Parallels Virtuozzo Containers 4.6 for Windows

Templates Management Guide

Contents

Preface

In This Chapter

About Parallels Virtuozzo Containers 4.6

Parallels Virtuozzo Containers 4.6 is a patented OS virtualization solution. It 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 Parallels Virtuozzo Containers 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 Parallels Virtuozzo Containers system structure:

The Parallels Virtuozzo Containers 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 Containers 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 Containers 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.

About This Guide

This guide is meant to provide complete information on Parallels Virtuozzo Containers templates, an exclusive Parallels technology, allowing you to efficiently deploy standard Windows applications inside Containers and to greatly save your Hardware Node resources (physical memory, disk space, and so on). 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 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 Parallels Virtuozzo Containers Templates, introduces you to the concept of Parallels Virtuozzo Containers OS and application templates.

Chapter 3, Creating Application Templates, provides information on how to create your own application templates using the **Parallels Virtuozzo Containers 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 **Parallels Virtuozzo Containers 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:\>vzlist -a`**
`Monoscape`	The names of commands, files, and directories.	Use `vzctl start` 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 `vzctl delete` *`CT_ID`*.
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.	*Host operating system* 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	CTRL+P, ALT+F4

press and hold down one key and then
press another.

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.

Getting Help

In addition to this guide, there are a number of other resources available for Parallels Virtuozzo Containers 4.6 which can help you use the product more effectively. These resources include:

▪ *Getting Started With Parallels Virtuozzo Containers 4.6*. This guide provides basic information on how to install Parallels Virtuozzo Containers 4.6 on your server, create new Containers, and perform main operations on them.

▪ *Parallels Virtuozzo Containers 4.6 Installation Guide*. This guide provides exhaustive information on the process of installing, configuring, and deploying your Parallels Virtuozzo Containers system. Unlike the *Getting Started With Parallels Virtuozzo Containers 4.6* guide, it contains a more detailed description of all the operations needed to install and set Parallels Virtuozzo Containers 4.6 to work including planning the structure of your Parallels Virtuozzo Containers network, performing the Parallels Virtuozzo Containers unattended installation, etc. Besides, it does not include the description of any Container-related operations.

▪ *Parallels Virtuozzo Containers 4.6 User's Guide*. This guide provides comprehensive information on Parallels Virtuozzo Containers 4.6 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 Containers system.

▪ *Parallels Virtuozzo Containers 4.6 Reference Guide*. This guide is a complete reference on all Parallels Virtuozzo Containers configuration files and Hardware Node command-line utilities.

▪ *Parallels Management Console Help*. This help system provides detailed information on Parallels Management Console, a graphical user interface tool for managing Hardware Nodes and their Containers.

▪ *Parallels Virtual Automation Online Help*. This help system shows you how to work with Parallels Virtual Automation, a tool providing you with the ability to manage 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.

Feedback

If you spot a typo in this guide, or if you have an opinion about how to make this guide more helpful, you can share your comments and suggestions with us by completing the Documentation Feedback form on our website (http://sp.parallels.com/en/support/usersdoc/).

C H A P T E R 2

About Parallels Virtuozzo Containers Templates

This chapter introduces you to the concept of OS and application templates used by Parallels Virtuozzo Containers.

In This Chapter

Templates Overview

A template in Parallels Virtuozzo Containers 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. Memory savings are especially significant when the corresponding applications make extensive use of Dynamic Link Libraries (DLLs).

- 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 Parallels Virtuozzo Containers. 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 in the operating system during the OS template creation. Parallels Virtuozzo Containers 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 a specific application. Parallels Virtuozzo Containers 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 OS template and add the Adobe Acrobat Reader application to it with the help of the `AcrobatReader` application template.

In Parallels Virtuozzo Containers, 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.

Understanding Templates Basics

The *Parallels Virtuozzo Containers 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, Parallels Virtuozzo Containers creates the `X:\vz\Templates\<template_name>` folder containing all template-related files (where `X:\vz` denotes the folder you specified during the Parallels Virtuozzo Containers installation for storing all Container data).

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 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). This folder is seen as the root folder from within the Container. And, which is the pivot of it all, thanks to VZFS, the links of the Container private area are seen as real files there.

Template Lifecycle

Any template of any kind should be *created* first. You can create a template using the **Parallels Virtuozzo Containers Template Creation** wizard. In addition, a number of already created templates are shipped by Parallels with Parallels Virtuozzo Containers 4.6.

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

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 Virtual Automation, 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 Virtual Automation, or the `vzctl create` command. Any of the installed application templates, in turn, can be *added to any number of Containers* using the same Parallels Virtuozzo Containers tools or the `vzpkgadd` utility.

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

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

Any application template or application update can be *removed from the Container* with the help of Parallels Management Console, Parallels Virtual Automation, 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 Virtual Automation, or the `vzpkgdeploy -u` command.

Creating Application Templates

You may wish to use special software inside Containers to perform specific tasks or functions, such as word-processing, creating spreadsheets, generating graphics, sending and receiving electronic mail, etc. However, installing an application inside every Container where you want 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 Containers by using the technology of Parallels Virtuozzo Containers 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

Template Creation Restrictions

Before starting to create your own application templates, familiarize yourself with the restrictions that Parallels Virtuozzo Containers imposes on the application templates creation process:

▪ There may arise problems with creating templates from those applications that contain or install one or more drivers currently not supported by Parallels Virtuozzo Containers. To learn whether this or that driver is supported by the Parallels Virtuozzo Containers software, send a request to the Parallels support team.

▪ You cannot build templates from those applications that require one or more temporary Container reboots during their installation.

> **Note:** Detailed on the temporary Container is provided in the **Creating Template From Installed Application** section (p. 14).

▪ You cannot make templates from those applications that require the Active Directory service running inside a temporary Container during their installation.

▪ If the application for which you want to create a template (the main application) requires a prerequisite application to be pre-installed inside a Container, first create a template for the prerequisite application, and then create an update for the template by adding to it the files of the main

application. For example, to use the Microsoft SQL Server 2008 template inside Containers, you can do the following:
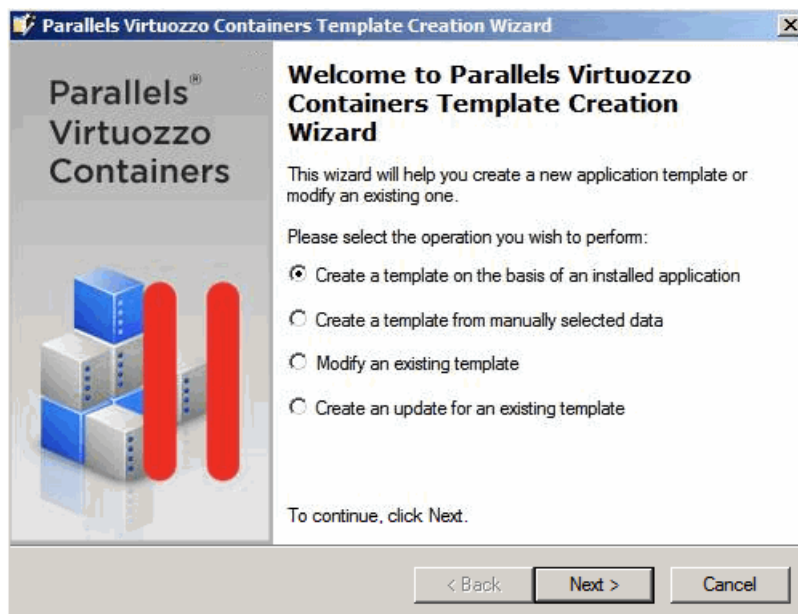
1. Create a template (the base template) for the Microsoft .Net 3.5 Service Pack 1 application. This application is a prerequisite application for Windows Installer 4.5, which, in turn, is a prerequisite application for SQL Server 2008.

2. Create an update for the base template, and include Windows Installer 4.5 in this update.

3. Create another update for the base template and for the update with Windows Installer 4.5, and include SQL Server 2008 in this update.

4. Install the base template and both updates into a Container in the order of their creation.

If you cannot create a template from your application because of one of the aforementioned restrictions or for some other reason, address your template creation request to the Parallels support team.

Launching Parallels Virtuozzo Containers Template Creation Wizard

Parallels Virtuozzo Containers provides a special wizard, the Parallels Virtuozzo Containers Template Creation wizard, for creating application templates. This wizard guides you through the creation process, gathers all the necessary information, and makes an application template for you. To invoke the wizard, select Programs > Parallels > Parallels Virtuozzo Containers > Parallels Virtuozzo Containers Template Creation Wizard on the Windows Start menu.

After you have launched the wizard, you are presented with the Welcome window.

In this window, you are asked to choose the way of creating the application template:

▪ Select the **Create a template on the basis of an installed application** radio button to create the 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 the 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.

Creating Template From Installed Application Data

To create an application template on the basis of the corresponding application installed in a special temporary Container, select the **Create a template on the basis of an installed application** radio button in the **Welcome** window and click **Next**.

Specifying Temporary Container Settings

In the first step, you are asked to specify the parameters for a temporary Container.
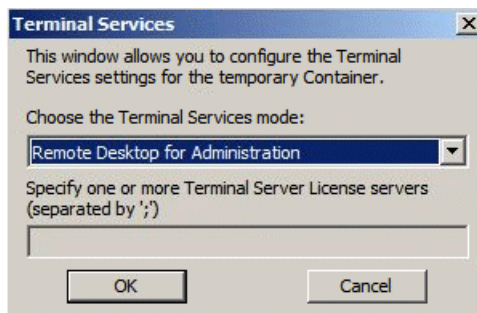

The temporary Container is automatically created by the wizard for the period necessary for making the application template. You will need to install the application installation files inside this Container later on, and the wizard will use the installed files and registry settings for the template creation. After the template has been successfully created and copied to the Hardware Node, the temporary Container is removed from the Hardware Node (unless the **Do not remove Container after template creation** check box is selected).

The fields you need to fill in in the **Specify Container Settings** window are explained in the table below:

Field Name	Description
Container ID	The ID to be assigned to the temporary Container. By default, the wizard offers the first unoccupied ID starting from 101. If you decide to change the offered ID, make sure that the Container with the specified ID does not exist on the Node. Otherwise, you will be warned with a message asking you to choose another Container ID.
Container disk space limit	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 want 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.
Do not remove Container after template creation	Defines whether the temporary Container is to be removed after the template creation or left intact.
Container IP address	The IP address (it must 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.
Use DNS server of Hardware Node	If selected, tells the temporary Container to use the same DNS server as the one used by the Hardware Node. You can clear the check box and indicate the desired DNS server in the **DNS server** field.
OS template	The OS template to be used for creating the temporary Container. You can leave the OS template offered by the wizard by default or click the down arrow and select the needed OS template on the drop-down menu.

You can also use the **Configure** button to define in which of the two standard Windows Terminal Services modes (Remote Desktop for Administration or Terminal Server) the temporary Container is to operate.

By default, the temporary Container is set to function in the Remote Desktop for Administration mode. If you want to use the Terminal Server mode, you will have to choose one of the two licensing schemes:

- device-based licensing (select the **Terminal Server (user-based access license)** radio button)
- user-based licensing (select the **Terminal Server (device-based access license)** radio button)

In both cases you will also have to specify one or more Terminal Server License servers in the **Specify one or more Terminal Server License servers** field.

Specifying Installation Files and Template Name

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

Do the following:

- In the **Application folder** field, enter the full path to the folder on the Hardware Node where the application installation files are located (if you have only one installation file, specify the full path to this file). Afterwards, the files from the folder specified in this field will be copied to and manually installed inside the 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 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, specify an arbitrary name for the resulting file that will contain the template. You can type any alphanumeric identifier you consider reasonable.

