

Parallels Infrastructure Manager

Administrator's Guide

ISBN: N/A
Parallels Holdings Ltd.
13755 Sunrise Valley Drive
Suite 600
Herndon, VA 20171
USA
Tel: +1 (703) 815 5670
Fax: +1 (703) 815 5675

© 1999-2008 Parallels Holdings Ltd. All rights reserved.
Distribution of this work or derivative of this work in any form is prohibited unless prior written permission is obtained from the copyright holder.

Table of Figures

Figure 1: Installing ActiveX SSH Client	43
Figure 2: Infrastructure Manager - Installing Remote Desktop ActiveX Control	44
Figure 3: Installing ActiveX SSH Client	111
Figure 4: Infrastructure Manager - Installing Remote Desktop ActiveX Control	112
Figure 5: Virtual Networks	144

Contents

Introduction	9
About This Guide	10
Logging In	12
Parallels Infrastructure Manager Interface Overview	13
Customizing Interface Settings	14
Extending Standard Browser Functionality	15
Using Drag-And-Drop	16
Using Parallels Infrastructure Manager Context Menu	17
Organizing Virtuozzo Infrastructure	18
Adding New Folder	19
Editing Folder Properties	20
Moving Folder	20
Moving Hardware Nodes to Another Folder	21
Adding Hardware Nodes to Folder	21
Adding Containers to Folder	21
Virtuozzo Servers Summary	22
Managing Containers	23
Container Dashboard Overview	25
Creating New Container	28
Selecting Host Hardware Node	29
Defining Container General Settings	29
Specifying IDs, IP Addresses and Hostnames for Multiple Containers	34
Configuring Container Network Parameters	35
Customizing Container Resources Settings	36
Validating Container Resources Configuration	40
Installing Applications into Container	41
Reviewing Container Configuration	41
Starting and Stopping Container	41
Logging In to Container	42
Using Parallels Power Panel to Access Container	42
Using SSH to Connect to Container	43
Using Remote Desktop Connection to Access Container	44
Changing Container Root/Administrator Password	45
Deleting Container	45
Working With Container Files and Folders	46
Creating Folder	47
Creating Text File	47
Editing Text File	48
Uploading File To Container	48
Copying Files and Folders Inside Container	48
Moving Files and Folders Inside Container	48
Editing File or Folder Properties	49
Managing and Monitoring Container Resources	49
Resources Overview	49
Changing Container Resource Parameters	55
Changing Disk Quota for Multiple Containers	61

Applying New Container Sample	62
Managing Container Services and Processes	67
Managing Container Services	67
Managing Services in Linux	68
Managing Services in Windows	70
Managing Container Processes	72
Installing Plesk	73
Working in Plesk Control Panel	74
Logging In to Confixx Control Panel	75
Container Migration Types	76
Migrating Containers Between Hardware Nodes	76
Migrating Physical Server to Container	77
Managing Container Applications	85
Managing Container Application Templates	85
Managing Container Software Packages	86
Managing Container Control Panels	88
Updating Container Software	89
Advanced Operations	90
Mounting External Volumes Inside Container	90
Cloning Container	93
Reinstalling Container	96
Repairing Container	98
Adjusting Container Configuration and Advanced Settings	99
Adjusting General Configuration of Multiple Containers	101

Managing Hardware Nodes 102

Registering Hardware Node in Parallels Infrastructure Manager	104
Hardware Node Dashboard Overview	104
Managing Hardware Node Containers	108
Logging In to Hardware Node	111
Using SSH to Connect to Hardware Node	111
Using Remote Desktop to Connect to Hardware Node	112
Monitoring Hardware Node Resources Consumption	113
Top CPU Resource Consuming Containers	114
Top Disk Space Consuming Containers	115
Top Total Memory Consuming Containers	116
Top Incoming Traffic Receiving Containers	117
Top Outcoming Traffic Handling Containers	118
Rebooting Hardware Node	119
Managing Offline Services Configuration	119
Creating Offline Service	120
Editing Offline Service	121

Managing OS and Application Templates 122

Managing OS Templates in Group Context	123
Viewing OS Template Properties	124
Listing Packages Included in OS Template	125
Managing Application Templates in Group Context	126
Viewing Application Template Properties	127
Listing Packages Included in Application Template	128
Managing OS Templates in Node Context	128
Viewing OS Template Properties	129
Listing Packages Included in OS Template	130
Managing Application Templates in Node Context	131
Viewing Application Template Properties	132
Listing Packages Included in Application Template	133

Uploading and Installing Template on Hardware Node.....134
 Installing Application Template On Hardware Nodes.....134
 Installing OS Template on Hardware Node.....135
 Caching OS Template on Hardware Nodes.....135
 Uninstalling Template From Hardware Nodes.....136
 Adding Application Templates to Containers.....136
 Updating Templates on Hardware Node.....137

Virtuozzo Network 138

Managing Network Adapters on Node138
 Listing Adapters138
 Viewing Physical Adapter Properties.....139
 Connecting Physical Adapter to Virtual Network140
 Creating VLAN Adapter on Node.....140
 Viewing VLAN Adapter Properties141
 Connecting VLAN Adapter to Virtual Network.....141
 Managing Virtual Networks142
 Listing Virtual Networks on Node145
 Creating Virtual Network on Node.....147
 Viewing Virtual Network Details.....148
 Configure Virtual Network Parameters on Node148
 Listing Virtual Networks in Virtuozzo Group.....149
 Creating New Virtual Network.....150
 Configuring Virtual Network Parameters.....150
 Managing Container Network Parameters151
 Viewing Container Network Parameters151
 Configuring Container Network Parameters152
 Managing IP Pool154
 Creating New IP Address Range.....155
 Editing IP Address Range.....155
 Viewing Allocated IP Addresses.....155
 Setting Up Network Accounting and Shaping.....156
 Managing Container Firewall162
 Configuring Firewall in Normal Mode.....163
 Adding Access Rule in Normal Mode.....164
 Selecting Mode.....164
 Building Input Chain165
 Building Output Chain.....167
 Building Forward Chain168
 Adding Rule in Advanced Mode.....169
 Editing Rule in Advanced Mode169
 Managing Email Gateway and Proxy Server.....170
 Specifying Proxy Server and Email Gateway.....170
 Managing Email Notifications Settings171
 Configuring Email Notifications171

Managing Container Backups 173

Defining Global Container Backups Settings174
 Defining per-Hardware Node Backup Settings175
 Creating Backups of Multiple Containers.....176
 Backing Up and Restoring Single Container178
 Creating Container Backup179
 Renewing Container Backup.....181
 Backup Details.....182
 Browsing Backup Contents183

Managing Parallels Infrastructure Manager Backups	184
Managing Hardware Node Backups	185
Managing Virtuozzo Licenses	186
Entering License Key.....	187
Uploading License File on Hardware Node.....	187
Installing License Key	188
Reviewing Installed Licenses	189
Transferring Licences	191
Virtuozzo License Statuses	191
Managing Virtuozzo Security	192
Understanding Role-Based Access Administration in Parallels Infrastructure Manager.....	193
Typical Scenario of Virtuozzo Containers Security Model Usage	194
Managing Virtuozzo Users	196
Viewing Users	196
Creating New User	197
Viewing User's Details	198
Configuring User's Parameters	198
Managing Virtuozzo Groups	199
Viewing Groups.....	199
Creating New Group.....	200
Viewing Group Details.....	200
Configuring Group Parameters.....	201
Managing Roles	202
Viewing Roles	202
Creating New Role	204
Configuring Role Parameters	209
Managing Authentication Databases	214
Viewing Authentication Databases.....	215
Registering New Database.....	216
Viewing Database Details	217
Configuring Database Details.....	218
Managing User/Group Permissions	218
Managing Permissions for Hardware Node.....	219
Managing Permissions for Containers.....	220
Managing Permissions for Virtuozzo Group.....	221
Managing Permissions for Logical Units	223
Managing Container Samples	225
Creating New Container Sample	226
Choosing Sample Configuration Source	226
Defining Container Sample General Settings.....	227
Setting Network Parameters	228
Customizing Resources Settings.....	229
Choosing Applications	233
Reviewing Container Sample Configuration.....	234
Creating New Container Sample by Splitting Hardware Node.....	234
Specifying General Parameters.....	234
Checking Container Sample Resource Parameters.....	235
Operations on Container Samples.....	235
Uploading Container Sample on Hardware Node.....	237
Editing Container Sample	237
Configuring Container Sample General Settings.....	239
Defining Container Sample Network Settings.....	240

Customizing Resources Settings.....	241
Adding Applications to Samples	245

Maintaining Virtuozzo Infrastructure 246

Provisioning Containers.....	247
Setting Up Container Requesting	248
Checking Container Requests.....	249
Processing Container Request	250
Updating Virtuozzo Software	251
Updating System Software	251
Updating OS and Application Templates	252
Configuring Access to Update Repository	254
Checking Update Repository Settings	257
Scheduling Regular Backups	258
Scheduling Backup Task	259
Managing Maintenance Task.....	261
Monitoring Operations and Viewing Logs	265
Viewing History of Container Status Changes	266
Viewing Alerts Log	266
Viewing Tasks Log.....	268
Viewing Active Tasks	269
Viewing Task Details	269
Viewing Error Details.....	270
Getting Support.....	270
Reporting Problem to Technical Support	270
Submitting Error Codes.....	271
Setting Up Support Channel.....	274
Searching for Screens	275

Troubleshooting 276

Services Inaccessibility.....	277
Network Problems	277
Invalid Credentials.....	278
File Problems	278
Listing Users	279
Group Operations.....	279
Elusive Problems	280

Glossary 281

Index 284

CHAPTER 1

Introduction

Parallels Infrastructure Manager is designed for Hardware Node administrators. It features the ability to manage a group of Hardware Nodes, and the Containers residing on them, using a standard Web browser running on any platform. The list of supported browsers is given below:

- Internet Explorer 6.0 and above
- Mozilla 1.7 and above
- Firefox 1.0 and above.

Although other browsers will most likely work, only those listed above have been extensively tested for compatibility with Parallels Infrastructure Manager.

After Parallels Infrastructure Manager has been installed, you can register available Nodes with it. Registered Nodes can be managed by an administrator using the Infrastructure Manager interface.

As Nodes are registered with Infrastructure Manager, they form a *group of Nodes* (different terms may be used - *Node Group*, *Group Nodes*, *Infrastructure Manager Nodes*, *Nodes registered in Parallels Infrastructure Manager*). Collective administration can be performed on a group of Nodes, such as:

- creating a logical structure of Hardware Nodes and the Containers residing on them,
- migrating Containers between Nodes,
- copying OS and application templates from one Node to another,
- making Container samples stored on an Virtual Manager Node available to other registered Hardware Nodes,
- consolidating Node IP addresses into a network address range.

Infrastructure Manager users are managed by the administrator. An administrator can add and remove users, and set user access privileges. A user's access privileges determines what operations a user can (and can't) perform on a registered Container.

Virtuozzo Containers software needs to be installed on a Hardware Node to enable the Hardware Node, and the Containers residing on the Hardware Node, to be managed using Infrastructure Manager. The Virtuozzo Containers software can be installed on Windows 2003 Server and Linux (Red Hat Enterprise Linux 4, Fedora Core 7, etc.) operating systems. Most of the Infrastructure Manager principles are the same, or similar, for both operating systems.

The following operations can be performed on registered hardware Nodes, and the Containers hosted on the registered Nodes, using Infrastructure Manager's Web interface:

- View and install Virtuozzo licenses;
- Create new Containers;
- Edit Container configuration, network parameters, and other settings;
- Reinstall and/or repair a Container;
- Change a Container's status;

- Manage Container groups;
- Manage Container backups;
- Manage Container samples (p. 225);
- Manage and monitor Container resources;
- Manage applications;
- Update OS/application templates installed on the Hardware Node;
- Manage Container requests;
-  Set up a Container firewall;
- Configure the Hardware Node administrator-Container user automatic email exchange;
- Start, stop, and restart services inside a Container;
- View a list of Container processes and send signals to them;
- View a Hardware Node's resource consumption;
- View Virtuozzo logs and monitor Container operations;
- Customize the Infrastructure Manager's interface;
- Migrate a physical server to a Container;
- etc.

In This Chapter

About This Guide.....	10
Logging In.....	12
Parallels Infrastructure Manager Interface Overview	13
Customizing Interface Settings	14
Extending Standard Browser Functionality	15

About This Guide

The Administrator's Guide is written for administrators of both Hardware Nodes and Container they host and consists of the following sections.

- The **Organizing Virtuozzo Infrastructure** chapter (p. 18) provides information on the most common ways to handle the relationships among different kinds of Virtuozzo objects (Hardware Nodes, Containers, etc.) in Parallels Infrastructure Manager.
- The **Managing Containers** chapter (p. 23) centers on:
 - managing Containers, such as creating, cloning, configuring, starting/stopping, reinstalling, repairing, firewalling, migrating between Nodes, etc;
 - managing services and processes running in a Container, including managing Windows services, managing Linux services, installing Plesk and working in Plesk Control Panel and managing and configuring name-based hosting services to be run by a Container;
 - managing and monitoring the resources allocated to a Container, which is monitoring its resources and changing the resources limits for both single Container and multiple Containers;

- managing the configuration samples the Container is based on: creating and viewing samples, setting a sample as a default one, uploading samples on the Hardware Nodes, editing samples (that is, effectively, editing the configuration of the Containers) and creating samples by splitting the Hardware Nodes to evenly distribute its resources among the hosted Containers based on this sample;
- migrating Containers both between Hardware Nodes and from a physical server to a Container (the so-called *p2v* migration).
- The **Managing Hardware Nodes** chapter (p. 102) deals with managing the Hardware Nodes, which includes registering Hardware Nodes in Parallels Infrastructure Manager, configuring the Hardware Nodes, managing the name-based hosting services to be run on the Containers residing on the Nodes, monitoring consumption of the resources allocated to the Nodes, managing OS and application templates installed on the Nodes, and rebooting the Nodes.
- The **Managing OS and Application Templates** chapter (p. 122) contains a description of Virtuozzo template management.
- The **Virtuozzo Network** chapter (p. 138) explains all the Virtuozzo network-related concepts, including:
 - configuring network accounting and shaping for the Hardware Nodes - tracking and limiting traffic for all the Containers on the Node;
 - configuring network accounting and shaping for single Containers - that is, changing the traffic rate guarantee and the method of limiting the traffic for the Container.
- The **Managing Container Backups** chapter (p. 173) refers to:
 - managing backups of multiple Containers;
 - backing up and restoring from backups a single Container;
- In the **Managing Virtuozzo Licences** chapter (p. 186) you will find information on:
 - viewing the detailed information on the current licences installed on the Hardware Node;
 - editing migration procedure details;
 - installing a Virtuozzo Server license on the Hardware Node;
 - identifying the current status of your licenses, that is, whether a license is active, expired etc.
- The **Managing Virtuozzo Security** chapter (p. 192) covers the following interaction-based operations:
 - managing Parallels Infrastructure Manager users access rights - creating new Infrastructure Manager users, editing the existing ones, managing users roles, setting up the self-registering in Infrastructure Manager, setting up email notification exchange between Hardware Node administrator and Infrastructure Manager users, etc;
- The **Managing Container Samples** chapter (p. 225) describes the management of Container sample configuration files, which serve as the basis for creating new Containers.
- The **Maintaining Virtuozzo Infrastructure** chapter (p. 246) is dedicated to:
 - managing Container requests, a client-administrator interaction-based feature streamlining the whole process of granting access to managing Containers;
 - updating the Virtuozzo Containers software, including updating system software and customizing the process of the update, updating OS and application templates, configuring access to the update repository and testing connection with the update repository.

- creating a timetable to automate Containers backing up and restarting;
 - viewing the dynamic of changes in the statuses of Container;
 - viewing the log of alerts generated every time a Container consumes more of a resource than is specified by the limit on that resource, or is coming close to that limit;
 - monitoring top resource consuming Containers;
 - viewing the tasks underway, the command line-style details of the tasks and the information on the errors in performing them.
 - receiving support from Parallels - downloading documentation and software, submitting a technical issue to the Parallels support team, establishing a private secure connection to the Parallels support team server and installing on the Hardware Node the certificate to identify the request sender.
- The Troubleshooting chapter (p. 276) lists most common problems you might encounter during Infrastructure Manager operations and the ways to solve them.

Logging In

The Virtuozzo administrator logs in to Parallels Infrastructure Manager through a browser by using the IP address (or hostname) of the corresponding Hardware Node and the TCP port specified in Virtuozzo offline services (by default, this port is 4643). If the Hardware Node you wish to manage is part of a Virtuozzo Group, you should log in to the Master Node of this Group. Logging in at the IP address/hostname of a Slave Node is not allowed. When connecting to the Hardware Node, you should enter the OS administrative credentials ( root/ Administrator and the corresponding password) and click the **Login** button.

The Virtuozzo administrator can endow other users with a certain scope of rights and privileges in Parallels Infrastructure Manager (see the **Managing Virtuozzo Security** chapter). These users can be created as Parallels internal users or taken from an external LDAP-compliant database. They log in to Infrastructure Manager at the same IP address/hostname and port as the Node administrator by using their respective user names and passwords. The set of actions these users will be able to perform in Infrastructure Manager will be defined by their privileges.

Whatever way you use, once you have connected to the Container, you are recommended to provide a valid email address on the Editing User's Personal Settings page in order to be able to log in to Infrastructure Manager in case you forget your password. The **Forgot your password?** link on the login page allows you to enter your user name and the email address provided on the Parallels Infrastructure Manager configuration page in order to receive an URL at this address informing you how to change your password.

Parallels Infrastructure Manager Interface Overview

The Parallels Infrastructure Manager interface has been designed to let the Virtuozzo Hardware Node administrator quickly perform all possible tasks through an intuitive navigation system.

The main components the Parallels Infrastructure Manager interface consists of are:

- The left menu frame listing and allowing to access all your Hardware Node(s) and Container(s) and the main types of operations to be performed on them with the help of Infrastructure Manager;
- The toolbar on top of the right frame allowing you to perform on your Hardware Nodes and Containers the actions most frequently called for in your routine management work and, when necessary, a few more buttons allowing to perform additional actions on the objects listed in the content part of the right frame (Container backups, packages updates, etc.);
- The content part on the right frame displaying the currently accessed Hardware Nodes or Containers, the key information (their statuses, configuration, etc.) and links to advanced actions.
- The **Tasks** pane at the bottom of the right frame allowing you to view all the operations recently finished and running at the moment, their start times, the objects they are applied to, their statuses, progress information and other details. The pane is minimized by default. To expand it click **Tasks** at the bottom of the screen.

The actual left menu appearance can be changed by pressing any of the following buttons placed on the bottom:

- **Infrastructure** - turns the left menu into a list of your Hardware Nodes and Containers organized the way you want it to be;
- **Logical View** - looks the same way as the Infrastructure menu, the only difference being the Containers that can be distributed between all your Hardware Nodes no matter what Nodes they are hosted by physically; (screen shot)
- **Management** - shows only the **Workflow, Updates, Scheduler, Alerts & Events, Tasks, and Support** links on the left menu;
- **Setup** - makes the left menu show only the **Network, Backups, Licensing, Security, and Container Samples** links;
- Clicking on the small folder icon makes the left menu display all the above as a tree.

The uppermost element on the Infrastructure-oriented left menu is the **Infrastructure** link. If expanded, it displays your Virtuozzo physical structure (that is, a hierarchical tree with Hardware Nodes as its upper levels and the Containers hosted on them as lower levels), if you have already designed one, as suggested below, and the default **Datacenter** link if you have not. Each of the Hardware Nodes and Containers that make up your Virtuozzo infrastructure displays its name on the Infrastructure-oriented left menu which, if clicked on, leads to its dashboard.

The logical view enabled on the Infrastructure Manager left menu displays the screen allowing you to create folders to contain the objects physically belonging to different levels - thus, in such a folder you can place Containers hosted on different Hardware Nodes.

Both logical and physical representations of your Virtuozzo infrastructure allows you to create folders to further collate the objects it consists of. You may, for example, devise and simulate a physical datacenter: create a folder called Datacenter, then create in the Datacenter folder several Rooms, divide each Room into Cages, and, finally, "mount" Racks where you want them to be.

While the actual appearance of the Infrastructure Manager interface content part on the right frame is dictated by the tag opened at the moment, there are always two main operational levels: the Containers level and the Hardware Nodes level that determine its overall appearance and the available options. Both levels afford to perform operations on a single Container or Hardware Node, as well as multiple operations. Each time you click on a Datacenter, or on a Room, a Cage, a Rack on the left Infrastructure Manager menu, - the right pane loads a screen with the Summary, Hardware Nodes, Containers, Templates, Backups, and Security tabs, the Summary tab opened by default.

