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Parallels

# Parallels Virtuozzo Containers for Windows

Templates Management Guide

Version 4.0



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# Contents

<b>Preface</b>	<b>5</b>
About Parallels Virtuozzo Containers .....	6
About This Guide .....	7
Organization of This Guide .....	7
Documentation Conventions .....	8
Getting Help .....	9
Feedback .....	10
<b>About Virtuozzo Templates</b>	<b>11</b>
Templates Overview .....	11
Understanding Templates Basics .....	12
Template Lifecycle .....	13
<b>Creating Application Template</b>	<b>14</b>
Launching Virtuozzo Template Creation Wizard .....	15
Creating Template From Installed Application Data .....	16
Creating Template From Manually Added Data .....	26
<b>Managing Templates</b>	<b>32</b>
Installing New Virtuozzo Templates on Hardware Node .....	33
Installing Windows Server 2003 Service Pack 2 Template .....	35
Installing Windows Server 2003 R2 OS Template .....	38
Installing MUI OS Template .....	40
Modifying Template .....	43
Creating and Installing Application Template Updates .....	49
Listing Templates .....	58
Adding Templates to Single Container .....	59
Adding Application Templates to Group of Containers .....	61
Copying Templates to Another Hardware Node .....	63
Removing Application Templates From Container .....	64
Removing Template From Hardware Node .....	65
<b>Glossary</b>	<b>66</b>
<b>Index</b>	<b>68</b>

# Table of Figures

Figure 1: Virtuozzo Containers OS Virtualization .....	6
Figure 2: Template Creation Wizard - Welcome Screen .....	15
Figure 3: Template Creation Wizard - Defining Container Settings .....	16
Figure 4: Template Creation Wizard - Specifying Template Parameters .....	17
Figure 5: Template Creation Wizard - Making Final Preparations .....	19
Figure 6: Template Creation Wizard - Viewing Files/Folders to Remove.....	20
Figure 7: Template Creation Wizard - Providing Template Information.....	20
Figure 8: Template Creation Wizard - Choosing Languages to Support .....	22
Figure 9: Template Creation Wizard - Entering Information on Application.....	23
Figure 10: Template Creation Wizard - Entering Template Uninstall Information .....	24
Figure 11: Template Creation Wizard - Installing Template .....	25
Figure 12: Template Creation Wizard - Specifying Container ID and Template Name.....	26
Figure 13: Template Creation Wizard - Adding Files and Registry Entries.....	27
Figure 14: Template Creation Wizard - Making Final Preparations .....	28
Figure 15: Template Creation Wizard - Viewing Files/Folders to Remove.....	29
Figure 16: Template Creation Wizard - Providing Template Information.....	29
Figure 17: Template Creation Wizard - Entering Template Uninstall Information .....	30
Figure 18: Template Creation Wizard - Installing Template .....	31
Figure 19: Management Console - Choosing Templates for Uploading .....	33
Figure 20: Management Console - Reviewing Virtuozzo Templates Distribution Settings	34
Figure 21: Virtuozzo Containers Autoinstaller - Selecting Mode.....	36
Figure 22: Virtuozzo Containers Autoinstaller - Choosing Components to Download.....	36
Figure 23: Virtuozzo Containers Autoinstaller - Selecting Mode.....	39
Figure 24: Virtuozzo Containers Autoinstaller - Choosing Components to Download.....	39
Figure 25: Virtuozzo Containers Autoinstaller - Selecting Mode.....	41
Figure 26: Virtuozzo Containers Autoinstaller - Selecting German Pack.....	41
Figure 27: Template Creation Wizard - Choosing Application Template.....	43
Figure 28: Template Creation Wizard - Editing Files and Registry .....	44
Figure 29: Template Creation Wizard - Viewing Files/Folders to Remove.....	45
Figure 30: Template Creation Wizard - Providing Template Information.....	45
Figure 31: Template Creation Wizard - Configuring OS Template Applications.....	46
Figure 32: Template Creation Wizard - Entering Template Uninstall Information .....	47
Figure 33: Template Creation Wizard - Selecting Templates.....	50
Figure 34: Template Creation Wizard - Defining Container Settings .....	51
Figure 35: Template Creation Wizard - Specifying Template Parameters .....	52
Figure 36: Template Creation Wizard - Making Final Preparations .....	53
Figure 37: Template Creation Wizard - Viewing Files/Folders to Remove.....	54
Figure 38: Template Creation Wizard - Providing Template Update Information .....	55
Figure 39: Template Creation Wizard - Template Update Uninstall Information.....	56
Figure 40: Template Creation Wizard - Installing Update Template.....	57
Figure 41: Management Console - Listing Templates .....	58
Figure 42: Management Console - Adding Template to Single Container .....	59
Figure 43: Management Console - Adding Template to Containers.....	61
Figure 44: Management Console - Copying Templates.....	63
Figure 45: Management Console - Removing Application Templates From Container .....	64
Figure 46: Management Console - Removing Template From Hardware Node.....	65

## CHAPTER 1

# Preface

## In This Chapter

About Parallels Virtuozzo Containers.....	6
About This Guide.....	7
Getting Help.....	9
Feedback.....	10

# About Parallels Virtuozzo Containers

Parallels Virtuozzo Containers is a patented OS virtualization solution. Virtuozzo Containers 4.0 creates isolated partitions or Containers on a single physical server and OS instance to utilize hardware, software, data center and management effort with maximum efficiency. The basic Virtuozzo capabilities are:

- **Intelligent Partitioning** - Division of a server into as many as hundreds of Containers with full server functionality.
- **Complete Isolation** - Containers are secure and have full functional, fault and performance isolation.
- **Dynamic Resource Allocation** - CPU, memory, network, disk and I/O can be changed without rebooting.
- **Mass Management** - Suite of tools and templates for automated, multi-Container and multi-server administration.

The diagram below represents a typical model of the Virtuozzo-based system structure:

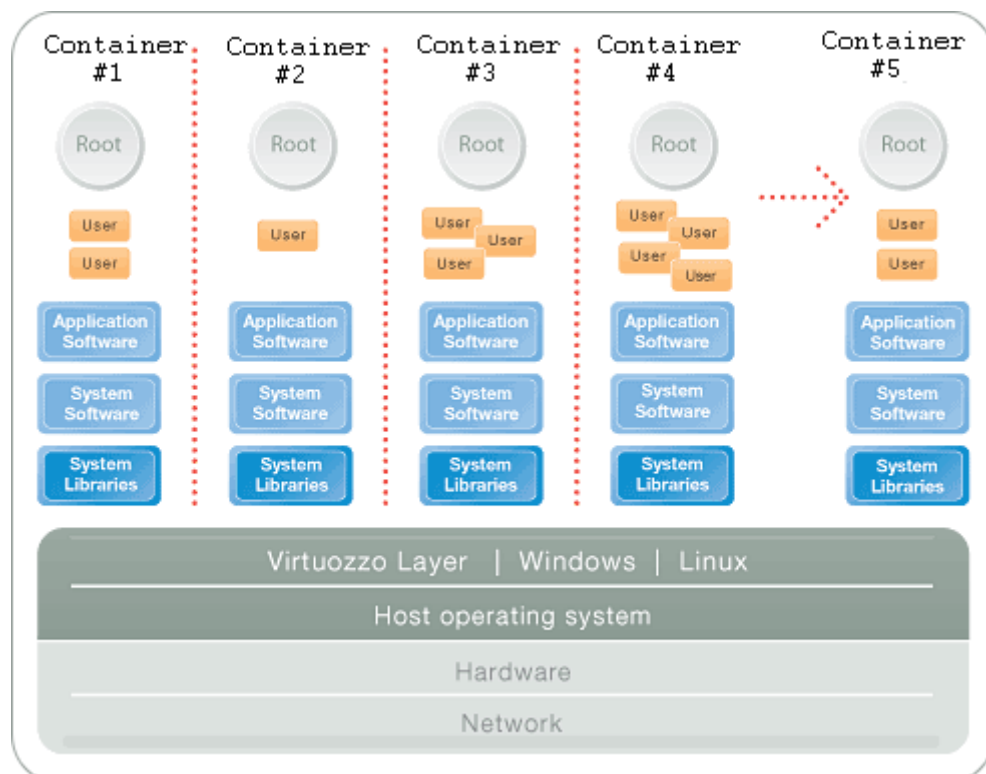


Figure 1: Virtuozzo Containers OS Virtualization

The Parallels Virtuozzo OS virtualization model is streamlined for the best performance, management, and efficiency. At the base resides a standard Host operating system which can be either Windows or Linux. Next is the virtualization layer with a proprietary file system and a kernel service abstraction layer that ensure the isolation and security of resources between different Containers. The virtualization layer makes each Container appear as a standalone server. Finally, the Container itself houses the application or workload.

The Parallels Virtuozzo OS virtualization solution has the highest efficiency and manageability making it the best solution for organizations concerned with containing the IT infrastructure and maximizing the resource utilization. The Parallels Virtuozzo complete set of management tools and unique architecture makes it the perfect solution for easily maintaining, monitoring, and managing virtualized server resources for consolidation and business continuity configurations.

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## About This Guide

This guide is meant to provide complete information on Virtuozzo templates - an exclusive Parallels Virtuozzo Containers technology allowing you to efficiently deploy standard Windows applications inside your Containers 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 template updates and manage them in a number of different ways.

The primary audience for this guide is anyone who is intended to deploy one or several applications inside their Containers 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.

## Organization of This Guide

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

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

**Chapter 4, Managing Templates**, centers on all those operations you can perform on your application templates using Parallels Management Console and the **Virtuozzo Template Creation** wizard.

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

### 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.

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## Getting Help

In addition to this guide, there are a number of other resources shipped with Virtuozzo Containers 4.0 which can help you use the product more effectively. These resources include:

- **Manuals:**
  - **Parallels Virtuozzo Containers Evaluation Guide.** This guide is destined to introduce you to the main features of Virtuozzo Containers 4.0 and to its underlying technology, to help you set up an environment for evaluating the Virtuozzo major features, and to suggest the relevant procedures for this evaluation.
  - **Parallels Virtuozzo Containers for Linux Installation Guide.** This guide provides exhaustive information on the process of installing, configuring, and deploying your Virtuozzo system. As distinct from the given guide, it contains a more detailed description of all the operations needed to install and set Virtuozzo Containers 4.0 to work including planning the structure of your Virtuozzo network, performing the Virtuozzo Containers unattended installation, etc. Besides, it does not include the description of any Container-related operations.
  - **Parallels Virtuozzo Containers for Linux User's Guide.** This guide provides comprehensive information on Virtuozzo Containers 4.0 covering the necessary theoretical conceptions as well as all practical aspects of working with Parallels Virtuozzo Containers. However, it does not deal with the process of installing and configuring your Parallels Virtuozzo system.
  - **Parallels Virtuozzo Containers for Linux Templates Management Guide.** This guide is meant to provide complete information on Virtuozzo templates - an exclusive Parallels Virtuozzo technology allowing you to efficiently deploy standard Linux applications inside your Containers and to greatly save the Hardware Node resources (physical memory, disk space, etc.).
  - **Parallels Virtuozzo Containers for Linux Reference Guide.** This guide is a complete reference on all Virtuozzo configuration files and Hardware Node command-line utilities.
- **Help systems:**
  - **Parallels Management Console Help.** This help system provides detailed information on Parallels Management Console - a graphical user interface tool for managing Virtuozzo Hardware Nodes and their Containers.
  - **Parallels Infrastructure Manager Online Help.** This help system shows you how to work with Parallels Infrastructure Manager - a tool providing you with the ability to manage Virtuozzo Hardware Nodes and their Containers with the help of a standard Web browser on any platform.
  - **Parallels Power Panel Online Help.** This help system deals with Parallels Power Panel - a means for administering individual Containers through a common Web browser on any platform.

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## 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!

The Parallels documentation forum (<http://forum.swsoft.com/forumdisplay.php?s=&forumid=239>) is the ideal place for your comments and suggestions. It is regularly monitored by the members of the Parallels technical documentation department, so it is likely that you will receive a reply to your post before long.

Note that new users will be asked to fill in a short registration form before being able to post. Registering will allow you to participate not only in the documentation forum discussions, but in all the other Parallels forums as well.

# About Virtuozzo Templates

## In This Chapter

Templates Overview .....	11
Understanding Templates Basics .....	12
Template Lifecycle .....	13

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## Templates Overview

A template in Virtuozzo Containers 4.0 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 Container by mounting over Virtuozzo File System (VZFS). Using templates lets you:

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

There are two types of templates in Virtuozzo Containers 4.0. These are OS (operating system) templates and application templates. An OS template is an operating system and the standard set of components that were installed on the operating system during the OS template creation. Virtuozzo Containers 4.0 uses OS templates to create new Containers with a preinstalled operating system. An application template is a set of files and registry settings pertaining to this or that application. Virtuozzo Containers 4.0 uses application templates to add extra software to the existing Containers. For example, you can create a Container on the basis of the Windows Server 2003 OS template and add the Adobe Acrobat Reader application to it with the help of the `AcrobatReader` application template.

In Virtuozzo Containers 4.0, you can perform the following operations with templates:

- create your own application templates and template updates;
- upload new templates and template updates to the Hardware Node and install them there;
- list the templates and template updates currently installed on the Hardware Node;
- add any of the templates and template updates installed on the Hardware Node to any number of Containers;
- remove templates and template updates from Containers;
- remove templates and template updates that are not needed any more from the Hardware Node.

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

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## Understanding Templates Basics

The 'Virtuozzo Templates' technology provides a way of sharing resources among lots of Containers, thus, enabling huge savings in terms of disk space and memory. For example, when you install an OS or application template on the Hardware Node, Virtuozzo Containers 4.0 creates the `X:\vz\Templates\<template_name>` folder containing all template-related files (where `X:\vz` denotes the folder you specified during the Virtuozzo Containers installation for storing all Container data).

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**Note:** All basic OS templates (i.e. Windows Server 2003 with Service Pack 1 and Windows Server 2003 with Service Pack 2) are installed into the `X:\vz\Templates\w2k3` folder irrespective of their names.

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When a Container based on the given OS template is created or the given application template is added to an existing Container, the Container contains only special links to real files in the `X:\vz\Templates\<template_name>` folder (for application and OS templates) and the system partition on the Node storing the Windows Server 2003 system files (for OS templates only). These links occupy very little space on the hard disk and are situated in the so-called *private area* of the Container (the corresponding folder is `X:\vz\private\<Container_ID>`). Along with links to the necessary OS or application files, the Container private area also contains the copy-on-write area. This area stores the information about those changes that the Container makes to the template files during its lifecycle and, therefore, is almost empty for all newly created Containers.

When a Container is started, its private area is mounted as Virtuozzo File System (VZFS) to the `X:\vz\private\<Container_ID>\root` folder. This folder is seen as the root folder from within the Container. And, which is the pivot of it all, thanks to the VZFS, the links of the Container private area are seen as real files there.

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**Note:** The contents of the `X:\vz\root\<Container_ID>` and `X:\vz\private\<Container_ID>\root` folders can be accessed for running or mounted Containers only.

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## Template Lifecycle

Any template of any kind should be *created* first. You can create a template using the **Virtuozzo Template Creation wizard**. In addition, a number of already created templates are shipped by Parallels with Virtuozzo Containers 4.0.

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**Note:** The current version of Virtuozzo Containers allows you to create application templates only.

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Then, the template should be *installed on the Hardware Node*. You can install OS and application templates with the help of Parallels Management Console, Parallels Infrastructure Manager, or using the `vzpkgdeploy -i` command.

The OS template that has been installed on the Hardware Node can be *used as the basis for creating new Containers* with the help of Parallels Management Console, Parallels Infrastructure Manager, or the `vzctl create` command. In their turn, any of the installed application templates can be *added to any number of Containers* using the same Virtuozzo tools or the `vzpkgadd` utility.

Any application template may be *modified according to your needs* using the **Virtuozzo Template Creation wizard**.

A *template update may be created* for any of the application templates installed on the Hardware Node using the **Virtuozzo Template Creation wizard**.

Any application template or application update may be *removed from the Container* with the help of Parallels Management Console, Parallels Infrastructure Manager, or using the `vzpkgrm` utility.

Finally, a template that is not used by any Container may be completely *removed from the Hardware Node* using Parallels Management Console, Parallels Infrastructure Manager, or the `vzpkgdeploy -u` command.

## CHAPTER 3

# Creating Application Template

You may wish to use special software inside your Containers 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 Container where you wish to use it may be a time-consuming operation and require many megabytes of disk space inside each Container. At the same time, adding an application to your Containers 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 Hardware Node hard disk only once, gigabytes of disk space are saved that would be lost if the application were installed separately into each and every Container.
- The application is loaded only once into the Node memory, so memory savings are also tangible.

## In This Chapter

Launching Virtuozzo Template Creation Wizard.....	15
Creating Template From Installed Application Data.....	16
Creating Template From Manually Added Data.....	26

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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 Containers 4.0 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 --> Parallels --> Parallels Virtuozzo Containers --> 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 2: Template Creation Wizard - Welcome Screen*

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

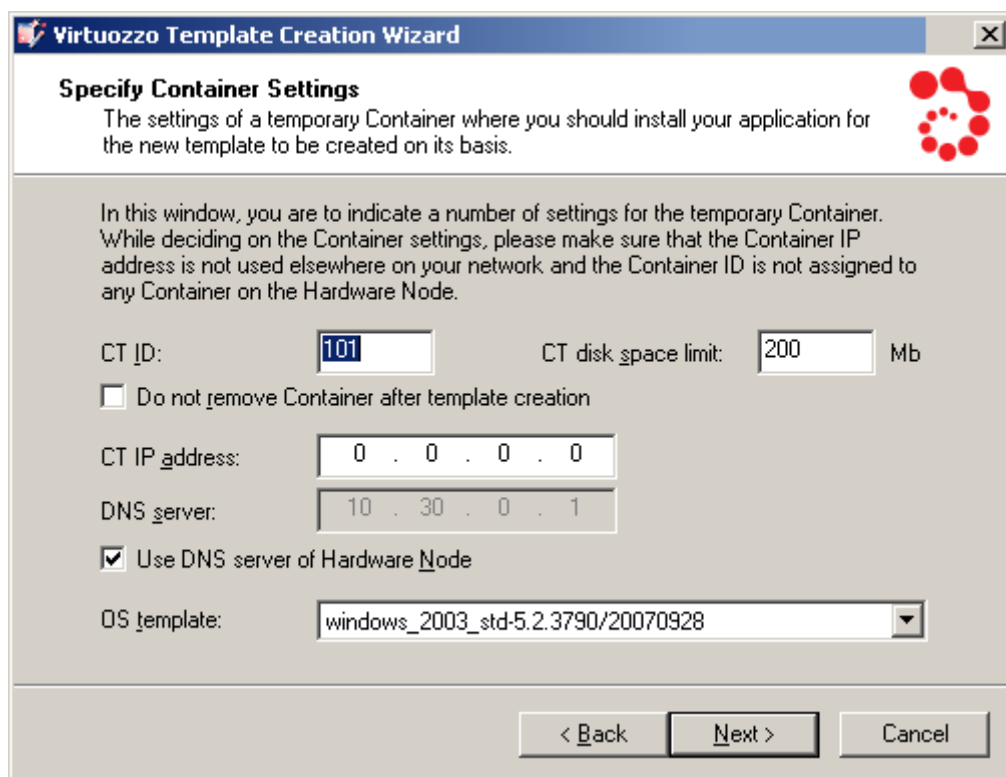
- Select the **Create a template on the basis of an installed application** radio button to create your application template on the basis of the corresponding application installed in a special temporary Container and customized, if necessary. In this case only the files and registry settings that will result from the application installation inside the temporary Container will be included in the template.

