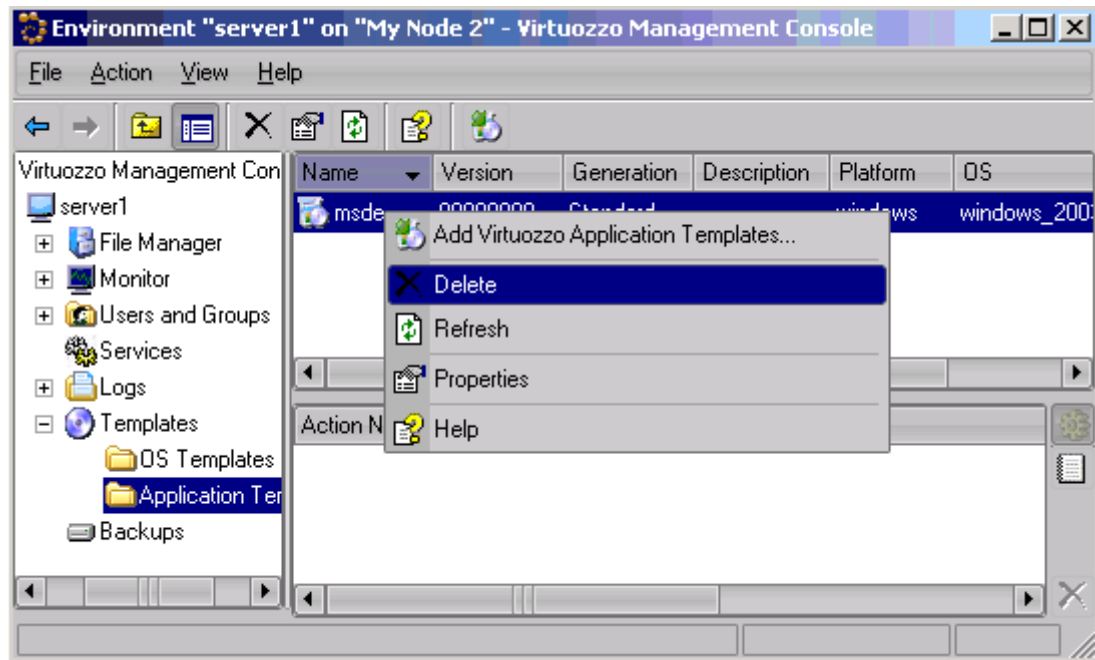


Figure 28: VZMC - Removing Application Templates From VE

- 5 In the Remove Virtuozzo Template window, confirm your decision by clicking the Remove button. You can also select the Forced removal check box to force the template deletion from the VE.

If you have several versions of an application template, you can delete a version(s) that are not needed any more. To this effect:

- 1 Open a list of Virtual Environments in the VZMC main window by selecting the Virtuozzo Virtual Environments item in the Hardware Node tree.
- 2 Double-click the name of the VE wherefrom you wish to delete a template version.
- 3 Click on the Templates item in the main tree of the opened Virtual Environment Manager, and then double-click the corresponding template.
- 4 Right-click the needed template version and select the Delete option on the context menu.
- 5 Confirm your decision by clicking the Remove button in the displayed dialog window.

Besides, you can use the Virtuozzo `vzpkgrm` utility to remove application templates from VEs. Detailed information on the `vzpkgrm` utility can be found in the Virtuozzo 4.0 for Windows Reference Guide.

## Removing Template From Hardware Node

Virtuozzo 4.0 allows you to remove those OS and application templates that are not needed any more. To this effect, you should perform the following operations:

- 1 Expand the Templates folder under the corresponding Hardware Node name in the VZMC main tree.
- 2 Click on either the Application Templates or OS Templates item to display a list of all application or OS templates installed on the Node, respectively.
- 3 Right-click on the template you wish to delete in the right pane and select the Delete option on the context menu:

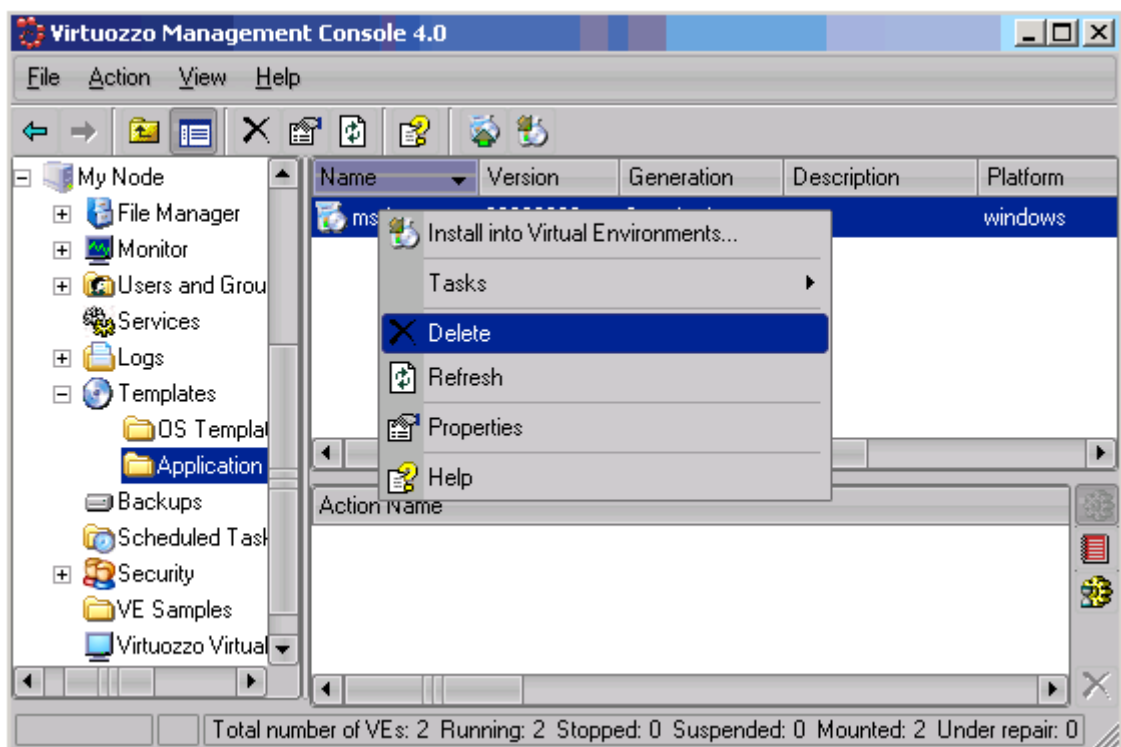


Figure 29: VZMC - Removing Template From Hardware Node

Please keep in mind that you cannot remove the template currently applied to one or more Virtual Environments on the Hardware Node.

- 4 In the Remove Virtuozzo Template window, confirm your decision by clicking the Remove button. You can also select the Forced removal check box to force the template deletion from the Hardware Node.

# Glossary

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

*Hardware Node* (or *Node*) is a server where *Virtuozzo* is installed for hosting *Virtual Environments*.

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

*Host Operating System* (or *Host OS*) is an operating system installed on the *Hardware Node*. Sometimes, it is marked as *VE 0*.

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

*OS template* (or *Operating System template*) is used to create new *Virtual Environments*. See also *Template*.

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

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

*Service Virtual Environment* denotes a special secure *VE* running *VZAgent* which is responsible for managing all the *Virtual Environments* of the given *Hardware Node* thru *VZMC* or *VZCC*. The Service *VE* is always marked as Virtual Environment 1.

*Service VE* is an abbreviation of *Service Virtual Environment*.

*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.

*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 Environments*. *Application templates* are used to install an application or a set of applications in *Virtual Environments*.

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

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

*VE* is an abbreviation of *Virtual Environment*.

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

*Virtual Environment* 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 Environments* share one *Hardware Node* and one OS kernel. However, they are isolated from each other. *Virtual Environment* is a kind of ‘sandbox’ for processes and users. *Virtual Environment 0* is used to designate the *Hardware Node* itself.

*Virtual Private Server* or *VPS* is an obsolete designation of a *Virtual Environment*. See *Virtual Environment*.

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

*Virtuozzo Adapter* is a virtual networking device, a gateway from a *VE* to the external network. *Virtuozzo Adapter* is automatically created during the *Virtuozzo* installation.

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

*Virtuozzo File System* is a virtual file system for mounting to *VE* private areas. *VZFS* links are seen as real files inside *Virtual Environments*.

*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 *Virtual Environments*. *VZMC* is cross-platform and runs on both Microsoft Windows and Linux workstations.

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

*VZAgent* is a special software used to tune, monitor, and manage the given *Hardware Node* and all the *Virtual Environments* residing on this Node.

*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* and other *Virtuozzo* utilities.

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

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

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

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

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