Customizing Interface Settings

On the Interface Settings tab of the User Profile screen you can set a number of parameters related to the Parallels Infrastructure Manager interface. The options provided on the Interface Settings tab are grouped into three sections: Navigation Settings, Regional Settings and Visual Settings.

Option	Description
Home Page	One of the ways to tweak Infrastructure Manager is to choose the first screen to be loaded when you log in to Infrastructure Manager from the Home Page drop-down menu.
Interface Language	As Parallels Infrastructure Manager is localized into a number of languages, this drop-down menu lets you choose the default interface language for Infrastructure Manager. This setting affects the language of both your current Infrastructure Manager session and all future sessions if User Default is chosen as the interface language on the Infrastructure Manager login screen.
Local Time Zone	This setting affects the date and time information found on such Infrastructure Manager pages as Tasks Log, Alerts and Events. Choose the time zone you wish to be used when viewing different kinds of logs.
GUI Elements Style	You may set the Infrastructure Manager toolbar buttons to represent the operations which can be performed by clicking them with only icons, or only text, or with both visual and verbal elements.
Interface Skin	Here you may choose a suitable interface skin for your Infrastructure Manager affecting such elements as the Infrastructure Manager general layout (framed or non-framed), icons and images, and the color palette.
Menu Details Level	You can choose what items will be displayed under the Infrastructure and the Logical View on the left Infrastructure Manager menu: folders, the Hardware Nodes distributed over them, Containers - those that run on the Hardware Nodes, in the Infrastructure, and arbitrarily sent to appropriate folders, in the Logical View.
Enable Tooltips	Selecting or clearing this checkbox defines whether you will see short descriptions of the elements of the Infrastructure Manager interface when pointing them with the cursor.

Show Top Right Buttons Pane	Selecting this checkbox makes a button pane always appear at the top right corner of Infrastructure Manager. You can also call up this pane by clicking an arrow in this corner. Use this pane, for example, to watch the Virtuozzo start-up tutorial.
Allow Dynamic Status Updates	Selecting this checkbox enables the statuses of Containers to be updated automatically on the left Infrastructure Manager menu, the Container dashboard screen and the Tasks pane without refreshing the current page manually. If you have problems with the connection to the Master Node (e.g. the bandwidth is low or the connection is unstable), enabling this function might make your work in Parallels Infrastructure Manager inconvenient and slow. In this case it is better to clear the checkbox.

After you decide on the suitable configuration and click the **Submit** button, the settings will be remembered for the current browser and user only. If you change the browser or move to another computer for working with Parallels Infrastructure Manager, the default settings will be used until you perform a new customization.

Extending Standard Browser Functionality

Parallels Infrastructure Manager extends the basic functionality of standard web browsers by providing you with the following facilities:

- support for the drag-and-drop operation within certain Parallels Infrastructure Manager components;
- support for the use of the Parallels Infrastructure Manager context menu with certain Infrastructure Manager objects.

Using Drag-And-Drop

Parallels Infrastructure Manager allows you to manipulate (drag-and-drop) elements in the left menu frame by selecting them with a mouse and moving them to another place in this frame. The list of main operations for which Infrastructure Manager provides the drag-and-drop support is given below:

- Moving any Hardware Nodes under the **Infrastructure** view to any folders available under this view or under the **Logical View** item.
- Moving any Containers listed under the corresponding Hardware Nodes in the **Infrastructure** view to any folders available under this view or under the **Logical View** item.
- Moving Hardware Nodes and Containers between folders under the **Infrastructure** view.
- Moving a folder under the **Infrastructure** view to another folder under this view.
- Moving Hardware Nodes and Containers between folders under the **Logical View** item.
- Moving a folder under the **Logical View** item to another folder under this item.

To perform a drag-and-drop operation, do the following:

- 1** Place the cursor over the object (e.g. a Container) you wish to drag-and-drop and press the mouse button.
- 2** Hold down the mouse button and drag the object to the appropriate place (e.g. some folder under the **Logical View** item).
- 3** Release the mouse button to drop the object.

Using Parallels Infrastructure Manager Context Menu

Parallels Infrastructure Manager includes support for context menus that give you quick access to the main features relating to the Hardware Nodes and Containers management. Below are some common uses for the context menus in Infrastructure Manager:

- Right-clicking the **Infrastructure** view opens the Infrastructure Manager context menu allowing you to create a new Container on any of your Hardware Nodes, create a new folder under the **Infrastructure** view, or configure the security policy for all the Nodes currently registered in Infrastructure Manager.
- Expanding the **Infrastructure** view and right-clicking any of the available Hardware Nodes brings about the Infrastructure Manager context menu allowing you to perform the most common operations on your Nodes: create a new Container, install a new OS or application template, reboot the Hardware Node, configure the security policy for the Node, etc. The same menu is also available if you right-click a Hardware Node on the **Hardware Nodes** tab of the **Infrastructure** window.
- Expanding the name of any Hardware Node listed under the **Infrastructure** view and right-clicking any Container opens the Infrastructure Manager context menu for the corresponding Container. This context menu includes such options as starting, stopping, or restarting the Container, creating Container clones, migrating the Container to another Hardware Node, etc. The same menu is also available if you right-click a Container on the **Containers** tab of the **Infrastructure** window.
- Right-clicking the **Logical View** item brings about the Infrastructure Manager context menu allowing you to create a new folder, Hardware Node, or Container under this item and to configure the security policy for all the Nodes currently registered in Infrastructure Manager.

CHAPTER 2

Organizing Virtuozzo Infrastructure

If the Virtuozzo Group Management functionality is enabled by your Virtuozzo license, Parallels Infrastructure Manager allows you to organize the multitude of registered Hardware Nodes and existing Containers in such a way that

- all of them present a logical and easily manageable structure (with as many levels as you like);
- the other Virtuozzo objects, like OS, and application templates, and Container backups, are automatically filtered to conform to the current level of the object hierarchy;
- the Parallels Infrastructure Manager security policies can be set up not on the Hardware Node or Container level, but on the level of an arbitrary group of objects, provided these objects are united into a folder.

There are two independent ways to design the Virtuozzo structure organization. They are called **Infrastructure** and **Logical View** and presented as top-level elements in the Infrastructure Manager left menu. You can use either one of them or, better, both at once, as their functions are different:

The **Infrastructure** view allows you to display the physical organization of the Virtuozzo infrastructure. For example, all the Hardware Nodes will sit one level lower than the datacenter, and all the Containers running on a certain Node will be shown under it. You can create your own folders in the **Infrastructure** group, but you cannot violate the order of nesting objects. As a way to help with the visual representation of physical objects, the folders you create here can also be called Datacenters and Racks.

Logical View allows you to group your Hardware Nodes and Containers in your own way independently of the physical infrastructure. For example, by grouping all the financial department activities under a common 'FinDep' folder, your organization will be able to manage them as a single entity by collectively managing permissions, scheduling backups, applying system updates, and more. Another peculiarity of the logical view is that any Hardware Node or Container may simultaneously appear in any number of folders.

The main operations related to organizing the Virtuozzo infrastructure are available with the top toolbar buttons visible if you are currently located in the **Infrastructure/Logical View** context (i.e. not in the Hardware Node or Container context). Below are the ways to set about performing these operations.

- adding a folder. On the left Infrastructure Manager menu, click the folder in which you want to create a new folder. Then, if you are in the **Infrastructure** context, click the **Add New Subfolder** button on the top toolbar. In the **Logical View** context, click the **Add to Folder** button on the top toolbar, then click **New Subfolder**.
- renaming a folder. On the left Infrastructure Manager menu, click the folder you wish to rename. On the top toolbar, click the **Manage Folder** button, then click **Configure**.
- moving a folder. On the left Infrastructure Manager menu, click the folder you wish to move. On the top toolbar, click the **Manage Folder** button, then click **Move**.
- deleting a folder. On the left Infrastructure Manager menu, click the folder you wish to delete. On the top toolbar, click the **Manage Folder** button, then click **Delete**.

- including a Hardware Node in a folder. Click on **Infrastructure** on the left Infrastructure Manager menu and go to the **Hardware Nodes** tab. Select the Hardware Node(s) you wish to include in a certain folder and click **Move** on top of the **Hardware Nodes** table. If you are working with **Logical View**, the course of actions is a bit different, because any Hardware Node can belong to any number of folders. On the left Infrastructure Manager menu, click the folder where you wish to include the Hardware Node. Then click the **Add to Folder** button on the top toolbar, and select **Hardware Node**.
- including a Container in a folder. In the **Infrastructure** view, the Containers always go with the Hardware Node on which they are hosted, so you cannot include them separately in folders. In **Logical View**, any Container can belong to any number of folders. On the left Infrastructure Manager menu, click the folder where you wish to include the Container. Then click the **Add to Folder** button on the top toolbar, and select **Container**.
- moving a Hardware Node or a Container to another folder. These actions do not essentially differ from including these objects in folders, so you should be guided by the explanations given above.
- removing a Hardware Node or a Container from the **Infrastructure** view. Unregister the corresponding Hardware Node (the **Unregister** button on the **Hardware Nodes** tab) or delete the Container (the **Delete** button on the **Containers** tab).
- removing a Hardware Node or a Container from a **Logical View** folder. On the left Infrastructure Manager menu, click the folder from which you wish to delete a Hardware Node/Container, then go to the **Hardware Nodes/Containers** tab. Select the object(s) you want to remove and click **Remove** on top of the table.

In This Chapter

Adding New Folder.....	19
Editing Folder Properties	20
Moving Folder	20
Moving Hardware Nodes to Another Folder	21
Adding Hardware Nodes to Folder	21
Adding Containers to Folder.....	21
Virtuozzo Servers Summary	22

Adding New Folder

The new folder you are creating will be placed directly under the currently selected folder in the Infrastructure or Logical View hierarchies.

Folders created are assigned a **Folder Type**. The default folder type is **Folder**. Folders created in the Infrastructure hierarchy can be of type **Folder**, **Datacenter**, or **Rack**. Folders created in the Logical View hierarchy can be of type **Folder** or **Datacenter**.

The **Folder Title** field is mandatory, it sets the name of the folder. Duplicate folder names are not allowed.

For detailed information on working with Parallels Infrastructure Manager's Infrastructure and Logical View trees, refer to **Organizing Virtuozzo Infrastructure**.

Editing Folder Properties

On the Configure screen it is possible to change the name of a folder and the icon representing the folder type.

To change the name of the folder enter a new folder name in the text box in the **Title** section. To change the folder icon (type) select the radio button next to the desired icon in the **Folder Type** section. Click the **Submit** button to apply any changes, or the **Cancel** button to discard any changes.

Any changes made to the folder name or folder type will not effect any **Hardware Node** or **Container** settings.

For detailed information on working with Parallels Infrastructure Manager's **Infrastructure** and **Logical View** trees, refer to **Organizing Virtuozzo Infrastructure**.

Moving Folder

Folders under the **Infrastructure** and **Logical View** level can be moved to other locations within their corresponding hierarchies. Locations a folder cannot be moved to include:

- the parent folder - a folder is already a child of its parent;
- the current folder - a folder cannot be a child of itself;
- any child folder - this would break the hierarchical structure by disconnecting any links to the hierarchy (one or more folders directly under the folder being moved would have to become the root node(s) in a new detached folder hierarchy).

In the drop-down within the **Destination Folder** section, select the folder you want to move the currently selected folder to. Invalid destinations cannot be selected and are grayed out. Click the **Move** button to commit the folder move operation, or **Cancel** to discard it.

For detailed information on working with Parallels Infrastructure Manager's **Infrastructure** and **Logical View** trees, refer to **Organizing Virtuozzo Infrastructure**.

Moving Hardware Nodes to Another Folder

Hardware Nodes can be moved from folder to folder in the **Infrastructure** view only, because the **Logical View** mode allows one and the same object to be simultaneously included in different folders, so this mode deals with objects inclusion, and not their moving.

For the selected Hardware Node(s) to be included in the folder of your choice, select this folder from the **Destination Folder** drop-down menu and click **Submit**. The Node(s) will be displayed on the Infrastructure Manager left menu as sub-levels of the selected folder.

For detailed information on working with Parallels Infrastructure Manager's **Infrastructure** and **Logical View** trees, refer to [Organizing Virtuozzo Infrastructure](#).

Adding Hardware Nodes to Folder

On the **Add Hardware Node(s)** screen you can include any registered Hardware Node in the current folder of the **Logical View** hierarchy. To do that, press the **Add** button below the **Hardware Nodes** section, select the Nodes to belong in the folder, click **Use Selected**, and finally click **Save**.

For detailed information on working with Parallels Infrastructure Manager's **Infrastructure** and **Logical View** trees, refer to [Organizing Virtuozzo Infrastructure](#).

Adding Containers to Folder

On the **Add Container(s)** screen you can include any of the existing Containers in the current folder of the **Logical View** hierarchy. To do that, press the **Add Containers** button below the **Containers** section, select the Containers to belong to the folder, click **Use Selected**, and finally click **Save**.

For detailed information on working with Parallels Infrastructure Manager's **Infrastructure** and **Logical View** trees, refer to [Organizing Virtuozzo Infrastructure](#).

Virtuozzo Servers Summary

The Virtuozzo Containers servers dashboard enables a Virtuozzo Containers server administrator to have digested information of his Hardware Nodes and Containers to quickly and timely assess the current situation and, if necessary, take the required steps.

The **Overall Status** section shows the Containers that have signalled resources consumption alerts or those Hardware Nodes whose licenses have expired or are going to expire.

The **Containers** and **Hardware Nodes** sections summarize the following data.

Column Name	Description
Status	Shows whether the Container or Hardware Node is running, stopped (or, available/not available for a Parallels Infrastructure Manager session), or needs to be paid attention to.
OS	The operating system the Container (and, the host Hardware Node) runs.
Technology	The virtualization technology behind the Container.

The **Create Container** and **Migrate Server to Container** links near the table enable you to create another Container and/or migrate a physical server to a Container. Following the **New Hardware Node** link opens the Parallels Infrastructure Manager screen where you can connect to a Hardware Node and register it in your Virtuozzo Group. Clicking the **Back Up Container** link brings about the **New Container Backups** screen allowing you to define the Containers to be backed up and to configure various backup options.

The **Add New Subfolder** link in the **Folder Operations** subsection allows you to create a new folder under the **Infrastructure** or **Logical View** levels. The **Add Container to Folder** and **Add HN to Folder** links are available when the **Logical View** screen is opened. They help to add more Containers and/or Hardware Nodes to the main level of the **Logical View** hierarchies.

CHAPTER 3

Managing Containers

This screen displays Containers hosted on all the Hardware Nodes that have been registered in Parallels Infrastructure Manager by now.

The information, such as the IP addresses, hostnames, statuses of all the Containers, presented in the Containers table is displayed according to the settings made on the **Select Columns** drop-down menu. If all the columns are selected, this table presents the following:

Column Name	Description
ID	The ID assigned to the Container.
Name	The name of the Container.
Hostname	The hostname of the Container.
Description	The description of the Container.
IP Address	The IP address(es) assigned to the Container.
Hardware Node	The hostname or IP address of the Hardware Node where the Container is hosted.
Technology	The virtualization solution the Container is based on. Currently Infrastructure Manager allows you to manage Virtuozzo-based Containers; it will support other virtualization technologies in the future.
Platform	The operating system installed on the host Hardware Node.
Architecture	The microprocessor architecture of the host Hardware Node.
Operating System	The OS template the Container is based on.
Original Sample	The Container sample the Container is based on. The asterisk after the sample name indicates that the Container sample has been customized by changing one or several QoS parameters.
CPU	Presents a visual representation showing how much host Hardware Node CPU time the Container is consuming at the moment.
Disk	Presents a visual representation showing the current host Hardware Node disk space consumption by the Container.
Memory	Presents a visual representation showing the current consumption of the memory resources allocated to the Container.
Alert	Every time a Container consumes more of a resource than is specified by the limit on that resource, or is coming close to that limit, an alert is generated and logged. The green, yellow, or red circle in this column indicates the cumulative resource consumption by the Container. For a more detailed QoS alerts description, refer to the Monitoring Container Principal Resources section.
Enabled	A green tick opposite a Container indicates that this Container is enabled and can be started, a red cross means that the Container is disabled and cannot be started.
Status	The current status of the Container.

Note: The CPU, Disk, and Memory columns provide a simplified representation that gives you a very general idea of the current resource consumption. The information is retrieved every 10 seconds and Parallels Infrastructure Manager displays the latest values. To have a more comprehensive resource consumption report for a Container, click its name to open the Container dashboard and open the Resources tab where you need to click the Overview link to open the screen displaying a minute resource consumption description.

To facilitate working with Containers residing on your Hardware Node, you may have the Containers table display only those Containers that conform to particular parameters. Above the table, click the Show Search link to display the fields where you can specify the parameters the Containers should meet; you can also customize these fields by clicking Customize. Then click on the Search link. To view all the Containers residing on your Hardware Node, click on the Reset Results link to the right of the parameter fields.

To manage several Containers at once, make use of Infrastructure Manager toolbar right above the table. You are able to execute the following operations on Container groups:

- creating any number of Containers at once (the **New Container** button);
- starting/stopping a Container group depending on the current Container state (the **Start/Stop** links, correspondingly);
-  stopping any Container(s) without waiting for two minutes for the Container shutdown scripts to be executed. It can be useful, for example, in case a Container is known to be corrupt. The **Power Off** option is available only for a user with administrative privileges in Infrastructure Manager (for example, root/Administrator);
- restarting the selected Containers (the **Restart** button);
- configuring general settings for a group of Containers (the **Configure** link);
- backing up the selected Container(s) (the **Back Up** link);
- migrating the selected Containers to one of the HNs registered in Infrastructure Manager (the **Migrate** link);
- cloning the selected Containers (the **Clone** link);
- deleting a Container group (the **Delete** link).

To perform anything of the above, select the checkboxes opposite the corresponding Containers and press the appropriate link on the Infrastructure Manager toolbar.

Many more operations can be performed on a single Container through the corresponding Container dashboard.

In This Chapter

Container Dashboard Overview	25
Creating New Container.....	28
Starting and Stopping Container	41
Logging In to Container	42
Changing Container Root/Administrator Password	45
Deleting Container	45
Working With Container Files and Folders	46
Managing and Monitoring Container Resources	49
Managing Container Services and Processes	67
Container Migration Types	76
Managing Container Applications	85
Advanced Operations	90
Adjusting Container Configuration and Advanced Settings	99

Container Dashboard Overview

The Container dashboard is divided into five sections, each reflecting the following Container details:

- 1 The **Container Status** section of the screen displays:
 - The current status of the Container.
 - The information on the resources consumption by the Container: coming close to, reaching, or going beyond the limits set for the Container generates a resources alert.
 - The current status of the templates and packages. The Container software which does not suggest updating is marked as **Up-to-date**.
 - The hostname of the Node where the Container is hosted (it is possible to migrate the Container to another one).
 -  The Container last 1, 5, and 15 minutes system load averages.
 - The last performed and next scheduled backups.
 - The total period of time during which the Container has been on without rebooting or stopping.
- 2 The data to be found in the **Container Configuration** section have to do with the Container identity - you can see its name and ID. Additionally, you may learn what sample defines the settings of the Container (and apply another one by clicking **Change**), and see what OS template the Container is based on (and update the OS template by clicking **Update**), and which application templates are currently installed in it (and add a new application template or remove an installed one by clicking **Add/Remove**).
- 3 The **Container Network Configuration** section allows you to see:
 - the Container hostname (if set);

- the information on the IP addresses of the Container `eth` (bridged) and `venet0` (routed) interfaces. The information is available only if the IP addresses were set during the Container creation. Clicking **Configure** opens the screen where you can configure the Container networking settings.
- 4** The **Tasks** section provides quick access to performing the following operations:
- Changing the Container name, description, OS template version, start-up and offline management options (the **General Settings** link).
 - Changing the root/Administrator password of the Container (the **Password** link).
 - Changing the resources share allocated to the Container (the **Resources** link).
 -  Configuring the virtual disk volumes of the Container (the **Volumes** link). The `C:` volume is always present in the Container as the mount point for the `root.efd` image file.
 - Installing new applications to or uninstalling existing ones from the Container (the **Templates** link).
 - Changing the Container hostname, IP address, DNS server IP address and search domains and configuring the mode of the Virtual Network adapters (the **Network Settings** link).
 - Configuring the network bandwidth of the outgoing traffic for this Container (the **Network Shaping** link). To define the default Container network shaping settings on the given Hardware Node, see the **Configure Shaping** screen.
 - Starting or stopping the Container (the **Start/Stop** link). Depending on the Container state, only that operation is accessible that complies with its current state.
 - Restarting the Container (the **Restart** link).
 - Managing the services running on the Container except for the `xinetd`-dependent services (the **Services** link).
 - Managing the Container files and folders (the **Files** link).
 - Backing up the Container, renewing or removing the existing backup, restoring the Container (the **Backups** link).
 -  Activating the firewall and configuring its mode (the **Firewall** link).
 - Creating a Container clone (the **Clone Container** link). A clone is an exact copy of an existing Container.
 - Moving the Container to another Hardware Node (the **Migrate Container** link).
 - Launching Parallels Power Panel to manage the Container in a separate window (the **Open Parallels Power Panel** link).
 -  Connecting to the Container via SSH (the **Terminal Login** link).
 -  Logging in to the Container via Remote Desktop Connection (the **Remote Desktop** link).
 - Configuring all the parameters of the backup operation and performing that operation on the current Container (the **Back Up Container** link).
 -  Saving important data from the damaged Container and repairing the Container by creating a new temporary Container (the **Repair Container** link).