- Select the Create a template from manually selected data radio button 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.

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## Creating Template From Installed Application Data

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



The screenshot shows the 'Specify Container Settings' window of the Virtuozzo Template Creation Wizard. The window title is 'Virtuozzo Template Creation Wizard' and the subtitle is 'Specify Container Settings'. Below the subtitle, there is a brief instruction: 'The settings of a temporary Container where you should install your application for the new template to be created on its basis.' A red logo consisting of several circles is visible in the top right corner. The main area contains the following settings:

- CT ID: 101
- CT disk space limit: 200 Mb
- Do not remove Container after template creation
- CT IP address: 0 . 0 . 0 . 0
- DNS server: 10 . 30 . 0 . 1
- Use DNS server of Hardware Node
- OS template: windows\_2003\_std-5.2.3790/20070928

At the bottom, there are three buttons: '< Back', 'Next >', and 'Cancel'.

*Figure 3: Template Creation Wizard - Defining Container Settings*

In the Specify Container Settings window, you are asked to set the parameters for a special Container 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 Container 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 Container will be removed from the Hardware Node (unless the Do not remove Container after template creation check box is selected).

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

- In the **CT ID** field, specify the ID to be assigned to the temporary Container. Make sure that the Container with the specified ID does not exist on your Node. Otherwise, you will be warned with a message asking you to choose another Container ID.
- In the **CT disk space limit** field, type the amount of disk space to be allocated to the temporary Container, 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 Container after template creation** check box to leave the temporary Container intact after the template creation.
- In the **CT IP address** field, enter the IP address (it should be unique within your network) to be assigned to the temporary Container. You should specify a valid IP address to be able to connect to the Container via RDP at a later time.
- Indicate a DNS server that the temporary Container 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 Container 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:

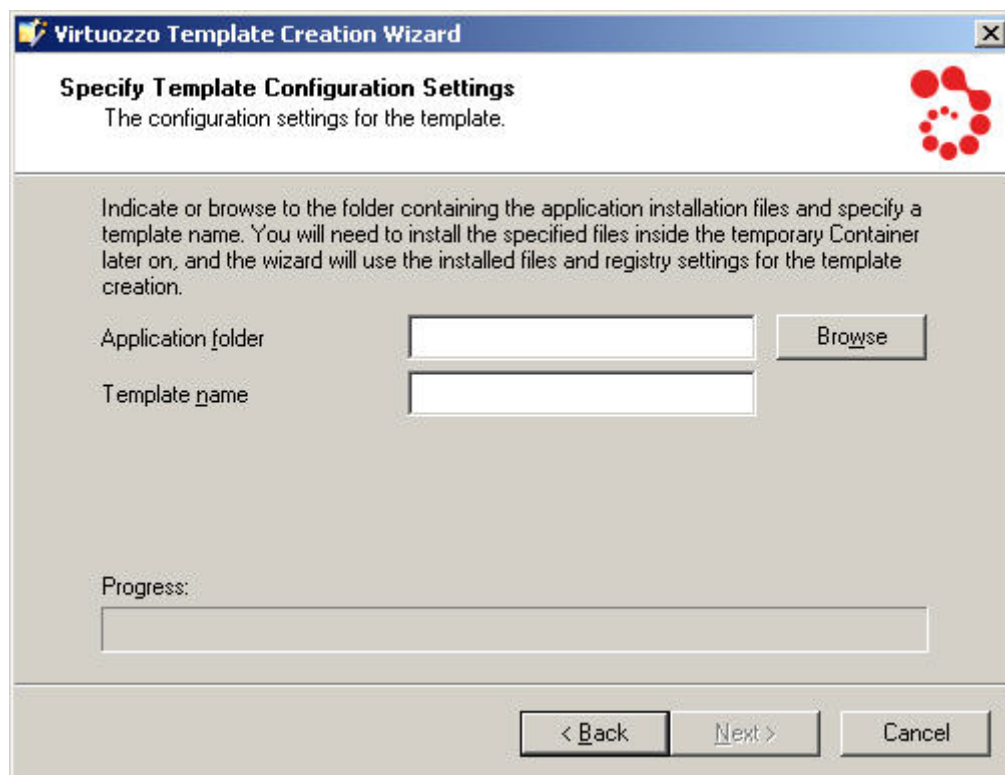


Figure 4: Template Creation Wizard - Specifying Template Parameters

- 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 Container, and the files and registry settings resulting from the files installation in the Container 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 Container.

After the Container has been created and started, the **Connect to Container** window is displayed. In this window you are supposed to click **Next** to add the selected templates to the temporary Container and establish an RDP connection to it. The RDP connection is needed to copy the source application files from the Hardware Node to the temporary Container; later on, these source application files will be manually installed inside this Container 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.

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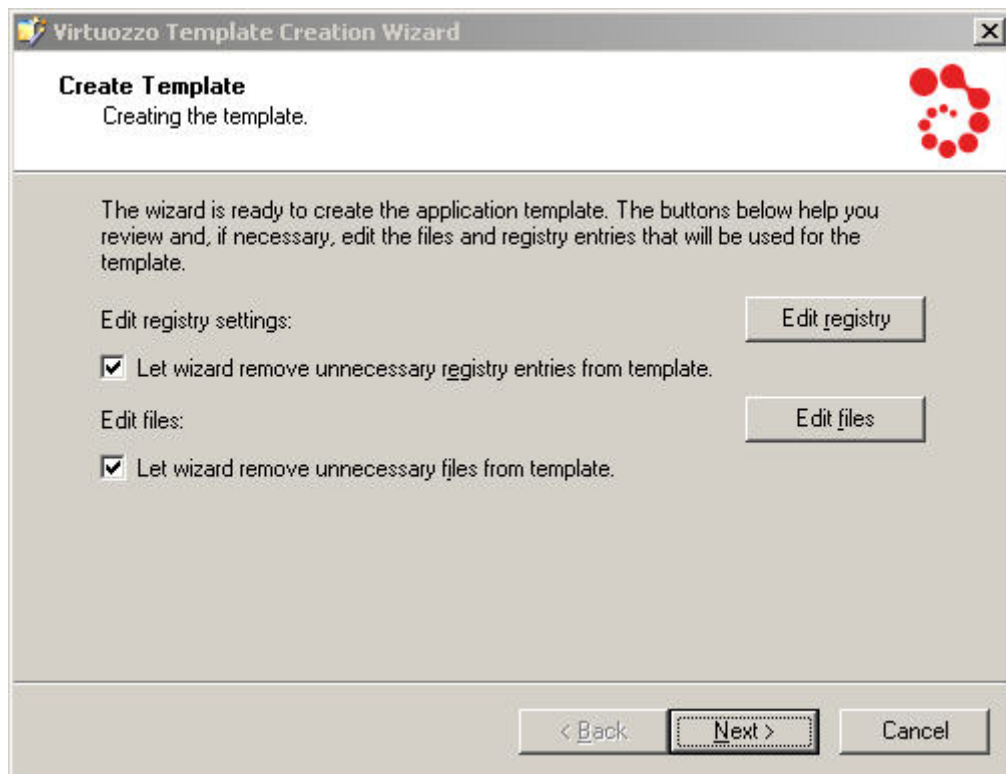
**Notes:** 1. Please do not close the RDP connection window manually.

2. If you are connected to the Hardware Node using an RDP client, you may need to complete the following operations to switch from the Container RDP connection window to the Hardware Node one:
    - a) Click the **Restore** button on the RDP connection bar of the Container RDP connection window to exit from the Container RDP full-screen mode.
    - b) On the RDP connection bar of the restored window, click the **Minimize** button to minimize the Container RDP connection window.
    - d) Click the **Maximize** button in the upper-right corner of the displayed window to return to the Hardware Node RDP full-screen mode.
- 

The **Prepare to Install Application Files** screen allows you to perform the final preparations before installing the application files inside the temporary Container. So, you may wish to open the minimized RDP connections window and locate the source application installation files that have been copied inside the Container. The source application files are located in the root directory of the Container (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 Container. 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 Container 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 5: Template Creation Wizard - 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 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 through and analyze all registry settings and folders/files resulted from the application files installation inside the Container 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 files and folders will be marked red and the folders containing them - reddish. For example:

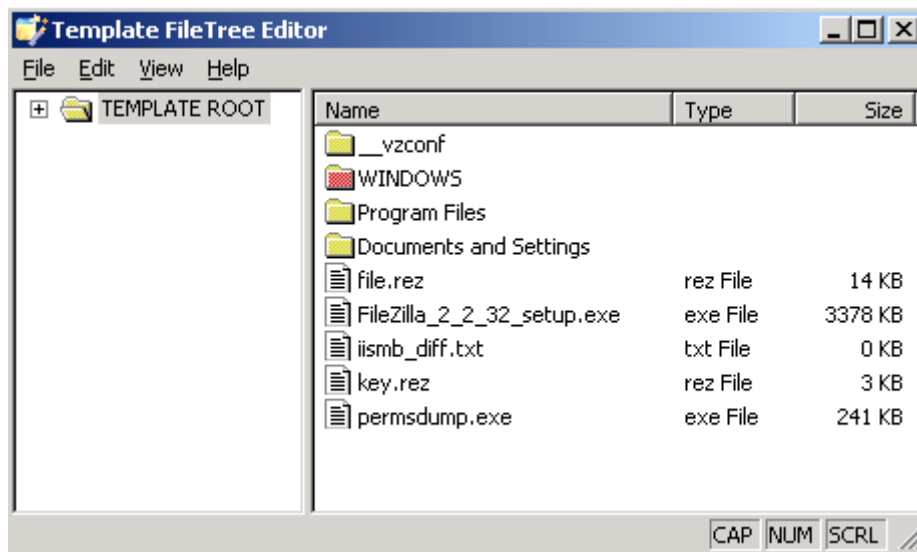


Figure 6: Template Creation Wizard - Viewing Files/Folders to Remove

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:

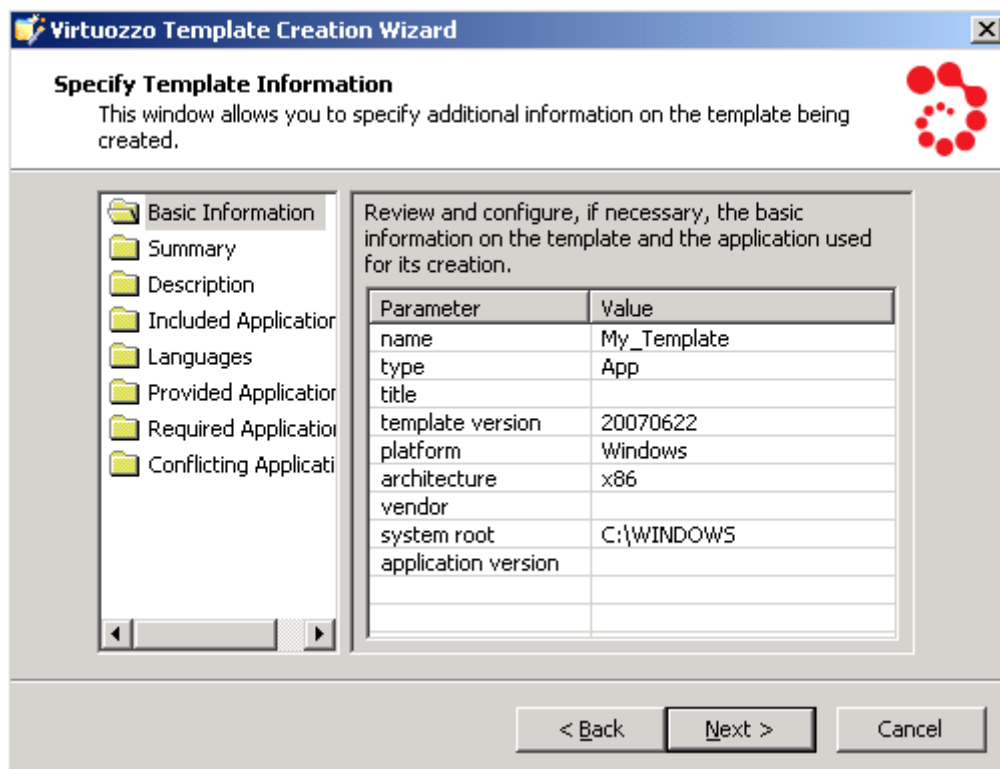


Figure 7: Template Creation Wizard - Providing Template Information

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 **Specify Template 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 Container).
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. Parallels Management Console) along with the template name.
template version	Mandatory. The template version in the YYYYMMDD format where YYYYMMDD 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.
architecture	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 x86 if your template will be used on 32-bit platforms only;</li> <li>▪ select x64_86 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 IA64 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 All if you are going to use the template on 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. C:\WINDOWS).
application 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 **Included Applications** folder is provided in the **Modifying Existing Template** section (p. 43) 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 **Specify Template Information** screen enables you to determine the template policy in respect of the localized version(s) of the Windows Server 2003 operating system:

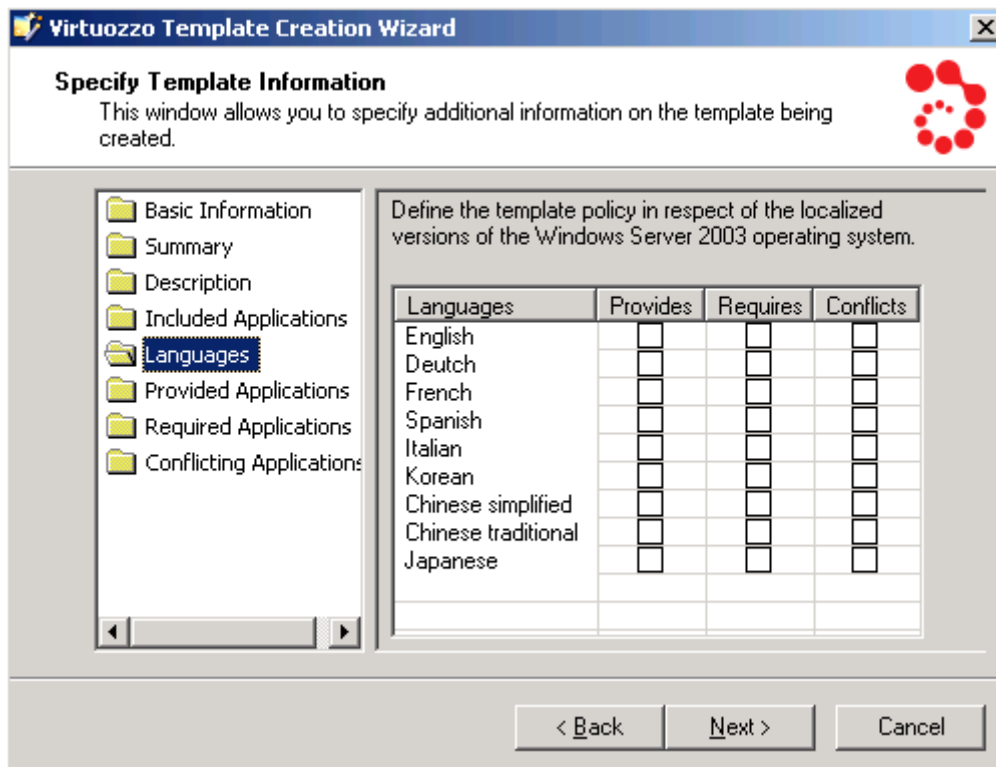


Figure 8: Template Creation Wizard - Choosing Languages to Support

In this window you can:

- Specify the localized versions of the Windows Server 2003 OS that should be used as the basis for a Container for the template to be successfully installed inside this Container. To this effect, select the check box in the **Requires** column opposite the corresponding languages.
- Specify the localized versions of the Windows Server 2003 OS that will be incompatible with the template being created (i.e. the template installation inside Containers 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 languages.

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

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

- Select the **Provided Applications** folder and specify the names of the applications which will be installed inside the Container together with the application template being created.
- Select the **Required Applications** 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 Container to successfully add the template to this Container.
- Select the **Conflicting Applications** folder and enter the names of the applications which may have conflicts with the template and needed to be removed from the Container before adding the template to this Container.

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 **Specify Template Information** window:

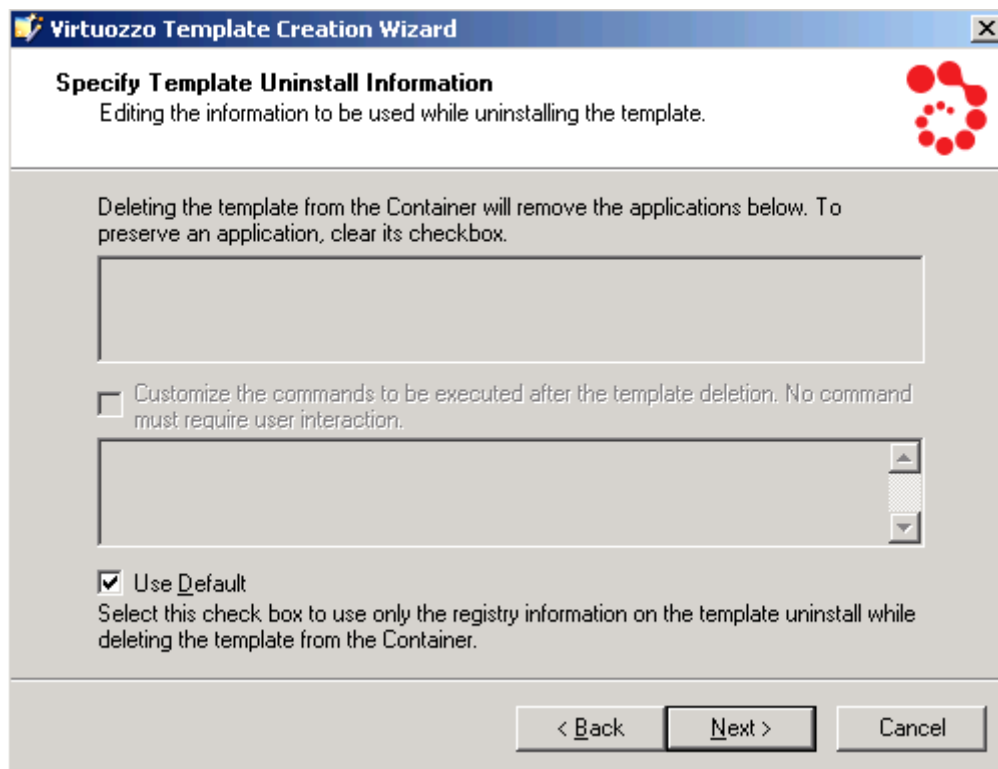
*Figure 9: Template Creation Wizard - Entering Information on Application*

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 next step of the wizard, you can change the operations to be performed inside a Container after removing the updated application template from the Container.