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

Preparing for Template Creation

After the Container has been created and started, the **Connect to Container** window is displayed. Click **Next** to establish an RDP connection to the temporary Container. The RDP connection is needed to copy the source application files from the Hardware Node to the 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.

Notes:

1. 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 window allows you to perform the final preparations before installing the application files inside the temporary Container. For example, you may wish to open the minimized RDP connection window and complete the following tasks:

- Locate the source application installation files and check that all the files have been successfully copied to the temporary Container. The source files are located in the root directory of the Container (e.g., C:\My_application.exe).

- Check the event logs inside the temporary Container and remove all the events that have occurred since the Container creation.

- Install specific server roles inside the temporary Container. This is needed if the template is intended for installing inside Containers running Windows Server 2008 and requires some server roles for its correct operation. The information on the installed server roles will then be collected by the wizard and added to the template configuration file. You will not be able to add the template to a Container until you install the necessary server roles inside it.

Note: If you are asked for credentials to log in to the temporary Container, use the `Administrator` user name and the `1q` password.

When you are ready, minimize the RDP connection window, and click Next.

Installing Application Files

When the Install Application Files window is opened, switch to the minimized RDP connection window, and manually install the 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. For example, if you want the `Messenger` service to be automatically launched inside a Container after applying the template to this Container, you can add the following string to the application `setup.cmd` file:
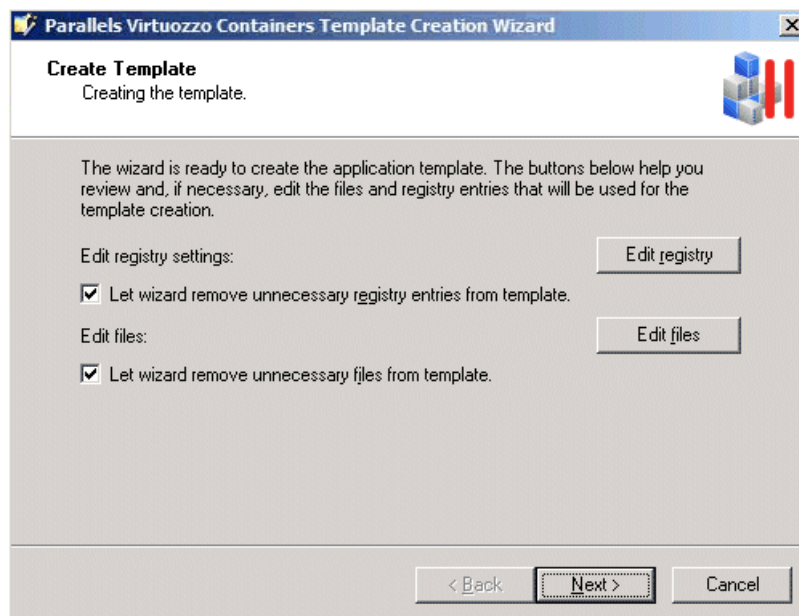
```
sc start messenger
```

Do not perform any operations that are not related to the application installation and customization because all registry and file system changes made inside the temporary 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.

Note: Once you start installing the source application files, do not install any server roles inside the temporary Container. If necessary, install them in the previous step of the wizard.
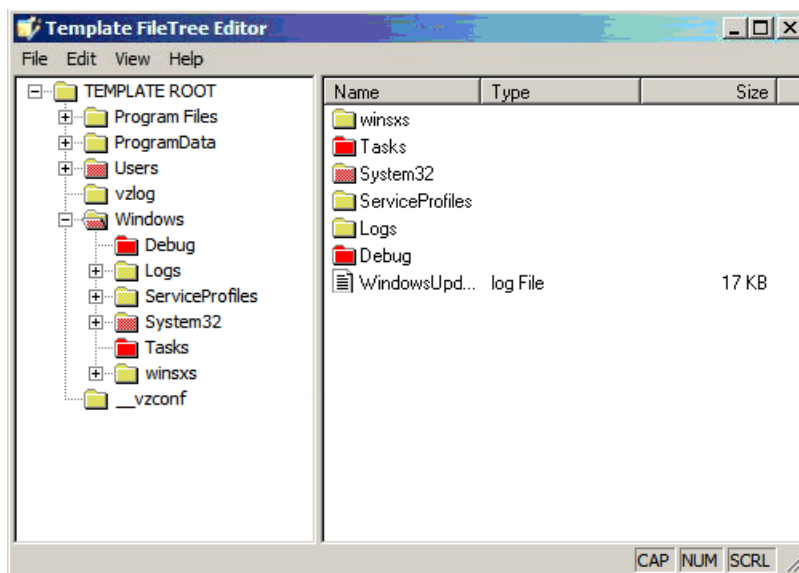
Editing Files and Registry Settings

The next screen of the wizard helps you review and configure the files and registry settings to be used for the template creation.

In this window, you can use the **Edit registry** and **Edit files** buttons to review and edit the registry entries and folders/files that are meant for making the application template.
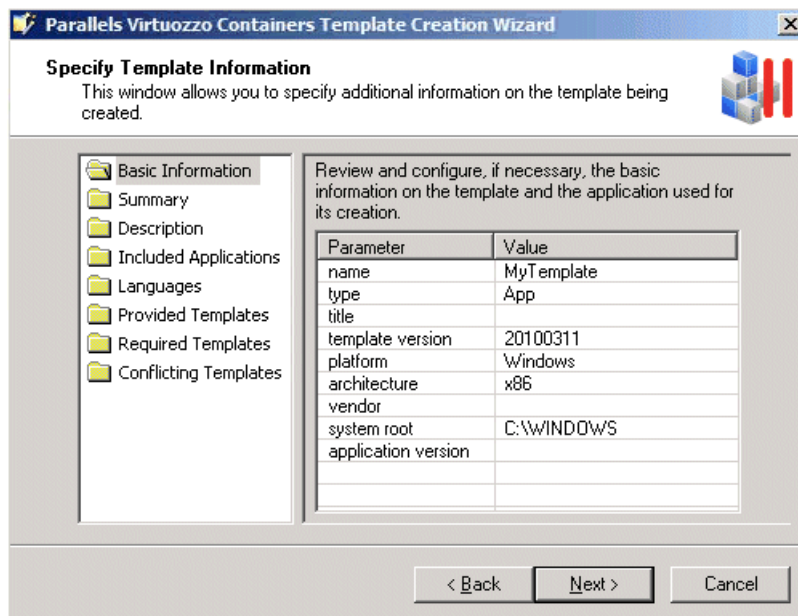
You can also make use of the **Let wizard remove unnecessary registry entries from template** and **Let wizard remove unnecessary files from template** check boxes. These check boxes, if selected, let the **Parallels Virtuozzo Containers Template Creation** wizard look through and analyze all registry settings and folders/files resulted from the application files installation inside the temporary Container and to be used for the application template creation. As a result of this operation, the wizard may select one or more registry entries and folders/files which are, in its opinion, of no use to the template and exclude them from the template creation process. You can easily find out what registry entries and folders/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 registry keys and folders/files are marked red and the folders containing them - reddish. For example:

If you do not want 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**.

Defining Template Configuration

In the next step of the wizard, decide on the template configuration.

First of all, you are prompted to review and, if necessary, modify the basic information on the template. To do this, select the **Basic Information** folder in the left part of the **Specify Template Information** window, and check the following fields:

Field Name	Description
name	Mandatory. The name to be assigned to the template. You can leave the name offered by the wizard or type any alphanumeric identifier of your choice. The specified name will be used to refer to the 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:
	▪ OS: must be indicated when creating OS templates.
	▪ App: must be indicated when creating application templates.
	▪ MUI: must be indicated when creating Multilingual User Interface (MUI) templates.
	Note: In the current version of Parallels Virtuozzo Containers, you can create application templates only.
title	Optional. The title of the template; it will be displayed by Parallels Virtuozzo Containers 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, respectively (e.g., 20100316 meaning that the template was created on the 16th of March, 2010).
platform	Optional. The operating system family with which the template is to be compatible. Can be either Windows or Linux.

	Note: Do not change the default value set to `Windows`.
`architecture`	Optional. The system architecture type with which the template is to be compatible. You can choose one of the following options:
  - `x86`: select this option if your template is intended for use on 32-bit architectures.
  - `x64_86`: select this option if your template is intended for use on x86-64-bit architectures.
  - `IA64`: select this option if your template is intended for use on IA64-bit architectures.
  - `All`: select this option to make the template compatible with 32-bit, x86-64-bit, and IA64-bit architectures.

By default, the system architecture type of your Hardware Node is displayed. |
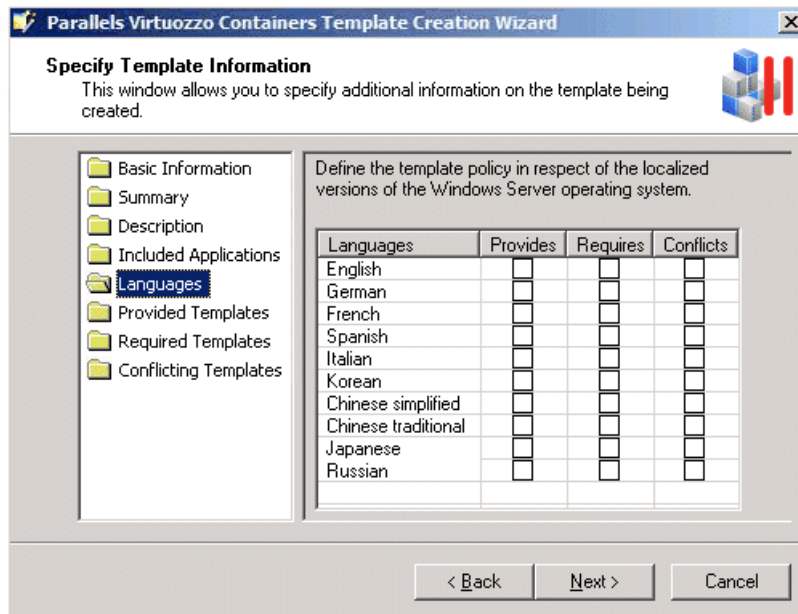| `vendor` | Optional. The name of the application vendor (the company or the author). |
`system root`	Optional. The folder inside the Container where the Windows Server operating system must be installed for the template to be successfully added to this Container (e.g., `C:\WINDOWS`).
	Note: Do not change the default folder.
`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, respectively. Just select the corresponding folder, and type the necessary information in the provided field. The specified information will be displayed by Parallels Virtuozzo Containers tools (Parallels Management Console and Parallels Virtual Automation).

In the **Languages** folder, you can determine the template policy in respect of the localized versions of the Windows Server operating system.

In this window, do the following:

- Specify the localized versions of Windows Server that must be used as the basis for a Container for the template to be successfully installed inside this Container. To do this, select the check boxes of the corresponding languages in the Requires column.

- Specify the localized versions of Windows Server that will be incompatible with the template being created (i.e. the template installation inside Containers running this version of Windows Server will always fail). To do this, select the check boxes of the corresponding languages in the Conflicts column.

- Specify the languages that will be provided by the template. Providing support for some language by means of an application template allows you to install other templates that require this language support inside Containers that have this template installed. For example, if your template provides the German language support and you install this template inside a Container, you will be able to install inside this Container other templates that require support for this language. To specify the languages to be provided by the template, select their check boxes in the Provides column.

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

- Select the Provided Templates folder, and specify the names of the application templates that will be installed inside the Container together with the template being created. Including a template in the list of provided templates allows you to install inside a Container other templates that require the provided template. For example, if you are creating a template for the Microsoft SQL Server 2008 Service Pack 2 (SQL 2008 SP2) application, you can include the templates for Service Pack 0, Service Pack 1, and Service Pack 2 in this template. In this case, if you install the SQL 2008 SP2 template inside a Container, you will also be able to install inside this Container all the templates that require the Service Pack 0, Service Pack 1, or Service Pack 2 template prior to their installation.