- Recovering the original state of the Container in case you have unintentionally modified, replaced, or deleted any file that is part of an application or OS template, and the action has brought about the Container malfunction (the **Reinstall Container** link).
 -  If you are managing a Container residing on the Hardware Node with the Linux operating system installed and wish to stop your Container, bear in mind that there is a two-minute timeout for the Container shutdown scripts to be executed. If the Container is not stopped in two minutes, the system forcibly kills all the processes in the Container. The Container will be stopped in any case, even if it is seriously damaged. To avoid waiting for two minutes if you are operating a Container that is known to be corrupt, you may use the **Power Off** link.
 - Removing the Container if you don't need it any more (the **Delete Container** link).
- 5** The **Container Resources** section summarizes the information on the current consumption of the CPU, memory and disk share allocated to the Container: the **Resources** column lists these resources, the **Used**, **Free**, and **Total** columns display the corresponding values in percentage terms and in diagrams. The percent value is calculated not in proportion to the total disk space of the Hardware Node, but in proportion to the quota on using the Node disk space by the Container.

Apart from the operations available in the **Tasks** section, the Parallels Infrastructure Manager toolbar provides you with access to the following operations:

- starting or stopping the Container (the **Start/Stop** link);
- restarting the Container (the **Restart** link);
- backing up the Container (the **Backups** link on the **Manage** menu);
- launching Parallels Power Panel to manage the Container (the **Open Parallels Power Panel** link on the **Login** menu). You can use this feature if:
 1. The offline management for the Container is enabled.
 2. A valid IP address is assigned to the Container.
 3. The IP address you have used to log in to Infrastructure Manager does not coincide with that of the corresponding Container.

-  connecting to the Container via SSH (the **Terminal Login** link on the **Login** menu);
-  logging in to the Container via Remote Desktop Connection (the **Remote Desktop** link on the **Login** menu);
-  suspending the selected Container(s): a suspended Container stays put, and so its processes and services do, to be later resumed from the checkpoint. Suspending Containers is a good method to disengage the Hardware Node resources for a certain period of time or saving the state of current operations which can be quickly launched again afterwards. Remember, that repairing, restarting and reinstalling a suspended Container can change the saved state of the Container, so these actions are not recommended for suspended Containers;
- changing the Container name, description, resources management configuration and start-up and offline management options (the **General Settings** link on the **Configure** menu);
- changing the root/Administrator password of the Container (the **Password** link on the **Configure** menu);
- changing the network settings (the **Network** link on the **Configure** menu);
- configuring the network bandwidth (the **Shaping** link on the **Configure** menu);
- changing the Container resource settings (the **Resources** link on the **Configure** menu);
-  configuring the virtual disk volumes of the Container (the **Volumes** link on the **Configure** menu);
- installing new Container applications (the **Templates** link on the **Configure** menu);
-  changing the firewall settings (the **Firewall** link on the **Configure** menu);
- changing the Container resources configuration by changing the sample the Container is based on (the **Apply Sample** link on the **Configure** menu).

Creating New Container

Parallels Infrastructure Manager enables you to create new Containers by means of the **New Container** wizard.

Note: The other approach to getting more Containers is realized within requesting, instead of creating Containers, which is described in the corresponding chapter (p. 247). Besides, your Containers list becomes a Container longer every time you migrate a physical server to a Container (p. 77) (and a Container shorter if you migrate a Container to another Hardware Node (p. 76)).

Selecting Host Hardware Node

On the first step of creating a new Container you can choose a host Hardware Node from the list of Infrastructure Manager Hardware Nodes, that is, the Nodes that have been registered in Parallels Infrastructure Manager, and enter the number of Containers you are going to create simultaneously.

The number of Containers is to be entered to the corresponding field in the **Multiple Container Configuration** section.

In the **Hardware Node Selection** section you can let Infrastructure Manager choose a host Node from the group of Infrastructure Manager Nodes by clicking the **Select Hardware Node Automatically** radio button. Do not forget to indicate the platform of the Node (Windows or Linux). If you want to select the Hardware Node yourself, click the **Select Hardware Node Manually** radio button.

To proceed with the Container(s) creation, click **Next**.

Defining Container General Settings

The second page of the **New Container** wizard enables you to define the Container general settings that are divided into several groups for your convenience. You can choose between creating a single Container and multiple Containers by entering the necessary number on the first step of the Container(s) creation wizard, and it is only in the latter case that the **Multiple Container Configuration** group is displayed.

The **General Configuration** group enables you to perform the following operations:

- Provide a name and a description for the Container; available when configuring settings for a single Container only. If you need a specific name and description for one of Containers created simultaneously, you can assign them after the Containers are created (p. 99).
- Select a Container sample (p. 225) that defines the Container resources parameters.
- Choose an OS template and its version you wish the Container to be based on.

The **Multiple Container Configuration** group appears if you are creating more than one Container at a time. Following is an explanation of the five drop-down menus that you find in this group:

- **Container IDs:**

Assign Container IDs automatically

Parallels Infrastructure Manager will assign Container IDs itself.

Assign Container IDs starting from a specified one

On the following screen you will be able to specify the Container ID for the first Container created. All the remaining Container IDs will be assigned based on the sequential incrementation of this first Container ID.

Set Container IDs manually

On the following screen you will be able to specify the Container IDs manually for each Container.

- **Names:**

Assign names based on a specified template

On the following screen you will be able to specify a template for assigning Container names, with the Container ID as the changing part.

<p>Set names manually for every Container</p>	<p>On the following screen you will be able to specify the Container names manually for each Container.</p>
<p>▪ Hostnames:</p>	
<p>Assign hostnames based on a specified template</p>	<p>On the following screen you will be able to specify a template for assigning Container hostnames, with the Container ID as the changing part.</p>
<p>Set hostnames manually for every Container</p>	<p>On the following screen you will be able to specify the Container hostnames manually for each Container.</p>
<p>▪ Routed Interface IP Addresses</p>	
<p>Assign according to the Container sample</p>	<p>The host-routed interface settings are taken from the Container sample used to create the Containers. These settings just define if the host-routed interface is created inside the Containers (one interface in each Container). If it is created, its IP address is taken from the global IP addresses pool.</p>
<p>Get from the global IP addresses pool</p>	<p>The IP addresses for the host-routed interfaces will be taken from the global pool of IP addresses (that can be configured on the IP Address Pool tab of the Setup --> Network screen).</p>
<p>Assign from a specified IP addresses range</p>	<p>On the following screen you will be able to specify the IP address for the first Container created. All the remaining Container IP addresses will be assigned based on the sequential incrementation of this first IP address.</p>
<p>Specify manually for every Container</p>	<p>On the following screen you will be able to specify the IP addresses manually for each Container.</p>
<p>▪ Bridged Interface IP addresses</p>	
<p>Assign according to the Container sample</p>	<p>The bridged interface settings are taken from the Container sample used to create the Containers. These settings define the number of bridged interfaces to be created inside each Container, and if this number is 1 or more, whether their IP addresses are received from the DHCP server or is taken from the global IP addresses pool.</p>
<p>Get from the DHCP server</p>	<p>The IP addresses for the bridged interfaces will be received from the DHCP server.</p>
<p>Get from the global IP addresses pool</p>	<p>The IP addresses for the bridged interfaces will be taken from the global pool of IP addresses (that can be configured on the IP Address Pool tab of the Setup --> Network screen).</p>
<p>Assign from a specified IP addresses range</p>	<p>On the following screen you will be able to specify the IP address for the first Container created. All the remaining Container IP addresses will be assigned based on the sequential incrementation of this first IP address.</p>
<p>Specify manually for every Container</p>	<p>On the following screen you will be able to specify the IP addresses manually for each Container.</p>

In the **Administrative Password** group, you should define and confirm the root/Administrator password. You will need this password to access the Container in the future, for example, through Parallels Power Panel.

Note: Remember that each Container user with the privileges of an administrator exercises full control over his/her Container, has his/her own user credentials (name and password) to access the Container and enjoys an unlimited access to other user accounts inside this Container, i.e. s/he has any right granted to a privately owned physical server as opposed to the Hardware Node administrator's authority or the rights of the other Containers users in regard to the given Container. Any Container user can be a member of an Active Directory domain (e.g. access any of the network shares to which the Container user has rights).

The **Advanced Configuration** group allows you to do the following:

- Specify the Container ID, a 32-bit (ranging from 0 to 4294967295) integer number over 100. This option is available only if you are creating a single Container. Detailed information on the Container IDs allocation can be viewed in the **Choosing Container ID** subsection of the **Parallels Virtuozzo Containers User's Guide**.

WARNING! When deciding on a Container ID, do not use the ID of any Container that was ever present in the system unless you are sure that no data belonging to the old Container remains on the Node. The fact is that the administrator of the newly-created Container might have access to these data in this case, i.e. to the backups of the old Container, its logs, statistics, etc.

- Start the Container after its creation;
- Have the Container started on every boot of the Hardware Node.

 The **Capabilities** subgroup of options in the **Advanced Configuration** group appears if you are creating more than one Container at a time. It enhances the operation of the Windows-based Containers you are creating by providing you with the ability to:

- Switch on the network browsing feature for the Container being created. The Windows 2003 browser service allows the Container on a Windows 2003 network to view all the network environment available. The browser service maintains a list (called the browse list) of all available domains and computers. The browse list can be viewed using Windows 2003 Explorer and is provided by a browser in the Container. The default for the feature is the off status. You can learn more on the option from the **Network Places overview** article of the Windows 2003 **Help** system invoked by selecting **Help and Support** on the Windows **Start** menu.
- Allow the packet QoS scheduler for the Container. This is one of the Quality of Service components in MS Windows 2003 Server that enable differentiation and preferential treatment for subsets of data transmitted over the network. The packet scheduler is the traffic control module that regulates how much traffic various applications are allowed, essentially enforcing the QoS parameters that are set for each particular application. For instance, you can use the feature to restrict a web site throughput to a certain maximum bandwidth value or differentiate between the data transmitted by critical applications (e.g. Plesk) and excessive data (e.g. multimedia applications), and allow preferential treatment for the important web sites or critical applications. The option is disabled by default. For additional information on the packet scheduler, address the **MSDN Library > Win32 and COM Development > Network Protocols > Quality of Service (QOS)** (http://msdn.microsoft.com/library/default.asp?url=/library/en-us/qos/qos/qos_start_page.asp).

Note: The concept of Quality of Service in MS Windows 2003 Server differs from that of Virtuozzo Quality of Service used to provide a fair share of the main system resources (disk space, CPU time, etc.) among Containers.

- Have the Container ID displayed on the Container desktop when connected to it by the RDP protocol.
- Enable/disable the Microsoft Cluster Server (MSCS) software to run inside the Container. The MSCS software integrated into the Windows Server 2003 operating system is designed to allow servers to work together as one server, thus, providing greater reliability for your applications and services. Running one and the same application on two or more servers in the cluster helps ensure high application availability if one of the servers fails. The clustering software controls the failover process so that the application continues running on the second server without any loss of data and without interruption in service. The Virtuozzo Containers software allows you to include Containers in a server cluster so that they can act as full participants (nodes) in the cluster. To learn more about the MSCS software, address [MSDN Library > Servers and Enterprise Development > Windows Server > Windows Server 2003 > Technical Articles > Introducing Microsoft Cluster Service \(MSCS\) in the Windows Server 2003 Family](http://msdn2.microsoft.com/en-us/library/ms952401.aspx) (<http://msdn2.microsoft.com/en-us/library/ms952401.aspx>).

To enable/disable any of the features listed under the **Advanced Configuration** group, select/clear the corresponding checkbox.

 The **Terminal Services** group allows you to define in which one of the two standard Windows TS modes (Remote Desktop for Administration and Terminal Server) the created Containers will operate. By default, any Container is automatically set to work in the Remote Desktop for Administration mode during its creation. So, you do not need to perform any additional operations to start connecting to Containers using this mode. Like in any other system with Windows Server 2003 installed, the Remote Desktop for Administration mode allows you to simultaneously open no more than two remote sessions and a console session to any Container on the Hardware Node.

If you are planning to have more than 2 remote sessions to a Container at the same time, you should enable the Terminal Server mode for this Container. You may also need to switch on this mode in case some of the Container applications require Terminal Server for their functioning. While set in the Terminal Server mode, the Container starts using the same Terminal Server License (TSL) server as the Hardware Node does. So, you can log in to the Container in this mode provided the TSL server for the Node is accessible by the Container and has a number of free client access licenses (CALs) installed. You can also redefine the TSL server to be used by the Container or set additional TSL servers for it in the **License Server Address** field.

The **Offline Management** group allows you to set the offline management options by selecting the appropriate radio button. Offline management of the corresponding Container ensures the Container manageability by means of one or more offline services from any browser at its own IP address. After offline management is enabled for the Container, one port of its IP address becomes permanently active whatever the Container state. The currently supported services are `vzpp` and `plesk` (for managing Containers with the Plesk control panel installed in them). You can:

- Disable the offline management of the Container.
- Enable the offline management of the Container via the offline management settings operating on the Hardware Node. Whenever you need to manage the Container offline, its offline management settings will be brought into synchronization with those in effect on the Node. Should any service be removed from the default services list, the Container will be unable to be managed via the service off the list. This option subscribes the Container to the default offline services.
- Manually compose the Container offline services list. You can select the service(s) you would like the Container to be subscribed to in the corresponding checkbox(es).

The **Permissions** group lets you create one or more permissions for the Containers to be created. As any permission is by definition a combination of a user or a group of users and a role in respect of a certain Infrastructure Manager object, you can indicate the corresponding user/group and role in the provided fields, thus creating a permission with respect to the Containers being created. To add more permissions, click the green plus sign to the right of the fields.

Click **Next** to submit the settings and move on to the next **New Container** wizard stage.

Specifying IDs, IP Addresses and Hostnames for Multiple Containers

If you are creating several Containers within one session, the screen displayed after the first one, where you have defined the general settings according to which the Containers creation process is to be carried on, is **Create New Containers: Multiple Configuration**. There are three sections, but it is the general settings made on the first step that determine these sections actual layout and whether they are displayed or not. The sections are:

- 1 The sections displayed if you have selected the "start from the one specified" method of assigning the Containers IDs, Hostnames and IP addresses: **Container ID Selection**, **Container Hostnames Selection**, **Container IP Address Selection**.
- 2 The **Container1**, **Container2** ... sections, displayed if you have selected to manually assign some or all of these parameters, placed, in this case, under these sections.

When assigning Containers hostnames, please notice the **Template should contain <ctid>** tag inside mark under the hostname field. This tag will be used for all the Containers you are creating as a variable to be automatically filled with fitting IDs. This means that if you are creating 4 Containers, have entered MYCT<ctid> for the hostname and 105 is the biggest ID of the Containers in your Containers list, then, after you are through with creating Containers, this list will be populated with four newly created Containers with the hostnames MYCT106, MYCT107, MYCT108 and MYCT109.

The IP addresses can be assigned, if at all, either manually or on the "start from the one specified" basis, which means entering an IP address only once for the 1st Container of the Containers you are creating, with all the rest of the Containers IP addresses being calculated from this one. If you are creating 4 Containers and entered 10.10.0.1 to the **Assign Container IP Address Starting From** field, then the Containers will be created with IP addresses of 10.10.0.1, 10.10.0.2, 10.10.0.3 and 10.10.0.4.

Even when assigning IP addresses on the "start from the one specified" basis you can both enter the necessary IP addresses to the **IP address** fields or, if your IP assigning principle has yet to be refined, leave them as they are to per-Container assign IP addresses later. (On the same screen you will be able to change each Container hostname.)

To add an IP address, click the  button near the **IP Address** field, to delete an IP address, click the  button.

Clicking the **Next** button opens the subsequent step of creation new Containers.

Configuring Container Network Parameters

The **Network Configuration** page lets you define all the major network parameters of the Container you are creating.

The first thing to be decided upon is whether the network connectivity for the Container should be provided in the host-routed or bridged mode. You can also have both types of network interfaces in the Container.

- The host-routed mode is simpler, no additional configuration of the Virtuozzo network is required for the created Containers to be immediately connected to the network. This mode is sufficient in most cases. However, the host-routed Containers cannot get their IP addresses by DHCP because their Virtual Network adapter does not have a unique MAC address.
- In the bridged mode, a Container is a full member of the network. However, a bridged Container must always belong to a Virtual Network that would provide the network connectivity for the Container. Virtual Networks are created (p. 147) and configured (p. 150) separately. So, at least one Virtual Network should be already configured on the Hardware Node for you to be able to use the bridged network mode for the Container being created. The bridged mode also allows you to create more than one virtual Ethernet adapter in the Container (click the **Add New Interface** link for this).

After you have selected either the **Routed Network** or **Bridged Network** checkbox (or both), you should indicate the IP parameters of the relevant interfaces (together with the parameters in the **Global Network** group that pertain to all the Container network interfaces, be they host-routed or bridged):

Parameter	Description
DNS Server IP Address	<p>One or more DNS servers to be used by the Container virtual adapters.</p> <p> For Linux-based Containers, all the DNS servers are common for all the Container virtual adapters.</p> <p> In Windows-based Containers, each virtual adapter can have its own DNS server.</p> <p>Note that the static values in these fields might be overridden if the Container gets the DNS servers from the DHCP server when operating in the bridged network mode.</p>
 WINS Server IP Address	<p>One or more WINS servers to be used by the Container virtual adapters. Each virtual adapter can be assigned its own WINS server.</p>
Search Domain	<p>One or more search domains to be used by the Container virtual adapters.</p> <p>All the search domains are common for all the Container virtual adapters.</p> <p>Note that the static values in these fields might be overridden if the Container gets the search domains from the DHCP server when operating in the bridged network mode.</p>
IP Address/Subnet Mask	<p>One or more IP addresses and subnet masks of the Container virtual adapter. In the bridged mode, if the Get IP Address by DHCP checkbox is selected, you do not have to provide an IP address for the Container; it will be assigned automatically by your DHCP server once the Container is started.</p>

- Connect to [Virtual Network] On this drop-down menu, you should select the Virtual Network to which the Container will be assigned, if you use the bridged network mode.
- Default Gateway If you want the Container to operate in the bridged mode and not use a DHCP server, you should indicate the default gateway for it.

Customizing Container Resources Settings

The Resources Customization screen allows you to adjust the resources the Container being created will be allowed to use.

The CPU-related resource management is based on the following parameters:

Parameter	Description
<code>cpuunits</code>	This is a positive integer number that determines the minimal guaranteed share of the CPU time your Container will receive.
<code>cpulimit</code>	This is a positive number indicating the CPU time in percent the corresponding Container is not allowed to exceed.
 <code>burst_cpulimit</code>	The CPU power limit, in percent, the Container cannot exceed. The limitations set in this parameter are applied to the Container when it exceeds the limit specified in the <code>burst_cpu_avg_usage</code> parameter.
 <code>burst_cpu_avg_usage</code>	The CPU usage limit, in percent, set for the Container. This limit is calculated as the ratio of the current Container CPU usage to the CPU limit (i.e to the value of the <code>CPULIMIT</code> parameter) set for the Container. If the limit is not specified, the full CPU power of the Hardware Node is considered as the CPU limit. Upon exceeding the <code>burst_cpu_avg_usage</code> limit, the <code>burst_cpulimit</code> limit is applied to the Container.
 <code>cpuguarantee</code>	This is a positive integer number indicating the CPU time, in percent, the corresponding Container is guaranteed to receive. If both the <code>cpuguarantee</code> and <code>cpuunits</code> parameters are set, the <code>cpuguarantee</code> parameter is first taken into account when distributing processor(s) time among the Containers existing on the Node; the remaining CPU time, if any, is given to the Containers in accordance with the value of the <code>cpuunits</code> parameter.
<code>cpus</code>	The number of CPUs set to handle all the processes inside the given Container. By default, any Container is allowed to consume the CPU time of all processors on the Node.