*Figure 10: Template Creation Wizard - 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 Container 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.

The next step of the wizard allows you to install the template on the Hardware Node:

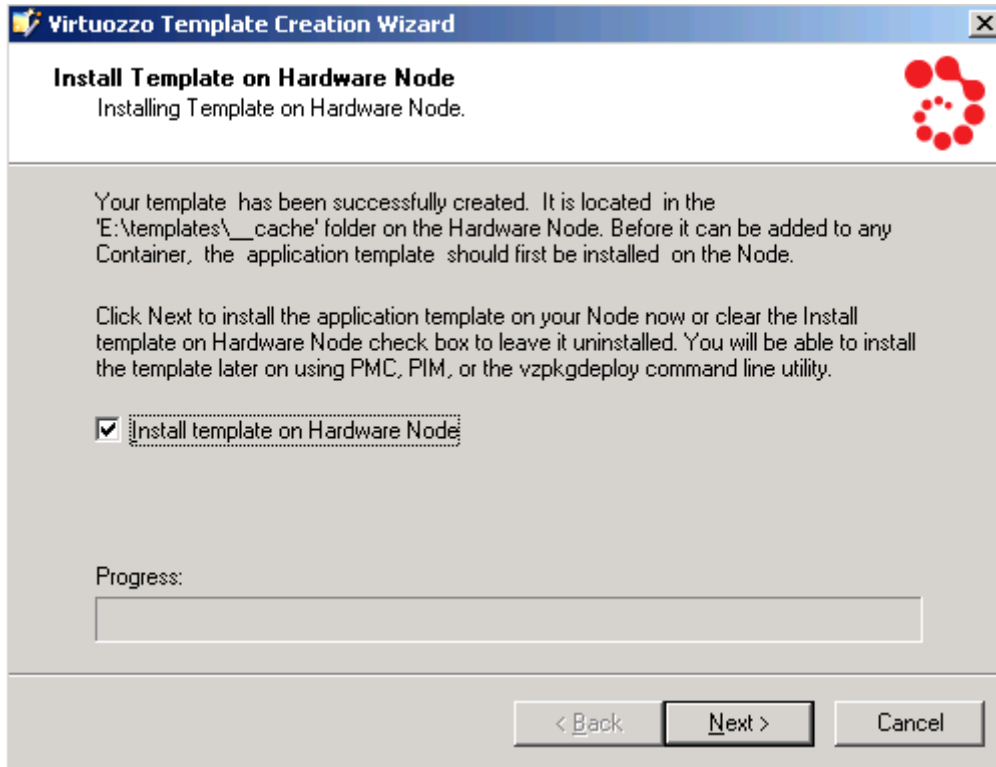


Figure 11: Template Creation Wizard - Installing Template

Each newly created template should be installed on the Node before it can be applied to your Containers. Click **Next** to install the template on your Hardware Node. If you do wish to install the application template at the moment, clear the **Install template on Hardware Node** check box and click **Next**. You will be able to install it later on by means of Parallels Management Console or the `vzpkgdeploy` utility. Please consult the **Uploading and Installing New Virtuozzo Templates on Hardware Node** section (p. 33) and **Parallels Virtuozzo Containers for Windows Reference Guide**, respectively, to learn how you can install your application templates on the Node.

The last screen of the wizard informs you that the application template has been successfully created and enables you to change the default location of the template. By default, the template is placed to the `X:\vz\Templates\__cache` folder on the Hardware Node where `X` denotes the disk drive set for storing Virtuozzo program files. However, you can change this location by selecting the **Save the template to another location** check box and specifying the path to the desired folder in the field provided.

Click **Finish** to exit the wizard.

---

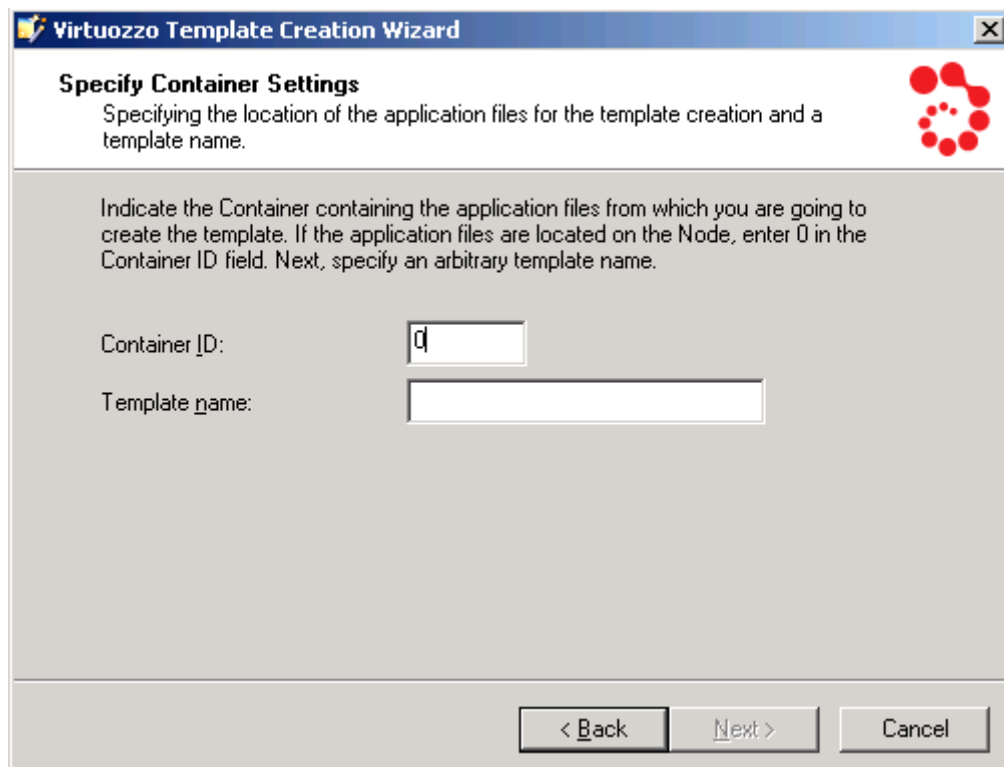
**Note:** The information you specify during the template creation is stored in a special XML file and used when performing certain operations on the application template. For example, it is used when you add the template to a Container. In this case Virtuozzo Containers 4.0 checks if the Container meets all the conditions set for the template in its XML file (e.g. whether all the required applications you indicated in the **Required Applications** folder on the **Specify Template Information** screen are installed inside the Container).

---

---

## Creating Template From Manually Added Data

If you have selected the Create a template from manually selected data radio button 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 Container Settings" with a sub-heading "Specifying the location of the application files for the template creation and a template name." and a red logo on the right. Below this, there is a paragraph of instructions: "Indicate the Container 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 Container ID field. Next, specify an arbitrary template name." There are two input fields: "Container ID:" with the value "0" and "Template name:" which is empty. At the bottom, there are three buttons: "< Back", "Next >", and "Cancel".

Figure 12: Template Creation Wizard - Specifying Container ID and Template Name

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

- **Container ID:** specify the ID of the Container 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.

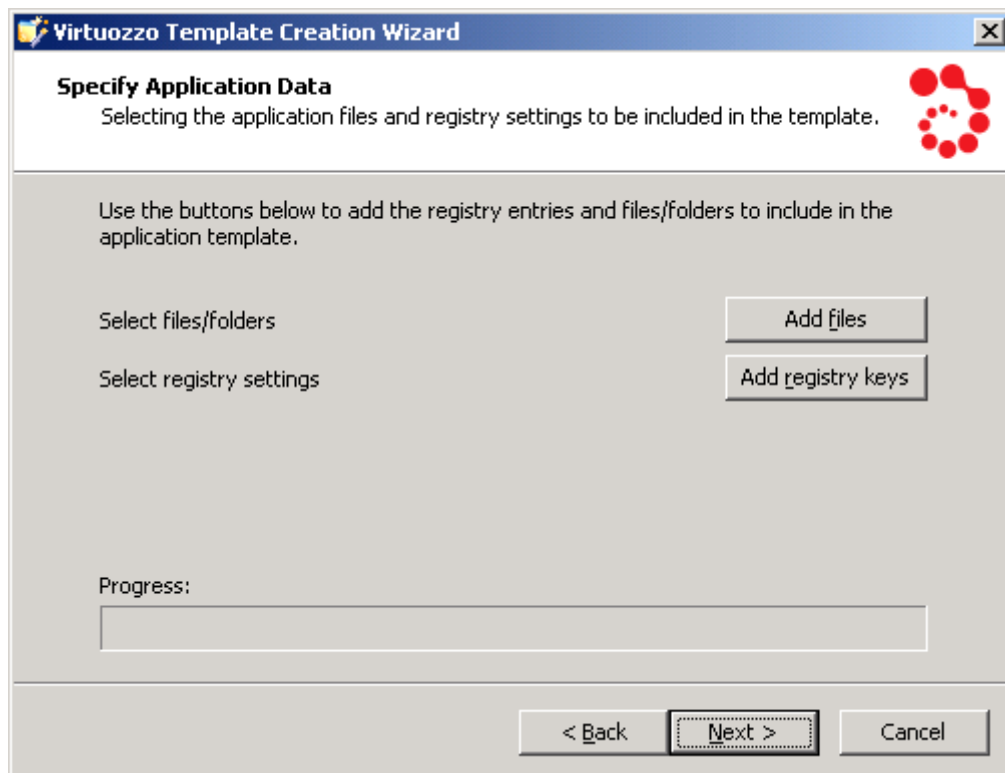
---

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

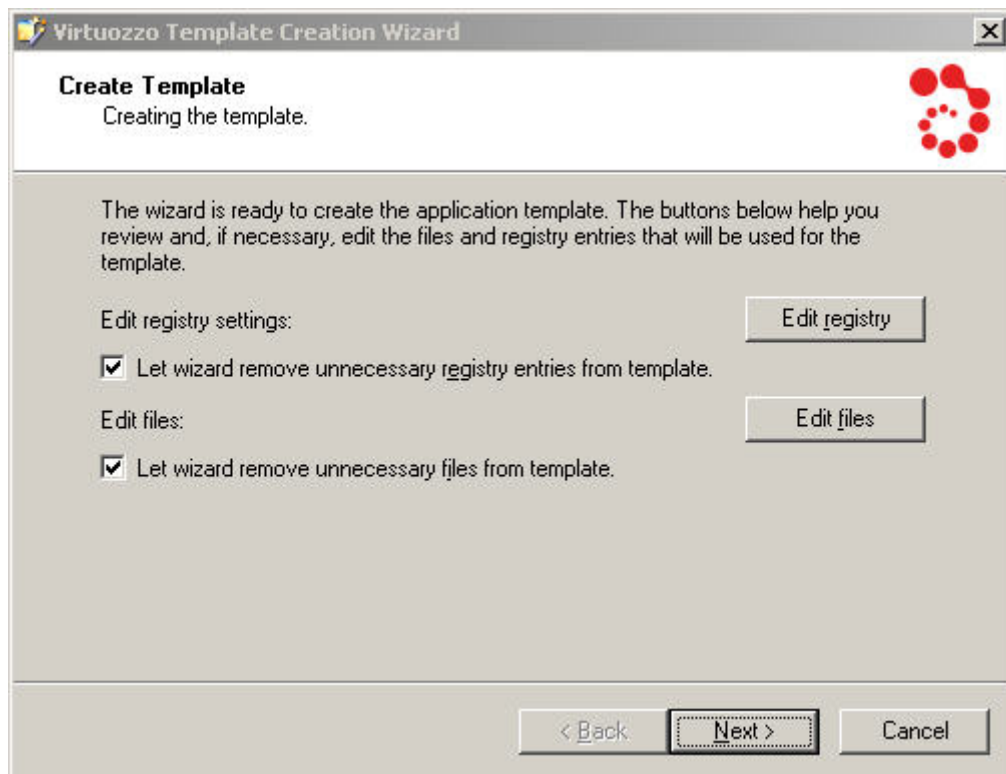


*Figure 13: Template Creation Wizard - Adding Files and Registry Entries*

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 14: Template Creation Wizard - 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 through and analyze all registry settings and folders/files 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 files and folders will be marked red and the folders containing them - reddish. For example:

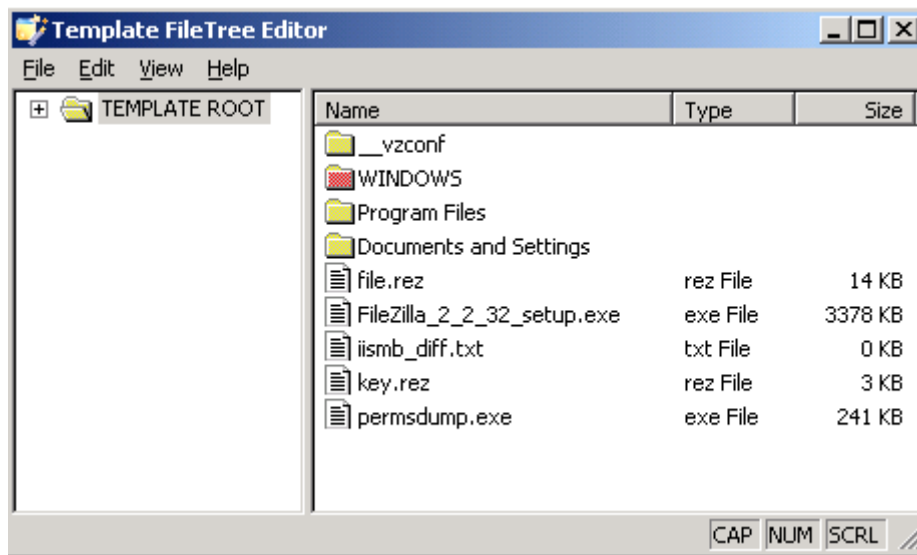


Figure 15: Template Creation Wizard - Viewing Files/Folders to Remove

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.

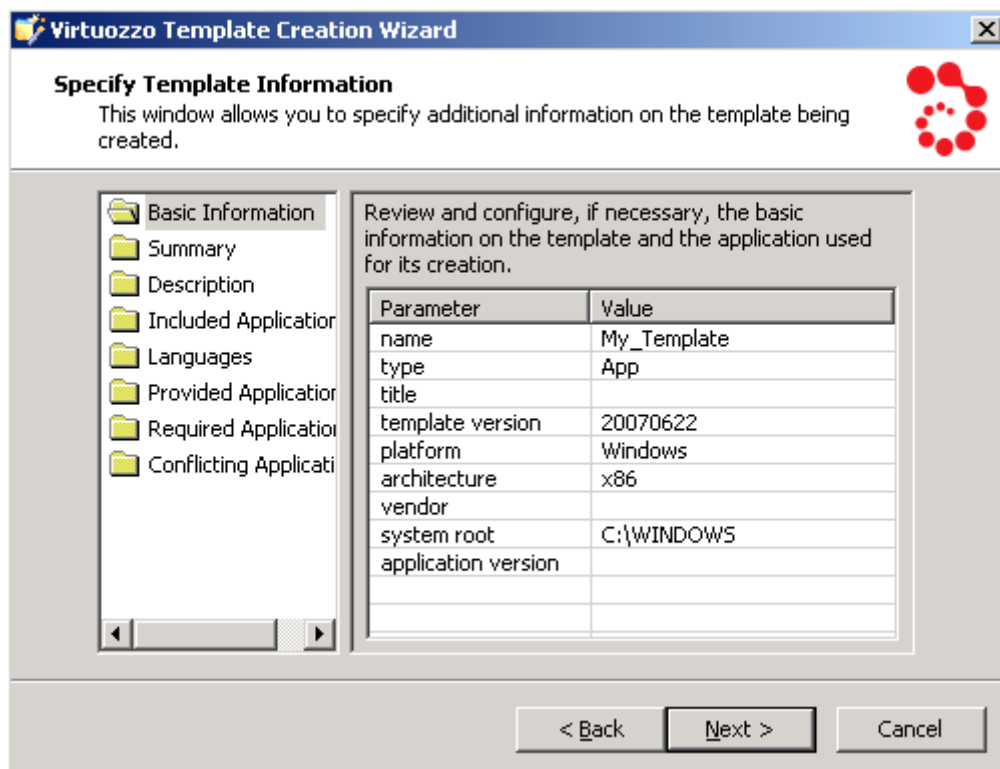
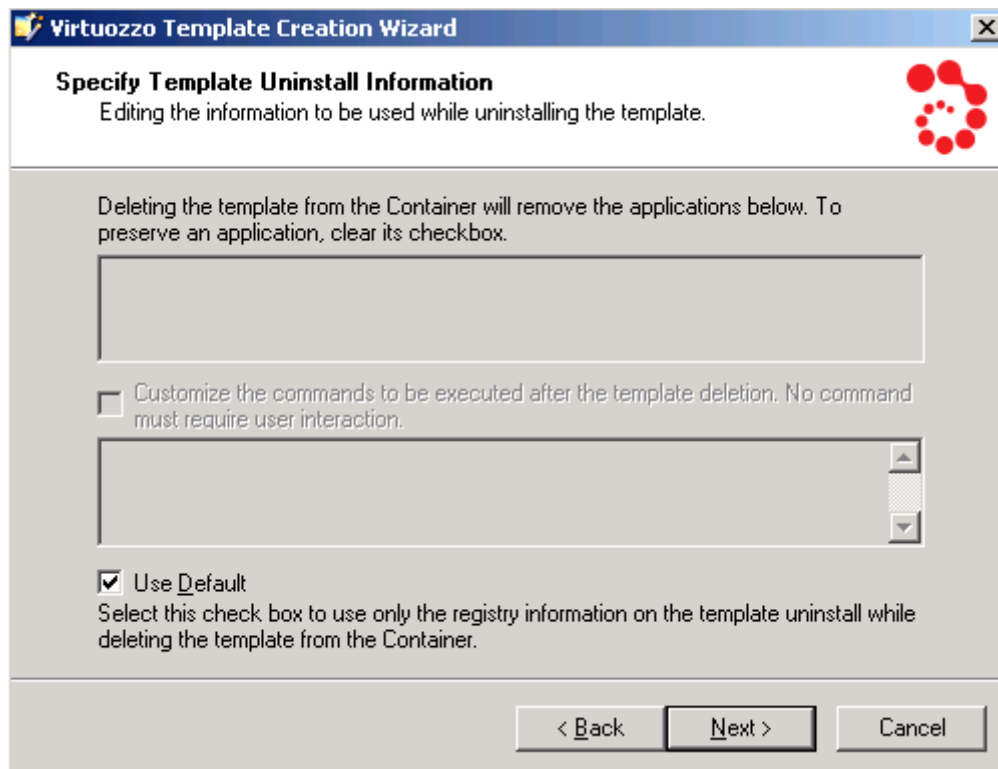


Figure 16: Template Creation Wizard - Providing Template Information

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

Next, you can specify what operations are to be performed inside a Container after removing the application template from the Container.