- Select the Required Templates folder, and indicate the names of the application templates which will have dependencies with the template you are creating and which must be pre-installed inside the Container to successfully add the template to it. Keep in mind that the specified applications must be

installed inside the corresponding Container with the help of the appropriate templates and not manually (e.g., by copying the application installation files to the Container via RDP and then installing the application in a standard way from inside the Container).

- Select the Conflicting Templates folder, and enter the names of the application templates which may have conflicts with the template being created and needed to be removed from the Container before adding the template to this Container. Keep in mind that the template will conflict only with those applications that are installed inside the corresponding Container with the help of the appropriate templates. If the specified applications are manually installed inside a Container, the template can be successfully added to it.

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.
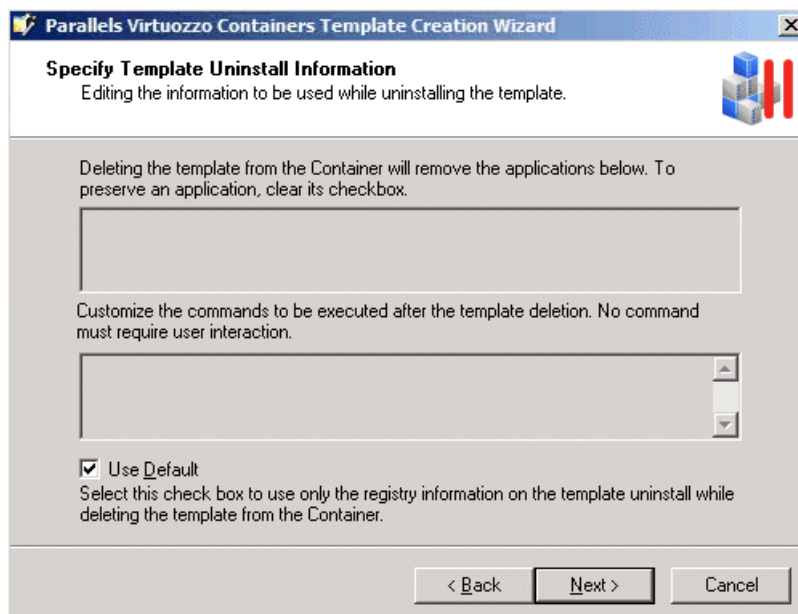

In the displayed window, do the following:

- In the Application template name field, specify the name of the application template 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. To do this, follow the 'click here to enter the application vendor' link at the bottom of the window and type the necessary information in the Vendor field.

b Application template 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. To do this, follow the 'click here to enter the application template version' link at the bottom of the window, type the template version in the Version number field, and select one of the radio buttons under this field.

    c **Vendor application version**. This check box, if selected, allows you to specify the information on the application version. To do this, follow the `'click here to enter the vendor application version'` link at the bottom of the window and type the right application version in the **Vendor version** field.

- To configure the parameters of any existing application, click the application template name and, in the displayed window, change the corresponding parameters as shown above.

- To remove an application template from a folder, select the name of the application template to be deleted, and click the **Remove** button.

Specifying Template Uninstall Information

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

By default, the uninstall information from the template 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:
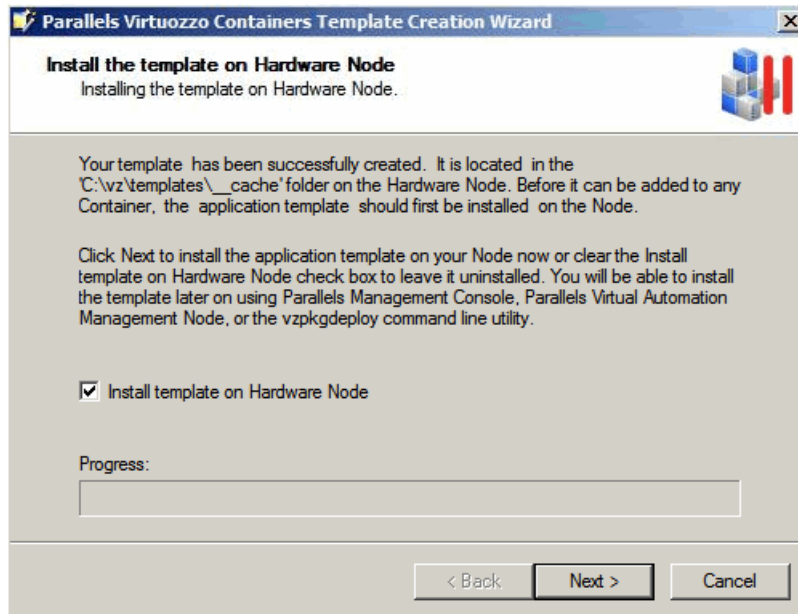
- Clear the **Use Default** check box and, in the top table, clear the check boxes next to the applications you want to preserve during the template removal.

- Clear the **Use Default** check box and, in the bottom table, edit the commands to be executed during the template removal from the Container.

  Note: When customizing the commands, make sure that all the commands do not require any user interaction during their execution. Otherwise, the template uninstall will fail.

Click **Next** to start creating the template.

Installing Template on Hardware Node

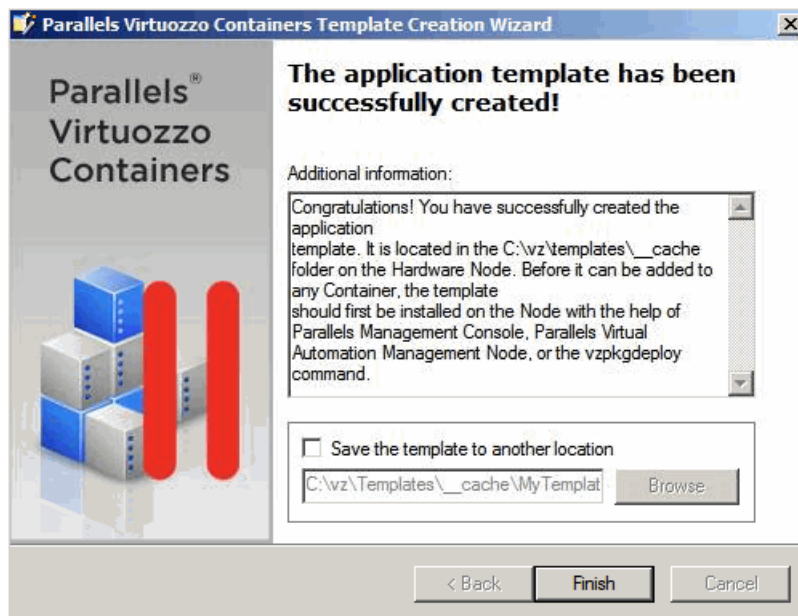The next step of the wizard allows you to install the template on the Hardware Node.

Each newly created template must be installed on the Node before it can be applied to Containers. Click **Next** to install the template on the Node. If you do not want 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 using the following tools:

- Parallels Management Console. Consult the **Installing New Templates on Hardware Node** section (p. 33) to learn how to install application templates using this GUI tool.
- The `vzpkgdeploy` utility. Consult the *Parallels Virtuozzo Containers 4.6 Reference Guide* to learn how to install application templates using this command-line utility.

Finishing Installation

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.
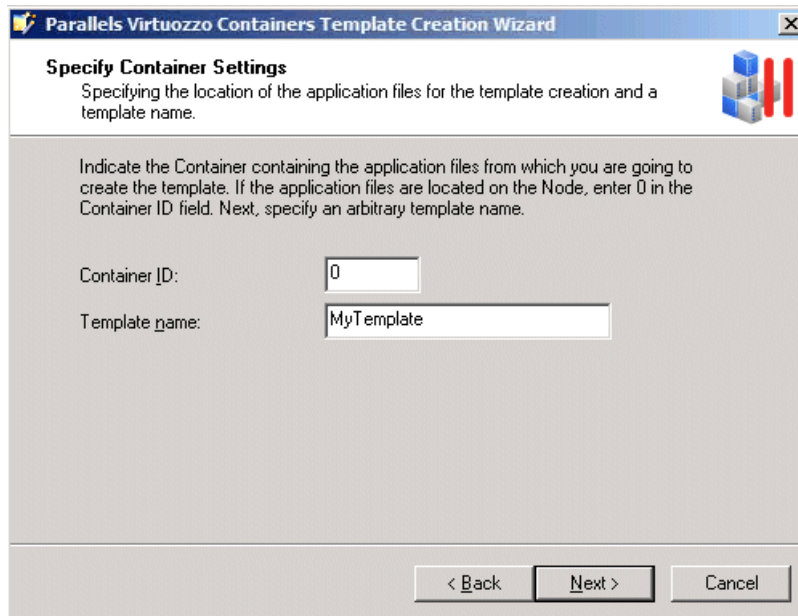
By default, the template is placed to the *X*:\vz\Templates__cache folder on the Hardware Node where *X* denotes the disk drive set for storing Parallels Virtuozzo Containers program files. However, you can change this location by selecting the **Save the template to another location** check box and 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, Parallels Virtuozzo Containers 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 Templates** 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 Parallels Virtuozzo Containers Template Creation Wizard** window, you will see the following window:

In this window, provide the following information:

- **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, type 0 in this field.
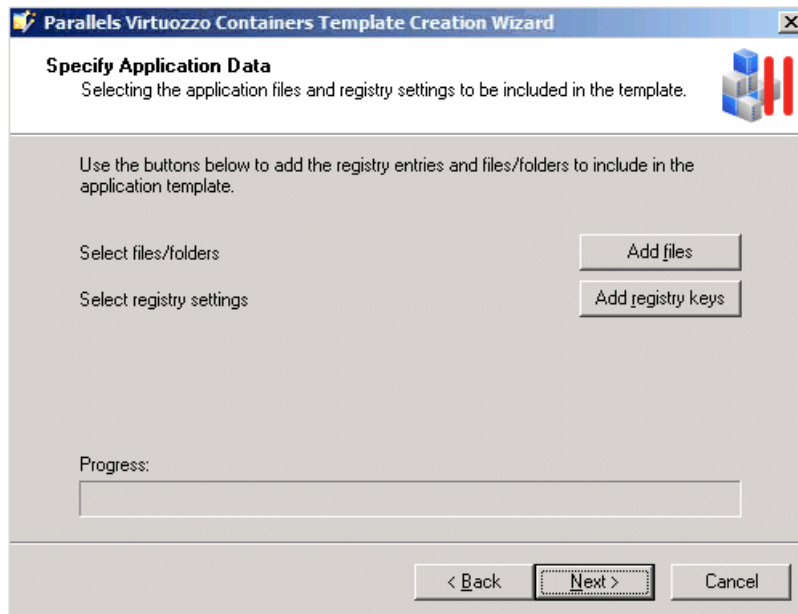
  Note: Make sure the Container where the application files and registry entries are located is running.

- **Template name**. 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, click **Next**.