The disk-related resource management is based on the following parameters:

Parameter	Description
<code>diskspace</code>	Total size of disk space consumed by the Container.
	When the space used by the Container hits the soft limit, the Container can allocate additional disk space up to the hard limit during the grace period indicated by the <code>quotatime</code> parameter value.
 <code>diskinodes</code>	Total number of disk inodes (files, directories, and symbolic links) allocated by the Container. When the number of inodes used by the Container hits the soft limit, the Container can create additional inodes up to the hard limit during the grace period indicated by the <code>quotatime</code> parameter value.

-  `quotauidlimit` Number of user/group IDs allowed for the Container internal disk quota. If set to 0, UID/GID quota will not be enabled.
-  `quotatime` The grace period for the disk quota overusage defined in seconds. The Container is allowed to temporarily exceed its quota soft limits for no more than the QUOTATIME period.
-  `ioprio` The Container priority for disk I/O operations. The allowed range of values is 0-7. The greater the priority, the more time the Container has for writing to and reading from the disk. The default Container priority is 4.

The memory-related resource management parameters are divided into 4 groups: memory parameters, primary system parameters, secondary system parameters, and auxiliary system parameters.

 Windows-based Containers use only the primary system parameters.

 For Linux-based Containers, this screen displays the memory-based, or the system-based, or both memory- and system-based Container resources data, depending on your memory management configuration:

- If the memory management mode is enabled for the Container, it can be allocated memory in much the same way as a certain amount of physical memory is installed on a physical computer. This is the recommended mode for managing Containers for most administrators.
- If the system management mode is enabled, the Container's performance depends on the values of quite a number of fine-grained parameters. The primary parameters are the starting point for defining the relative power of a Container. The secondary parameters are dependent on the primary ones and are calculated from them according to a set of constraints. The auxiliary parameters help improve fault isolation among applications in a Container and the way applications handle errors and consume resources.
- If both resource management modes are used, the more restrictive value is taken into account each time the system makes the decision whether to allocate this or that resource to the Container.

 *Memory parameters*

Parameter	Description
<code>slmmemorylimit</code>	An approximation of the size of the physical memory allocated to the Container. In other words, the Container performance is similar to the performance of a physical computer with as much physical memory installed as is indicated in this parameter.

Primary system parameters

Parameter	Description
<code>numproc</code>	The maximal number of processes the Container may create.
 <code>numsessions</code>	The number of simultaneous terminal sessions that can be opened to the Container.
 <code>vprvmem</code>	The size of private (or potentially private) memory allocated by the Container. The memory that is always shared among different applications is not included in this resource parameter.
 <code>numtcpsock</code>	The number of TCP sockets (PF_INET family, SOCK_STREAM type). This parameter limits the number of TCP connections and, thus, the number of clients the server application can handle in parallel.

 **numothersock** The number of sockets other than TCP ones. Local (UNIX-domain) sockets are used for communications inside the system. UDP sockets are used, for example, for Domain Name Service (DNS) queries. UDP and other sockets may also be used in some very specialized applications (SNMP agents and others).

 **vmguarpages** The memory allocation guarantee, in pages. Container applications are guaranteed to be able to allocate additional memory so long as the amount of memory accounted as `privvmpages` (see the auxiliary parameters) does not exceed the configured barrier of the `vmguarpages` parameter. Above the barrier, additional memory allocation is not guaranteed and may fail in case of overall memory shortage.

 **avnumproc** The average number of processes and threads.

 *Secondary system parameters*

Parameter	Description
<code>kmemsize</code>	The size of unswappable kernel memory allocated for the internal kernel structures for the processes of a particular Container. Note: For the Virtuozzo Containers 64-bit version for IA-64 processors, it takes 4 (four) times more the size of the kernel memory than that for the Virtuozzo Containers 32-bit version to handle one and the same process.
<code>tcpsndbuf</code>	The total size of send buffers for TCP sockets, i.e. the amount of kernel memory allocated for the data sent from an application to a TCP socket, but not acknowledged by the remote side yet.
<code>tcprecvbuf</code>	The total size of receive buffers for TCP sockets, i.e. the amount of kernel memory allocated for the data received from the remote side, but not read by the local application yet.
<code>othersockbuf</code>	The total size of UNIX-domain socket buffers, UDP, and other datagram protocol send buffers.
<code>dgramrcvbuf</code>	The total size of receive buffers of UDP and other datagram protocols.
<code>oomguarpages</code>	The out-of-memory guarantee, in pages. Any Container process will not be killed even in case of heavy memory shortage if the current memory consumption (including both physical memory and swap) does not reach the <code>oomguarpages</code> barrier.
<code>privvmpages</code>	The size of private (or potentially private) memory allocated by an application. The memory that is always shared among different applications is not included in this resource parameter.

 *Auxiliary system parameters*

Parameter	Description
<code>lockedpages</code>	The memory not allowed to be swapped out (locked with the <code>mlock()</code> system call), in pages.
<code>shmpages</code>	The total size of shared memory (including IPC, shared anonymous mappings and <code>tmpfs</code> objects) allocated by the processes of a particular Container, in pages.
<code>numfile</code>	The number of files opened by all Container processes.
<code>numflock</code>	The number of file locks created by all Container processes.

numpty	The number of pseudo-terminals, such as an ssh session, screen or xterm applications, etc.
numsiginfo	The number of siginfo structures (essentially, this parameter limits the size of the signal delivery queue).
dcachesize	The total size of dentry and inode structures locked in the memory.
numiptent	The number of IP packet filtering entries.

Notes: The parameters containing "pages" in their names are measured in 4096-byte pages in the Virtuozzo Containers 32-bit version and in 16384-byte pages in the Virtuozzo Containers 64-bit version for IA-64 processors.

In the Virtuozzo Containers 64-bit versions, all the system parameter values are 64-bit and, therefore, can exceed the values in the Virtuozzo Containers 32-bit version (where the parameters values are 32-bit). For example, the limit of the oomguarpages parameter in the Virtuozzo Containers 64-bit version for IA-64 processors can be maximally set to 9223372036854775807 instead of 2147483647 in the Virtuozzo Containers 32-bit version. To learn more about the difference between the Virtuozzo Containers 64-bit and 32-bit versions turn to the [Virtuozzo Containers for 64-bit Processors](#) section of the [Parallels Virtuozzo Containers User's Guide](#).

The information on the available parameters is presented in the table with the following columns:

Column Name	Description
Parameter	The name of the resource parameter.
Limited	If this checkbox is cleared, the limits on the corresponding resource are not set for the Container.
 Limit	The limit on the consumption of the given resource by the Container. The units in which the limit is measured are specified in the Units column.
 Soft Limit	The limit on the consumption of the given resource by the Container that can be exceeded only if the system is not fully loaded. The units in which the limit is measured are specified in the Units column.
 Hard Limit	The limit on the consumption of the given resource by the current Container that cannot be exceeded under any circumstances. The units in which the limit is measured are specified in the Units column.
Units	The units in which the resource values are measured.
Description	The description of the resource parameter.

 You can use the **Validate** button at the foot of the page to display if any constraint violations (p. 40) have been found and learn the corresponding constraints on the resource management parameters.

 The **Memory Management Configuration** group lets you choose the way to manage the Container resources:

- The **Old-style UBC resource management** option tells the system to use all those fine-grained parameters for system resources allocation that have always been part of the Virtuozzo traditional resource management.
- The **SLM-only resource management** option allows you to reduce a set of memory-related parameters to a single `slmmemorylimit` parameter, which essentially denotes the amount of RAM the given Container is allowed to use.
- The **Use both UBC and SLM simultaneously** option validates both of the schemes above for putting restrictions on the usage of system resources by the Container.

If you have entered new values for one or several resource parameters and then decided to change them to the default values from the Container sample, you can reset the new values by clicking the curved arrow against the corresponding parameter(s).

After you have customized the Container parameters and checked their interdependencies, click **Next**.

Validating Container Resources Configuration

 The system resource control parameters have complex interdependencies, or constraints. Violation of these interdependencies can be catastrophic for the Container. In order to ensure that the Container under creation does not break them, it is important to validate the Container configuration file before creating Containers on its basis.

The utility checks constraints on the resource management parameters and displays all the constraint violations found. There can be three levels of violation severity, represented by the following icons on the Container dashboard:

- | | | |
|---|-----------------------|---|
|  | Recommendation | This is a suggestion, which is not critical for the Container or Hardware Node operations. The configuration is valid in general; however, if the system has enough memory, it is better to increase the settings as advised. |
|  | Warning | A constraint is not satisfied, and the configuration is invalid. The Container applications may not have optimal performance or may fail in an ungraceful way. |
|  | Error | An important constraint is not satisfied, and the configuration is invalid. The Container applications have increased chances to fail unexpectedly, to be terminated, or to hang. |

After setting the reasonable values for the parameters, the Container can be safely run.

Installing Applications into Container

 The **New Container(s): Application Selection** page of the **New Container** wizard allows you to choose applications to install them to the Container directly after its creation. All available applications that can be added to the Container are listed in the **Available Applications** table in the left part of the displayed page. The type and number of applications vary depending on the OS template the Container will be based on, i.e. only those applications are displayed that are compatible with the giContainern OS template.

To add the application(s) you need to the Container, tick the checkbox(es) opposite the application(s) you wish to add and click on the >> button. After that, the application(s) appear(s) in the **Scheduled for Installation** table in the right part of the page. To remove any application from the Container being created, tick its checkbox in the **Scheduled for Installation** table and click on the << button. If you are not sure at the moment what applications you need to add to the Container, you can add them later (after the Container has been created), as is described in the **Managing Container Applications** subsection.

The **Resolve** button enables you to check unresolved dependencies among the applications selected for installation and review them in case of finding any. It is strongly advisable to make use of the button after you have added the applications you wish to install to the **Scheduled for Installation** table. To eliminate unresolved dependencies, you can remove one of the problem applications from the **Scheduled for Installation** table as is shown above.

After you have selected the applications to be installed and checked their dependencies, click on the **Next>** button.

Reviewing Container Configuration

The last page of the **New Container** wizard lets you review the major settings of the Container configuration you provided on the previous steps. If you are satisfied with the information entered, click **Create** to start creating the Container. Otherwise, you can return to the previous steps by clicking the **Back** button and change the corresponding parameters.

Starting and Stopping Container

A Container may be started up, restarted, and shut down like an ordinary computer. Depending on the Container state, only those operations are accessible that comply with its current state. For example, a running Container cannot be started for obvious reasons, and so on. The following Container states can be characterized as stable:

Status	Description
Running	The Container is running; therefore, it may only be restarted or stopped.
Down	The Container is stopped; therefore, it may only be started.
 Repairing	The Container is being repaired. You cannot perform any action on the Container until you click the Finish Repair button on the Start Container in Repair Mode page (p. 98).

Besides these states, during Container operations a Container may be in one of the transitional states: mounting, starting, stopping, etc. When in a transitional state, you cannot perform any action on the Container until the operation is finished. The description of all possible Container statuses is provided in the [Container Statuses](#) section.

Click the **Start Container**, **Stop Container**, or **Restart Container** button to perform the corresponding action. On clicking one of these buttons, this action is logged.

 If you are managing a Container residing on the Hardware Node with the Linux operating system installed and wish to stop your Container, bear in mind that there is a two-minute timeout for the Container shutdown scripts to be executed. If the Container is not stopped in two minutes, the system forcibly kills all the processes in the Container. The Container will be stopped in any case, even if it is seriously damaged. To avoid waiting for two minutes if you are operating a Container that is known to be corrupt, you may use the **Power Off** link that is situated in the **Tasks** section of the Container dashboard.

Logging In to Container

Using Parallels Power Panel to Access Container

Parallels Power Panel is the tool designed for the administrators of a particular Container. A Parallels Infrastructure Manager user can also use it to take a closer look at a particular Container (provided the corresponding rights are granted to them).

Parallels Power Panel can be opened in one of the following ways:

- On a list of Containers, right-click the needed Container, then select **Log In -> Open Parallels Power Panel**;
- On the Container dashboard, select **Log In -> Open Parallels Power Panel** on the top toolbar;
- On the Container dashboard, click **Open Parallels Power Panel** in the **Tasks** group of links.

Sometimes it is not possible to open Parallels Power Panel due to the following reasons:

- An IP address might not be assigned to the corresponding Container;
- Offline management might be disabled globally on the Hardware Node;
- Offline management might be disabled for the corresponding Container (though enabled globally).

So, to make sure Parallels Power Panel can be opened for any Container, you should enable offline management both globally and for the particular Container, as well as assign this Container an IP address.

Using SSH to Connect to Container

 You can use the Secure Shell (ssh) application to remotely connect to your Container and work inside its directory tree using standard Linux command line tools. To connect to the Container by ssh, you should make sure that:

- 1 You are launching Parallels Infrastructure Manager in Internet Explorer 5.0 or above. SSH connection to the Container is supported by other browsers only if you have a Java Virtual Machine on your computer.
- 2 The Container is running. If it is not, start it on the **Start/Stop Container** page.

Note: If your Container is running the Windows Server 2003 operating system, please turn to the **Using Remote Desktop Connection to Access Container** section (p. 44) to learn to manage Containers by means of the Remote Desktop Connection application.

The SSH Connection window is opened upon clicking on the Terminal Login icon on the Container dashboard. You are presented with the Login and Password fields where you should enter the relevant information (root or any other user name you might have created for this Container and this user's password) to be passed to the ssh server inside the Container.

After you have filled in these two fields, click the Login button. If you are doing this for the first time, your browser may display a window like this asking you to install additional components:



Figure 1: Installing ActiveX SSH Client

Note: When connecting to your Container via SSH using a browser other than Internet Explorer, this window does not appear. The SSH connection through browsers on the Mozilla engine is provided by the Java technology.

Click **Yes** in this window and wait for the ssh terminal window to appear, whereupon you get connected to the Container and may start sending commands to it via ssh.

Using Remote Desktop Connection to Access Container

 You can use Remote Desktop Connection - a standard Windows application - to connect to the Container by means of the Remote Desktop Protocol (RDP). The feature is available only for Internet Explorer 5.0 or above. It is not supported by other browsers. To connect to the Container via RDP, you should make sure that the Container is running. If it is not, start it.

Note: If you are managing a Linux-based Container, please turn to the **Using SSH to Connect to Container** section (p. 43) to learn to manage the Container by means of Secure Shell.

The Remote Desktop window is opened upon clicking on the Remote Desktop icon on the Container dashboard. You are presented with the **Login** button that you should click to open a Remote Desktop session. If you are doing this for the first time, your browser may display a window like this asking you to install additional components:



Figure 2: Infrastructure Manager - Installing Remote Desktop ActiveX Control

Click **Yes** in this window and wait for the Remote Desktop terminal window to appear, whereupon you will be presented with the **Login** and **Password** fields. After entering the necessary information (**Administrator** or any other user name you might have created for this Container and this user's password) in the fields provided, click **Enter** to get connected to the Container and start sending commands to it via Remote Desktop.

Changing Container Root/Administrator Password

A Virtuozzo server(s) administrator can benefit from the **Change Password** option on the screen where, to perform this operation, you should enter a new root/Administrator password for the current Container into the fields provided and click **Change**.

Note that Parallels Infrastructure Manager does not check the entered password as to its length and non-conformity to dictionary entries, so choosing a simple password rests entirely at your own risk. It is recommended to use a chaotic set of lowercase (a-z) and uppercase (A-Z) letters, digits (0-9), and punctuation marks as root/administrator password. The following punctuation marks are allowed: ! " \$ % & , () * + - . / ; : < = > ? [\] ^ _ { | }. The space character, #, and @ symbols are not allowed. The password should not be less than 5 or more than 14 characters.

Note: The password of the Virtuozzo server(s) administrator proper can be changed on the **Personal Settings** tab of the **User Profile** screen which is displayed through the **User Profile** link on the right of the Infrastructure Manager toolbar.

Deleting Container

The **Delete** screen allows you do remove those Containers from your Hardware Nodes that you do not need anymore. This screen is opened:

- after you click the **Delete Container** link on the corresponding Container dashboard;
- after you select the check boxes of the Containers you wish to delete on the **Containers** tab of the **Infrastructure** window and click the **Delete** icon above the **Containers** table on this tab.

All the Containers scheduled for removing are listed in the **Delete Container** section of the **Delete** screen. To delete the listed Containers, select the **Yes, I want to delete the Container(s)** check box and click the **Delete** button; otherwise, click **Cancel**.

When removing Containers, please keep in mind the following:

- Removing a Container means that the private area of the Container is completely deleted from the Host OS and all the Container private files are irrevocably erased from the Node.
- Deleting a considerable number of Containers may take a rather long run.

Working With Container Files and Folders

For a running Container, you can navigate inside the Container directory structure, list the Container files and directories and perform all essential file operations on the **File Manager** page. ( Right after opening this screen, you are presented with a list of drives inside the Container. Click on a drive (e.g. C:) to see its contents.) The main information on the directory/drive contents is presented in the form of a table. The first table column indicates if the object is a directory or a file. The remaining columns mean the following:

Column Name	Description
Name	The name of the directory or file.
Size	The size of the file.
Modified	The date and time of the last modification of the directory or file.
 Permissions	The first symbol in this column indicates if this is a directory (the letter d) or not (the minus sign). The following three symbols designate the permissions that the owner of the directory/file has on it, then go another three symbols for the permissions of the users belonging to the group assigned to the directory/file, and the final set of three symbols denotes the permissions of all the rest. The symbols in each of the set express consecutively the following permissions: read, write, and execute. The presence of a letter (correspondingly, r, w, or x) indicates that the permission is given, and the minus sign - that it is absent.
 User	The owner of the file/directory.
 Group	The users' group that has certain permissions on the file/folder. These permissions are presented by the 5th thru 7th symbols in the Permissions column.
Actions	Hyperlinks for performing certain operations with the directory or file (see below).

 **Note:** If the Container is being repaired (p. 98), the file manager root directory (/) corresponds to the `/repair` directory of the temporary Container, in other words, it represents the root directory of the problem Container, not that of the newly-created one.

Apart from viewing a list of files and directories with their essential properties, you are able to perform the following operations:

- Create a new folder in the current directory (p. 47);
- Create a new text file in the current directory (p. 47);
- Edit existing text files (p. 48);
- Upload a file from your local computer to the current Container directory (p. 48);
- Download a file from the current Container directory to your local computer (by clicking the diskette icon in the **ACTIONS** column);
- Copy any number of files or folders to another directory inside the Container (p. 48);
- Move any number of files or folders to another directory inside the Container (p. 48);
- Edit the properties of any folder or file (p. 49);
- Remove any number of files or folders by selecting them and following the **Remove** link.

To perform a certain operation (e.g. copying) on a number of directories or files, tick the corresponding checkboxes. The uppermost checkbox allows you to select all the directories and files at once.

Creating Folder

The page where you can indicate the name of a new folder to be created is called **Create Folder**.

Enter the folder name in the **Folder Name** field and click **Submit**. The new folder will be created in the current directory (designated above the field).

Creating Text File

The **Create File** page allows you to create simple text files directly inside the Container, without having to upload them from your local computer.

In the **Specify File** section, you should enter the name of the file to be created in the current directory (this directory is indicated under the page heading) to the **Name** field and, optionally, type the text of the file in the **Content** field. Click **Create** when you are finished to create the new file.

Editing Text File

Parallels Infrastructure Manager allows you to edit any text file inside your Container directly thru the Parallels Infrastructure Manager interface. The **Edit File** page can be accessed by clicking on the right icon in the **ACTIONS** column for the corresponding text file on the **File Manager** page.

This page presents the contents of the file in an editable field. Make your modifications and click **Submit** to write a new version of the file.

Uploading File To Container

The current version of Parallels Infrastructure Manager allows you to upload external files to the Container, up to ten files at a time. The **Upload File** page is displayed after clicking the **Upload File** link on the **File Manager** page.

Click the **Browse** button, navigate to the local file you wish to upload and double-click it. The path to the file will be displayed in the corresponding **Specify File** field. Another way of indicating the file is to enter this path manually.

When you click **Upload**, the files that you have specified will be uploaded to the current directory inside the Container. For your reference, this directory is indicated above the **Specify File** group.