*Figure 17: Template Creation Wizard - 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 Container. 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 Container to meet your demands. While customizing the commands, please make sure that all the commands do not require any user interaction during their execution.

The next step of the wizard allows you to installed the template on the Hardware Node:

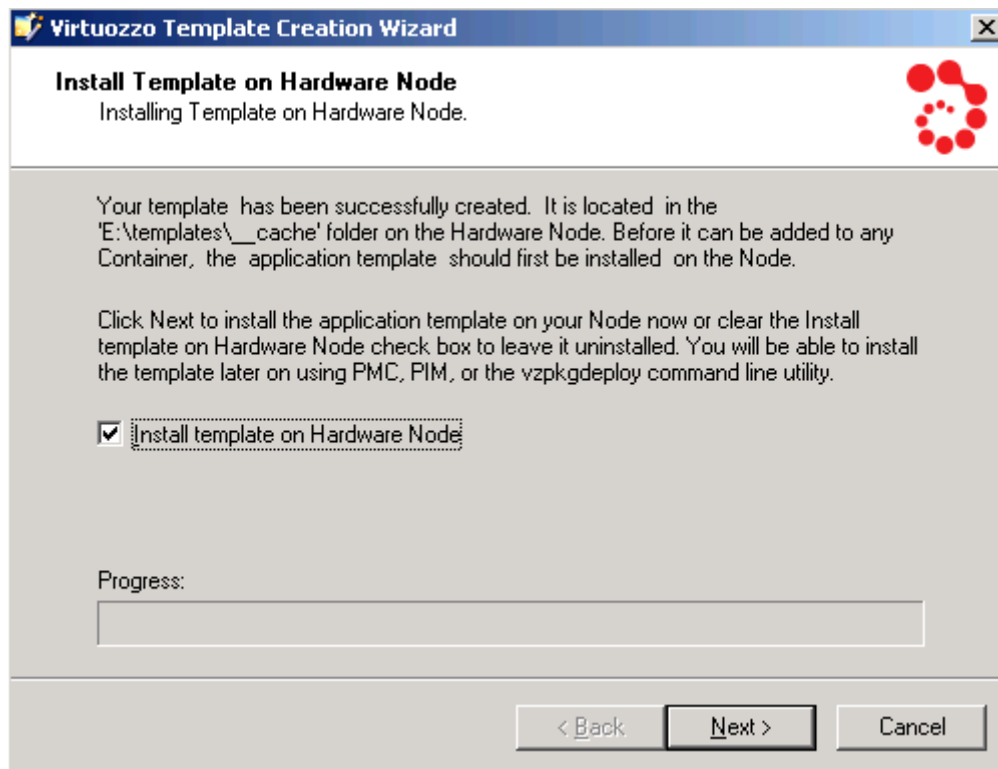


Figure 18: Template Creation Wizard - Installing Template

Each newly created template should be installed on the Node before it can be applied to your Containers. Click **Next** to install the template on your Hardware Node. If you do not wish to install the application template at the moment, clear the **Install template on Hardware Node** check box and click **Next**. You will be able to install it later on by means of Parallels Management Console or the `vzpkgdeploy` utility. Please consult the **Uploading and Installing New Virtuozzo Templates on Hardware Node** section (p. 33) and **Parallels Virtuozzo Containers for Windows Reference Guide**, respectively, to learn how you can install your application templates on the Node.

The last screen of the wizard informs you that the application template has been successfully created and enables you to change the default location of the template. By default, the template is placed to the `X:\vz\Templates\__cache` folder on the Hardware Node where `X` denotes the disk drive set for storing Virtuozzo program files. However, you can change this location by selecting the **Save the template to another location** check box and specifying the path to the desired folder in the field provided.

Click **Finish** to exit the wizard.

---

**Note:** The information you specify during the template creation is stored in a special XML file and used when performing certain operations on the application template. For example, it is used when you add the template to a Container. In this case Virtuozzo Containers 4.0 checks if the Container meets all the conditions set for the template in its XML file (e.g. whether all the required applications you indicated in the Required Applications folder on the Specify Template Information screen are installed inside the Container).

---

## CHAPTER 4

# Managing Templates

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

## In This Chapter

Installing New Virtuozzo Templates on Hardware Node .....	33
Modifying Template .....	43
Creating and Installing Application Template Updates .....	49
Listing Templates.....	58
Adding Templates to Single Container .....	59
Adding Application Templates to Group of Containers .....	61
Copying Templates to Another Hardware Node.....	63
Removing Application Templates From Container .....	64
Removing Template From Hardware Node .....	65

---

## 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 Parallels Management Console 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.

---

**Note:** In general, the process of installing OS templates on your Hardware Node does not differ from that used to install application templates and is described below. However, some OS templates (e.g. for Windows Server 2003 Service Pack 2, Windows Server 2003 R2, or Windows Server 2003 MUI packs) require a number of additional operations to be performed prior to their installation. So, if you are installing an OS template, please refer to the following subsections before proceeding with the template installation.

---

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

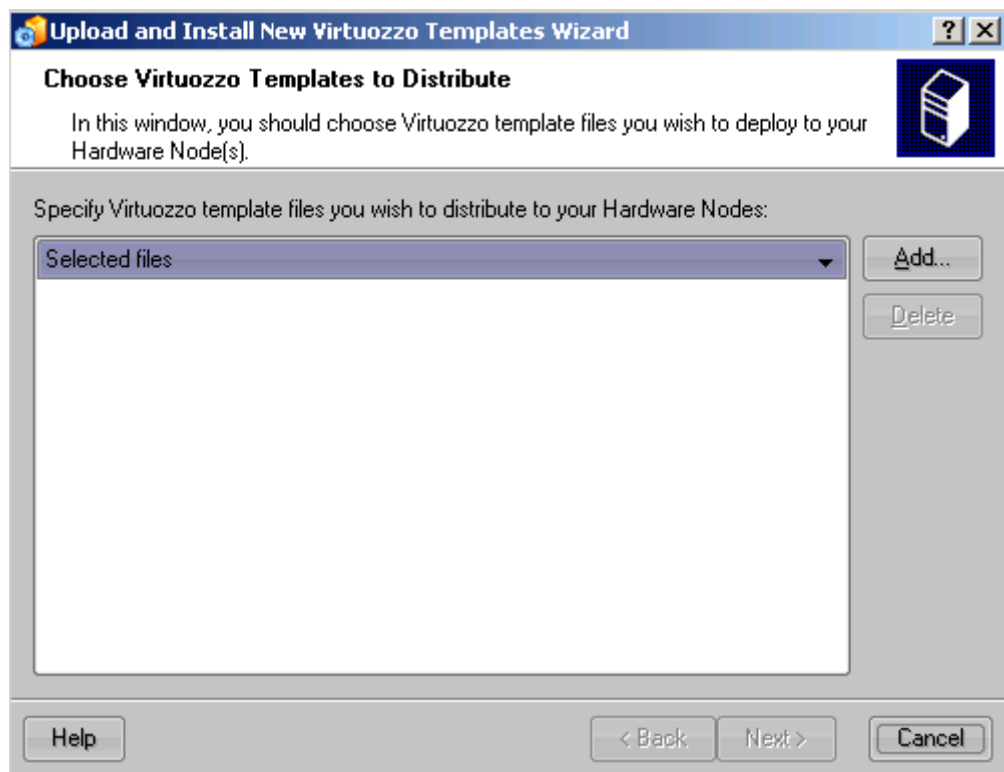
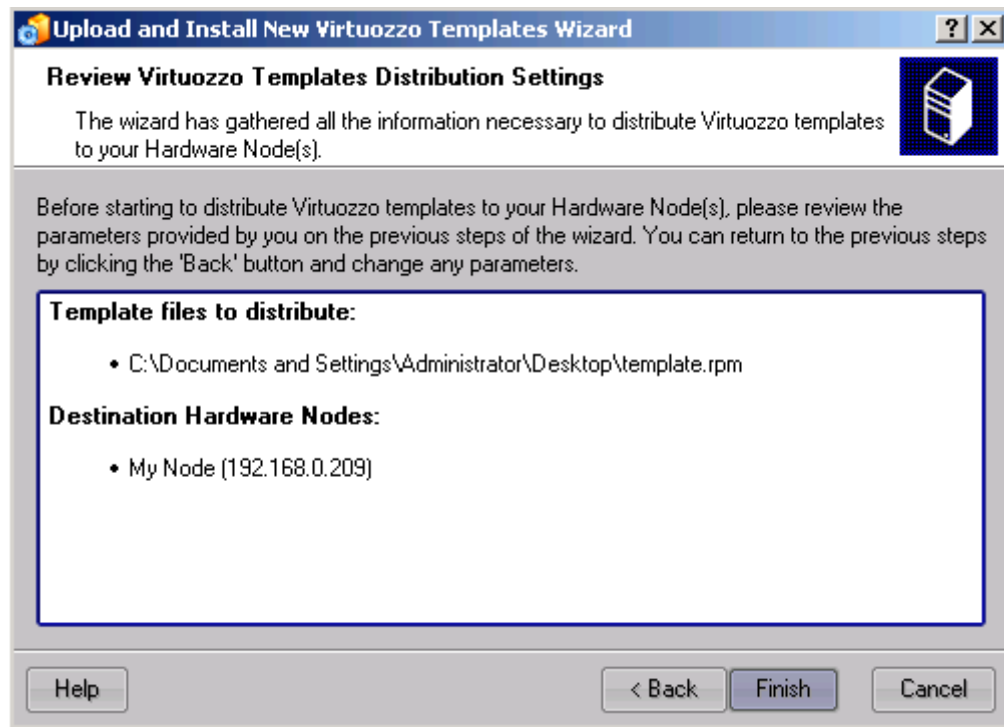


Figure 19: Management Console - Choosing Templates for Uploading

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. Parallels Management Console 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 20: Management Console - 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 *Parallels Virtuozzo Containers Reference Guide* for complete information on this utility and its options.

## Installing Windows Server 2003 Service Pack 2 Template

The Windows Server 2003 Service Pack 2 (SP2) OS template is used for creating Containers running the Windows Server 2003 operating system with SP2. This OS template is automatically installed on your server if it is running the Windows Server 2003 operating system with SP2 during the Virtuozzo Containers 4.0 installation. So, you do not need to perform any additional operations to start creating Containers on its basis. If this is not the case (i.e. you have Windows Server 2003 Service Pack 1 installed on your system and, consequently, are using the Windows Server 2003 SP1 OS template for the Container creation), you should manually install the Windows Server 2003 operating system with SP2 and the SP2 OS template on your Hardware Node to start creating Containers with Windows Server 2003 Service Pack 2.

---

**Note:** After the Service Pack 2 and SP2 OS template installation, all your existing Containers will be upgraded to run the Windows Server 2003 operating system with SP2.

---

Let us assume the following:

- You wish to create Containers running the 32-bit English version of Windows Server 2003 SP2.
- Your Hardware Node is currently running Windows Server 2003 with Service Pack 1 (Standard Edition) and has the Windows Server 2003 SP1 OS template installed.

In this case you should perform the following operations to install Service Pack 2 and the SP2 OS template on the Node and make all your existing and newly created Containers run the 32-bit English version of Windows Server 2003 SP2:

- 1 Back up all Containers residing on the Hardware Node. This step is optional, however, highly recommended. In this case you will be able to restore your Containers if something goes wrong during the upgrade to SP2. For detailed information on how to create Container backups, please turn to the **Backing Up and Restoring Containers** section of the **Parallels Virtuozzo Containers User's Guide**.
- 2 Stop all the Containers (including the Service Container) on the Hardware Node.

---

**Note:** You can stop the Service Container by running the `vzctl stop 1` command in the command line.

---

- 3 Obtain the Windows Server 2003 SP2 OS template. For example, you can do it using the `vzinstall` utility:
  - a Launch the `vzinstall` utility by double-clicking the `vzinstall.exe` file.
  - b On the **Welcome to Parallels Virtuozzo Autoinstall** screen, select the 'Download only' mode and click **Next**:



Figure 21: Virtuozzo Containers Autoinstaller - Selecting Mode

- c On the Parallels Virtuozzo Containers Components screen, expand Virtuozzo Containers 4.0 for Windows x86 --> OS Language Packs --> English and select Available; then click Next:

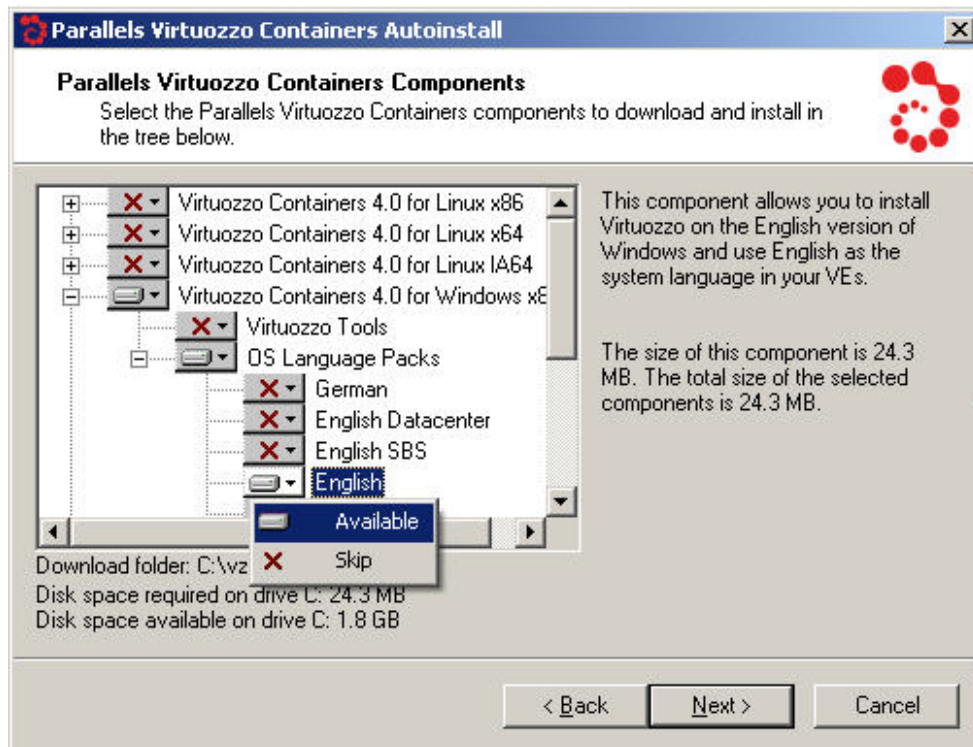


Figure 22: Virtuozzo Containers Autoinstaller - Choosing Components to Download

- d** On the Download Information screen, click Download.
- 4** After the download is finished, locate the `w2k3en_SP2_x86.ex_` file in the `X:\vz\download` folder and change its extension to `.exe`.
  - 5** Double-click the `w2k3en_SP2_x86.exe` file to produce the `w2k3sp2_std_<template_version>_en_x86.efd` OS template.
  - 6** Copy the resulting template to the `X:\vz\Templates\__cache` folder on the Hardware Node (where `X:\vz` denotes the folder storing all the data used by your Containers: private areas, installed templates, patches, logs, etc.).
  - 7** Remove the Windows Server 2003 SP1 OS template currently installed on the Node using the `vzpkgdeploy` utility. For example, you can do this as follows:  

```
X:\...\Administrator>vzpkgdeploy -u windows_2003_std_sp1-<template_version>
```
- Note:** There can be only one basic OS template (either Windows Server 2003 with SP1 or Windows Server 2003 with SP2) installed on your Node at the same time.
- 8** Install the Windows Server 2003 SP2 OS template by running the following command on the Node:  

```
X:\...\Administrator>vzpkgdeploy -i w2k3sp2_std_<template_version>_en_x86
```
  - 9** Upgrade the operating system on your Node to Windows Server 2003 Service Pack 2. You can follow the following link to download Service Pack 2: <http://www.microsoft.com/downloads/details.aspx?FamilyId=95AC1610-C232-4644-B828-C55EEC605D55&displaylang=en>.
  - 10** Reboot the Hardware Node.

- 
- Notes:** 1. You must follow the order of the operations described above; otherwise, your Containers may become broken.  
2. Do not start any of your Containers until you complete the upgrade.
- 

After it has been successfully installed on the Node, the SP2 template can be accessed by the `windows_2003_std_sp2-<template_version>` name or the `w2k3` alias and used for creating Containers running the Windows Server 2003 operating system with Service Pack 2. Detailed information on how to create new Containers is provided in the **Operations on Containers** chapter of the *Parallels Virtuozzo Containers User's Guide*.

## Installing Windows Server 2003 R2 OS Template

The Windows Server 2003 R2 OS template is used for creating Containers running the Windows Server 2003 operating system with R2. To be able to create Containers with this OS, the Windows Server 2003 R2 operating system and the corresponding Windows Server 2003 R2 OS template (e.g. the English R2 OS template if you are running the English version of Windows Server 2003 R2) should be installed on your Hardware Node .

The current version of Virtuozzo Containers allows you to create Containers running the following versions of Windows Server 2003 R2 (both 32-bit and 64-bit):

- English (Standard, Enterprise, and Datacenter Editions);
- French (Standard and Enterprise Editions);
- German (Standard and Enterprise Editions);
- Spanish (Standard and Enterprise Editions);
- Italian (Standard and Enterprise Editions);
- Simplified Chinese (Standard and Enterprise Editions);
- Traditional Chinese (Standard and Enterprise Editions);
- Korean (Standard and Enterprise Editions);
- Japanese (Standard and Enterprise Editions).