Specifying Application Files and Registry Settings

In the **Specify Application Data** window, you are prompted to specify the application files and registry entries to be added to the application template.
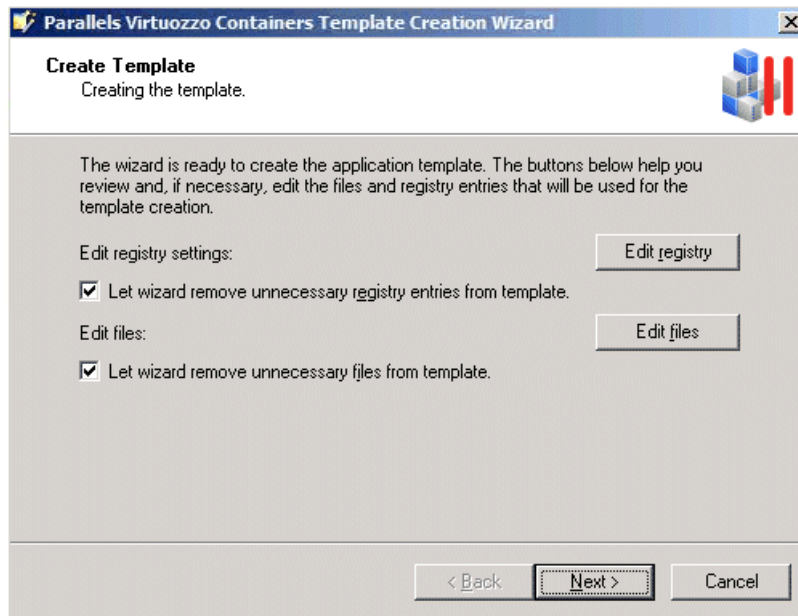
In this window, do the following:

- Click the **Add files** button to open the **Template configuration** window, and choose the application files out of which the application template is to be made. You can select any number of files with any extensions (`.exe`, `.vbs`, `.txt`, etc.). After you have chosen the needed files, click the **Save** button in the **Template configuration** window to confirm your selection.

- Click the **Add registry keys** button to open the **Template configuration** window, and select the registry entries to be added to the application template. After you have chosen the needed entries, click the **Save** button in the **Template configuration** window to confirm your selection.
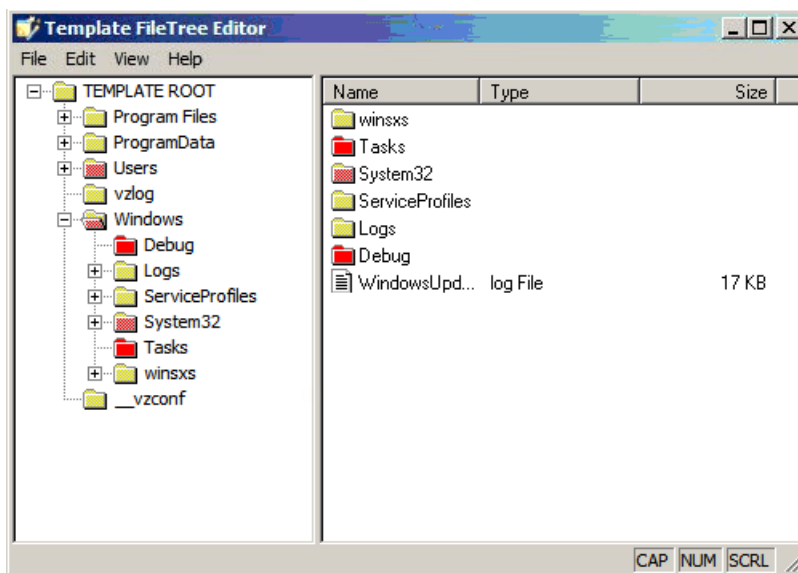
Preparing for Template Creation

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

In this window, use the **Edit registry** and **Edit files** buttons to review and edit the registry entries and files that you selected in the previous step of the wizard and that are meant for making the application template.
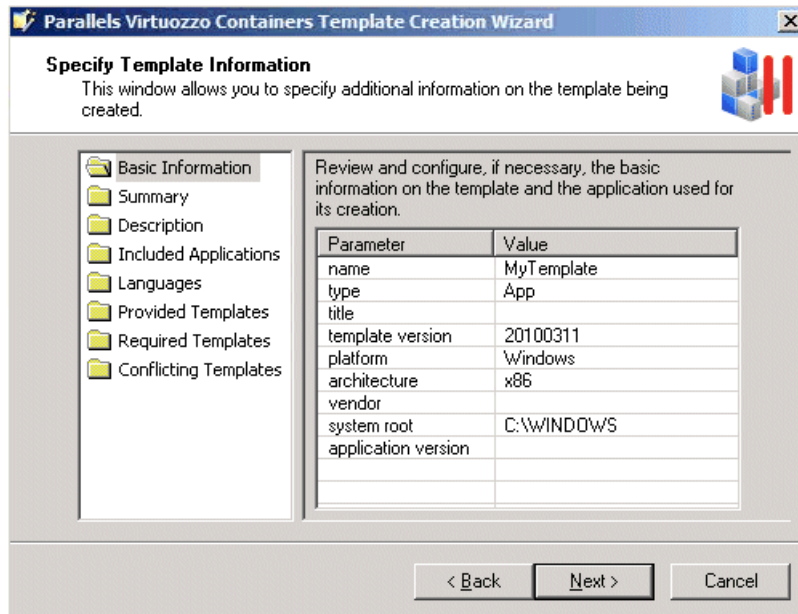
You can also make use of the **Let wizard remove unnecessary registry entries from template** and **Let wizard remove unnecessary files from template** check boxes. These check boxes, if selected, let the **Parallels Virtuozzo Containers Template Creation Wizard** look through and analyze all registry 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 folders/files which are, in its opinion, of no use for the template 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:

If you do not want 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.
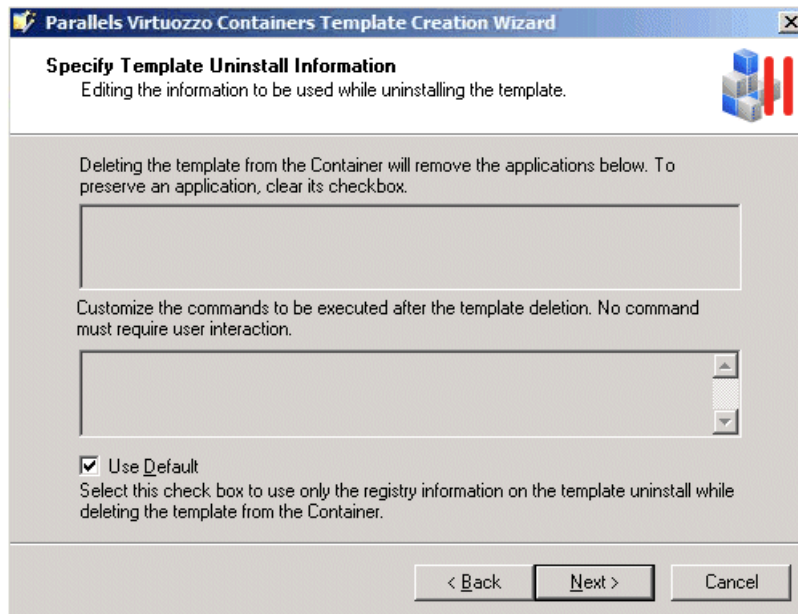
Defining Template Configuration

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

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

Specifying Template Uninstall Information

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

By default, the uninstall information from the template 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:
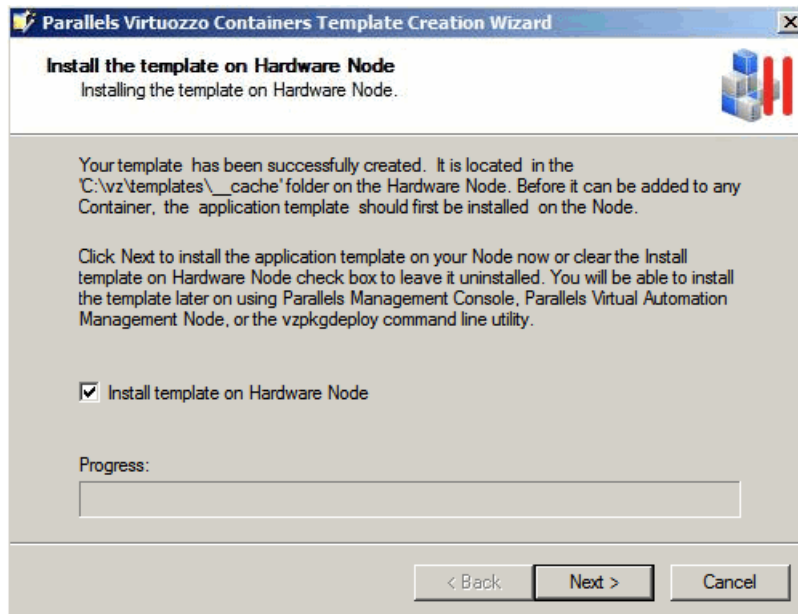
- Clear the Use Default check box, and in the top table, clear the check boxes next to the applications you want to preserve during the template removal.
- Clear the Use Default check box, and in the bottom table, edit the commands to be executed during the template removal from the Container.

   Note: While customizing the commands, make sure that all the commands do not require any user interaction during their execution. Otherwise, the template uninstall will fail.

Click Next to continue.

Installing Application Template

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

Each newly created template must be installed on the Node before it can be applied to your Containers. Click **Next** to install the template on the Hardware Node. If you do not want 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 using the following tools:

- Parallels Management Console. Consult the **Installing New Templates on Hardware Node** section (p. 33) to learn how to install application templates using this GUI tool.

- The vzpkgdeploy utility. Consult the *Parallels Virtuozzo Containers 4.6 Reference Guide* to learn how to install application templates using this command-line utility.

Finishing Template Creation

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 Parallels Virtuozzo Containers 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, Parallels Virtuozzo Containers checks if the Container meets all the conditions set for the template in its XML file (e.g., whether all the required application templates you indicated in the **Required Templates** folder on the **Specify Template Information** screen are installed inside the Container).

C H A P T E R   4

Managing Templates

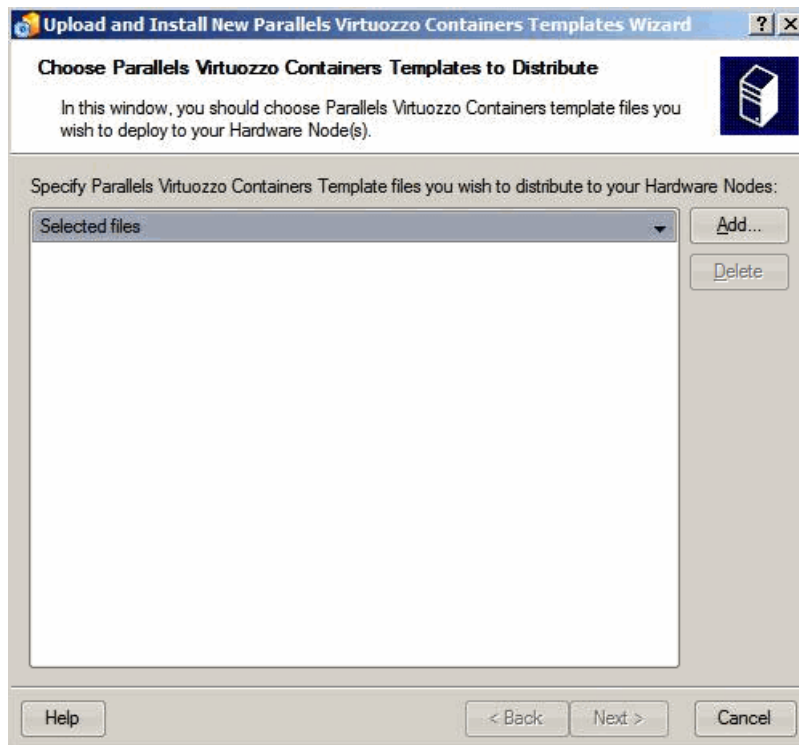This chapter concentrates on the tasks you can perform on Parallels Virtuozzo Containers templates.