Copying Files and Folders Inside Container

The **Copy File(s)** page, where you can perform the copy operation, gets displayed after you have selected one or more files and/or folders by ticking the corresponding checkboxes on the **File Manager** page and clicking **Copy**.

On the **Copy File(s)** page, click **Select** and, in the pop-up window, navigate to the folder where you want to copy the files and/or folders, check the radio button to the left of it, and press **Select**. The path to the target folder will be displayed in the **Destination Path** field. Click **Copy** to begin the copy process.

Moving Files and Folders Inside Container

The **Move File(s)** page, where you can perform the move operation, gets displayed after you have selected one or more files and/or folders by ticking the corresponding checkboxes on the **File Manager** page and clicked **Move**.

On the **Move File(s)** page, click **Select** and, in the pop-up window, navigate to the folder where you want to move the files and/or folders, check the radio button to the left of it, and press **Select**. The path to the target folder will be displayed in the **Destination Path** field. Click **Move** to begin the move process.

Editing File or Folder Properties

The page where you can view and edit some properties of a certain file or folder is accessible by clicking the leftmost icon in the **ACTIONS** column for the corresponding file or folder on the **File Manager** page.

The information is given on the following file or folder general properties, whether editable or not:

Field	Description	Editable?
Name	The name of the file or folder.	Yes.
Path	The path to the file or folder inside the Container.	No. See Moving Files and Folders Inside Container for information on how to change the path.
Size	The size of the file. To save the time needed to open the page, a link is given for a folder to calculate its overall size.	No.
Modified	The date and time of the last modification of the file or folder.	No.

 You can also change such file/folder properties as permissions and ownership.

When you click **Submit** on the **Change Properties** page, your changes will be applied to the given file or folder.

Managing and Monitoring Container Resources

The main goal of resource control in Virtuozzo Containers 4.0 is to provide service level management for Containers. Because of Hardware Node resources being shared by its Containers, correctly configured resource control settings prevent serious impacts resulting from the resource over-usage (accidental or malicious) of any Container on the other Containers. Using resource control parameters for service level management also allows to enforce fairness of resource usage among Containers and better service quality for preferred Containers, if necessary.

Resources Overview

The **Overview** subtab summarizes the current CPU, system and disk usage by the Container in the following table:

CPU Usage	This is a positive integer or fractional number that determines the minimal guaranteed percentage share of the CPU time your Container will receive. For stopped Containers, this parameter is not available.  Load Average for the CPU usage is the average number of active processes for the past 1, 5, and 15 minutes, respectively. Value 0.0 means that the CPU is idle, 1.0 that the CPU is fully used. Value 2.0 denotes that the CPU load exceeds the nominal value by two times.
-----------	--

Memory Usage	This is a cumulative figure presenting the average consumption of a number of critical memory-related parameters by your Container.
Disk Usage	Total amount of disk space allocated to the Container. When the space used by the Container hits the soft limit (or reaches 100% on the percent bar), the Container can be allowed additional disk space up to the hard limit during the grace period.

The information on the disk and memory usage is organized as follows:

Column Name	Description
Resource	The name of the resource: memory, disk space or disk inodes.
Used	Consumed amount of memory, disk size, or the number of inodes.
Free	Available amount of memory, disk size, or inodes number.
Total	The total amount of memory, disk size or inodes..

CPU Parameters

The CPU-related resource management is based on the following parameters:

Parameter	Description
cpuunits	This is a positive integer number that determines the minimal guaranteed share of the CPU time your Container will receive.
cpulimit	This is a positive number indicating the CPU time in percent the corresponding Container is not allowed to exceed.
 burst_cpulimit	The CPU power limit, in percent, the Container cannot exceed. The limitations set in this parameter are applied to the Container when it exceeds the limit specified in the burst_cpu_avg_usage parameter.
 burst_cpu_avg_usage	The CPU usage limit, in percent, set for the Container. This limit is calculated as the ratio of the current Container CPU usage to the CPU limit (i.e to the value of the CPULIMIT parameter) set for the Container. If the limit is not specified, the full CPU power of the Hardware Node is considered as the CPU limit. Upon exceeding the burst_cpu_avg_usage limit, the burst_cpulimit limit is applied to the Container.
 cpuguarantee	This is a positive integer number indicating the CPU time, in percent, the corresponding Container is guaranteed to receive. If both the cpuguarantee and cpuunits parameters are set, the cpuguarantee parameter is first taken into account when distributing processor(s) time among the Containers existing on the Node; the remaining CPU time, if any, is given to the Containers in accordance with the value of the cpuunits parameter.
cpus	The number of CPUs set to handle all the processes inside the given Container. By default, any Container is allowed to consume the CPU time of all processors on the Node.

The information on the available parameters is presented in the table with the following columns:

Column Name	Description
Parameter	The name of the resource parameter.
Current Usage	Indicates the consumption of the corresponding resource by the Container at the moment of calling the current Infrastructure Manager page. The units in which the consumption is measured are specified in the Units column. If the current usage is not available (<i>n/a</i>), it means that either the Container is not running, or the nature of the resource does not suggest its changing over time.
 Limit	The limit on the consumption of the given resource by the Container. The units in which the limit is measured are specified in the Units column.
 Soft Limit	The limit on the consumption of the given resource by the Container that can be exceeded only if the system is not fully loaded. The units in which the limit is measured are specified in the Units column.
 Hard Limit	The limit on the consumption of the given resource by the current Container that cannot be exceeded under any circumstances. The units in which the limit is measured are specified in the Units column.
Units	The units in which the resource values are measured.
Description	The description of the resource parameter.

Disk Parameters

The disk-related resource management is based on the following parameters:

Parameter	Description
diskspace	Total size of disk space consumed by the Container.
	When the space used by the Container hits the soft limit, the Container can allocate additional disk space up to the hard limit during the grace period indicated by the <code>quotatime</code> parameter value.
 <code>diskinodes</code>	Total number of disk inodes (files, directories, and symbolic links) allocated by the Container. When the number of inodes used by the Container hits the soft limit, the Container can create additional inodes up to the hard limit during the grace period indicated by the <code>quotatime</code> parameter value.
 <code>quotauidlimit</code>	Number of user/group IDs allowed for the Container internal disk quota. If set to 0, UID/GID quota will not be enabled.
 <code>quotatime</code>	The grace period for the disk quota overusage defined in seconds. The Container is allowed to temporarily exceed its quota soft limits for no more than the <code>QUOTATIME</code> period.
 <code>ioprio</code>	The Container priority for disk I/O operations. The allowed range of values is 0-7. The greater the priority, the more time the Container has for writing to and reading from the disk. The default Container priority is 4.

The information on the available parameters is presented in the table with the following columns:

Column Name	Description
Parameter	The name of the resource parameter.
Current Usage	Indicates the consumption of the corresponding resource by the Container at the moment of calling the current Infrastructure Manager page. The units in which the consumption is measured are specified in the Units column. If the current usage is not available (<i>n/a</i>), it means that either the Container is not running, or the nature of the resource does not suggest its changing over time.
 Limit	The limit on the consumption of the given resource by the Container. The units in which the limit is measured are specified in the Units column.
 Soft Limit	The limit on the consumption of the given resource by the Container that can be exceeded only if the system is not fully loaded. The units in which the limit is measured are specified in the Units column.
 Hard Limit	The limit on the consumption of the given resource by the current Container that cannot be exceeded under any circumstances. The units in which the limit is measured are specified in the Units column.
Units	The units in which the resource values are measured.
Description	The description of the resource parameter.

Memory Parameters

The memory-related resource management parameters are divided into 4 groups: memory parameters, primary system parameters, secondary system parameters, and auxiliary system parameters.

 Windows-based Containers use only the primary system parameters.

 For Linux-based Containers, this screen displays the memory-based, or the system-based, or both memory- and system-based Container resources data, depending on your memory management configuration:

- If the memory management mode is enabled for the Container, it can be allocated memory in much the same way as a certain amount of physical memory is installed on a physical computer. This is the recommended mode for managing Containers for most administrators.
- If the system management mode is enabled, the Container's performance depends on the values of quite a number of fine-grained parameters. The primary parameters are the starting point for defining the relative power of a Container. The secondary parameters are dependent on the primary ones and are calculated from them according to a set of constraints. The auxiliary parameters help improve fault isolation among applications in a Container and the way applications handle errors and consume resources.
- If both resource management modes are used, the more restrictive value is taken into account each time the system makes the decision whether to allocate this or that resource to the Container.

Memory parameters

Parameter	Description
<code>slmmemorylimit</code>	An approximation of the size of the physical memory allocated to the Container. In other words, the Container performance is similar to the performance of a physical computer with as much physical memory installed as is indicated in this parameter.

Primary system parameters

Parameter	Description
<code>numproc</code>	The maximal number of processes the Container may create.
 <code>numsessions</code>	The number of simultaneous terminal sessions that can be opened to the Container.
 <code>vprvmem</code>	The size of private (or potentially private) memory allocated by the Container. The memory that is always shared among different applications is not included in this resource parameter.
 <code>numtcpsock</code>	The number of TCP sockets (PF_INET family, SOCK_STREAM type). This parameter limits the number of TCP connections and, thus, the number of clients the server application can handle in parallel.
 <code>numothersock</code>	The number of sockets other than TCP ones. Local (UNIX-domain) sockets are used for communications inside the system. UDP sockets are used, for example, for Domain Name Service (DNS) queries. UDP and other sockets may also be used in some very specialized applications (SNMP agents and others).

 `vmguarpages` The memory allocation guarantee, in pages. Container applications are guaranteed to be able to allocate additional memory so long as the amount of memory accounted as `privvmpages` (see the auxiliary parameters) does not exceed the configured barrier of the `vmguarpages` parameter. Above the barrier, additional memory allocation is not guaranteed and may fail in case of overall memory shortage.

 `avnumproc` The average number of processes and threads.

 *Secondary system parameters*

Parameter	Description
<code>kmemsize</code>	The size of unswappable kernel memory allocated for the internal kernel structures for the processes of a particular Container. Note: For the Virtuozzo Containers 64-bit version for IA-64 processors, it takes 4 (four) times more the size of the kernel memory than that for the Virtuozzo Containers 32-bit version to handle one and the same process.
<code>tcpsndbuf</code>	The total size of send buffers for TCP sockets, i.e. the amount of kernel memory allocated for the data sent from an application to a TCP socket, but not acknowledged by the remote side yet.
<code>tcprcvbuf</code>	The total size of receive buffers for TCP sockets, i.e. the amount of kernel memory allocated for the data received from the remote side, but not read by the local application yet.
<code>othersockbuf</code>	The total size of UNIX-domain socket buffers, UDP, and other datagram protocol send buffers.
<code>dgramrcvbuf</code>	The total size of receive buffers of UDP and other datagram protocols.
<code>oomguarpages</code>	The out-of-memory guarantee, in pages. Any Container process will not be killed even in case of heavy memory shortage if the current memory consumption (including both physical memory and swap) does not reach the <code>oomguarpages</code> barrier.
<code>privvmpages</code>	The size of private (or potentially private) memory allocated by an application. The memory that is always shared among different applications is not included in this resource parameter.

 *Auxiliary system parameters*

Parameter	Description
<code>lockedpages</code>	The memory not allowed to be swapped out (locked with the <code>mlock()</code> system call), in pages.
<code>shmpages</code>	The total size of shared memory (including IPC, shared anonymous mappings and <code>tmpfs</code> objects) allocated by the processes of a particular Container, in pages.
<code>numfile</code>	The number of files opened by all Container processes.
<code>numflock</code>	The number of file locks created by all Container processes.
<code>numpty</code>	The number of pseudo-terminals, such as an <code>ssh</code> session, <code>screen</code> or <code>xterm</code> applications, etc.
<code>numsiginfo</code>	The number of <code>siginfo</code> structures (essentially, this parameter limits the size of the signal delivery queue).

<code>dcachesize</code>	The total size of dentry and inode structures locked in the memory.
<code>numiptent</code>	The number of IP packet filtering entries.

Notes: The parameters containing "pages" in their names are measured in 4096-byte pages in the Virtuozzo Containers 32-bit version and in 16384-byte pages in the Virtuozzo Containers 64-bit version for IA-64 processors.

In the Virtuozzo Containers 64-bit versions, all the system parameter values are 64-bit and, therefore, can exceed the values in the Virtuozzo Containers 32-bit version (where the parameters values are 32-bit). For example, the limit of the `oomguarpages` parameter in the Virtuozzo Containers 64-bit version for IA-64 processors can be maximally set to 9223372036854775807 instead of 2147483647 in the Virtuozzo Containers 32-bit version. To learn more about the difference between the Virtuozzo Containers 64-bit and 32-bit versions turn to the [Virtuozzo Containers for 64-bit Processors](#) section of the [Parallels Virtuozzo Containers User's Guide](#).

The information on the available parameters is presented in the table with the following columns:

Column Name	Description
Parameter	The name of the resource parameter.
Current Usage	Indicates the consumption of the corresponding resource by the Container at the moment of calling the current Infrastructure Manager page. The units in which the consumption is measured are specified in the Units column. If the current usage is not available (<i>n/a</i>), it means that either the Container is not running, or the nature of the resource does not suggest its changing over time.
 Limit	The limit on the consumption of the given resource by the Container. The units in which the limit is measured are specified in the Units column.
 Soft Limit	The limit on the consumption of the given resource by the Container that can be exceeded only if the system is not fully loaded. The units in which the limit is measured are specified in the Units column.
 Hard Limit	The limit on the consumption of the given resource by the current Container that cannot be exceeded under any circumstances. The units in which the limit is measured are specified in the Units column.
Units	The units in which the resource values are measured.
Description	The description of the resource parameter.

Changing Container Resource Parameters

The [Configure](#) page allows you to change the disk, CPU, and system resources the Container may allocate.

The CPU-related resource management is based on the following parameters:

Parameter	Description
<code>cpuunits</code>	This is a positive integer number that determines the minimal guaranteed share of the CPU time your Container will receive.

<code>cpulimit</code>	This is a positive number indicating the CPU time in percent the corresponding Container is not allowed to exceed.
 <code>burst_cpulimit</code>	The CPU power limit, in percent, the Container cannot exceed. The limitations set in this parameter are applied to the Container when it exceeds the limit specified in the <code>burst_cpu_avg_usage</code> parameter.
 <code>burst_cpu_avg_usage</code>	The CPU usage limit, in percent, set for the Container. This limit is calculated as the ratio of the current Container CPU usage to the CPU limit (i.e to the value of the <code>CPULIMIT</code> parameter) set for the Container. If the limit is not specified, the full CPU power of the Hardware Node is considered as the CPU limit. Upon exceeding the <code>burst_cpu_avg_usage</code> limit, the <code>burst_cpulimit</code> limit is applied to the Container.
 <code>cpuguarantee</code>	This is a positive integer number indicating the CPU time, in percent, the corresponding Container is guaranteed to receive. If both the <code>cpuguarantee</code> and <code>cpuunits</code> parameters are set, the <code>cpuguarantee</code> parameter is first taken into account when distributing processor(s) time among the Containers existing on the Node; the remaining CPU time, if any, is given to the Containers in accordance with the value of the <code>cpuunits</code> parameter.
<code>cpus</code>	The number of CPUs set to handle all the processes inside the given Container. By default, any Container is allowed to consume the CPU time of all processors on the Node.

The disk-related resource management is based on the following parameters:

Parameter	Description
<code>diskspace</code>	Total size of disk space consumed by the Container.  When the space used by the Container hits the soft limit, the Container can allocate additional disk space up to the hard limit during the grace period indicated by the <code>quotatime</code> parameter value.
 <code>diskinodes</code>	Total number of disk inodes (files, directories, and symbolic links) allocated by the Container. When the number of inodes used by the Container hits the soft limit, the Container can create additional inodes up to the hard limit during the grace period indicated by the <code>quotatime</code> parameter value.
 <code>quotauidlimit</code>	Number of user/group IDs allowed for the Container internal disk quota. If set to 0, UID/GID quota will not be enabled.
 <code>quotatime</code>	The grace period for the disk quota overusage defined in seconds. The Container is allowed to temporarily exceed its quota soft limits for no more than the <code>QUOTATIME</code> period.
 <code>ioprio</code>	The Container priority for disk I/O operations. The allowed range of values is 0-7. The greater the priority, the more time the Container has for writing to and reading from the disk. The default Container priority is 4.

The memory-related resource management parameters are divided into 4 groups: memory parameters, primary system parameters, secondary system parameters, and auxiliary system parameters.

 Windows-based Containers use only the primary system parameters.

 For Linux-based Containers, this screen displays the memory-based, or the system-based, or both memory- and system-based Container resources data, depending on your memory management configuration:

- If the memory management mode is enabled for the Container, it can be allocated memory in much the same way as a certain amount of physical memory is installed on a physical computer. This is the recommended mode for managing Containers for most administrators.
- If the system management mode is enabled, the Container's performance depends on the values of quite a number of fine-grained parameters. The primary parameters are the starting point for defining the relative power of a Container. The secondary parameters are dependent on the primary ones and are calculated from them according to a set of constraints. The auxiliary parameters help improve fault isolation among applications in a Container and the way applications handle errors and consume resources.
- If both resource management modes are used, the more restrictive value is taken into account each time the system makes the decision whether to allocate this or that resource to the Container.

 *Memory parameters*

Parameter	Description
<code>slmmemorylimit</code>	An approximation of the size of the physical memory allocated to the Container. In other words, the Container performance is similar to the performance of a physical computer with as much physical memory installed as is indicated in this parameter.

Primary system parameters

Parameter	Description
<code>numproc</code>	The maximal number of processes the Container may create.
 <code>numsessions</code>	The number of simultaneous terminal sessions that can be opened to the Container.
 <code>vprvmem</code>	The size of private (or potentially private) memory allocated by the Container. The memory that is always shared among different applications is not included in this resource parameter.
 <code>numtcpsock</code>	The number of TCP sockets (PF_INET family, SOCK_STREAM type). This parameter limits the number of TCP connections and, thus, the number of clients the server application can handle in parallel.
 <code>numothersock</code>	The number of sockets other than TCP ones. Local (UNIX-domain) sockets are used for communications inside the system. UDP sockets are used, for example, for Domain Name Service (DNS) queries. UDP and other sockets may also be used in some very specialized applications (SNMP agents and others).

 `vmguarpages` The memory allocation guarantee, in pages. Container applications are guaranteed to be able to allocate additional memory so long as the amount of memory accounted as `privvmpages` (see the auxiliary parameters) does not exceed the configured barrier of the `vmguarpages` parameter. Above the barrier, additional memory allocation is not guaranteed and may fail in case of overall memory shortage.

 `avnumproc` The average number of processes and threads.

 *Secondary system parameters*

Parameter	Description
<code>kmemsize</code>	The size of unswappable kernel memory allocated for the internal kernel structures for the processes of a particular Container. Note: For the Virtuozzo Containers 64-bit version for IA-64 processors, it takes 4 (four) times more the size of the kernel memory than that for the Virtuozzo Containers 32-bit version to handle one and the same process.
<code>tcpsndbuf</code>	The total size of send buffers for TCP sockets, i.e. the amount of kernel memory allocated for the data sent from an application to a TCP socket, but not acknowledged by the remote side yet.
<code>tcprecvbuf</code>	The total size of receive buffers for TCP sockets, i.e. the amount of kernel memory allocated for the data received from the remote side, but not read by the local application yet.
<code>othersockbuf</code>	The total size of UNIX-domain socket buffers, UDP, and other datagram protocol send buffers.
<code>dgramrecvbuf</code>	The total size of receive buffers of UDP and other datagram protocols.
<code>oomguarpages</code>	The out-of-memory guarantee, in pages. Any Container process will not be killed even in case of heavy memory shortage if the current memory consumption (including both physical memory and swap) does not reach the <code>oomguarpages</code> barrier.
<code>privvmpages</code>	The size of private (or potentially private) memory allocated by an application. The memory that is always shared among different applications is not included in this resource parameter.

 *Auxiliary system parameters*

Parameter	Description
<code>lockedpages</code>	The memory not allowed to be swapped out (locked with the <code>mlock()</code> system call), in pages.
<code>shmpages</code>	The total size of shared memory (including IPC, shared anonymous mappings and <code>tmpfs</code> objects) allocated by the processes of a particular Container, in pages.
<code>numfile</code>	The number of files opened by all Container processes.
<code>numflock</code>	The number of file locks created by all Container processes.
<code>numpty</code>	The number of pseudo-terminals, such as an ssh session, screen or xterm applications, etc.
<code>numsiginfo</code>	The number of <code>siginfo</code> structures (essentially, this parameter limits the size of the signal delivery queue).