If your server is running the Windows Server 2003 R2 operating system, the appropriate Windows Server 2003 R2 OS template is automatically installed on it during the Virtuozzo Containers 4.0 installation. So, you do not need to perform any additional operations to start creating Containers on its basis. If this is not the case (e.g. you upgraded your system to R2 after the Virtuozzo Containers installation), you should install the R2 OS template manually. Let us assume that you wish to create Containers running the 32-bit English version of Windows Server 2003 R2 (Standard Edition), however, do not have the English R2 OS template installed. In this case you should perform the following operations to install this template on the Hardware Node:

- 1** Make sure that your Node is running the 32-bit English version of Windows Server 2003 R2.
- 2** Obtain the Windows Server 2003 R2 OS template. For example, you can do it using the `vzinstall` utility:
  - a** Launch the `vzinstall` utility by double-clicking the `vzinstall.exe` file.
  - b** On the **Welcome to Parallels Virtuozzo Autoinstall** screen, select the 'Download only' mode and click **Next**:



Figure 23: Virtuozzo Containers Autoinstaller - Selecting Mode

- c On the Parallels Virtuozzo Containers Components screen, expand Virtuozzo Containers 4.0 for Windows x86 --> OS Language Packs --> English and select Available; then click Next:

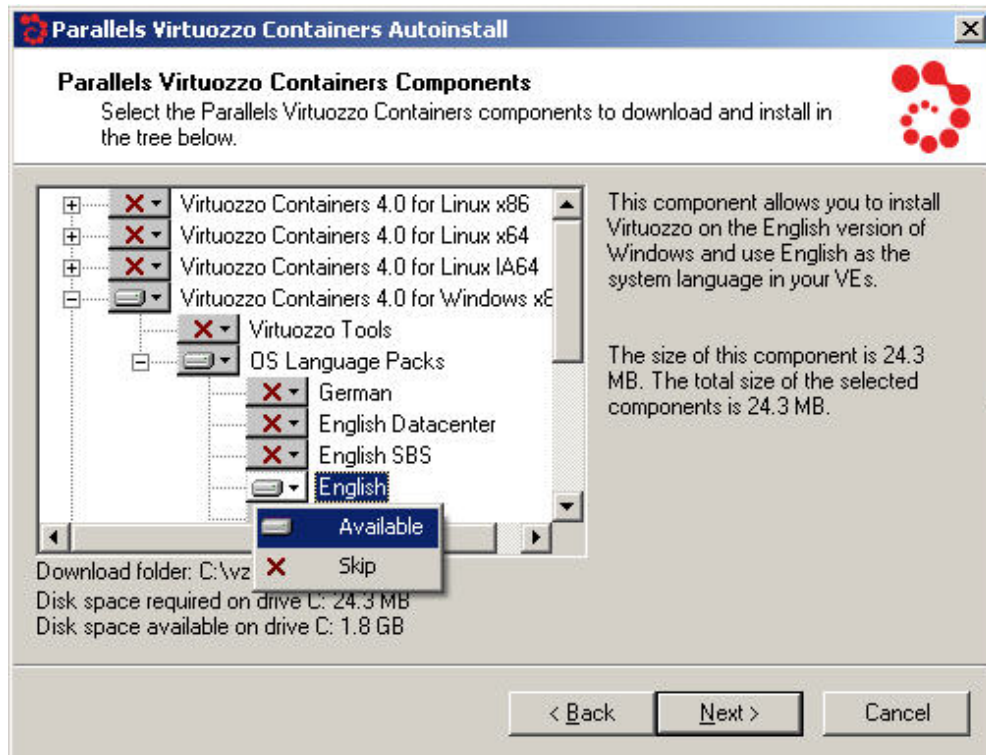


Figure 24: Virtuozzo Containers Autoinstaller - Choosing Components to Download

- d** On the **Download Information** screen, click **Download**.
- 3** After the download is finished, locate the `w2k3en_x86_R2.mui` file in the `X:\vz\download` folder and change its extension to `.exe`.
- 4** Double-click the `w2k3en_x86_R2.exe` file to produce the `w2k3_r2.efd` OS template.
- 5** Copy the resulting template to the `X:\vz\Templates\__cache` folder on the Hardware Node (where `X:\vz` denotes the folder storing all the data used by your Containers: private areas, installed templates, patches, logs, etc.).
- 6** Install the `w2k3_r2.efd` OS template on the Hardware Node using Parallels Management Console. Detailed information on how you can do it is given in the **Installing New Virtuozzo Templates on Hardware Node** section (p. 33).

After it has been successfully installed on the Node, the R2 OS template can be accessed by the `windows_2003_std_R2-<template_version>` name or the `w2k3_r2` alias and used for creating Containers running the Windows Server 2003 operating system with R2. Detailed information on how to create new Containers is provided in the **Operations on Containers** chapter of the **Parallels Virtuozzo Containers User's Guide**.

## Installing MUI OS Template

Multilingual User Interface (MUI) OS templates are used for creating Containers running the following localized versions of Windows Server 2003 x64 Standard or Enterprise Edition: German, Spanish, French, Korean, Simplified Chinese, Traditional Chinese. To be able to create Containers running any of these versions of Windows Server 2003 x64, your Hardware Node should meet the following requirements:

- run the English version of Windows Server 2003 x64 Edition;
- has the corresponding MUI pack installed;
- has the corresponding Virtuozzo MUI OS template installed.

If your server is running the 64-bit English version of Windows Server 2003 with a deployed MUI pack, the appropriate Windows Server 2003 MUI OS template is automatically installed on it during the Virtuozzo Containers 4.0 installation. So, you do not need to perform any additional operations to start creating Containers on its basis. If this not the case (e.g. you installed the MUI pack after the Virtuozzo Containers installation), you should install the MUI OS template manually. Let us assume that you wish to create Containers running the 64-bit German version of Windows Server 2003 (Standard Edition), however, do not have the German MUI OS template installed. In this case you should perform the following operations to install this template on the Hardware Node:

- 1** Make sure that your Node is running the English version of Windows Server 2003 x64 Edition and has the German MUI pack installed.
- 2** Obtain the German MUI OS template. For example, you can do it using the `vzinstall` utility:
  - a** Launch the `vzinstall` utility by double-clicking the `vzinstall.exe` file.
  - b** On the **Welcome to Parallels Virtuozzo Autoinstall** screen, select the 'Download only' mode and click **Next**:



Figure 25: Virtuozzo Containers Autoinstaller - Selecting Mode

- c On the Parallels Virtuozzo Containers Components screen, expand Virtuozzo Containers 4.0 for Windows x64 --> OS Language Packs --> German and select Available; then click Next:

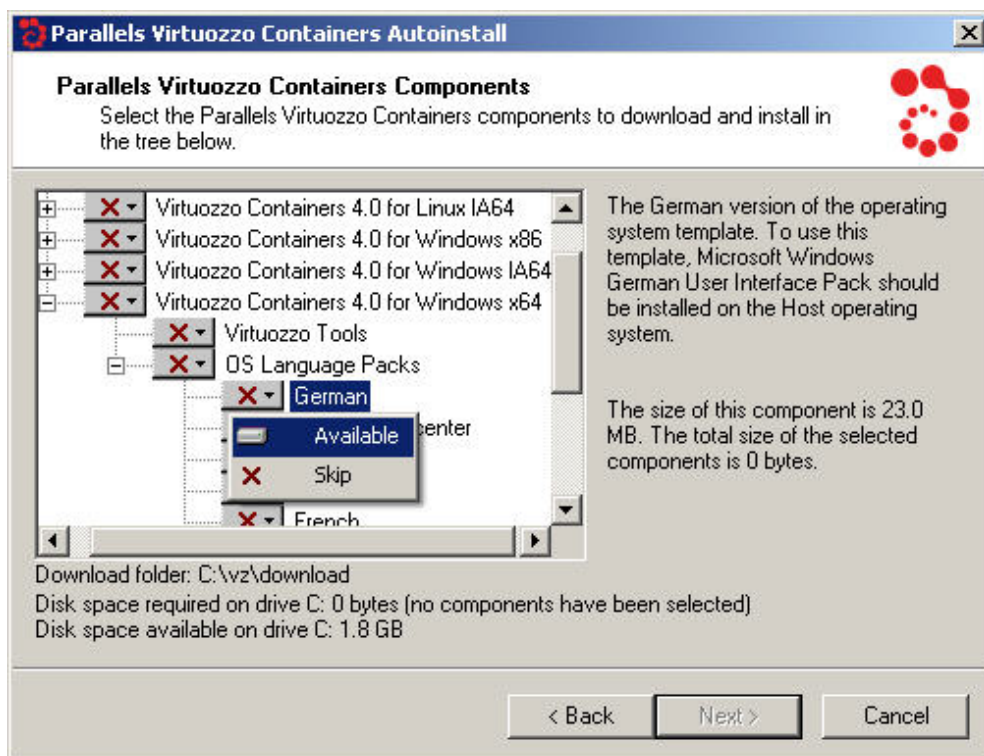


Figure 26: Virtuozzo Containers Autoinstaller - Selecting German Pack

- d** On the **Download Information** screen, click **Download**.
- 3** After the download is finished, locate the `w2k3de_x64.mui` file in the `X:\vz\download` folder and change its extension to `.exe`.
- 4** Double-click the `w2k3de_x64.exe` file to produce the `w2k3_de.efd` template.
- 5** Copy the resulting template to the `X:\vz\Templates\__cache` folder on the Hardware Node (where `X:\vz` denotes the folder storing all the data used by your Containers: private areas, installed templates, patches, logs, etc.).
- 6** Install the `w2k3_de.efd` template on the Hardware Node using Parallels Management Console. Detailed information on how you can do it is given in the **Installing New Virtuozzo Templates on Hardware Node** section (p. 33).

After it has been successfully installed on the Node, the German MUI template can be accessed by the `windows_2003_std_de-<template-version>` name or the `w2k3_de` alias and used for creating Containers running the 64-bit German version of Windows Server 2003. Detailed information on how to create new Containers is provided in the **Operations on Containers** chapter of the **Parallels Virtuozzo Containers User's Guide**.

## Modifying Template

Virtuozzo Containers 4.0 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 --> Parallels --> Parallels Virtuozzo Containers --> 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 an existing template** radio button 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:

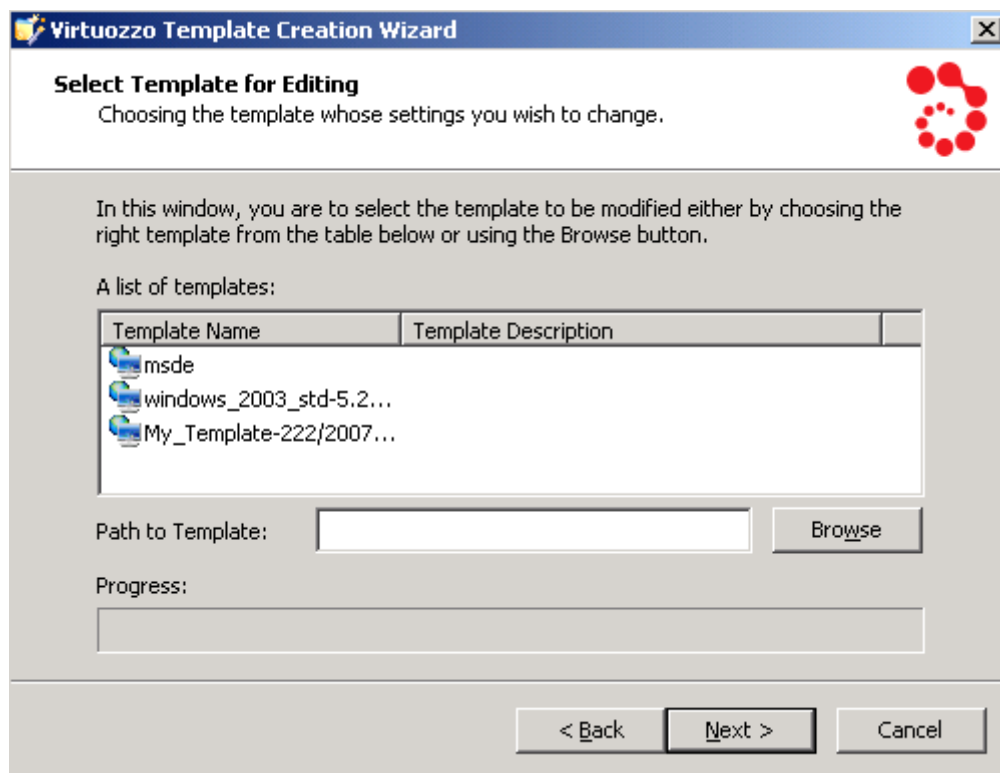
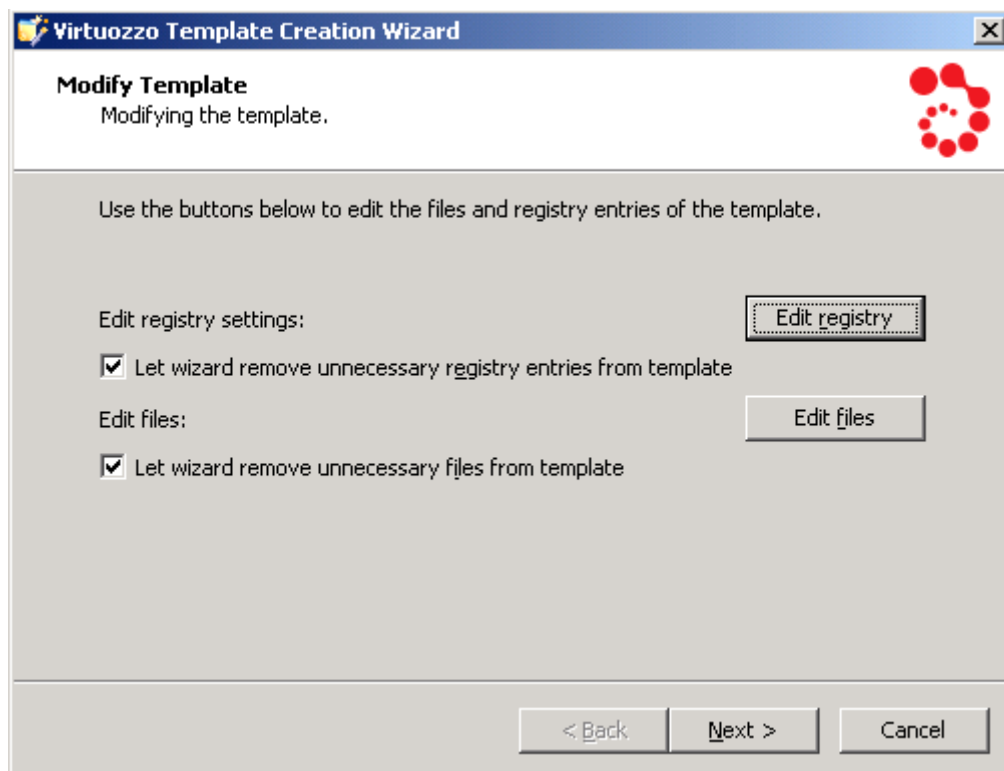


Figure 27: Template Creation Wizard - Choosing Application Template

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 28: Template Creation Wizard - 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 **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 wizard look through 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 files and folders will be marked red and the folders containing them - reddish. For example:

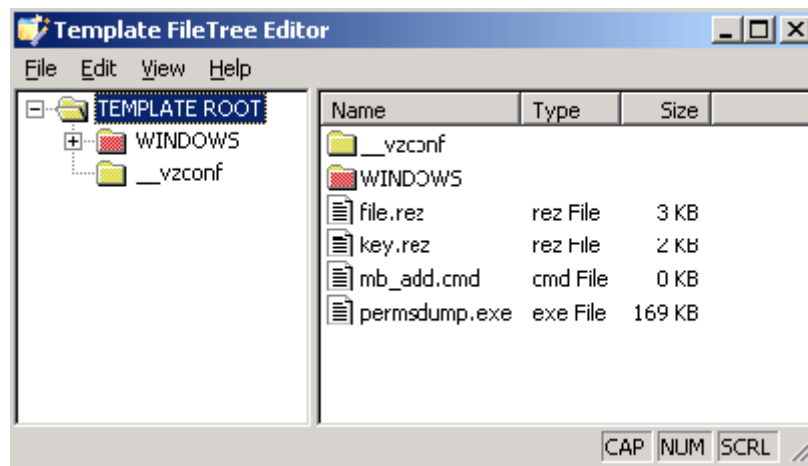


Figure 29: Template Creation Wizard - Viewing Files/Folders to Remove

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:

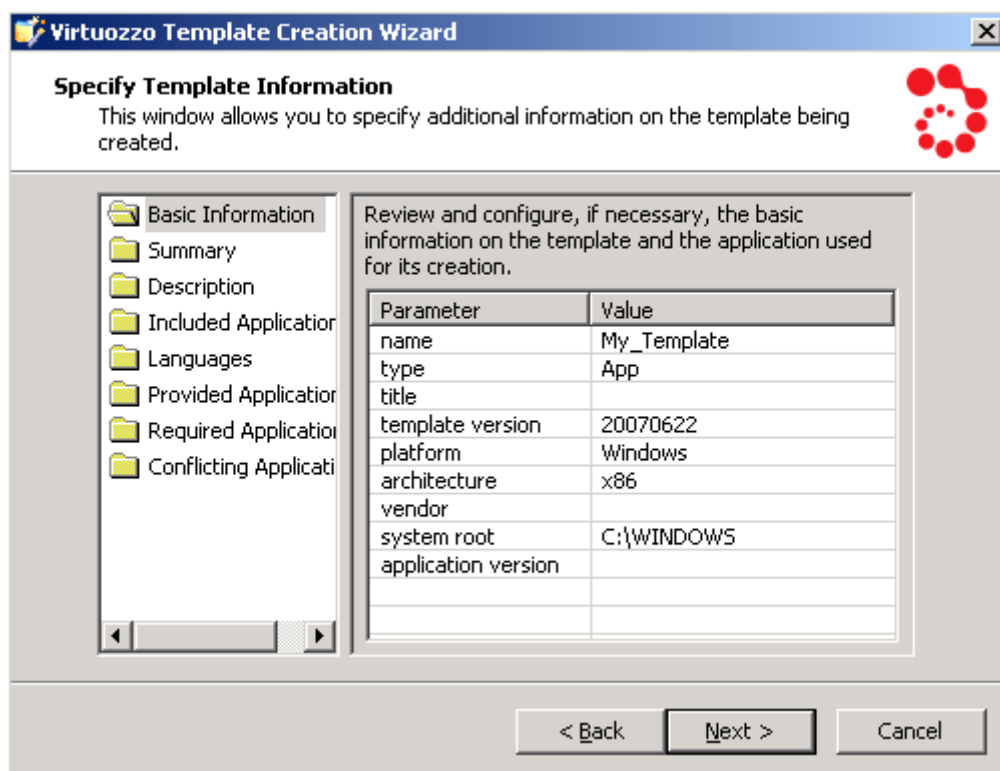


Figure 30: Template Creation Wizard - Providing Template Information

All template parameters (except for the **Included Applications** folder) that you can configure on this screen are explained in the **Creating Template From Manually Added Data** section (p. 26) in detail.