In This Chapter

Installing New Parallels Virtuozzo Containers Templates on Hardware Node

In case you have one or more new Parallels Virtuozzo Containers templates that you would like to upload and install on your Hardware Node, you need first to have these files accessible from the computer where Parallels Management Console is installed (e.g., insert the CD-ROM with the templates into the computer CD-ROM drive or copy the templates to the computer hard disk), and then launch the **Upload and Install New Parallels Virtuozzo Containers Templates** wizard.
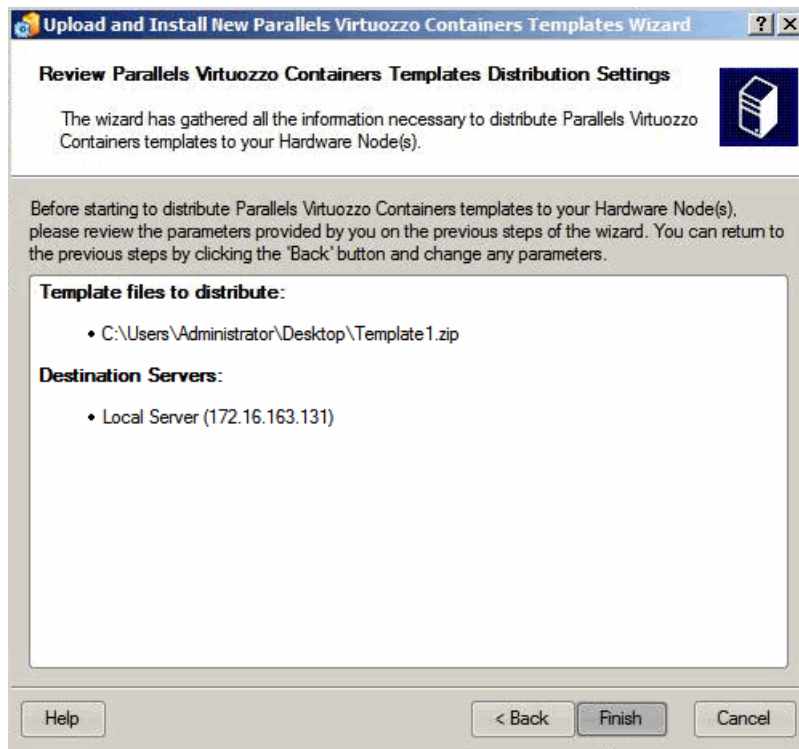
To invoke the wizard, right-click the **Templates** item under any Hardware Node registered in Parallels Management Console, and choose **Upload and Install New Parallels Virtuozzo Containers Templates**. The **Choose Parallels Virtuozzo Containers Templates to Distribute** window opens.

In this window, choose the templates to be deployed to the Hardware Node. To do this, click the **Add** button, and provide the path to the templates. Click **Next**.

The next screen will prompt you to define the target Hardware Node where you want to install the templates. Parallels Management Console can upload and install the specified templates to any registered Hardware Node. By default, the current Hardware Node is selected. Select all Nodes where you want to install the templates, 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 the templates installation settings.

It summarizes the information provided by you in the previous steps: which 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 and make the necessary changes to the information entered.
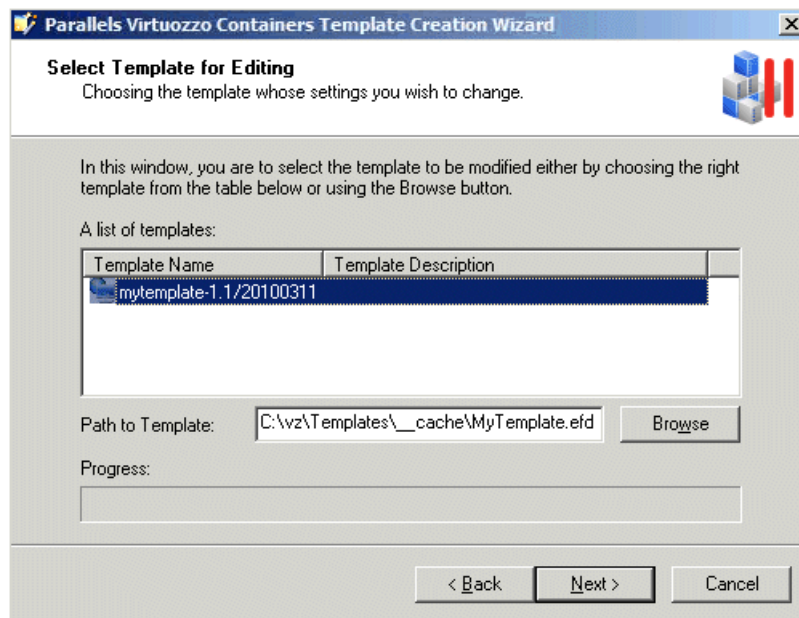
You can also install application templates by using the vzpkgdeploy utility. For information on this utility and its options, see the *Parallels Virtuozzo Containers 4.6 Reference Guide*.

Modifying Templates

Parallels Virtuozzo Containers allows you to customize any of existing templates using the Parallels Virtuozzo Containers Template Creation wizard. For example, this may be useful if you want 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. To invoke the wizard, select Programs > Parallels > Parallels Virtuozzo Containers > Parallels Virtuozzo Containers Template Creation Wizard on the Windows Start menu. You will be presented with the Welcome to Parallels Virtuozzo Containers Template Creation Wizard window where you should select the Modify an existing template radio button and click Next to proceed with the wizard.

Selecting Template

In the first step of the wizard, you are asked to choose the template to be modified.
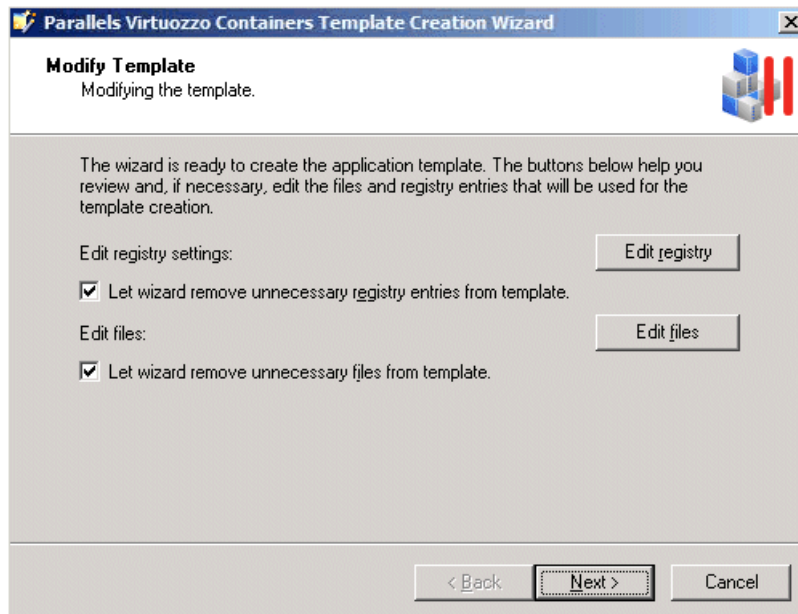
In the **Select Template for Editing** window, do the following:

- Choose the template to be modified from the list of displayed templates. This list contains 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 Parallels Virtuozzo Containers program files).
- Type the path to the template in the **Path to Template** field or click the **Browse** button and locate the template. This way of choosing templates can be used if the template you are going to alter is located in a folder other than $X:\vz\Templates\_cache$ and is, therefore, not listed on the screen.
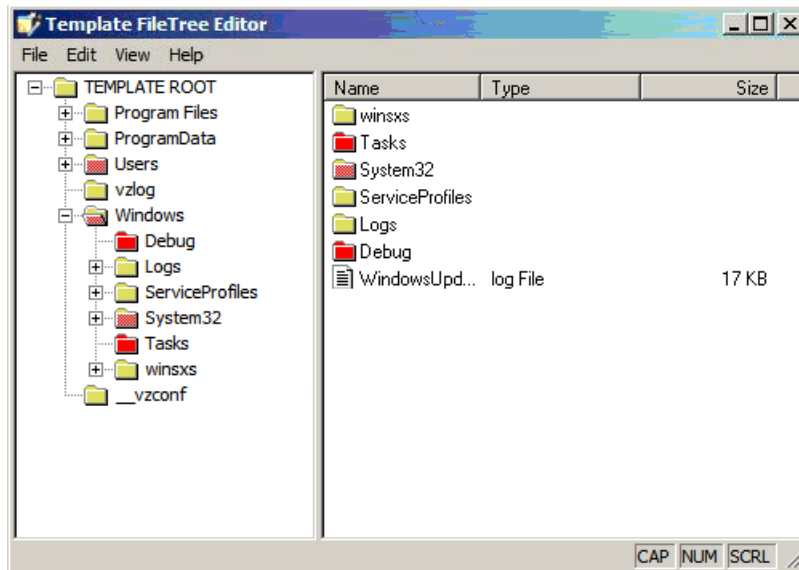
Editing Files and Registry Entries

After choosing the right template, click **Next** to display the **Modify Template** window.

In this window, do the following:

- Click the Edit registry button to open the Template Registry Data Editor window. If necessary, change registry entries 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. If necessary, change the contents of 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.
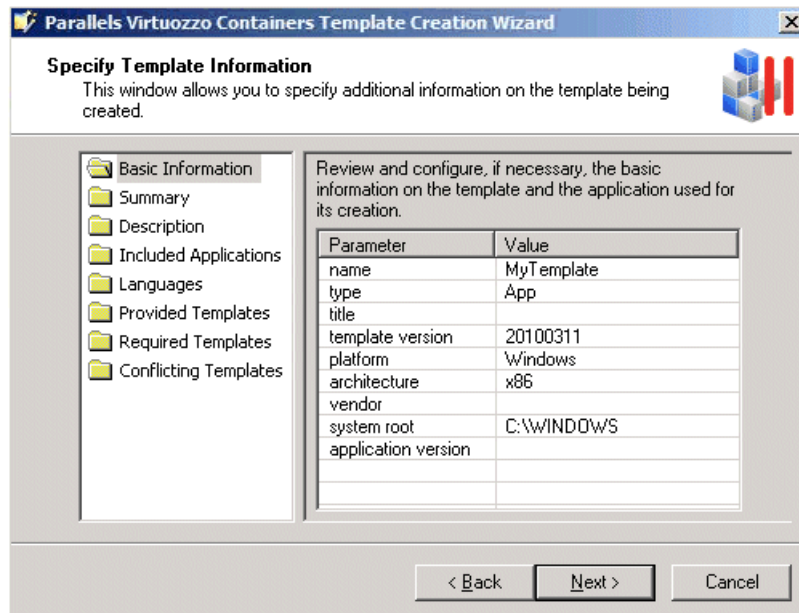
You can also make use of the Let wizard remove unnecessary registry entries from template and Let wizard remove unnecessary files from template check boxes. These check boxes, if selected, let the wizard look through and analyze all registry settings and folders/files you are going to include in your application template. As a result of this operation, the wizard may select one or several registry entries and folders/files which are, in its opinion, of no use for the template 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:

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

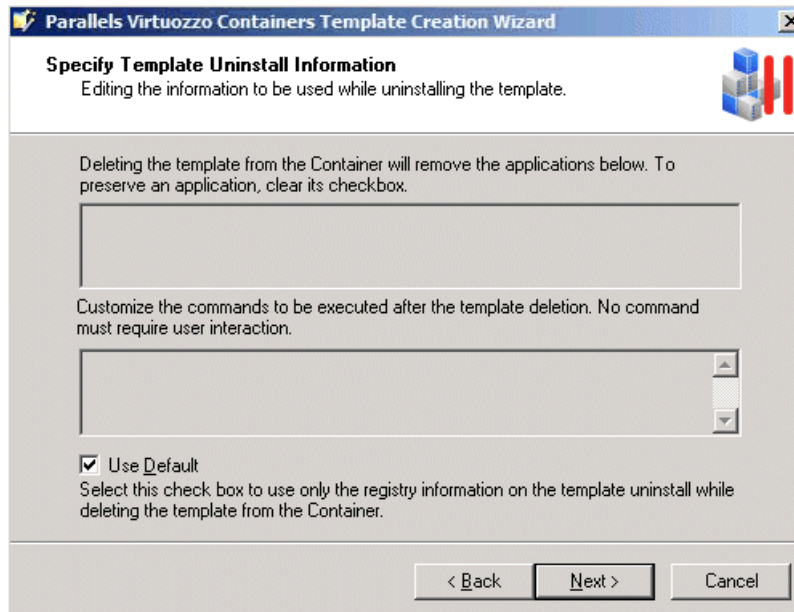## Editing Template Configuration

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

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

Specifying Template Uninstall Information

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

By default, the uninstall information from the template 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, in the top table, clear the check boxes next to the applications you want to preserve during the template removal.