<code>dcachesize</code>	The total size of dentry and inode structures locked in the memory.
<code>numiptent</code>	The number of IP packet filtering entries.

Notes: The parameters containing "pages" in their names are measured in 4096-byte pages in the Virtuozzo Containers 32-bit version and in 16384-byte pages in the Virtuozzo Containers 64-bit version for IA-64 processors.

In the Virtuozzo Containers 64-bit versions, all the system parameter values are 64-bit and, therefore, can exceed the values in the Virtuozzo Containers 32-bit version (where the parameters values are 32-bit). For example, the limit of the `oomguarpages` parameter in the Virtuozzo Containers 64-bit version for IA-64 processors can be maximally set to 9223372036854775807 instead of 2147483647 in the Virtuozzo Containers 32-bit version. To learn more about the difference between the Virtuozzo Containers 64-bit and 32-bit versions turn to the [Virtuozzo Containers for 64-bit Processors](#) section of the [Parallels Virtuozzo Containers User's Guide](#).

The information on the available parameters is presented in the table with the following columns:

Column Name	Description
Parameter	The name of the resource parameter.
Current Usage	Indicates the consumption of the corresponding resource by the Container at the moment of calling the current Infrastructure Manager page. The units in which the consumption is measured are specified in the Units column. If the current usage is not available (<i>n/a</i>), it means that either the Container is not running, or the nature of the resource does not suggest its changing over time.
 Limit	The limit on the consumption of the given resource by the Container. The units in which the limit is measured are specified in the Units column.
 Soft Limit	The limit on the consumption of the given resource by the Container that can be exceeded only if the system is not fully loaded. The units in which the limit is measured are specified in the Units column.
 Hard Limit	The limit on the consumption of the given resource by the current Container that cannot be exceeded under any circumstances. The units in which the limit is measured are specified in the Units column.
Limited	If this checkbox is cleared, the limits on the corresponding resource are not set for the Container.
Units	The units in which the resource values are measured.
Description	The description of the resource parameter.

 You can use the **Validate** button at the foot of the page to display if any constraint violations (p. 40) have been found and learn the corresponding constraints on the resource management parameters.

If you have entered new values for one or several resource parameters and then decided to change them to the default values from the Container sample, you can reset the new values by clicking the curved arrow against the corresponding parameter(s).

After you have customized the Container parameters and checked their interdependencies, click **Submit**.

To customize the resources of several Containers at once, use one of the Parallels Infrastructure Manager group change wizards.

You can also edit the Container resource values via `ssh` by using the `vmctl` utility. Mind though that you need to use the `--save` option to have the edited UBC parameters reported by Parallels Infrastructure Manager or Parallels Power Panel. For more information, see [Virtuozzo Reference Guide: Virtuozzo Command Line Interface > vmctl > vmctl set](#).

Changing Disk Quota for Multiple Containers

You can specify a new disk quota for a bunch of your Containers at once on the **Configure: Set Container Disk Limits** page.

The **Containers Disk Usage Current Statistics** table lets you take in the current disk quota and usage for all the selected Containers at a single glance.

In the **Change Containers Disk Quota** group there are three major options to set a defined disk quota for the Containers:

- Use the **Set Disk Quota to** option to specify an exact size of the disk space each Container is allowed to consume.
- Use the **Increase Disk Quota by** option to have the quota increased by a specified amount for each Container. So, if two or more Containers had different disk quotas before, the latter will remain different because the increase is the same.
- Use the **Decrease Disk Quota by** option to have the quota decreased by a specified amount for each Container. So, if two or more Containers had different disk quotas before, the latter will remain different because the decrease is the same.

To further tune the disk usage, set the inodes limit you think is reasonable for the total number of files you have or are going to have on each Container disk. In the **Change Containers Disk Inodes Limit** group you can:

- Set an inodes density value and use the **Calculate the disk inodes limit using the inodes per KB ratio** option;
- Set an inodes limit value to depend on the current Container inodes density;
- Manually enter an inodes limit value;

Just enter the desired number into the corresponding field, choose the proper units of measurements and click **Submit**.

Note: When performing the operation, bear in mind that the disk quota for a Container cannot be less than the size of the disk space already occupied by this Container (you can learn it from the **Resources** table on the **Summary** tab).

The two remaining options in both groups speak for themselves - select **Set unlimited Disk Quota/Inodes** to remove any disk space/inodes restrictions for the selected Containers, or select **Do not change Disk Quota/Inodes Limit** to leave the current disk space restrictions intact.

Applying New Container Sample

Any Container is configured by means of its own Container sample (a configuration file used as an archetype to reproduce all its settings for a Container based on it). The **Apply Sample to Container** page enables you to change the Container sample the Container is based on and, thus, to change all the resources the Container may consume and/or allocate at once.

In the **Original Container Sample** table at the top of the page, you can view the name and description of the current Container sample the Container is based on ( the information is not available currently for the Containers running the Windows operating system).

The **Select Container Sample** table allows you to choose another configuration sample to base the Container on by selecting the radio button against the corresponding Container sample. All available Container samples listed are supplied with the following information: the name and brief description of the Container sample.

To facilitate working with Container samples, you may have the **Select Container Sample** table display only those Container samples that have the corresponding name or a certain word in their description. On top of the table, press the **Show Search** link to display the fields where you can specify the parameters the given Container sample should meet; then click on the **Search** link. To view all available Container samples, click on the **Reset Results** link to the right of the **Search** link. You can have Parallels Infrastructure Manager display only those parameters you need at the moment. To show or hide certain columns, click the **Select Columns** link and select the parameters you want to be displayed or clear those you do not.

 The **Advanced Configuring Options** group allows you to have the Container restarted if the parameters setup for the selected sample requires restarting.

Note: Before applying a new Container sample to a Container, make sure you are aware of the resource values defined in this Container sample and to be set for the Container. Detailed information on Container samples is provided in the **Managing Container Samples** section (p. 225).

Applying New Container Sample to Multiple Containers

You can specify a new Container sample for a bunch of your Containers at once on the **Configure: Apply Container Sample** page.

You should select the relevant Container sample on the **Container Samples** list, then click **Next** to choose from the sample Quality of Service parameters to be applied to the Containers, if needed.

Adjusting Container Sample Resource Parameters for Multiple Containers

The **Configure: Review Resources** page allows you to specify what resource parameters from the selected sample should be applied to the Containers. You can decide whether a parameter needs to be applied by selecting the corresponding checkbox.

The CPU-related resource management is based on the following parameters:

Parameter	Description
<code>cpuunits</code>	This is a positive integer number that determines the minimal guaranteed share of the CPU time your Container will receive.
<code>cpulimit</code>	This is a positive number indicating the CPU time in percent the corresponding Container is not allowed to exceed.
 <code>burst_cpulimit</code>	The CPU power limit, in percent, the Container cannot exceed. The limitations set in this parameter are applied to the Container when it exceeds the limit specified in the <code>burst_cpu_avg_usage</code> parameter.
 <code>burst_cpu_avg_usage</code>	The CPU usage limit, in percent, set for the Container. This limit is calculated as the ratio of the current Container CPU usage to the CPU limit (i.e to the value of the <code>CPULIMIT</code> parameter) set for the Container. If the limit is not specified, the full CPU power of the Hardware Node is considered as the CPU limit. Upon exceeding the <code>burst_cpu_avg_usage</code> limit, the <code>burst_cpulimit</code> limit is applied to the Container.
 <code>cpuguarantee</code>	This is a positive integer number indicating the CPU time, in percent, the corresponding Container is guaranteed to receive. If both the <code>cpuguarantee</code> and <code>cpuunits</code> parameters are set, the <code>cpuguarantee</code> parameter is first taken into account when distributing processor(s) time among the Containers existing on the Node; the remaining CPU time, if any, is given to the Containers in accordance with the value of the <code>cpuunits</code> parameter.
<code>cpus</code>	The number of CPUs set to handle all the processes inside the given Container. By default, any Container is allowed to consume the CPU time of all processors on the Node.

The disk-related resource management is based on the following parameters:

Parameter	Description
<code>diskspace</code>	Total size of disk space consumed by the Container.
	When the space used by the Container hits the soft limit, the Container can allocate additional disk space up to the hard limit during the grace period indicated by the <code>quotatime</code> parameter value.
 <code>diskinodes</code>	Total number of disk inodes (files, directories, and symbolic links) allocated by the Container. When the number of inodes used by the Container hits the soft limit, the Container can create additional inodes up to the hard limit during the grace period indicated by the <code>quotatime</code> parameter value.
 <code>quotauidlimit</code>	Number of user/group IDs allowed for the Container internal disk quota. If set to 0, UID/GID quota will not be enabled.
 <code>quotatime</code>	The grace period for the disk quota overusage defined in seconds. The Container is allowed to temporarily exceed its quota soft limits for no more than the <code>QUOTATIME</code> period.

 `ioprio` The Container priority for disk I/O operations. The allowed range of values is 0-7. The greater the priority, the more time the Container has for writing to and reading from the disk. The default Container priority is 4.

The memory-related resource management parameters are divided into 4 groups: memory parameters, primary system parameters, secondary system parameters, and auxiliary system parameters.

 Windows-based Containers use only the primary system parameters.

 For Linux-based Containers, this screen displays the memory-based, or the system-based, or both memory- and system-based Container resources data, depending on your memory management configuration:

- If the memory management mode is enabled for the Container, it can be allocated memory in much the same way as a certain amount of physical memory is installed on a physical computer. This is the recommended mode for managing Containers for most administrators.
- If the system management mode is enabled, the Container's performance depends on the values of quite a number of fine-grained parameters. The primary parameters are the starting point for defining the relative power of a Container. The secondary parameters are dependent on the primary ones and are calculated from them according to a set of constraints. The auxiliary parameters help improve fault isolation among applications in a Container and the way applications handle errors and consume resources.
- If both resource management modes are used, the more restrictive value is taken into account each time the system makes the decision whether to allocate this or that resource to the Container.

 *Memory parameters*

Parameter	Description
<code>slmmemorylimit</code>	An approximation of the size of the physical memory allocated to the Container. In other words, the Container performance is similar to the performance of a physical computer with as much physical memory installed as is indicated in this parameter.

Primary system parameters

Parameter	Description
<code>numproc</code>	The maximal number of processes the Container may create.
 <code>numsessions</code>	The number of simultaneous terminal sessions that can be opened to the Container.
 <code>vprvmem</code>	The size of private (or potentially private) memory allocated by the Container. The memory that is always shared among different applications is not included in this resource parameter.
 <code>numtcpsock</code>	The number of TCP sockets (PF_INET family, SOCK_STREAM type). This parameter limits the number of TCP connections and, thus, the number of clients the server application can handle in parallel.
 <code>numothersock</code>	The number of sockets other than TCP ones. Local (UNIX-domain) sockets are used for communications inside the system. UDP sockets are used, for example, for Domain Name Service (DNS) queries. UDP and other sockets may also be used in some very specialized applications (SNMP agents and others).

 **vmguarpages** The memory allocation guarantee, in pages. Container applications are guaranteed to be able to allocate additional memory so long as the amount of memory accounted as `privvmpages` (see the auxiliary parameters) does not exceed the configured barrier of the `vmguarpages` parameter. Above the barrier, additional memory allocation is not guaranteed and may fail in case of overall memory shortage.

 **avnumproc** The average number of processes and threads.

 *Secondary system parameters*

Parameter	Description
<code>kmemsize</code>	The size of unswappable kernel memory allocated for the internal kernel structures for the processes of a particular Container. Note: For the Virtuozzo Containers 64-bit version for IA-64 processors, it takes 4 (four) times more the size of the kernel memory than that for the Virtuozzo Containers 32-bit version to handle one and the same process.
<code>tcpsndbuf</code>	The total size of send buffers for TCP sockets, i.e. the amount of kernel memory allocated for the data sent from an application to a TCP socket, but not acknowledged by the remote side yet.
<code>tcprecvbuf</code>	The total size of receive buffers for TCP sockets, i.e. the amount of kernel memory allocated for the data received from the remote side, but not read by the local application yet.
<code>othersockbuf</code>	The total size of UNIX-domain socket buffers, UDP, and other datagram protocol send buffers.
<code>dgramrecvbuf</code>	The total size of receive buffers of UDP and other datagram protocols.
<code>oomguarpages</code>	The out-of-memory guarantee, in pages. Any Container process will not be killed even in case of heavy memory shortage if the current memory consumption (including both physical memory and swap) does not reach the <code>oomguarpages</code> barrier.
<code>privvmpages</code>	The size of private (or potentially private) memory allocated by an application. The memory that is always shared among different applications is not included in this resource parameter.

 *Auxiliary system parameters*

Parameter	Description
<code>lockedpages</code>	The memory not allowed to be swapped out (locked with the <code>mlock()</code> system call), in pages.
<code>shmpages</code>	The total size of shared memory (including IPC, shared anonymous mappings and <code>tmpfs</code> objects) allocated by the processes of a particular Container, in pages.
<code>numfile</code>	The number of files opened by all Container processes.
<code>numflock</code>	The number of file locks created by all Container processes.
<code>numpty</code>	The number of pseudo-terminals, such as an ssh session, screen or xterm applications, etc.
<code>numsiginfo</code>	The number of <code>siginfo</code> structures (essentially, this parameter limits the size of the signal delivery queue).

dcachesize	The total size of dentry and inode structures locked in the memory.
numiptent	The number of IP packet filtering entries.

Notes: The parameters containing "pages" in their names are measured in 4096-byte pages in the Virtuozzo Containers 32-bit version and in 16384-byte pages in the Virtuozzo Containers 64-bit version for IA-64 processors.

In the Virtuozzo Containers 64-bit versions, all the system parameter values are 64-bit and, therefore, can exceed the values in the Virtuozzo Containers 32-bit version (where the parameters values are 32-bit). For example, the limit of the `oomguarpages` parameter in the Virtuozzo Containers 64-bit version for IA-64 processors can be maximally set to 9223372036854775807 instead of 2147483647 in the Virtuozzo Containers 32-bit version. To learn more about the difference between the Virtuozzo Containers 64-bit and 32-bit versions turn to the [Virtuozzo Containers for 64-bit Processors](#) section of the [Parallels Virtuozzo Containers User's Guide](#).

The information on the available parameters is presented in the table with the following columns:

Column Name	Description
Parameter	The name of the resource parameter.
 Limit	The limit on the consumption of the given resource by the Container. The units in which the limit is measured are specified in the Units column.
 Soft Limit	The limit on the consumption of the given resource by the Container that can be exceeded only if the system is not fully loaded. The units in which the limit is measured are specified in the Units column.
 Hard Limit	The limit on the consumption of the given resource by the current Container that cannot be exceeded under any circumstances. The units in which the limit is measured are specified in the Units column.
Units	The units in which the resource values are measured.
Description	The description of the resource parameter.
	The Advanced Configuring Options group allows you to have the Container restarted if the parameters setup for the selected sample requires restarting.

Note: Before applying a new Container sample to a Container, make sure you are aware of the resource values defined in this Container sample and to be set for the Container. Detailed information on Container samples is provided in the [Managing Container Samples](#) section (p. 225).

Click **Apply Sample** to apply the selected sample and resource parameters to your Containers.

Managing Container Services and Processes

Parallels Infrastructure Manager allows you to manage services and processes inside Containers in a number of ways. You can:

- Open a list of principal services inside your Container through the **System Services** link with the opportunity to start, stop, restart any of them and control their autostart option.
- Open a list of processes running inside the Container by clicking the **System Processes** link with the opportunity to send various signals to any of the processes.
-  Log in to the Plesk control panel via the **Plesk Control Panel** link in case the corresponding template is installed in the Container. If the Plesk template is not installed, the **Plesk Control Panel** link is not displayed. Instead you can make use of the **Install Plesk** link provided in lieu of the **Plesk Control Panel** link to install the Plesk control panel in the Container.
-  Log in to the Confixx control panel by choosing the **Confixx control panel** link in case the corresponding template is installed in the Container. If the template is not installed, the **Confixx control panel** link is not displayed. The feature is available for a Linux-based Container.
-  Create or change your firewall settings by clicking on the **Firewall** link.
- Providing you have installed a Site Builder application template to this Container, you can use it by clicking the **Site Builder** link.
-  If the name-based hosting is enabled on the Hardware Node, you can edit the **Name-Based Hosting** settings for this Container.

Managing Container Services

The process of managing services inside Container running the Windows operating system and the Linux operating system varies slightly:

- To learn how to manage services in Containers running the Linux operating system, please see the **Managing Services in Linux** subsection.
- To learn how to manage services in Containers running the Windows operating system, please see the **Managing Services in Windows** subsection.

Managing Services in Linux

The System Services SysV subtab is used to view all the services you are running on the Container except for the xinetd-dependent services. To see the xinetd-dependent services list, click the System Services Xinetd subtab. By default, 20 services are shown on the screen, but you may have more services displayed by pressing the appropriate link on top of the table. You may also have the System Services table display only those services that have a particular name or status. On top of the table, press the **Show Search** link to display the fields where you can specify the name or the status of the service you wish to view; then click on the **Search** link. You can have Parallels Infrastructure Manager display only those parameters you need at the moment. To show or hide certain columns, click the **Select Columns** link and select the parameters you want to be displayed or clear those you do not.

The System Services SysV screen presents a table reflecting the services inside the Container and providing the following information:

Column Name	Description
Name	The system ID of the service executable file.
Status	Indicates whether the service is running or not. A green arrow means that the service is running; a red cross - that it is stopped.
Autostart	If there is a green tick in this column, this service is started automatically on the Container startup; if a red cross - it is not.

Note: This table displays only those services that are listed in the configuration file `etc/vzcp/standart-services.xml`. placed in the Service Container directory `/vz/root/1`.

With the help of the Infrastructure Manager toolbar you can perform the following actions on any service in the table:

- Start the service by selecting its checkbox and clicking **Start Service**. Only stopped services are subject to this action.
- Restart the service by selecting its checkbox and clicking **Restart Service**. Only running services are subject to this action.
- Stop the service by selecting its checkbox and clicking **Stop Service**. Only running services are subject to this action.
- Enable/disable the autostart feature by selecting the service(s) and clicking **Enable/Disable Autostart**.

All the above and a service description is available on the screen which opens by clicking the name of the service in the **Name** column.

Note: If you have just started the Container and opened the Services page, not all the services may have had enough time to start. Wait a little and refresh the page to update the state of the services.

Managing xinetd-Dependent Services

The **System Services Xinetd** subtab is used to view all the services you are running on this Container that are dependent on the `xinetd` service. To see the other services, click the **System Services SysV** subtab. By default, 20 services are shown for each tab, but you may have more services displayed by pressing the appropriate link on top of the table. You may also have the **System Services** table display only those services that have a particular name or status. On top of the table, press the **Show Search** link to display the fields where you can specify the name or the status of the service you wish to view; then click on the **Search** link. You can have Parallels Infrastructure Manager display only those parameters you need at the moment. To show or hide certain columns, click the **Select Columns** link and select the parameters you want to be displayed or clear those you do not.

The **System Services Xinetd** page presents a table reflecting the `xinetd`-dependent services inside the Container and providing the following information:

Column Name	Description
Name	The system ID of the service executable file.
Status	Indicates whether the service is enabled or not. A green arrow means that the service is enabled; a red cross - that it is disabled.
Autostart	If there is a tick in this column, the <code>xinetd</code> service is started automatically on the Container startup, so is the given service; if a cross - it is not.

Note: This table displays only those services that are listed in the configuration file `etc/vzcp/standart-services.xml`. placed in the Service Container directory `/vz/root/1`.

You can perform the following actions on any service in the table:

- Enable the service by selecting its checkbox and clicking on the **Enable** button on the Parallels Infrastructure Manager toolbar. Only disabled services are subject to this action.
- Disable the service by selecting its checkbox and clicking on the **Disable** button on the Infrastructure Manager toolbar. Only enabled services are subject to this action.

Viewing Service Details

The **Service Details** screen provides the principal information on the given service and lets you manage it.

The following information is provided:

- The description of the service;
- Whether the service is running or stopped;
- Whether the service is started automatically on the Container startup or not.

You may perform the following actions on any such service:

- Stop the service by clicking the **Stop Service** button. Only running services are subject to this action.
- Restart the service by clicking the **Restart Service** button. Only running services are subject to this action.
- Start the service by clicking the **Start Service** button. Only stopped services are subject to this action.
- Enable/disable the autostart feature by clicking the **Enable Autostart/ Disable Autostart** button, correspondingly.