The **Included Applications** folder in the **Specify Template 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:

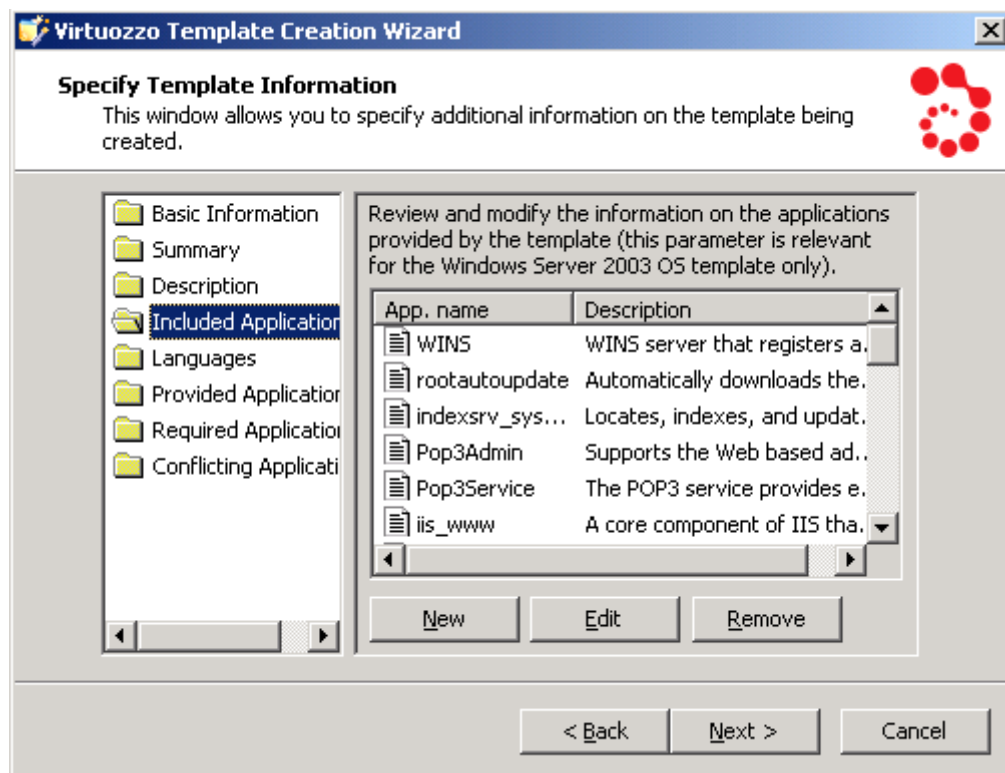


Figure 31: Template Creation Wizard - Configuring OS Template Applications

When you select this folder, you will be presented with a table displaying the names and descriptions of all applications included in the given Windows Server 2003 OS template or the corresponding MUI template. These names and descriptions coincide with those of standard Windows components and are automatically installed inside Containers based on this template during their creation. In this window you can:

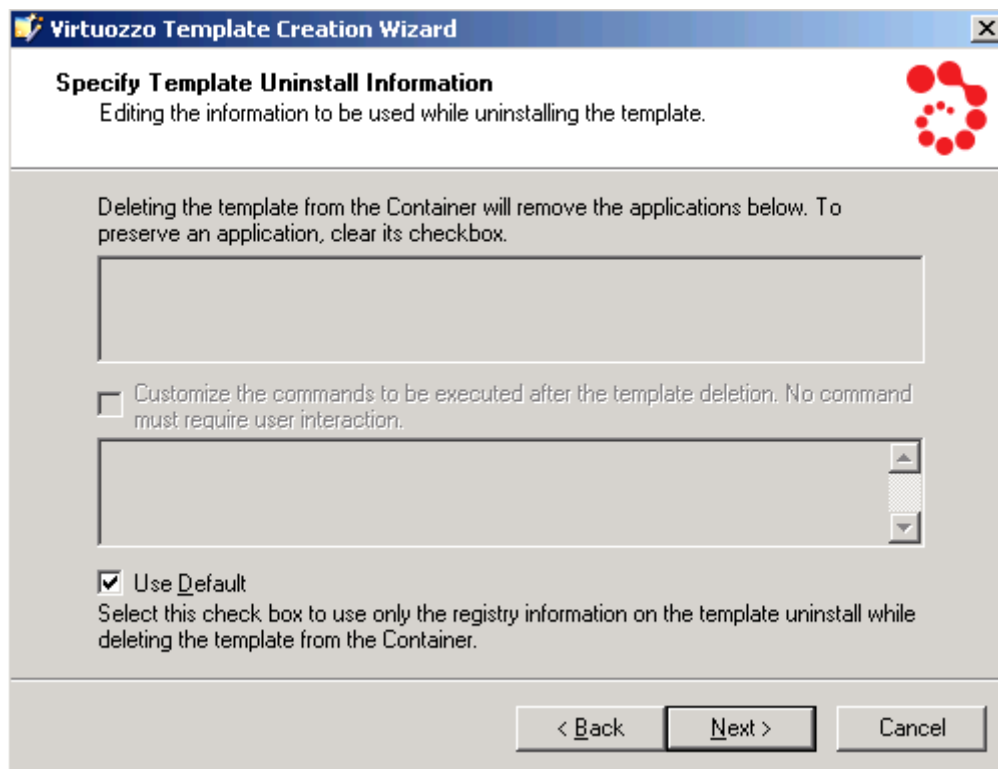
- Modify the name and description of any application by selecting this application in the table, clicking the **Edit** button, and making the necessary changes in the displayed window.
- Delete the name and description of any application by selecting this application in the table and clicking the **Remove** button. For example, this may be necessary if you are going to add some application template to your Container and this template conflicts with some standard Windows application listed in the table on the **Specify Template Information** screen. In this case you can remove the information on the corresponding application from the table, thus, resolving the conflict with template to be added to the Container.

Please keep in mind that deleting the application name and description only removes this information from the XML file associated with the template; the application itself is not removed from the template.

- Add the information on a new Windows application by clicking the **New** button and typing the application name and description in the fields provided. For example, this may be necessary if you are going to add some application template to your Container and this template requires some standard Windows application not listed in the table on the **Specify Template Information** screen to be installed inside this Container. In this case you can add the name and description of the required Windows application to the table, thus, allowing the template to be applied to your Container.

Please keep in mind that adding the application name and description to the table only adds this information to the template XML file; the application itself is not added to the template.

On the next step of the wizard, you can change the operations to be performed inside a Container after removing the updated application template from the Container.



*Figure 32: Template Creation Wizard - 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 Container 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 the **Next** button for the changes applied to your template to come into effect. However, before you can start using the newly created template, you should remove the original template from the Hardware Node and install the modified template on it by means of Parallels Management Console or the `vzpkgdeploy` utility. Please consult the **Uploading and Installing New Virtuozzo Templates on Hardware Node** section (p. 33) and **Parallels Virtuozzo Containers for Windows Reference Guide**, respectively, to learn how you can install your application templates on the Node.

---

# Creating and Installing Application Template Updates

Sometimes, you may need to update one or more application templates installed on your Hardware Node. This may happen, for example, in case the distribution vendor provides a new version of some application. If it is added from a template to certain Containers, this application should be updated to the new version in these Containers. The easiest way to do it is to create the corresponding template update, install it on the Hardware Node, and add it to the needed Containers. All these operations can be performed with the help of the **Virtuozzo Template Creation** wizard. In the process of creating a template update, the wizard completes the following tasks:

---

**Notes:** 1. The functionality of creating application templates is available since update 5 of Parallels Virtuozzo Containers 4.0. You can check the number of the latest Parallels Virtuozzo update installed on your Node by opening Control Panel, double-clicking **Add or Remove Programs**, and navigating to the latest Virtuozzo Containers update in the **Currently installed programs** table. If you have update 5 installed, it will be shown as `Parallels Virtuozzo Containers 4.0 update 400005`. If you do not have this update installed, please refer to the **Keeping Your Virtuozzo Containers System Up-to-Date** chapter of the **Parallels Virtuozzo Containers 4.0 User's Guide** to learn how you can do it.

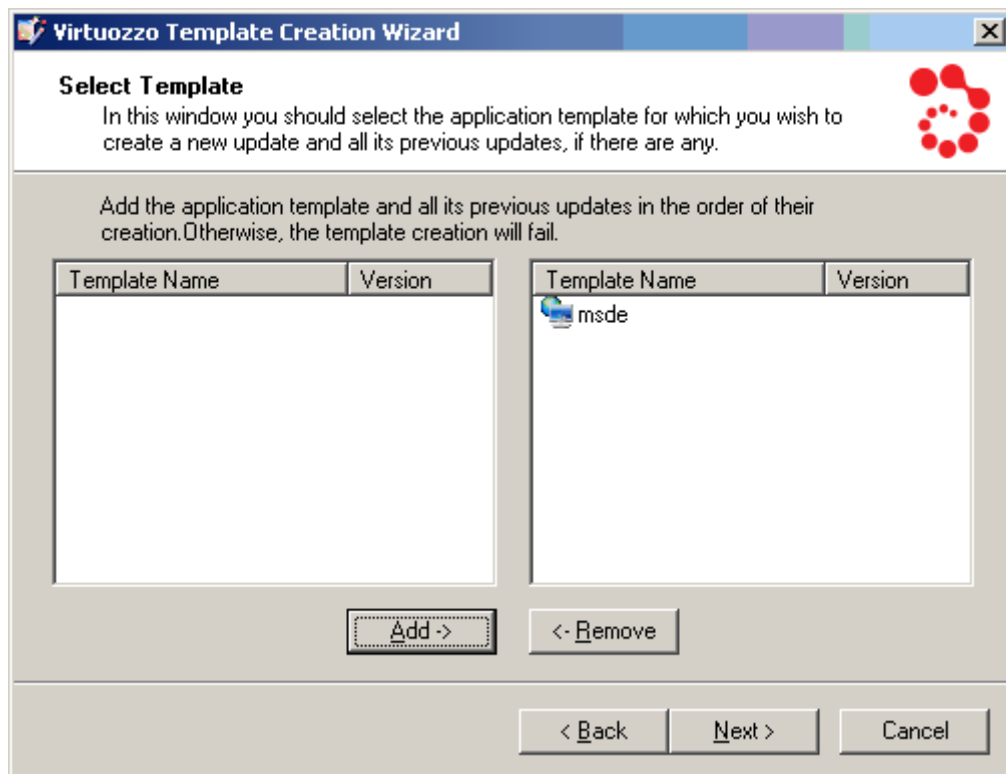
2. Currently, the **Virtuozzo Template Creation** wizard enables you to create application template updates only.

---

- 1 Installs the original template and all its previous updates, if any, inside a temporary Container and stores the Container state after the template installation.
- 2 Tracks and records all the changes in the temporary Container registry settings and files resulting from installing the new version of your application inside this Container.
- 3 Saves the collected changes into a special file containing all the template update-related information and installs it on the Hardware Node, if necessary.

In order to invoke the wizard, select **Programs --> Parallels --> Parallels Virtuozzo Containers --> 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 **Create an update for an existing template** radio button and click **Next** to proceed with the template update creation.

On the first step of the wizard, you are asked to select the application template for which you wish to create a new update:



*Figure 33: Template Creation Wizard - Selecting Templates*

The left pane of the **Select Template** window lists all the application templates currently installed on the Hardware Node. To select the template for preparing an update, select its name and click the **Add** button. The template will be moved to the right pane of the displayed window. If you already have one or more application template updates installed on your Node, they are also shown in the left pane and must be added to the right pane in the order of their creation. To move the template or any of its updates back to the left pane, select the template or template update name in the right pane and click **Remove**.

---

**Note:** You can create an update for one application template at a time. If you wish to create updates for several application templates, you should run the **Virtuozzo Template Creation** wizard several times.

---

After selecting the required template and its updates, click **Next** to display the **Specify Container Settings** window:

Figure 34: Template Creation Wizard - Defining Container Settings

In this window you are prompted to set the parameters for a special Container which is automatically created by the wizard for the period necessary for making the template update. After the template update has been successfully created and copied to the Hardware Node, the temporary Container will be removed from the Hardware Node (unless the **Do not remove Container after template creation** check box is selected).

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

- In the **CT ID** field, specify the ID to be assigned to the temporary Container. Make sure that the Container with the specified ID does not exist on your Node. Otherwise, you will be warned with a message asking you to choose another Container ID.
- In the **CT disk space limit** field, type the amount of disk space to be allocated to the temporary Container, in megabytes. Make sure that the size of the template, all its updates, and the installation files of the updated application 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 and must be increased.
- Select the **Do not remove Container after template creation** check box to leave the temporary Container intact after the template update creation.
- In the **CT IP address** field, enter the IP address (it should be unique within your network) to be assigned to the temporary Container. You should specify a valid IP address to be able to connect to the Container via RDP at a later time.
- Indicate a DNS server that the temporary Container 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 Container 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 update installation files and the name of the resulting template update:

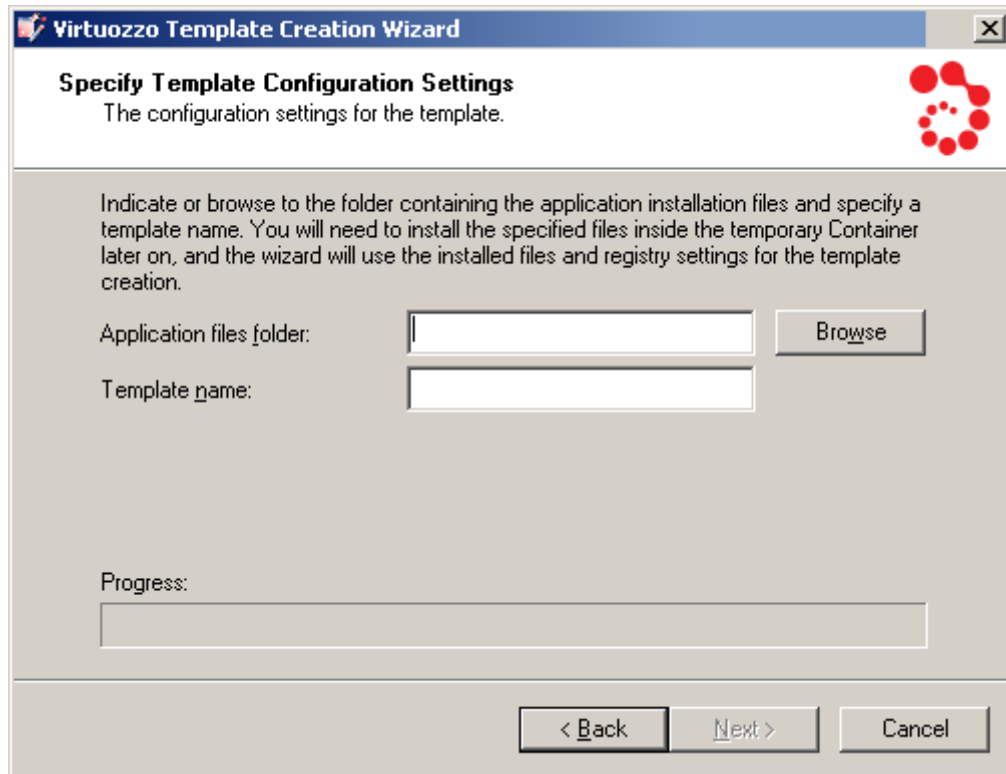


Figure 35: Template Creation Wizard - Specifying Template Parameters

- In the **Application files folder** field, you should enter the full path to the folder on the Hardware Node where the update installation files are located. Afterwards, the files from the folder specified in this file will be copied to and manually installed inside the created temporary Container. 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 update. You can type any alphanumeric identifier you consider reasonable for the template update file.

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

After the Container has been created and started, the **Connect to Container** window is displayed. Clicking **Next** in this window starts the process of adding the original template and all its previous updates, if any, to the temporary Container and establishing an RDP connection to it. The established RDP connection is used by the wizard to copy the update installation files from the Hardware Node to the temporary Container. After an RDP connection window is opened, minimize it and proceed with the wizard.

---

**Notes:** 1. Please do not close the RDP connection window manually.

---

2. If you are connected to the Hardware Node using an RDP client, you may need to complete the following operations to switch from the Container RDP connection window to the Hardware Node one:

- a) Click the **Restore** button on the RDP connection bar of the Container RDP connection window to exit from the Container RDP full-screen mode.
- b) On the RDP connection bar of the restored window, click the **Minimize** button to minimize the Container RDP connection window.
- d) Click the **Maximize** button in the upper-right corner of the displayed window to return to the Hardware Node RDP full-screen mode.

The **Prepare to Install Application Files** screen allows you to perform the final preparations before installing the update installation files inside the temporary Container. So, you may wish to open the minimized RDP connection window and locate the update installation files that have been copied inside the Container. These files are located in the root directory of the Container (e.g. `C:\App_update.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 update installation files inside the temporary Container; you can also customize the installed application to meet your demands. All the changes resulting from installing the update installation files inside the Container and customizing the installed application will be saved later on as the template update. Please do not perform any operations that are not related to the application update installation and customization since all registry and file system changes made inside the Container after the RDP connection is established will also be recorded and included in the template update. 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 update creation:

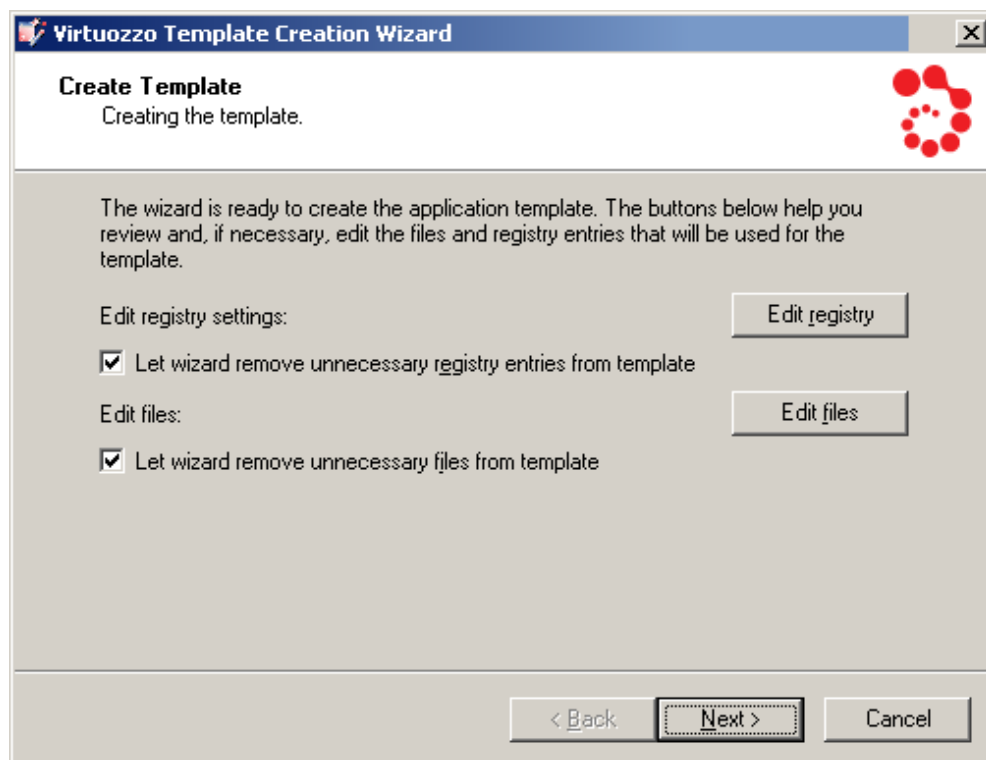


Figure 36: Template Creation Wizard - Making Final Preparations

In this window you can use the **Edit registry** and **Edit files** buttons to review and edit the registry entries and files that are meant for making the template update.