- Clear the **Use Default** check box and, in the bottom table, edit the commands to be executed during the template removal from the Container.

  Note: When customizing the commands, make sure that all the commands do not require any user interaction during their execution. Otherwise, the template uninstall will fail.

Click the **Next** button for the changes applied to your template to come into effect.

Installing Template

The **Install Template on Hardware Node** window allows you to install the modified template on the Hardware Node. To do so, just click **Next**. If you do not want 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 using the following tools:

- Parallels Management Console. Consult the **Installing New Templates on Hardware Node** section (p. 33) to learn how to install application templates using this GUI tool.

- The `vzpkgdeploy` utility. Consult the *Parallels Virtuozzo Containers 4.6 Reference Guide* to learn how to install application templates using this utility.

Creating and Installing Application Template Updates

Sometimes, you may need to update one or more application templates installed on the 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 using the corresponding template update.

To make a template update, you can use the Parallels Virtuozzo Containers Template Creation wizard. In the process of creating the template update, the wizard completes the following tasks:
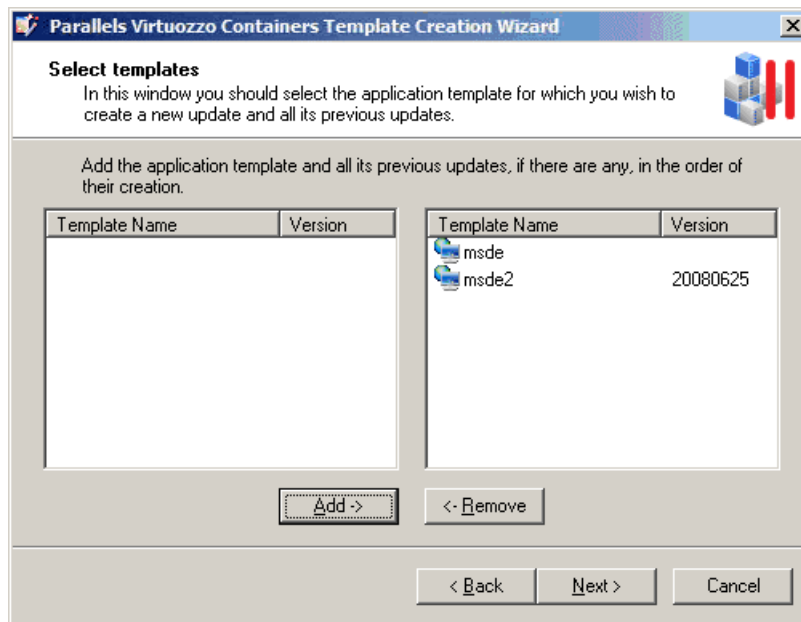
Note: Currently, the Parallels Virtuozzo Containers Template Creation wizard does not allow you to create updates for OS templates.

1 Installs the original template and all its previous updates, if any, inside a temporary Container and saves 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 the 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.

To invoke the wizard, select Programs > Parallels > Parallels Virtuozzo Containers > Parallels Virtuozzo Containers Template Creation Wizard on the Windows Start menu. You will be presented with the Welcome to Parallels Virtuozzo Containers Template Creation Wizard window. Select the Create an update for an existing template radio button, and click Next to proceed with the template update creation.
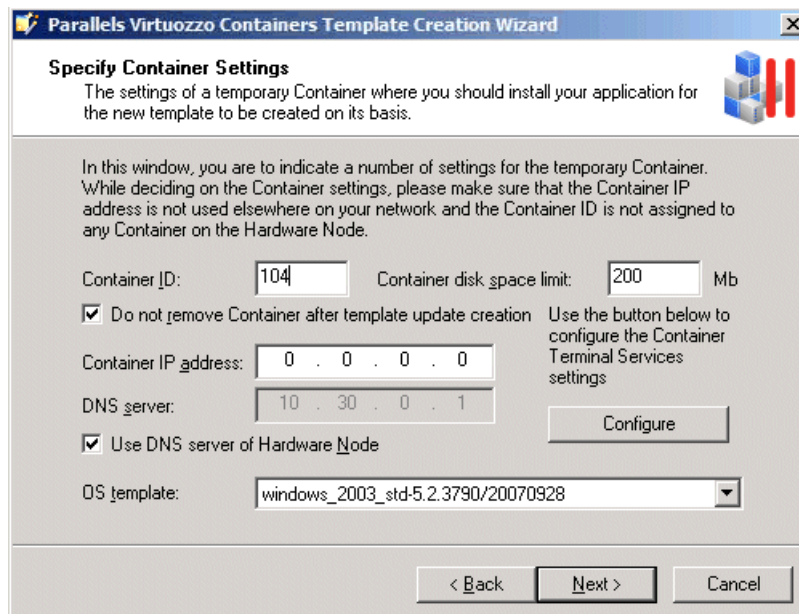
Selecting Application Template

In the first step of the wizard, you are asked to select the application template for which you want to create a new update. The left pane of the Select templates 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 the 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 want to create updates for several application templates, you must run the **Parallels Virtuozzo Containers Template Creation** wizard several times.

Specifying Temporary Container Settings

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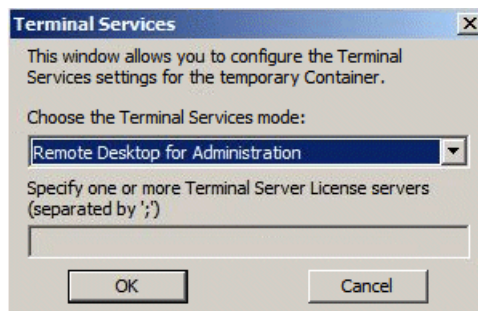
In this window, you are prompted to set the parameters for a special Container which is automatically created by the wizard for the period necessary for making the template update. After the template update has been successfully created and copied to the Hardware Node, the temporary Container will be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

The fields you need to fill in in the Specify Container Settings window are explained in the table below:

Field Name	Description
Container ID	The ID to be assigned to the temporary Container. By default, the wizard offers the first unoccupied ID starting from 101. If you decide to change the offered ID, make sure that the Container with the specified ID does not exist on the Node. Otherwise, you will be warned with a message asking you to choose another Container ID.
Container disk space limit	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.
Do not remove Container after template creation	Defines whether the temporary Container is to be removed after the template update creation or left intact.
Container IP address	The IP address (it must be unique within your network) to assign 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.
Use DNS server of Hardware Node	If selected, tells the temporary Container to use the same DNS server as the one used by the Hardware Node. You can clear the check box and indicate the desired DNS server in the DNS server field.
OS template	The OS template to be used for the temporary Container creation. You can leave the OS template offered by the wizard by default or click the down arrow and select the needed OS template on the drop-down menu.

You can also use the Configure button to define in which of the two standard Windows Terminal Services modes (Remote Desktop for Administration or Terminal Server) the temporary Container is to operate.

By default, the temporary Container is set to function in the Remote Desktop for Administration mode. If you want to use the Terminal Server mode, you will have to choose one of the two licensing schemes:
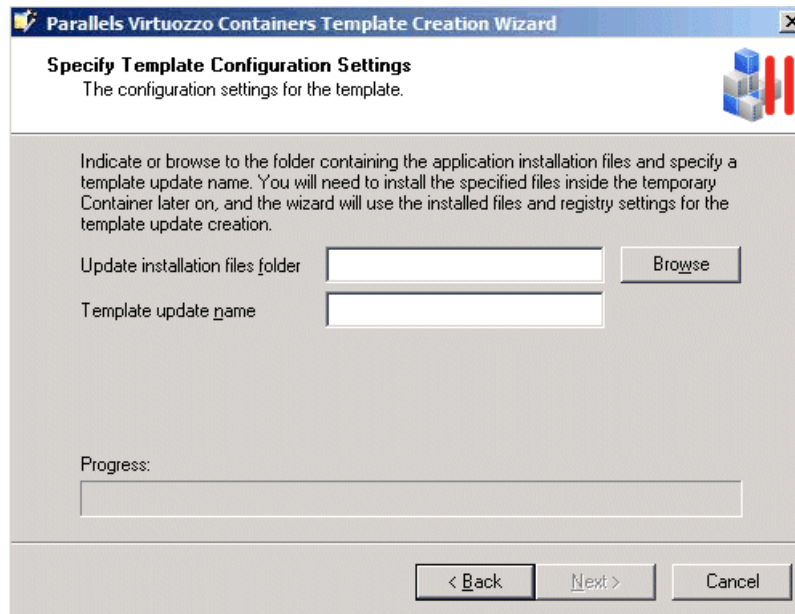
▪ device-based licensing (select the Terminal Server (user-based access license) radio button)

- user-based licensing (select the **Terminal Server (device-based access license)** radio button)

In both cases, you will also have to specify one or more Terminal Server License servers in the **Specify one or more Terminal Server License servers** field.

Specifying Installation Files and Template Update Name

In the next step of the wizard, you are asked to specify the path to the update installation files and the name of the resulting template update.

- In the **Update installation files folder** field, enter the full path to the folder on the Hardware Node where the update installation files are located (if you have only one file, specify the full path to this file). Afterwards, the installation files will be copied to and manually installed inside the created temporary Container. You can also use the **Browse** button to the right of the **Update installation 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 update name** field, 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.

Preparing for Template Update Creation

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 then 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. 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 window allows you to perform the final preparations before installing the application files inside the temporary Container. For example, you may wish to open the minimized RDP connection window and complete the following tasks:

- Locate the source application installation files and check that all the files have been successfully copied to the temporary Container. The source files are located in the root directory of the Container (e.g. C:\My_application.exe).

- Check the event logs inside the temporary Container and remove all the events that have occurred since the Container creation.

- Install specific server roles inside the temporary Container. This is needed if the template is intended for installing inside Containers running Windows Server 2008 and requires some server roles for its correct operation. The information on the installed server roles will then be collected by the wizard and added to the template configuration file. You will not be able to add the template to a Container until you install the necessary server roles inside it.

Note: If you are asked for credentials to log in to the temporary Container, use the Administrator user name and the lq password.

When you are ready, minimize the RDP connection window, and click Next.
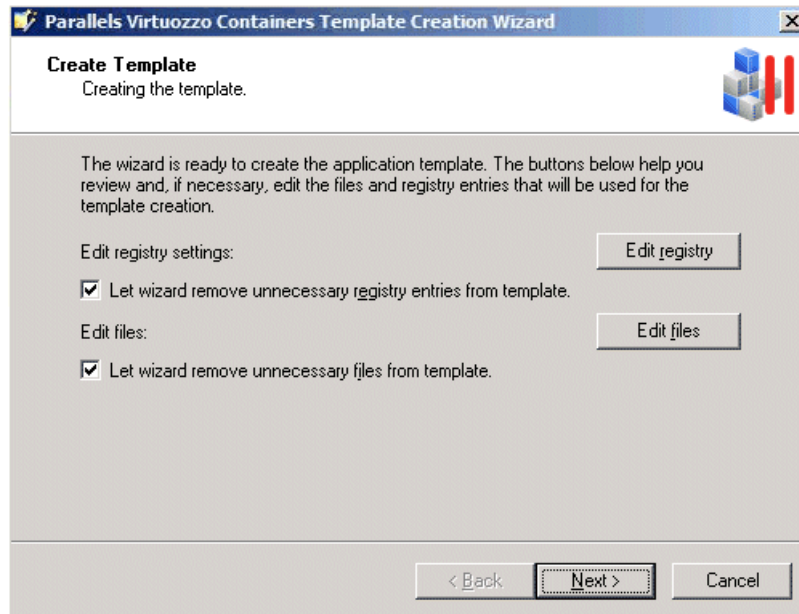
Installing Application Files

When the Install Application Files window is opened, switch to the minimized RDP connection window, and manually install the 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.