Viewing xinetd-Dependent Service Details

 The **Service Details** screen provides the principal information on the given service and lets you manage it.

As the service is dependent on the `xinetd` service, i.e. `xinetd` is charged with launching the service when necessary, you can only either enable or disable such a service - depending on its current state - by clicking the **Enable/Disable Service** button, correspondingly. Moreover, the `xinetd` service must be running to perform any such action; otherwise, the operation will result in an error. You cannot manage the autostart feature of `xinetd`-dependent services, as its value is inherited from the `xinetd` service.

Managing Services in Windows

 The **System Services** page is displayed when clicking on the **System Services** link on the **Services** tab of the Container dashboard. It presents the table reflecting those services inside your Container that you can manage. The table provides the following information:

Column Name	Description
Name	The name of the service running inside your Container.
Status	Indicates whether the service is running or not.
Startup Type	Indicates whether: <ul style="list-style-type: none"> ▪ The service is started automatically on the Container startup; ▪ The startup type of the service is set to <code>SERVICE_DISABLED</code>; ▪ The service can be launched only manually.

Logon as Indicates the user account (the `LocalService` account, the `NetworkService` account, etc.) that was used to start the service.

You can perform the following operations on any service in the table:

- Stop the service by selecting its checkbox and clicking on the **Stop** button. Only running services are subject to this action.
- Restart the service by selecting its checkbox and clicking **Restart**. Only running services are subject to this action.
- Start the service by selecting its checkbox and clicking on the **Start** button. Only stopped services are subject to this action.
- Open the **Services Details** page to enable/disable the autostart feature by clicking on the name of the service in the Name column.

To facilitate working with Container services, you may have the **System Services** table display only those services that have a particular name, startup type (automatic, manual, disabled), are in a certain state (running or stopped), or were started by a certain user. On top of the table, press the **Show Search** link to display the fields where you can specify the parameters your services should meet; then click on the **Search** link. To view all the services currently running inside your Container, click on the **Reset Results** link to the right of the **Search** link. You can have Parallels Infrastructure Manager display only those parameters you need at the moment. To show or hide certain columns, click the **Select Columns** link and select the parameters you want to be displayed or clear those you do not.

Note: If you have just started the Container and opened the **Services** page, not all the services may have had enough time to start. Wait a little and refresh the page to update the state of the services.

Viewing Service Details.

 The **Service Management** page opened on clicking the name of the service you have selected on the **System Services** page allows you to change the startup type of your Container services:

- Make a service automatically start on the Container startup by selecting **Automatic** in the drop-down list of the **Startup Type** field and clicking on the **Submit** button.
- Set a service as "manual" meaning that you should start the service manually before it can be loaded by the operating system and made available for use. To this effect, select **Manual** and click on the **Submit** button.
- Disable a service by selecting **Disabled** in the drop-down list and clicking on the **Submit** button.

Note: Changing the default service settings might prevent key services from running correctly. It is especially important to use caution when changing the startup type of services that are configured to start automatically.

In the **Dependencies** section you can find out what system components depend on the selected service. You can also view the system components your service depends on, if there are any. You should always take into account the service dependencies before changing its settings. This information is very important since if a service is stopped or is not functioning properly, the dependent services may also be affected.

Managing Container Processes

The System Processes page is displayed when clicking on the System Processes link on the Services tab of the Container dashboard. It presents a table reflecting all the running processes inside the Container. The table provides the following information:

Column Name	Description
PID	The process ID.
%CPU	The percent of the CPU time the process is currently using.
 %MEM	The percent of the RAM size the process is currently using.
Command	The command that is used to launch the process.
 Nice	The relative priority of the process assigned to it by the user. The negative values mean that the user has manually increased the priority, the positive values - that they have decreased it.
Pri	The absolute priority of the process assigned to it by the process scheduler. On a Linux Node, the range is from 0 (the highest priority) to 39 (the lowest priority). The usual process priority is 30. On a Windows Node, the range can be from 0 (the highest priority) to 31 (the lowest priority). The usual process priority is 8.
RSS	(Resident Segment Size) The size of physical memory the process really uses (in Kilobytes).
 Stat	The state of the process. The possible states are: R - runnable, on the run queue; S - sleeping; T - traced or stopped; D - uninterruptable sleep; Z - defunct, "zombie". If two letters are shown, the second letter means the following: W - has no resident pages; < - high-priority process; N - low-priority task; L - has pages locked in memory; s - the process is a session leader; "+" means the process is in the foreground process group of its control terminal.
Time	The total amount of the CPU time the process has used so far.
User	The user the process belongs to.

To have the information in the table refreshed automatically with the current values, click the **Enable Autorefresh** button. It is worthy to note that only the table on the current page is refreshed, which takes much less resources in comparison with refreshing the whole Parallels Infrastructure Manager page.

 On a Windows Node, you may select any number of processes by ticking the checkboxes against the corresponding processes (tick the uppermost checkbox to select all the processes at once) and end them by clicking the **End Process** button.

 On a Linux Node, you may select any number of processes by ticking the checkboxes against the corresponding processes (tick the uppermost checkbox to select all the processes at once) and send them a standard signal. Choose the needed signal on the drop-down menu and click the **Send Signal** button. The following signals can be sent:

- **SIGHUP** - is a hang-up signal. It is often used to ask a daemon process to re-read its configuration.
- **SIGTERM** - sends the termination signal to the process. This is the best way to give the process a chance for an orderly shutdown and proper data saving. As the process might be able to catch this signal and stay alive, you may have to make use of the `sigkill` or `sigint` signals.
- **SIGCONT** - continues the process causing it to resume.
- **SIGSTOP** - stops (suspends) the process. The process will still be on the task list.
- **SIGINT** - causes the process to immediately interrupt. The signal is very close to `sigkill`, the difference being that, unlike `sigkill`, it can be caught by the process and ignored if the process gets out of hand. In this case you should send `sigkill` to shut down the process.
- **SIGKILL** - unconditionally kills the process. Mind that sending `sigkill` to any process removes any chance for it to do a tidy cleanup and shutdown, which might have unfortunate consequences.

Installing Plesk

 The **Install Plesk** page allows you to install the Plesk control panel in the Container. This page can be accessed by clicking the **Install Plesk** link on the **Control Panels** subtab of the **Software** tab of the Container dashboard, which is displayed if the Plesk template is not installed in the Container. To install Plesk in a Container, you should press the **Install** button on the **Install Plesk** page. Just follow the instructions on the screen to complete the installation. After you have successfully installed the Plesk control panel in the Container, the **Plesk Panel** link becomes visible on the Container dashboard. Follow this link to start working in Plesk.

Note: For the Plesk installation to be possible, the Plesk application template on the Hardware Node must be compatible with the OS template the current Container is running. Besides, the Container must have the resources available no less than is entered in the `vzcpcon.conf` configuration file for Plesk installation, i. e. enough to run Plesk on the given Container.

Working in Plesk Control Panel

In case the Plesk control panel is installed inside the Container, the Plesk control panel link becomes visible on the Container dashboard. You can click on this icon to go to the Plesk control panel page.

On this page you can use the **Login to Plesk** link to start a Plesk control panel session. A new browser window with the Plesk control panel is launched and you are able to get straight down to work there.

To change the Plesk admin password, click the **Change Password** link on the **Plesk Control Panel** page. Setting a new password from time to time is recommended to assure the maximum security of a Container.

Logging In to Plesk Control Panel

 Using the **Login to Plesk** link on the Plesk control panel page you can open a pop-up window to start managing the Container via Plesk.

In this window, you should open the **Login to Plesk** link to start a Plesk control panel session. A new browser window with the Plesk control panel is launched and you are able to get straight down to work there.

The logging in to Plesk is performed automatically, you do not need to enter the name and password of the admin user since you have already been identified by your Parallels Infrastructure Manager user credentials.

You might wish to change the Parallels Power Panel user Plesk admin password used to log in to Parallels Power Panel via Plesk. The **Change Plesk Admin Password** page allows you to change the current password of the admin user, which should be done from time to time to maintain the maximum security of the Container.

Note: If your Plesk version is lower than 7.0.2, the option of changing the admin password is not provided for Parallels Infrastructure Manager.

Changing Plesk Administrator Password

 Although logging in to Plesk from Parallels Infrastructure Manager is performed automatically and does not require specifying the credentials of the `admin` user, the Plesk `admin` user name and password may be of use for a Parallels Power Panel user willing to directly log in to the Container via Plesk. To maintain the maximum security of the Container, it is recommended to change occasionally the current password of the `admin` user. The **Change Plesk Admin Password** page opened through the **Change Password** link on the **Plesk Control Panel** page allows you to edit the administrator password.

To set a new password, you need to type it into the **New admin password** field and then retype it in the **Retype new admin password** field below to ensure you have provided a correct password. The password should be no less than 5 characters and difficult enough to guess to guarantee the privacy of the Container.

After you have entered a new admin password, press **Change** to submit the changes made.

Note: If your Plesk version is lower than 7.0.2, the option of changing the `admin` password is not provided for Parallels Infrastructure Manager.

Logging In to Confixx Control Panel

 In case the Confixx control panel is installed inside the Container, the **Confixx control panel** icon becomes visible on the Container dashboard. You can click on this icon to go to the **Confixx control panel** login window.

In this window, you should enter your credentials (login and password) into the corresponding fields and press the **Login to Confixx** button. You may learn the credentials from your provider. In case the credentials entered are correct, a new browser window with Confixx control panel is launched and you are able to get straight down to work there.

If you select the **Save Login data** checkbox, you won't have to type your login and password again when you later visit this page - the credentials will be filled in automatically. In this case, the credentials information is stored not on the server, but on the client side (i.e. on the computer where your browser window is launched).

Note: The Confixx control panel with version below 3.0 is not supported.

Container Migration Types

Migrating Containers Between Hardware Nodes

The cases when you need to move your Containers from one Hardware Node to another can be quite numerous. A migration can be performed to distribute the workload between Nodes, or in view of an interruption in the source Node operation, and this can be done with the help of Parallels Infrastructure Manager. On the **Migrate Container(s)** screen you need to select the Hardware Node you are going to move the Container(s) to and select some additional options.

When selecting the destination Hardware Node for you Container(s), remember that you will only be able to migrate Containers between:

- same platform Nodes, so the choice of the destination Nodes that you can pick from the drop-down menu is predefined by the type of operating system the migrated Containers are based on;
- Hardware Nodes registered in Parallels Infrastructure Manager. If you need to migrate the Container(s) to a Node that has not been registered yet, this has to be done first (p. 104).



In the **Live Migration** section, choose one of the following migration methods:

- offline migration, stops the Container before migrating, but a possible outage is typically reduced to no more than one minute. To migrate the Container this way, leave the **Perform live migration to avoid service interruption** checkbox clear;
- online migration, migrates a Container with no interruption in its operation at all. To migrate a Container online, select the **Perform live migration to avoid service interruption** checkbox;

(For more details on the Container migration types refer to the **Migrating Containers** section in the **Parallels Virtuozzo Containers User's Guide**).

In the **Advanced Options** section consider the following:

- removing the Container(s) private areas (the directories to store the Container(s) files and other data) from the source Hardware Node when the migration is finished, which lets you free some disk space. On the other hand, you might want to leave the private areas on the source Node intact until you ascertain the migrated Container operates normally;
- leaving the migrated Container(s) stopped to perform some additional operations on it;
- migrating the Container(s) even if their IP addresses might cause conflicts on the destination Hardware Node or if the templates the Containers use are not installed there. Keep in mind that though it is possible to force the migration of such Containers, they might not be able to start on the destination Node until the problems with IP addresses and/or templates are resolved..

Click the **Migrate** button if you are ready to initiate the Container(s) migration, otherwise click **Cancel**.

Migrating Physical Server to Container

Parallels Infrastructure Manager provides you with an effective tool for a fast and reliable physical to virtual machine migration. Migration of a stand-alone physical server to a Container may be useful for a server using its available resources only partially, as the usage of the resources on the Hardware Node hosting Containers is distributed efficiently among the Containers. Therefore the Node is never idle at the same time allotting the Containers enough resources to operate. You can benefit from the physical server to Container migration by:

- Cutting down administrative and operations costs. Decreasing the number of physical servers under management reduces administrative overhead, as well as rack space, power, and hardware replacement costs.
- Reducing downtime costs. Container allows you to back up your production environment, which can be rapidly deployed in the event of a system failure.
- Optimizing resource utilization. Each server under management is fully used; its resources are not wasted.
- Improving standardization. Deployment of standard hardware allows for improved security and reliability across your organization's network as well as the streamlined management that virtual infrastructure brings.

The migration procedure is rendered easy and smooth with the help of the **Migration** wizard which can be invoked by following the **Containers** link on the Infrastructure Manager main menu or on the **Infrastructure Manager** dashboard (p. 18) and then clicking on the **Migrate Server to Container** icon.

Notes: 1. The **Migration** wizard works for both Linux- and Windows-based server migration. However, Linux-Windows differences result in some differences in the corresponding migration procedure steps.

2. Although the Virtuozzo Containers software allows you to migrate virtually any physical server running the Windows Server 2003/Windows Server 2000 or Linux operating system to a Container on your Hardware Node, there is a number of limitations which should be taken into account before deciding on the migration process. To get detailed information on these limitations, please consult the **Migration Restrictions** subsection of the **Parallels Virtuozzo Containers User's Guide**.

Setting up Connection to Physical Server

The starting point of the **Migration** wizard is establishing a connection to the physical server you wish to migrate.

To do this you need to specify the server IP address or hostname in the **IP Address or Hostname** field. The IP address and hostname should be the ones the server is recognized by on a network. After you have filled in the server coordinates, you have to provide the administrator's credentials (user name and password) you use to log in to the migrating server. The default user name for the Linux-based server is `root`, the default user name for the Windows-based server is `Administrator` unless you have created a different user account. In this case you are expected to enter the user name you have adopted for a new user account. Mind that the new user must have the scope of rights the Linux root user or the Windows administrator is endowed with.

After you have entered all the required information, click **Connect** to set up a connection to the server.

Reviewing Physical Server Configuration

The second page of the **Migration** wizard allows you to check the configuration of the server you are going to migrate into a Container. This is necessary for you to verify that you are connected to exactly the same server you wish to migrate.

The information on the server is divided into three groups.

The **Hardware Information** table includes:

Name	Description
Architecture	The architecture of the server CPU(s).
CPU	The number, name and power of the processor(s) installed on the physical server.
Operating Memory (Physical Memory on a Windows-based server)	The physical memory: the total physical memory available, the amount of the server physical memory used and the amount of free memory still remaining.
Swap Memory	The swap partition data: the total swap partition size, the swap memory used and the amount of the free swap memory.

The **Network Information** tells you the server hostname and the network interface details, such as the server IP address(es) and the network adapter type(s).

 The **Linux Disk Partitions** section yields the following information:

Name	Description
Name	The name of the partition on the server disk.
Mounted	The mount point of the partition described.
Type	The file system type.
Block Size	The block size of the partition file system.

Total Blocks	The number of the blocks in the file system.
Used Blocks	The number of the blocks used.
Free Blocks	The number of the blocks still available for data storage.
Total Inodes	The overall number of the inodes in the partition.
Used Inodes	The number of the inodes used.
Free Inodes	The number of inodes free to use.

 The Windows Disk Partitions section reads:

Name	Description
Drive	The name of the partition on the server disk.
Type	The file system type.
Total Space	The volume of the drive.
Used Space	The space of the drive in use.
Free Space	The space of the drive free to be used.

After you have reviewed the physical server system information, click **Next** to proceed to the  customization of the server migration procedure or  configuring the target Container (p. 81).

Customizing Migration Procedure

 On the third page you have an opportunity to edit the details of the migration process. This page reads: **Migrate Physical Server to Container: Prepare Server**, so you can tune your physical server migration by:

- indicating your Linux distribution in the **Distribution Selection** section before migrating a physical server (the option is required). The **Migration** wizard tries to identify the migrated server distribution automatically, but the potential danger here may be its failure to do so. This is likely to make it impossible to carry out certain post-migration operations on the Container into which the physical server has been migrated. Therefore, to cut out the risk, you must prompt the wizard your server distribution by selecting the corresponding name in the **Select the Distribution** drop-down menu.
- choosing a user/group quota partition to migrate. As a server administrator, you might have already divided your hard disk into partitions to be used by different users/groups and set a corresponding quota for the usage thereof. Since all the file systems are copied to a single partition in the Container, your user/group quota parameters configuration may be lost. Therefore you are allowed to choose a partition you wish to save the quota values for and specify it in the **Quota migration** section. To do this you have to select the partition name on the drop-down menu. Note that if you have more than one partition you have allocated for non-root users, the quota parameters setup will be lost for the partitions other than the one you have indicated in this section. In this case you will need extra post-migration user/group, or *second-level* quota parameters setting up. You can learn more on the second-level quota configuration option in the **Managing Disk Quotas** section of the **Parallels Virtuozzo Containers User's Guide**.

Note: Although the partition migration with quotas proceeds smoothly in most cases, we recommend that you check all the partition quotas after the physical server migration and adjust them, if needed.

- excluding paths from copying them to the Container in the **Exclude Paths** section. This option allows you to avoid migrating the data you do not need. You can single out such paths yourself or in some cases you will be prompted to do so by the relevant warning, advising you to exclude a certain path. The droppable path should be provided in the blank field in this section. You can add more paths to skip by clicking the  icon to the right of the field. Clicking the  icon near the field will remove the field with the path entered.
- stopping the services before the migration by means of the **Stop Services** section. This is highly recommended to prevent the running services from modifying any files which might hamper the migration. To stop the services, click their checkboxes.

After you have done all the necessary customization, click **Next** to move on to the fourth page where you can configure the Container to migrate your physical server to.

Configuring Container

The **Migrate Physical Server to Container: Configure Container** page allows you to configure a Container into which you can migrate your physical server.

 When configuring the Container for the migration of a Windows-based server, the only information to provide is the Container ID in the **Container Configuration** group. You can either opt for selecting the Container ID automatically (the **Select Container ID automatically** radio button), or assign the Container the ID to fit in your Containers nomenclature. The Container ID is a 32-bit (ranging from 0 to 4294967295) integer number over 100. (Detailed information on the Container IDs allocation can be viewed in the **Choosing Container ID** subsection of the **Parallels Virtuozzo Containers User's Guide**.) To enable the feature, select its checkbox.

 By default, most Container parameters, such as Container hostname, IP address(es), DNS server(s) and hostname lookup parameters are inherited from the physical server and are displayed on this page in the appropriate fields. By editing these parameters you can apply your own values. Mind though that you do so at your own risk, and if you are not quite expert in the matter, the recommendation is to leave the default settings. On this page you can verify or edit Container general settings that are divided into three groups for your convenience: configuration parameters, network parameters, and advanced parameters.

 The **Configuration** group enables you to perform the following operations:

- Select a Container sample (p. 235) you want the Container to be based on;
- Choose an OS template and its version you wish the Container to be based on. By default, Parallels Infrastructure Manager automatically searches for the most compatible OS template. However you can change the OS template if needed.
- Select the **Customize resource settings** checkbox, which allows you to adjust resource parameters on the next page of the wizard. This operation is optional.

 The **Network** group lets you do the following to define the network parameters:

- Verify the Container hostname. Mind that it is inherited from the physical server. Changing the hostname may result in future conflicts and malfunction.
- Assign an IP address to it. You can set several IP addresses for the Container by clicking the  icon to the right of the **IP Address** field. At the same time, clicking the  icon near the **IP Address** field will remove the corresponding IP address assigned to the Container.
- Enter one or more DNS servers that this Container is supposed to use in the **DNS server IP address** field or leave it blank. By clicking the  or  icons you can add/remove, accordingly, the DNS servers IP addresses for the Container being configured. Note that the static values in these fields might be overridden if the Container gets the DNS servers from the DHCP server when operating in the bridged network mode.

- Define a list for hostname lookup in the **Search domain** field or leave it blank. Use the  or  icons to add/remove the lookup parameters for the Container. The search list is normally determined by the domain name(s); by default, it contains the local domain name(s) only. You can also add external domain names for a particular Container. A search query is performed by attempting to use each item in the list in turn until a match is found. Note that this process may be slow and may generate a lot of network traffic if the servers for the listed domains are not local, and that the query might time out if no server is available for one of the domains. Note also that the static values in these fields might be overridden if the Container gets the search domains from the DHCP server when operating in the bridged network mode.

 The **Advanced** group helps to specify the Container ID, a 32-bit (ranging from 0 to 4294967295) integer number over 100. (Detailed information on the Container IDs allocation can be viewed in the **Choosing Container ID** subsection of the **Parallels Virtuozzo Containers User's Guide**.) To enable the feature, select its checkbox.