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 through and analyze all registry settings and folders/files to be used for the template update 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 update or may even cause the template update to malfunction and exclude them from the template update creation process. You can easily find out what registry entries and folder/files will not be included in the template update by clicking the **Edit registry** and **Edit files** buttons, respectively, and exploring the contents of the displayed windows. Unnecessary and suspicious files and folders will be marked red and the folders containing them - reddish. For example:

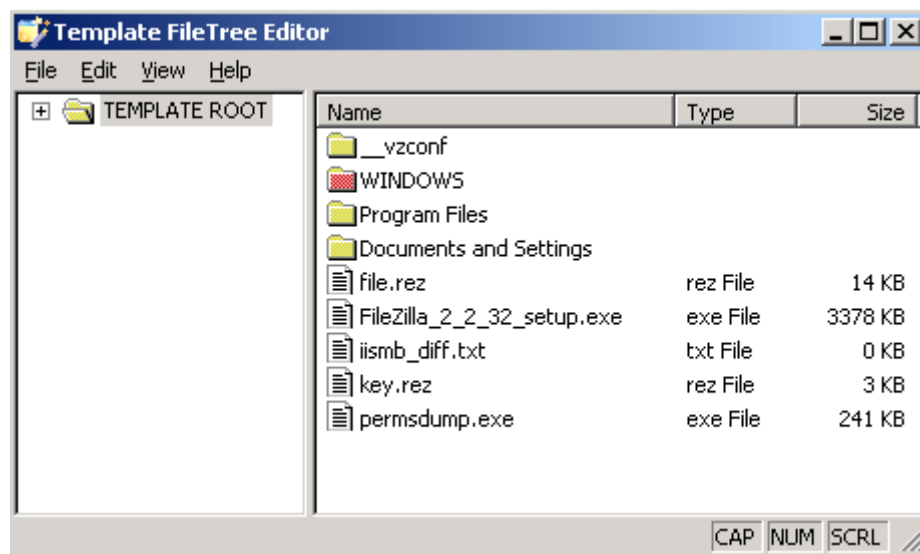


Figure 37: Template Creation Wizard - Viewing Files/Folders to Remove

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

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

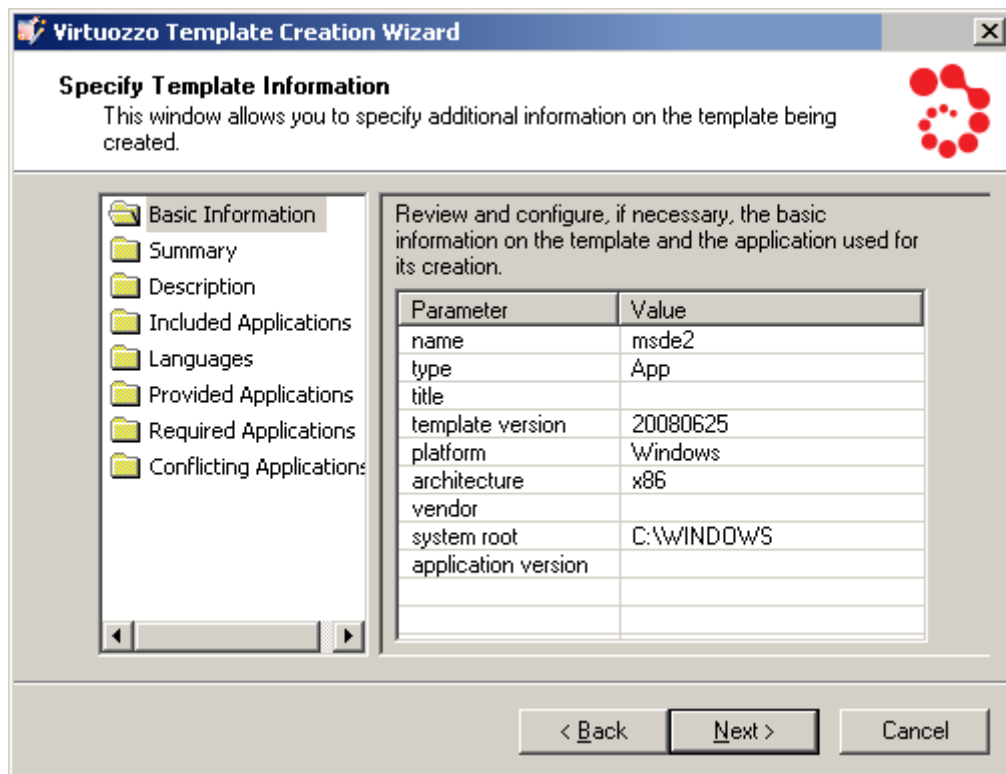


Figure 38: Template Creation Wizard - Providing Template Update Information

All template update parameters that you can configure on this screen are explained in the *Creating Template From Manually Added Data* section (p. 26) in detail.

---

**Note:** By default, the **Required Applications** folder contains the template for which the new update is intended and all its previous updates. You can add any other templates or applications to this folder, but you are not recommended to remove any of the already present templates. Otherwise, the updated application may not work properly.

---

On the next step of the wizard, you can change the operations to be performed inside a Container after removing the template update from this Container.

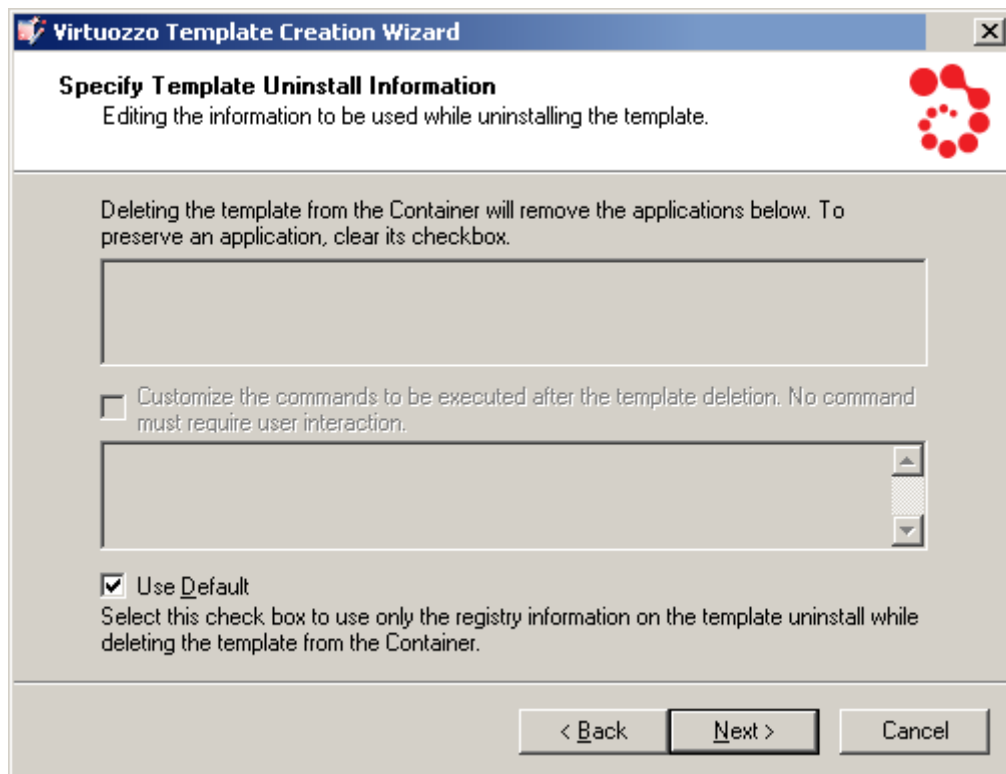


Figure 39: Template Creation Wizard - Template Update Uninstall Information

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

- Clear the **Use Default** check box and then clear the check boxes of the applications to be preserved during the template update 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 update removal from the Container 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 update.

The next step of the wizard allows you to install the template update on the Hardware Node:

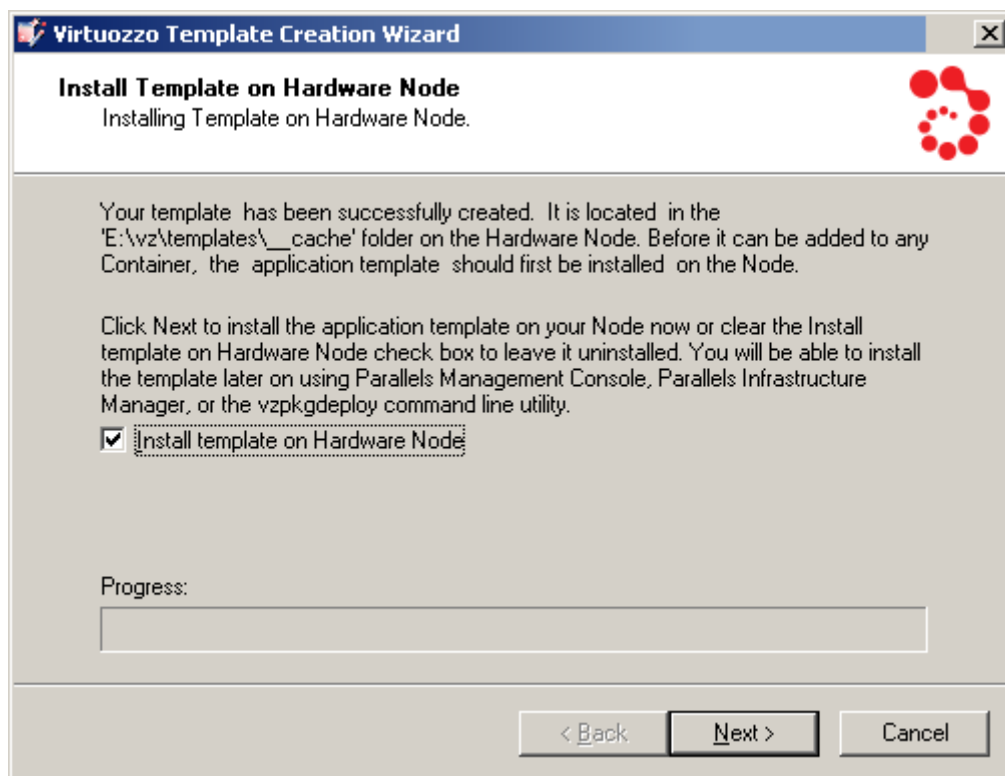


Figure 40: Template Creation Wizard - Installing Update Template

Each new template update should be installed on the Node before it can be applied to your Containers. Click **Next** to install the template update on your Hardware Node right after its creation. If you do not wish to install the template update at the moment, clear the **Install template on Hardware Node** check box and click **Next**. You will be able to install it later on by means of Parallels Management Console or the `vzpkgdeploy` utility. Please consult the **Uploading and Installing New Virtuozzo Templates on Hardware Node** section (p. 33) and **Parallels Virtuozzo Containers for Windows Reference Guide**, respectively, to learn how you can install templates and their updates on your Node.

The last screen of the wizard informs you that the template update has been successfully created and enables you to change the default location of the template update. By default, it is placed to the `X:\vz\Templates\__cache` folder on the Hardware Node where `X` denotes the disk drive set for storing Virtuozzo program files. You can change this location by selecting the **Save the template to another location** check box and specifying the path to the desired folder in the field provided. However, if you plan to install the template update on this Node, you should save it to the default folder.

Click **Finish** to exit the wizard.

---

**Note:** The information you specify during the template update creation is stored in a special XML file and used when performing certain operations on the template update. For example, it is used when you add the template to a Container. In this case Virtuozzo Containers 4.0 checks if the Container meets all the conditions set for the template update in its XML file (e.g. whether all the required templates and templates updates you indicated in the **Required Applications** folder on the **Specify Template Information** screen are installed inside the Container).

---

## Listing Templates

You may want to list the templates installed on the Hardware Node. They may be already used or not used by certain Containers. To list templates in Parallels Management Console, it is sufficient to choose the **Templates** item under the corresponding Hardware Node name and select either the **OS Templates** or **Application Templates** tab to see a list of the OS or application templates installed on the Node, respectively. For example:

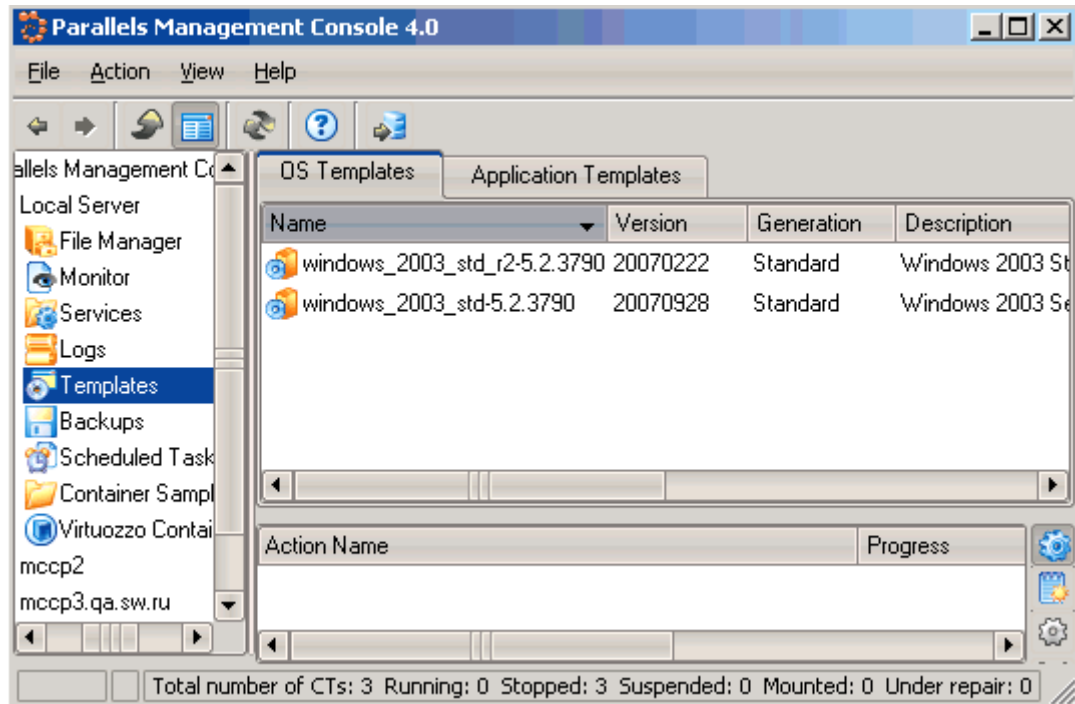


Figure 41: Management Console - Listing Templates

To see the templates used by a particular Container, double-click the needed Container in the Container list in the right pane to open this Container management window, and then again choose the **Templates** item and click the **OS Templates** or **Application Templates** tab 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 Containers. Detailed information on this utility can be found in the *Parallels Virtuozzo Containers Reference Guide*.

# Adding Templates to Single Container

After you have installed a number of application templates on the Hardware Node, you may add them to any number of Containers. To successfully add a template to a Container, this Container should be running. Parallels Management Console provides you with a special wizard - **Virtuozzo Template Installation Wizard** - allowing you to easily add an application template to a particular Container on your Hardware Node. To invoke the wizard:

- 1 Open a list of Containers in the Management Console main window by selecting the **Virtuozzo Containers** item in the Hardware Node tree.
- 2 Right-click the Container (it must be running) where you wish to add the template and select **Templates --> Add/Update Virtuozzo Templates** on the context menu.

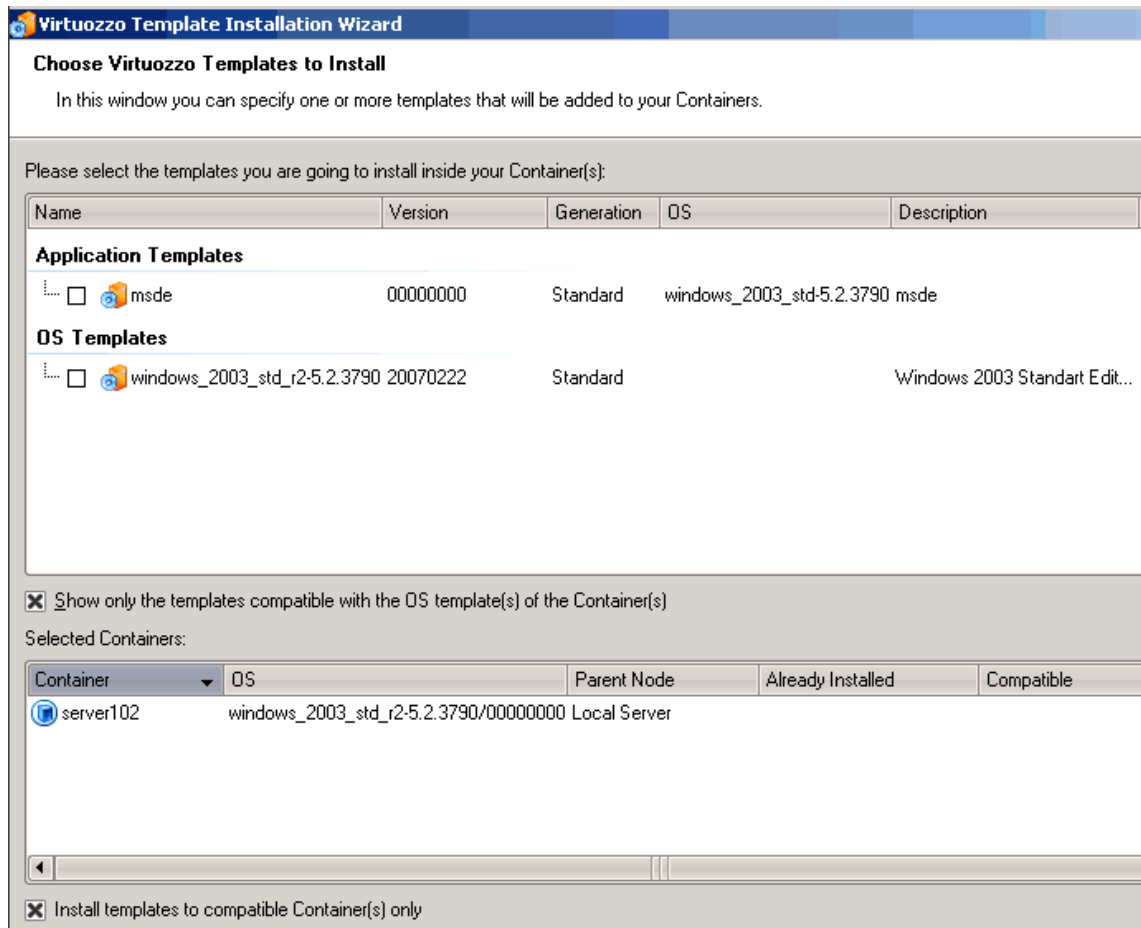


Figure 42: Management Console - Adding Template to Single Container

In the **Choose Virtuozzo Templates to Install** window, you should select one or more templates to be added to the Container. This window is divided into two parts:

- The table in the top part of the window lists all the templates compatible with the given Container. You can view all the templates (both compatible and incompatible with the Container) currently installed on the Hardware Node by clearing the **Show only the templates compatible with the OS template of the Container** check box. To schedule a template for installation, select its check box in the table and click **Next**. You can also make use of the **Select All/Deselect All** buttons to select/deselect all the listed templates at once.
- The table at the bottom of the window displays the information on the Container where the selected template is to be added:

Column Name	Description
Container	The name assigned to the Container.
OS	The OS template the Container is based on.
Parent Node	The Hardware Node where the Container is residing.
Already Installed	Indicates whether the selected template is already installed inside the Container.
Compatible	Indicates whether the Container is compatible with the selected template.
Available	Indicates whether the selected template is installed on the Hardware Node where the given Container is hosted.  This option is relevant only for those Containers that reside on Hardware Nodes belonging to a Virtuozzo Group. In this case if the selected template is marked as unavailable (i.e. 'No' is displayed in the column), it means that the template is installed on another Node in the Virtuozzo Group and cannot be added to the Container.