Do not perform any operations that are not related to the application update installation and customization because 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.

Note: Once you start installing the source application files, do not install any server roles inside the temporary Container. If necessary, install them in the previous step of the wizard.
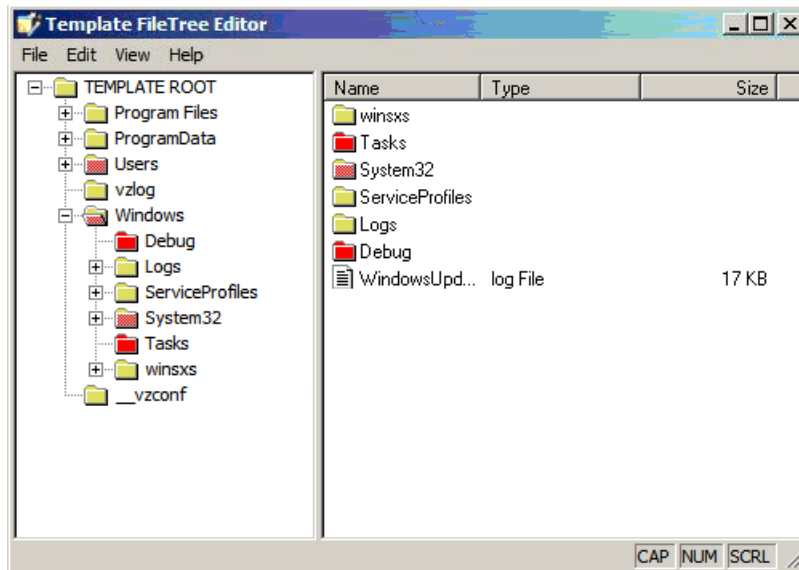
Editing Files and Registry Settings

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

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.
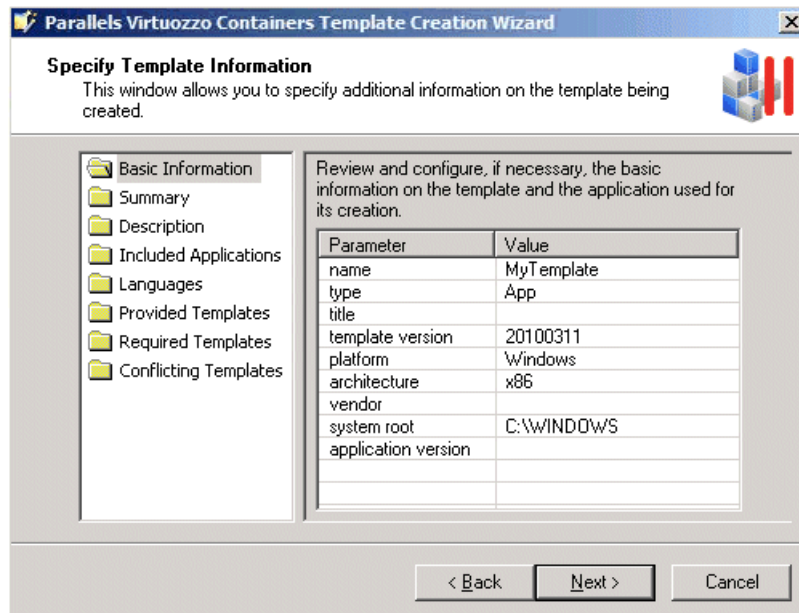
You can also make use of the Let wizard remove unnecessary registry entries from template update and Let wizard remove unnecessary files from template update check boxes. These check boxes, if selected, let the Parallels Virtuozzo Containers Template Creation wizard look through and analyze all registry 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 folders/files which are, in its opinion, of no use for the template update 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:

If you do not want 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.

Defining Template Configuration

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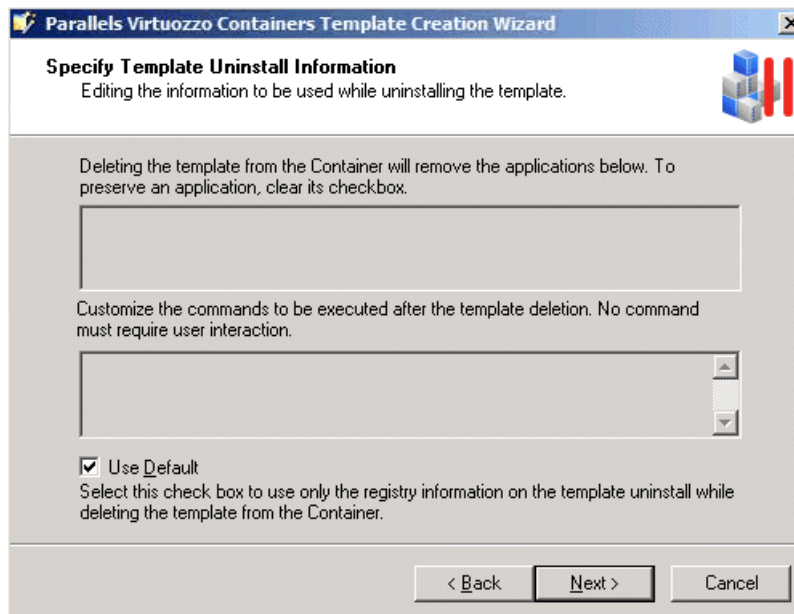

All parameters that you can configure on this screen are explained in the Creating Template From Manually Added Data section (p. 26) in detail.

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

Specifying Template Uninstall Information

In 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.

By default, the uninstall information from the template update registry is used to decide on the actions to be taken during the template update 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 update by doing the following:
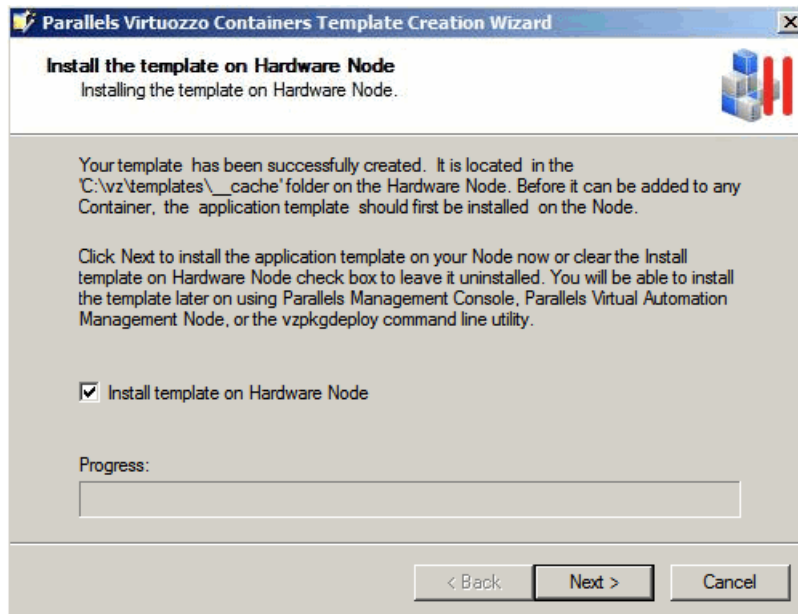
- Clear the Use Default check box, and in the top table, clear the check boxes next to the applications you want to preserve during the template update removal.

- Clear the Use Default check box, and in the bottom table, edit the commands to be executed during the template update removal from the Container.

  Note: When customizing the commands, make sure that all the commands do not require any user interaction during their execution. Otherwise, the template update uninstall will fail.

Click Next to start creating the template update.

Installing Template Update

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

Each new template update must be installed on the Node before it can be applied to Containers. Click Next to install the template update on the Hardware Node right after its creation. If you do not want to install the template update at the moment, clear the Install template update on Hardware Node check box, and click Next. You will be able to install it later using the following tools:

- Parallels Management Console. Consult the Installing New Templates on Hardware Node section (p. 33) to learn how to install application templates using this GUI tool.

- The vzpkgdeploy utility. Consult the *Parallels Virtuozzo Containers 4.6 Reference Guide* to learn how to install application templates using this command-line utility.

Finishing Template Update Creation

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 Parallels Virtuozzo Containers program files. You can change this location by selecting the Save 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, save it to the default folder.
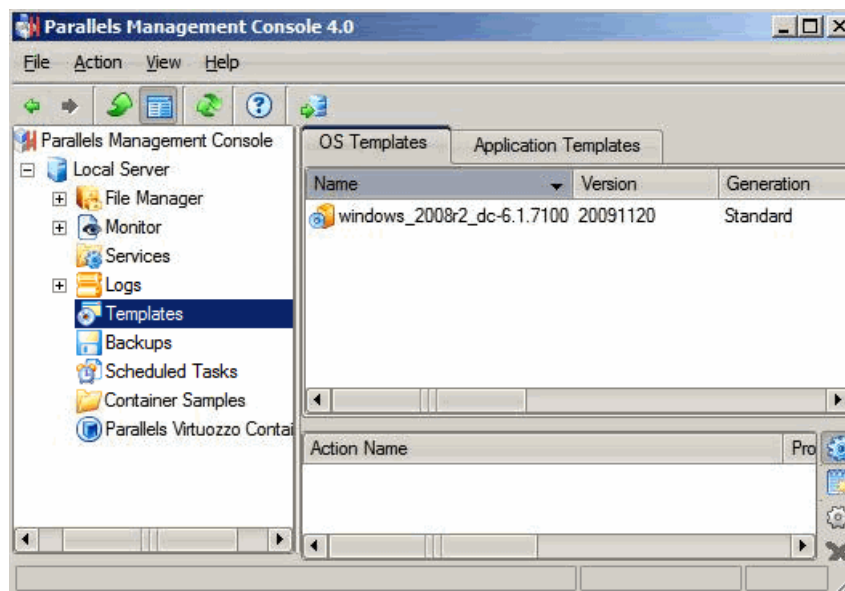
Click Finish to exit the wizard.

Notes:

1. 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 Parallels Virtuozzo Containers 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 Templates folder on the Specify Template Information screen are installed inside the Container).

2. Keep in mind that if your original application update cannot be uninstalled separately from the main application, you will have to forcibly remove the corresponding template update from your Container. You can find detailed information on removing templates and their updates from Containers in the **Removing Application Templates and Templates Updates From Container** section (p. 54).

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 the templates in Parallels Management Console, choose the **Templates** item under the corresponding Hardware Node name, and select either the **OS Templates** or **Application Templates** tab to see the list of the OS or application templates installed on the Node, respectively.
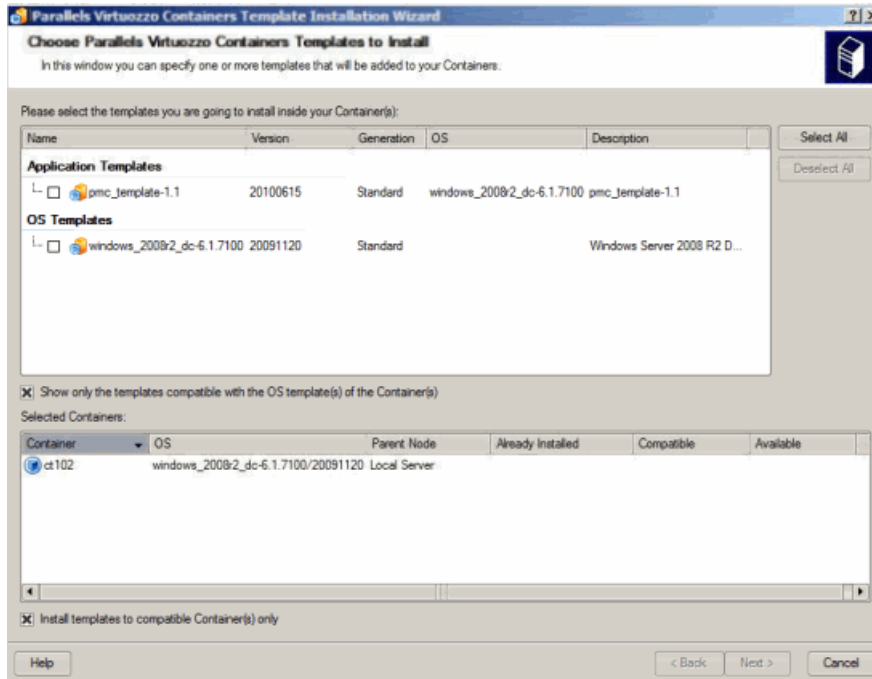

To see the templates used by a particular Container, double-click the needed Container in the Container list in the right pane to open this Container management window, and then again choose the **Templates** item and click the **OS Templates** or **Application Templates** tab in the left pane of the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

In the command line, you can use the `vzpkgls` utility to list the templates installed on the Hardware Node and applied to Containers. Detailed information on this utility can be found in the *Parallels Virtuozzo Containers 4.6 Reference Guide*.

Adding Templates to Single Container

After you have installed a number of application templates on the Hardware Node, you can add them to any number of Containers. To successfully add a template to a Container, the Container must be running. In Parallels Management Console, you can use **Parallels Virtuozzo Containers Template Installation** wizard to add an application template to a particular Container. To invoke the wizard:

1 Select the **Parallels Virtuozzo Containers** item to open the list of Containers in the Management Console main window.

2 Right-click the Container (it must be running) to which you want to add the template, and choose **Templates** > **Add/Update Parallels Virtuozzo Containers Templates**.

In the **Choose Parallels Virtuozzo Containers Templates to Install** window, 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) 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 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 Parallels 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 Parallels 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 in 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.

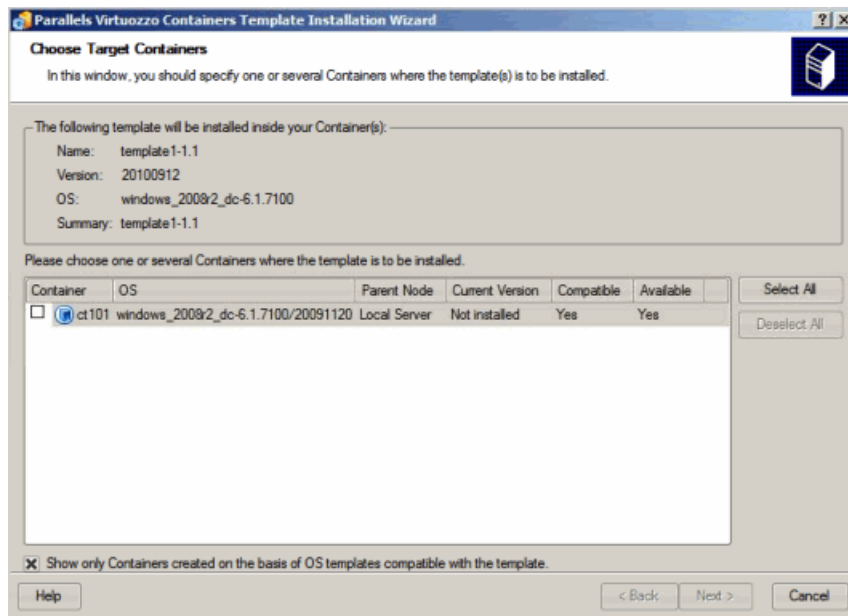You can also add a template to an individual Container by doing the following:

1 Open the list of Containers in the Management Console main window by selecting the Parallels Virtuozzo Containers item in the Hardware Node tree.

2 Double-click the name of the Container to which 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 Parallels Virtuozzo Containers Application Template option on the context menu.

4 Follow the instructions of the wizard.

Note: Before adding an application template to a Container, carefully read the terms and conditions set forth in the license agreement of the application that was used as the basis for the template creation. Different licensing models used by application vendors may impose different restrictions on the application usage. For example, you may need to obtain and install a separate license inside each Container where you are planning to use the application.

Adding Application Templates to Group of Containers

To add an application template to a group of Containers at once, do the following:

1 In the Management Console left pane, expand the Templates item.

2 In the Management Console right pane, click the Application Template tab to see the list of application templates installed on the Node.

3 Select the templates to install holding down the CTRL or SHIFT keys.

4 Right-click the selection, and choose the Install Into Containers option.

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, keep in mind the following:

- Only running Containers are displayed in the table of the Choose Target Containers window since Parallels Virtuozzo Containers 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 application templates to Containers 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 Parallels Virtuozzo Containers Templates.

4   In the Choose Parallels Virtuozzo Containers 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 Parallels Virtuozzo Containers Templates Installation Settings window, review the information provided by you in 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 4.6 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 Parallels Virtuozzo Containers, you should use only 64-bit application templates to add them to your Containers.

Copying Templates to Another Hardware Node

Parallels Management Console allows you to copy OS and application templates between any Hardware Nodes registered in Parallels Management Console. To do this:

1 Select the Templates item, and click either the OS Templates or Application Templates tab depending on whether you want to copy an OS or application template, respectively.

2 In the Management Console right pane, right-click the template, and choose Tasks > Copy to Another Hardware Node.

The table in the Copy Parallels Virtuozzo Containers Templates window lists all Hardware Nodes 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 do this, select the check box next to the template name, and click the Copy button to the right of the table.
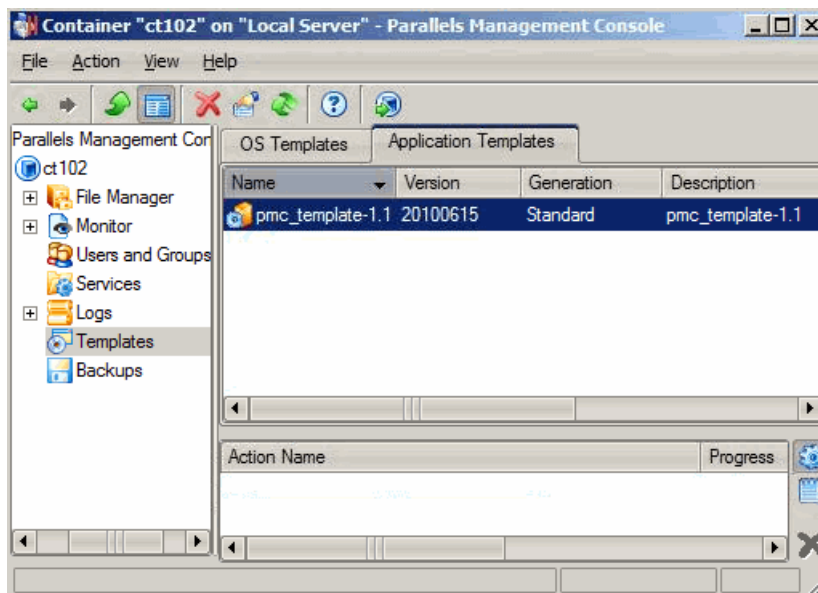
Removing Application Templates and Template Updates From Container

Parallels Management Console allows you to remove an application template or any of its updates from a Container. To do this:

1   Open the list of Containers in the Management Console main window by selecting the Parallels Virtuozzo Containers item under the corresponding Hardware Node name.

2   Double-click the name of the Container wherefrom you want to delete the template/template update. The Container Manager opens.

3   Select the Templates item, and click the Application Templates tab to see the list of application templates/template updates applied to the Container.

Note: If the application template you want to remove from a Container has one or more template updates, first delete these updates in the order reverse to the order of their creation, and only then delete the application template itself.

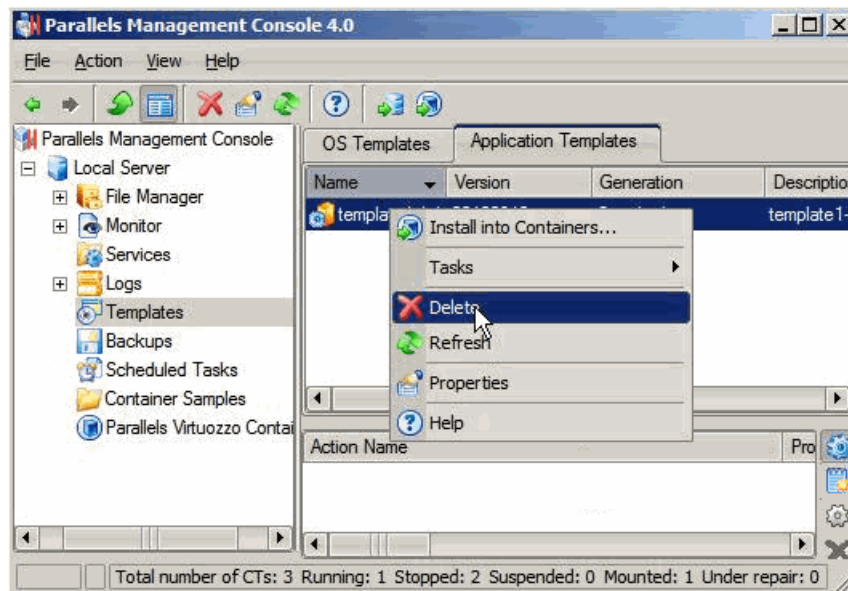**4**   Right-click the application template/template update, and choose Delete.

5   In the Remove Parallels Virtuozzo Containers Template window, confirm your decision by clicking the Remove button. If you have any problems with removing the template/template update (e.g., if you are deleting a template update created from the application update that cannot be uninstalled separately from the main application), you can select the Force removal check box to force the template/template update deletion.

Besides, you can use the `vzpkgrm` utility to remove application templates and their updates from Containers. Detailed information on the `vzpkgrm` utility can be found in the *Parallels Virtuozzo Containers 4.6 Reference Guide*.

Removing Templates From Hardware Node

Parallels Virtuozzo Containers allows you to remove those OS and application templates that are not needed any more from the Hardware Node. To do this:

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 the list of all application or OS templates installed on the Node, respectively.

3 Right-click the template you want to delete in the right pane, and choose Delete.

Keep in mind that you cannot remove the templates currently applied to one or more Containers on the Hardware Node.

4 In the Remove Parallels Virtuozzo Containers Template window, confirm your decision by clicking the Remove button. If you have any problems with removing the template, you can select the Forced removal check box to force the template deletion from the Hardware Node.

C H A P T E R   5

Glossary

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

Container is a virtual private server, which is functionally identical to an isolated standalone server, with its own IP addresses, processes, files, user database, configuration files, applications, system libraries, and so on. While sharing the same *Hardware Node* and OS kernel, *Containers* are isolated from each other. A *Container* is a kind of 'sandbox' for processes and users.

Hardware Node (or **Node**) is the server where *Parallels Virtuozzo Containers* is installed.

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

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

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

Parallels Virtuozzo Containers license is a special license which you must install on a *Hardware Node* to be able to use *Parallels Virtuozzo Containers*. Every *Hardware Node* must have a license installed.

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

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

Parallels Power Panel is a tools for managing personal *Containers* via a standard Web browser.

Parallels Virtual Automation is a tool for managing *Hardware Nodes* and *Containers* residing on them via a standard Web browser.

Private area is a location where *Container* files which are not shared with other *Containers* are stored.

Template is a set of original application files (packages) repackaged for using inside *Containers*. 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 applications or sets of applications in *Containers*.

Parallels Agent (or **Parallels Agent Protocol**) is an XML-based protocol used to monitor and manage *Hardware Nodes*. It is a backend for the *Parallels Management Console*.

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