On the next screen, you can select the **Force template installation** check box to force the template installation inside the Container. In this case no dependencies and no available versions of the application template will be checked during its installation, which may cause the template to malfunction.

The last screen 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 template to the Container; otherwise, click **Back** and change the necessary parameters.

You can also add a template to an individual Container by doing the following:

- 1 Open the list of Containers in the Management Console main window by selecting the **Virtuozzo Containers** item in the Hardware Node tree.
- 2 Double-click the name of the Container where you want to add a template.
- 3 Select the **Templates** item in the main tree of the opened Container Manager, click the **Application Templates** tab, right-click somewhere in the top part of the Management Console right pane, and select the **Add Virtuozzo Application Template** option on the context menu.
- 4 Follow the instructions of the wizard.

## Adding Application Templates to Group of Containers

To add an application template to a group of Containers at once, you should perform the following operations in Parallels Management Console:

- 1 In the Management Console left pane, expand the **Templates** item under the name of the Hardware Node where the needed templates are installed.
- 2 In the Management Console right pane, click the **Application Template** tab to see a list of application template currently installed on the Node.
- 3 Select all the necessary templates holding down the **CTRL** or **SHIFT** keys where necessary.
- 4 Right-click the selection and choose the **Install Into Containers** option:

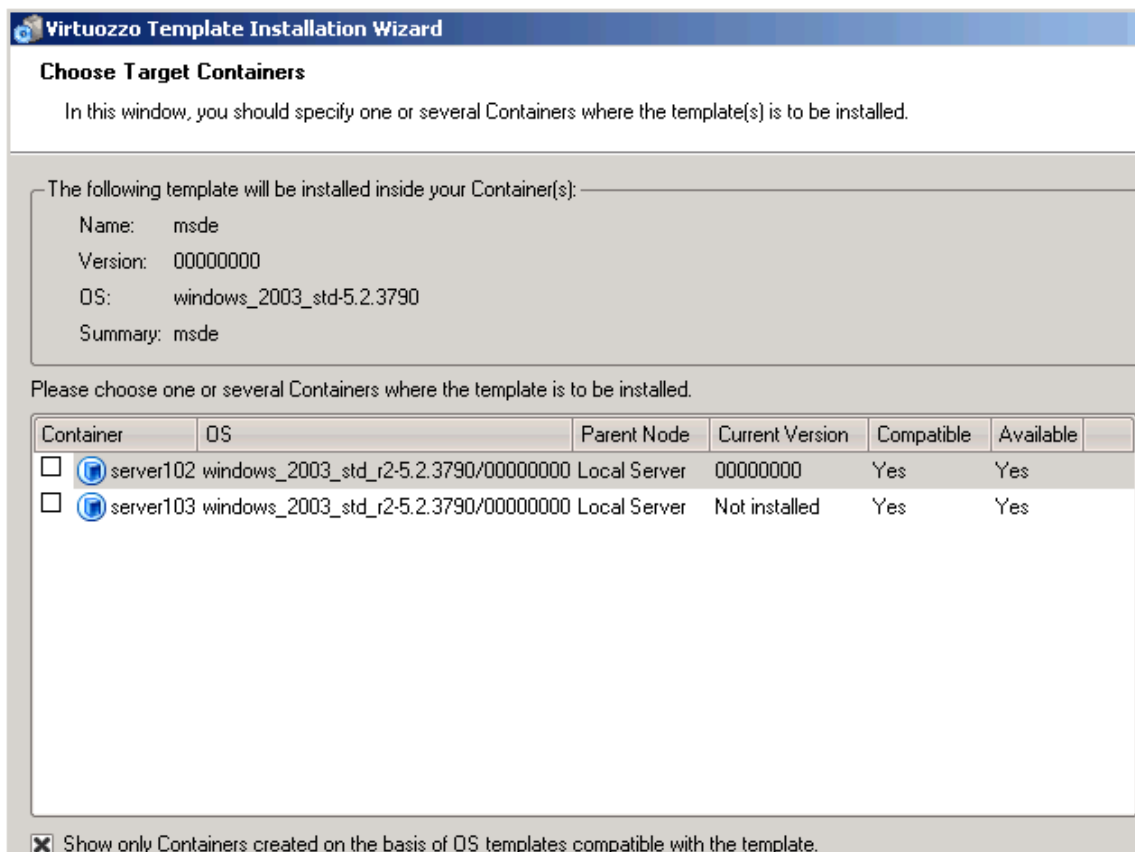


Figure 43: Management Console - Adding Template to Containers

- 5 Select the check boxes of the Containers where the application template is to be added and click **Next**. You can use the **Select All/Deselect All** buttons to select/deselect all Containers listed in the **Choose Target Containers** window. When choosing the Containers where the template is to be installed, keep in mind the following:
  - Only running Containers are displayed in the table of the **Choose Target Containers** window since Virtuozzo Containers 4.0 allows you to add templates to running Containers only.

- By default, the table in the **Choose Target Containers** window shows only those Containers that are compatible with the OS template used for the creation of these Containers. To view all the Containers existing on the given Hardware Node, clear the **Show only Containers ...** check box.
- 6** On the **Set Template Installation Options** screen, click **Next**.
  - 7** 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 Container; otherwise, click **Back** and change the necessary parameters.

Another way of adding one or more application templates is the following:

- 1** In the Management Console left pane, select the **Containers** item under the corresponding Hardware Node name.
- 2** In the Management Console right pane, select the Containers where the template is to be added using the CTRL and SHIFT keys.
- 3** Right-click the selection and choose **Templates --> Add/Update Virtuozzo Templates** on the context menu.
- 4** In the **Choose Virtuozzo Templates to Install** window, select the application template to be installed and click **Next**.
- 5** In the **Set Template Installation Options** window, select the **Force template installation** check box, if necessary.
- 6** In the **Review Virtuozzo Templates Installation Settings** window, 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 Container; otherwise, click **Back** and change the necessary parameters.

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

---

**Notes:** 1. You can as well do without templates and install virtually any application directly inside any Container 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 Containers, you should use only 64-bit application templates to add them to your Containers.

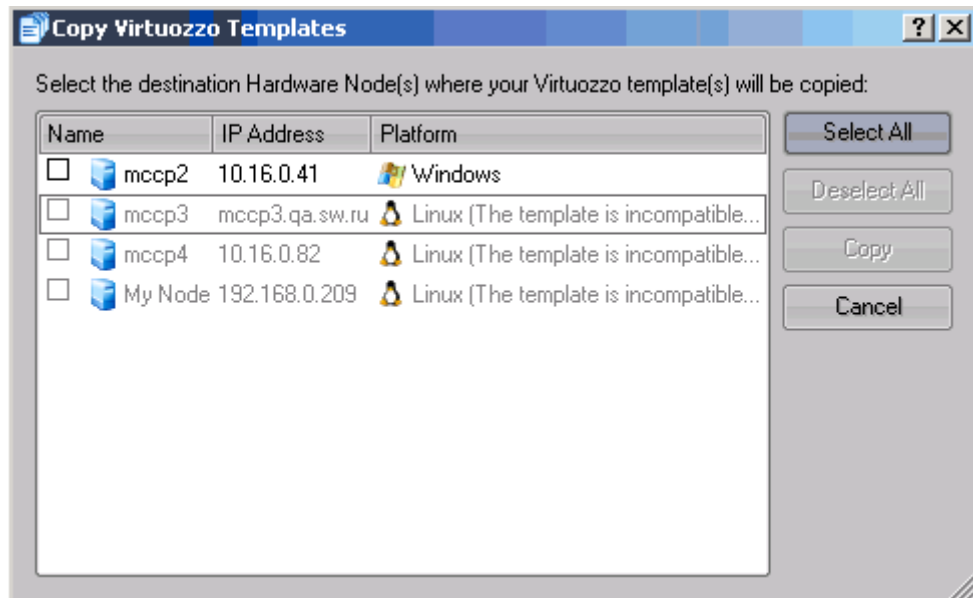
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## Copying Templates to Another Hardware Node

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

- 1 Select the **Templates** item under the Hardware Node name where the template to be copied is installed and select either the **OS Templates** or **Application Templates** tab depending on whether you wish to copy an OS or application template, respectively.
- 2 In the Management Console right pane, right-click the template and select **Tasks --> Copy to Another Hardware Node** on the context menu:



*Figure 44: Management Console - Copying Templates*

In the displayed window, you can view a list of Hardware Nodes currently registered in Parallels Management Console. You can copy the template to any of the listed Nodes provided it is compatible with the Host OS installed on this Node. To this effect, select the check box next to the template name and click the **Copy** button to the right of the table.

## Removing Application Templates From Container

Parallels Management Console allows you to remove an application template from a Container. To this effect, you should:

- 1 Open a list of Containers in the Management Console main window by selecting the **Virtuozzo Containers** item under the corresponding Hardware Node name.
- 2 Double-click the name of the Container wherefrom you want to delete a template to open the Container Manager.
- 3 Select the **Templates** item in the main tree of the opened Container Manager and click the **Application Templates** tab to see a list application templates currently applied to the Container.
- 4 Right-click the application template you wish to delete and select the **Delete** option on the context menu:

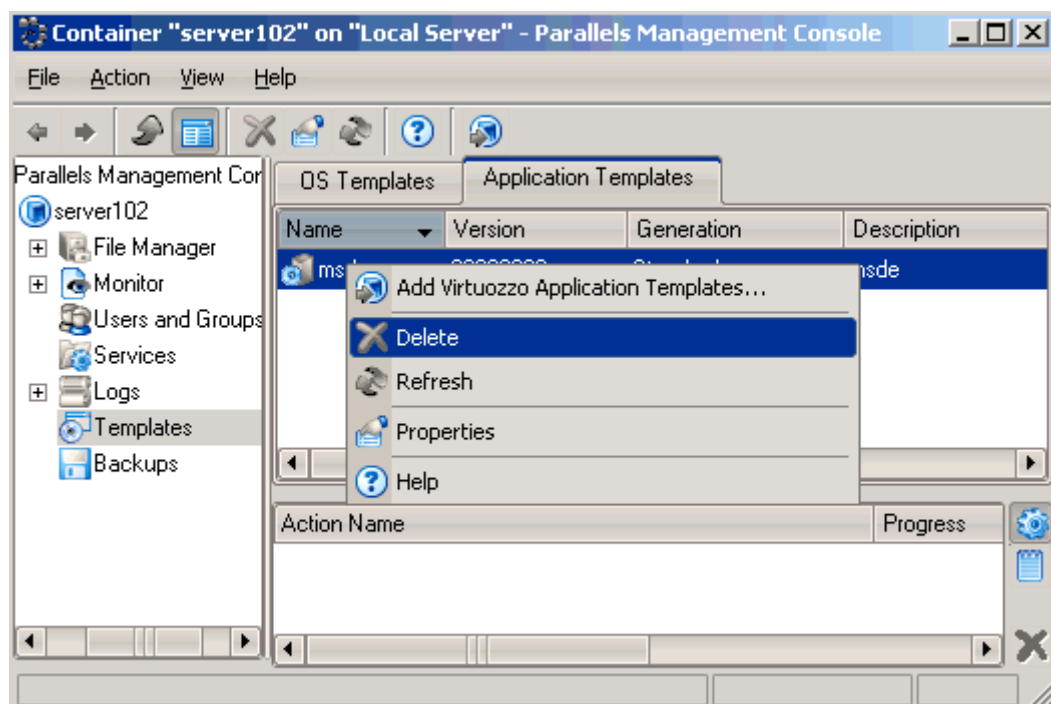


Figure 45: Management Console - Removing Application Templates From Container

- 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 Container.

Besides, you can use the Virtuozzo `vzpkgrm` utility to remove application templates from Containers. Detailed information on the `vzpkgrm` utility can be found in the **Parallels Virtuozzo Containers Reference Guide**.

## Removing Template From Hardware Node

Virtuozzo Containers 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 Select the **Templates** item under the corresponding Hardware Node name in the Parallels Management Console main tree.
- 2 Click on either the **Application Templates** or **OS Templates** tab to display a list of all application or OS templates installed on the Node, respectively.
- 3 Right-click the template you wish to delete in the right pane and select the **Delete** option on the context menu:

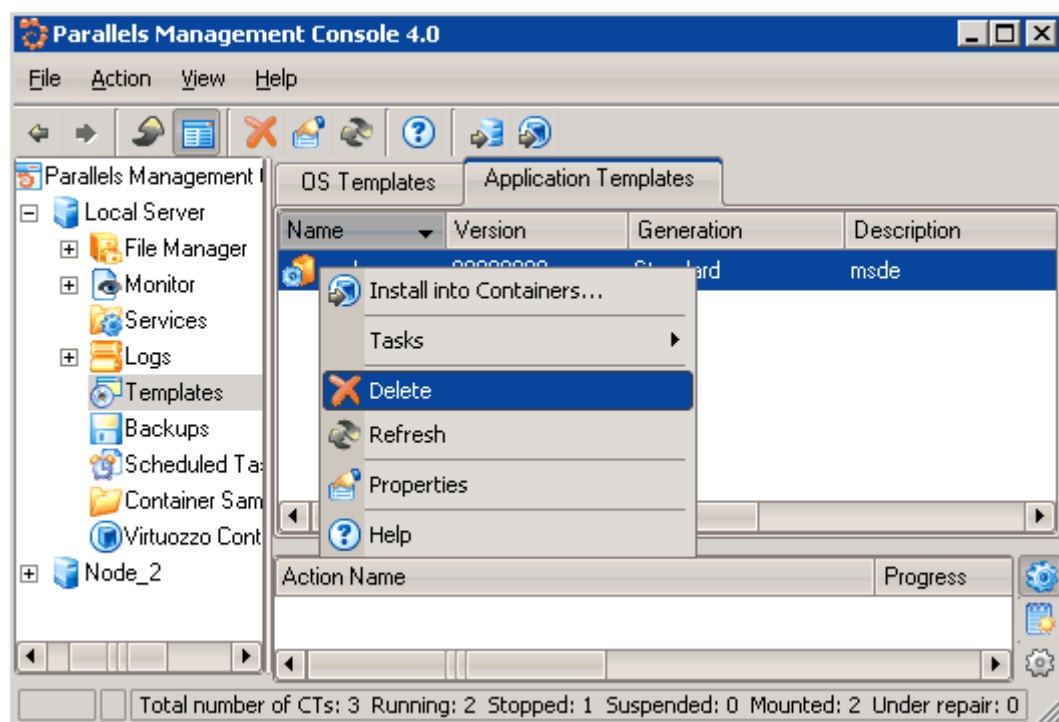


Figure 46: Management Console - Removing Template From Hardware Node

Please keep in mind that you cannot remove the templates currently applied to one or more Containers 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 *Containers*. See also *Template*.

*Container* (or *regular Container*) 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. Containers share one *Hardware Node* and one OS kernel. However, they are isolated from each other. A Container is a kind of 'sandbox' for processes and users. *Container 0* and *Container 1* are used to designate the *Hardware Node* and the *Service Container*, respectively.

*Container 0* is used to designate a *Hardware Node* where the *Virtuozzo Containers* software is installed.

*Container 1* is used to designate the *Service Container*.

*Hardware Node* (or *Node*) is a server where the *Virtuozzo Containers* software is installed for hosting *Containers*. Sometimes, it is marked as *Container 0*.

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

*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.

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

*Parallels Infrastructure Manager* (or *Infrastructure Manager*) is a tool designed for managing *Hardware Nodes* and all *Containers* residing on them with the help of a standard Web browser on any platform.

*Parallels Management Console* (or *Management Console*) is a *Virtuozzo Containers* management and monitoring tool with graphical user interface. It is used to control individual *Hardware Nodes* and their *Containers*. *Management Console* is cross-platform and runs on both Microsoft Windows and Linux workstations.

*Parallels Power Panel* is a means for administering personal *Containers* with the help of a standard Web browser (Internet Explorer, Mozilla, etc.) on any platform.

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

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

*Service Container* is a special *Container* automatically created on the *Hardware Node* during the *Virtuozzo Containers* installation and needed to manage your *regular Containers* by means of *Parallels Infrastructure Manager*, *Parallels Power Panel*, and *Parallels Management Console*. Sometimes, the *Service Container* is marked as *Container 1*.

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

*Template* 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 *Containers* with a preinstalled operating system. *Application templates* are used to install an application or a set of applications in *Containers*.

*Virtual Environment* (or *VE*) is an obsolete designation of a *Container*.

*Virtuozzo Control Center* (or *VZCC*) is an obsolete designation of *Parallels Infrastructure Manager*.

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

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

*Virtuozzo Power Panels* (or *VZPP*) is an obsolete designation of *Parallels Power Panel*.

*Virtual Private Server* (or *VPS*) is an obsolete designation of a *Container*.

*Parallels Agent* (or *Parallels Agent Protocol*) is an XML-based protocol used to monitor and manage a *Hardware Node*. The *Parallels Agent* software implements this protocol and is a backend for the *Parallels Management Console*.

# Index

## A

- About Parallels Virtuozzo Containers • 6
- About This Guide • 7
- About Virtuozzo Templates • 11
- Adding Application Templates to Group of Containers • 65
- Adding Templates to Single Container • 63
- Applications • 17, 28

## C

- Copying Templates to Another Hardware Node • 67
- Creating and Installing Application Template Updates • 53
- Creating Application Template • 14
- Creating Template From Installed Application Data • 17
- Creating Template From Manually Added Data • 28

## D

- DNS server • 17
- Documentation Conventions • 8

## F

- Feedback • 10

## G

- Getting Help • 9
- Glossary • 70

## I

- Installing MUI OS Template • 44
- Installing New Virtuozzo Templates on Hardware Node • 35
- Installing Windows Server 2003 R2 OS Template • 41
- Installing Windows Server 2003 Service Pack 2 Template • 37
- IP Address
  - Container • 17

## L

- Launching Virtuozzo Template Creation Wizard • 15

- Listing Templates • 62

## M

- Managing Templates • 34
- Modifying Template • 47

## N

- Node
  - Hardware • 35

## O

- Organization of This Guide • 7

## P

- Preface • 5

## R

- Registry • 14, 17, 28
- Removing Application Templates From Container • 68
- Removing Template From Hardware Node • 69

## T

- Template
  - application • 11, 14, 35, 62, 65, 68
  - creating • 14, 17, 28
  - installing • 35, 65
  - listing • 62
  - OS (Operating System) • 62
  - removing • 68
- Template Lifecycle • 13
- Templates Overview • 11

## U

- Understanding Templates Basics • 12