Click **Next** to submit the settings and go on to the next **Migration** wizard stage.

Configuring Container Network Parameters

The **Migrate Server to Container: Container Network** page lets you define all the major network parameters of the Container where you are migrating the physical server.

The first thing to be decided upon is whether the network connectivity for the Container should be provided in the host-routed or bridged mode. You can also have both types of network interfaces in the Container.

- The host-routed mode is simpler, no additional configuration of the Virtuozzo network is required for the created Containers to be immediately connected to the network. This mode is sufficient in most cases. However, the host-routed Containers cannot get their IP addresses by DHCP because their Virtual Network adapter does not have a unique MAC address.
- In the bridged mode, a Container is a full member of the network. However, a bridged Container must always belong to a Virtual Network that would provide the network connectivity for the Container. Virtual Networks are created (p. 147) and configured (p. 150) separately. So, at least one Virtual Network should be already configured on the Hardware Node for you to be able to use the bridged network mode for the Container being created. The bridged mode also allows you to create more than one virtual Ethernet adapter in the Container (click the **Add New Interface** link for this).

After you have selected either the **Routed Network** or **Bridged Network** checkbox (or both), you should indicate the IP parameters of the relevant interfaces (together with the parameters in the **Global Network** group that pertain to all the Container network interfaces, be they host-routed or bridged):

Parameter	Description
DNS Server IP Address	<p>One or more DNS servers to be used by the Container virtual adapters.</p> <p> For Linux-based Containers, all the DNS servers are common for all the Container virtual adapters.</p> <p> In Windows-based Containers, each virtual adapter can have its own DNS server.</p> <p>Note that the static values in these fields might be overridden if the Container gets the DNS servers from the DHCP server when operating in the bridged network mode.</p>
 WINS Server IP Address	<p>One or more WINS servers to be used by the Container virtual adapters. Each virtual adapter can be assigned its own WINS server.</p>
Search Domain	<p>One or more search domains to be used by the Container virtual adapters.</p> <p>All the search domains are common for all the Container virtual adapters.</p> <p>Note that the static values in these fields might be overridden if the Container gets the search domains from the DHCP server when operating in the bridged network mode.</p>
IP Address/Subnet Mask	<p>One or more IP addresses and subnet masks of the Container virtual adapter. In the bridged mode, if the Get IP Address by DHCP checkbox is selected, you do not have to provide an IP address for the Container; it will be assigned automatically by your DHCP server once the Container is started.</p>
Connect to [Virtual Network]	<p>On this drop-down menu, you should select the Virtual Network to which the Container will be assigned, if you use the bridged network mode.</p>

Default Gateway If you want the Container to operate in the bridged mode and not use a DHCP server, you should indicate the default gateway for it.

Customizing Container Resource Settings

 The **Migrate Physical Server to Container: Container Resources Customization** page, where you can check or edit the future Container resource parameters, can only be displayed on the conditions that you:

- first, are migrating a *Linux-based* physical server;
- and, second, have selected the **Customize resources settings** checkbox on the previous step.

Note: The default resource parameters are calculated with a 150% allowance made for the physical server maximum load. However if you are sure you need to increase the available resources, you can do so by entering new values in the appropriate fields.

You can find the description of all the customizable resource parameters in the **Resource Parameters Description** section.

Reviewing Configuration and Setting Post-migration Start/Stop Option

On the final page of the **Migration** wizard you can review the physical and virtual servers configuration details. To revise or change any of these, please go **Back**.

You are also offered to automatically stop the physical server and start the Container after migration. Stopping the physical server and starting the Container after migration is necessary to avoid a possible conflict between the physical and virtual servers due to the identical network and other settings. However you can skip the option and do the work manually right after the migration before managing the virtual server if you want to check the migration results, e.g. compare the files in the source migrated machine and target virtual server.

When you are ready, click **Migrate** to start the physical to virtual server migration.

 **Note:** If you press **Cancel** on certain steps, and the migration wizard exits, there may remain a temporary directory on the physical server that you should remove manually. The name of the directory is `/var/vzagent.tmp`.

Managing Container Applications

Applications can either be added to the Container by means of the corresponding Virtuozzo templates or installed in the Container as individual software packages.

The **Applications Templates** subtab of the **Container Software** tab allows you to do the following:

- view the applications added to the Container as application templates (both EZ and standard) as well as their up-to-date status.
- if some of the applications are not up to date (i.e. the updated versions of the corresponding templates or template packages are available on the Hardware Node), update them by clicking the **Update Container Software** button on the toolbar.
- add more applications available on the Hardware Node or delete unnecessary ones by clicking **Manage** and performing these actions on the screen that opens.

Managing Container Application Templates

The **Manage** button on the **Applications Templates** subtab of the **Container Software** tab opens the screen that allows you to manage applications available to the Container. On this page, you can:

- View the applications already installed in the Container. These applications are listed in the **Installed/Scheduled Applications** table in the right part of the page.
- Install new applications to the Container. To add any of the applications from the **Available Applications** table to the Container, tick the corresponding checkboxes and click on the **>>** button. After that, the applications appear in the **Installed/Scheduled Applications** table in the right part of the page. Clicking the **Submit** button starts the installation process.
- Delete those applications from the Container that are not needed any more. To remove any application, tick the corresponding checkbox in the **Installed/Scheduled Applications** table and click on the **<<** button. After that, the application appears in the **Available Applications** table in the left part of the page. Click the **Submit** button to start the deletion process.
-  Check unresolved dependencies among the selected applications with the help of the **Resolve** button. To eliminate unresolved dependencies, you can remove one of the problem applications from the **Installed/Scheduled Applications** table as explained above.

Note: Only standard template based Container application dependencies require resolving. If you are managing a Container based on an EZ template, the **Resolve** button is not present on the screen.

Adding Application Templates to Multiple Containers

It is possible to add one or more application templates simultaneously to a multitude of Containers on the **Configure: Add Software to Containers** page (accessible by selecting the Containers on the list, clicking **Configure** and selecting the **Add Software to Containers** option). The available templates are listed in the **Select Applications to Add** group. There are two conditions for being able to add the templates listed under that group to the Containers in question:

- 1 They should be installed on all the Hardware Nodes where the respective Containers are situated.
- 2 They should be compatible with all the Containers for which this operation is performed.

Select the checkboxes beside those applications that you want to add to the Containers. You also have the option to start those Containers that are stopped to be able to add the templates to them. Otherwise, the templates will not be added to the Containers that are not running.

Click **Next** to review your operation details and start the software installation.

Removing Application Templates From Multiple Containers

It is possible to remove one or more application templates simultaneously from a multitude of Containers on the **Configure: Remove Software From Containers** page (accessible by selecting the Containers on the list, clicking **Configure** and selecting the **Remove Software From Containers** option). The templates that are added to all the Containers in question and thus can be removed from all of them are listed in the **Select Applications to Remove** group.

Select the checkboxes beside those applications that you want to remove from the Containers. You also have the option to start those Containers that are stopped to be able to remove the templates from them. Otherwise, the templates will not be removed from the Containers that are not running.

Click **Submit** to start the software uninstallation.

Managing Container Software Packages

 Parallels Infrastructure Manager enables you to install, update, and uninstall rpm and deb packages in Containers based on EZ OS templates.

Note: The Container you want to manage software packages in has to be running.

You can obtain the information on the packages currently installed in the Container in the **Installed Packages** table, presented as follows:

Column Name	Description
Name	The name of the package.
Epoch	Indicates the version of a deb package or the version of an rpm package in case the version of the rpm package is not available.
Version	The version of an rpm package.

Arch	The processor architecture; if the column shows the "noarch" value, the packet is likely to be either non-executable or contain documentation.
Summary	A short description of the package.
Status	Shows if there is a fresher version of the package: Up-to-date or Update Found .

The **Installed Packages** table displays from 10 up to 80 packages; the default number is 20 and can be changed by clicking **10**, **40**, or **80** on top of the table. To see the next portion of packages, click either the number of the page next to the one you are having at the moment, or **next** (or **last**, to view the last page).

If the status of a package in the **Installed Packages** table suggests that an update is available, you can select this package and click the **Update** link on the Infrastructure Manager toolbar. To update all those packages that you can see on the page, select the uppermost checkbox and click **Update**. If you need to run update for all the packages installed in the Container, do not select anything - simply click the **Update All** icon on the Infrastructure Manager toolbar.

To uninstall a package, select it (or select the uppermost checkbox to uninstall all the packages listed on the page), and click **Uninstall**.

The Virtuozzo Containers software can query the repository where the packages for your distribution are stored for new packages available for downloading and install them in your Container. To connect to the repository, fetch a list of the packages, see the packages description, and download and install in your Container the packages you need, click **Install Packages** on the Infrastructure Manager toolbar.

Installing Software Packages in Container

 The Virtuozzo Containers software can connect to your Linux distribution download packages repository to form a list of packages ready to be downloaded to your Hardware Node and installed in your Container. All these operations are available on the **Install New Packages** screen.

Note: A repository can be a place where multiple files are located for distribution over a network, or a repository can be a location that is directly accessible to the user without having to travel across a network. Therefore connecting to your repository might involve either going to the web site repository (e.g. Fedora Core or Red Hat), or to the repository, created on your Hardware Node. For information on creating a local repository, refer to the **Setting Up Repository for EZ Templates** section in the **Parallels Virtuozzo Containers Templates Management Guide**.

On the **Install New Packages** screen you can obtain the following information on the packages:

Column Name	Description
Name	The name of the package.
Epoch	Indicates the version of a deb package or the version of an rpm package in case the version of the rpm package is not available.
Version	The version of an rpm package.
Arch	The processor architecture; if the column shows the "noarch" value, the packet is likely to be either non-executable or contain documentation.

The **Available Packages** table can display 10, 20, 40 or 80 packages, the default number is 20 and can be changed by clicking **10**, **40**, or **80** on top of the table. To see the next portion of packages, click either the number of the page next to the one you are having at the moment, or **next** (or **last**, to view the last page).

To install a package, select its checkbox (or the uppermost checkbox, to install all the packages shown in the table) and click **Install**.

Managing Container Control Panels

There are a number of control panels that can be installed on the Hardware Node in the form of templates and added to any Container hosted on that Node. Among such control panels are Plesk, , Sitebuilder, and , Confixx.

The **Control Panels** subtab of the **Software** tab of the Container dashboard provides a single place for managing all these control panels in this particular Container. It goes without saying that the control panel template must be installed on the Node for the panel to be manageable on this screen.

The two major management operations that can be performed here are:

- adding the control panel template to the Container (the **Install** link), which ensures that this Container can be managed by the given control panel.
- logging in to the control panel to begin managing the Container with its help (the **Login** link). This is possible only if the control panel template has already been added to the Container.

Note: In the case of the Plesk control panel, the **Login** link is called **Manage** and leads to the screen where you can not only log in to Plesk but also change the Plesk admin password.

Updating Container Software

The **Update Software** page allows you to update the OS and application packages in the given Container by adding available templates updates (in the case of standard Virtuozzo templates) or updating Container packages directly (in the case of Virtuozzo EZ templates). The **Update Software** page is available on clicking the **Update Container Software** link on the Parallels Infrastructure Manager toolbar, which becomes visible if you are currently located on the **Application Templates** subtab of the **Container Software** tab.

The page will display the relevant information in one of three ways:

- 1 If no updated templates for the given Container have been installed on the Hardware Node or no updated packages are found in the repository, the page just informs you of this fact.
- 2 If the Container uses standard Virtuozzo templates and one or more updated versions of the corresponding template(s) are installed on the Node, you are able to select an updated version for adding to the Container.
- 3 If the Container uses Virtuozzo EZ templates and updated packages for the given Container can be found in the repository, you are able to select the packages that you wish to update inside the Container.

Two options for customizing the update process are available on clicking the **Configure Updating** group:

- The **Force software update** option tells the system to perform the update even if unresolved dependencies are met during the process;
- The **Jump over several upgrades instead of adding them sequentially** option can be used if two or more sequential updates are found for this or that template.

Click **Update** to update the templates/packages you have selected for the given Container.

Updating Software in Multiple Containers

The OS and application packages can be updated simultaneously in a multitude of Containers by adding available templates updates (in the case of standard Virtuozzo templates) or updating Container packages directly (in the case of Virtuozzo EZ templates). All the currently available OS and application packages updates will be installed to the selected Containers. This is done on the **Configure: Upgrade Containers Software** page. For instructions on updating Container templates, refer to the **Updating OS and Application** section (p. 252).

Two actions for customizing the update process are available on clicking the **Configure Updating** group:

- The **Force software update** action tells the system to perform the update even if unresolved dependencies are met during the process;
- There is no way to update a stopped Container. If some of the Containers you selected for updating are not running, select the **Start the stopped Containers** check box. The Containers that are not running will then be started only to be updated and stopped again.

Click **Update** to update the selected Containers. To return to the previous page, or cancel upgrading click **Back** and **Cancel**, accordingly.

Advanced Operations

Advanced operations that can be performed on your Container are accessible via the Container dashboard. These operations include the following:

-  Mounting external disk drives (volumes) inside a Container (the **Volumes** link);
- Cloning a Container (the **Clone** link);
- Reinstalling a Container (the **Reinstall** link);
-  Repairing a Container (the **Repair** link).

Mounting External Volumes Inside Container

 External volumes are those drives inside a Container that can be added to the default C: drive. The **Volumes** page opened on following the **Volumes** link on the **Configuration** tab of the Container dashboard enables you to perform the following operations:

- Add additional disk drives to your Container (by following the **New Volume** link);
- Increase/decrease the current size of the disk drive and modify its measurement units (by clicking on a drive in the **Volumes** table);
- Mount a Hardware Node image file to a Container virtual drive (by following the **Mount Disk Image** link);
- Unmount an existing disk drive from your Container (by selecting the corresponding checkbox in the **Volumes** table and clicking **Unmount**);
- Unmount an existing disk drive from your Container and remove the corresponding image file from the Hardware Node (by selecting the corresponding checkbox in the **Volumes** table and clicking **Delete**);
- Mount a Hardware Node physical device to a Container virtual drive (by following the **Mount Device** link).

The **Volumes** table lists all the available drives inside the Container, including the default C: drive:

Column Name	Description
Mount Point	The name of the drive as it is seen inside the Container.
Device	This can be either a file or a physical device on the Hardware Node that is mounted to the mount point.
Size	The size of the drive (not applicable for certain devices, for example, if a Hardware Node CD-ROM device is mounted inside the Container).

Creating Virtual Drive Inside Container

 Any Container is created with only one disk storage inside it - the C: disk drive. However, Parallels Infrastructure Manager allows you to add new virtual disk drives to any Container residing on your Hardware Node. You can then use the newly created virtual disk drive in the same way as you would use it on a stand-alone computer: format it, create new files and folders within the drive, etc.

To create a new virtual drive inside a Container, make use of the **Create Volume** page which opens on clicking the **New Volume** link on the **Volumes** page. You will be asked to fill in two fields:

- In the **Mount Point** field, choose the name of the drive from the drop-down list.
- In the **Volume Size** field, enter the desired size of the new drive and choose the relevant units of measurement.

Click **Create** to create the new virtual drive inside the given Container.

Resizing Virtual Drive

 Resizing any virtual drive inside a Container, including the default C: drive, can be performed on the **Resize Volume** page, which is opened after you click on the corresponding drive on the **Volumes** page.

Designate the desired size in the **New Size** field, choose the relevant units of measurement and click **Resize**. Mind that the operation of decreasing the size might not be successful if the total size of used space on the drive exceeds the new size that you wish to assign to the drive.

Mounting Existing Virtual Disk

 Parallels Infrastructure Manager allows you to mount virtual disk files located on the Hardware Node to new drive letters inside any Container. Currently, only the `efd` virtual disk format is supported. Image files can be located anywhere on the Hardware Node (on your hard disk, CD-ROM drive, floppy drive, etc.) and should have the `.efd` extension.

The path to the virtual disk image is provided on the **Mount Disk Image** page, which you access by following the corresponding link on the **Volumes** page. On the **Mount Disk Image** page, you may either fill in the **Image Path** field manually (the path to the image should be absolute in relation to the Hardware Node) or click **Select** next to the field and navigate to the needed virtual disk file in the window that opens.

In the **Mount Point** field, choose the name of the drive from the drop-down list.

Click **Mount** after you have provided the path to the virtual disk file and the mount point, and the file will be mounted to the desired drive inside your Container.

Note: The permissions of the image file mounted to a Container correspond to those of this image file on the Hardware Node, i.e. you are able to perform the same operations on the file inside the Container as you are allowed on the Node.

Mounting Hardware Node Device

 In some circumstances, you may need to give your Container direct access to a drive on your Hardware Node. Parallels Infrastructure Manager allows you to mount a drive on the Node to a drive inside your Container, thus, granting you access to this drive from inside the Container. After mounting the drive, you can work with the mounted drive inside the Container in the same way as you would do it on the Hardware Node.

Virtually any drive available on the Node can be mounted to a Container, e.g.:

- a physical hard drive;
- a DVD-ROM drive;
- a CD-ROM drive;
- a floppy disk, etc.

A Hardware Node device can be mounted to a Container on the **Mount Device** page accessible by following the corresponding link on the **Volumes** page. On the **Mount Device** page, you should first indicate the name of the Node drive in the **Device Name** field. This should be a letter of the alphabet followed by a colon. For example, D: is a common appellation of CD-ROM drives.

In the **Mount Point** field, choose the name of the drive from the drop-down list.

Click **Mount** after you have provided the name of the device on the Hardware Node and the mount point inside the Container, and the device will be mounted to the desired drive inside your Container.

Note: The permissions of the device mounted to a Container correspond to those of this device on the Hardware Node, i.e. you are able to perform the same operations on the drive inside the Container as you are allowed on the Node.

Cloning Container

You can create a complete copy of a particular Container (in respect of all the Container data and resource parameters), or a Container *clone*. This is a good means to save your time since you do not bother about setting the Container configuration parameters and the like. Moreover, you can create a number of Container clones at a sitting by opening the Containers page, selecting the ones to be cloned and clicking the **Clone** link.

The option is available on the **Clone Container** page which enables you to define the name, hostname, password, offline management, and set the advanced settings for the Container being created.

The **General Settings** section enables you to:

- Provide a name for the Container clone.

The **Network Settings** section lets you:

- Set a hostname of the Container. Mind that the range of symbols for the Container hostname is limited.  For a Windows Node, the hostname may start singularly with a-z, A-Z or an underscore (_), contain further any of the following symbols: a-z, A-Z, 0-9, _ , - and have a-z, A-Z, 0-9 or _ at the end. The maximum number of symbols is 15.  For a Linux-based Container, the hostname should consist of a-z, 0-9, _ , and may have a point in the middle. The number of symbols should not exceed 256.

In the **New Password** section, you can set a new password for the Container clone. In this case you provide the password in the **Administrative password** field and confirm it in the field below. You can leave the field blank though to use the password from the cloned Container. The password is needed to access the Container in the future, for example, through Parallels Power Panel.

The **Advanced Settings** section lets you:

- Specify the Container ID, a 32-bit (ranging from 0 to 4294967295) integer number over 100 (Detailed information on the Container IDs allocation can be viewed in the **Choosing Container ID** subsection of the **Parallels Virtuozzo Containers User's Guide**.);
- Start the Container after cloning;

The **Offline Management** group allows you to set the offline management options by selecting the appropriate radio button. Offline management of the corresponding Container ensures the Container manageability by means of one or more offline services from any browser at its own IP address. After offline management is enabled for the Container, one port of its IP address becomes permanently active whatever the Container state. The currently supported services are `vzpp` and `plesk` (for managing Containers with the Plesk control panel installed in them). You can:

- Disable the offline management of the Container.
- Enable the offline management of the Container via the offline management settings operating on the Hardware Node. Whenever you need to manage the Container offline, its offline management settings will be brought into synchronization with those in effect on the Node. Should any service be removed from the default services list, the Container will be unable to be managed via the service off the list. This option subscribes the Container to the default offline services.

- Manually compose the Container offline services list. You can select the service(s) you would like the Container to be subscribed to in the corresponding checkbox(es).

By default, the **Offline Management** radio button is set to the option used by the Container being cloned. You can change it to use another offline management mode for the new Container.

Note: The rest of the Container general settings (p. 29) are copied from the cloned Container by default.

Click **Clone** to initiate the creation of the Container clone or **Customize** to set up the remaining network settings of the new Container.

Setting Network Parameters for Container Clone

The **Clone Container - Configure Network** screen allows you to define what Virtual Network adapters the new Container will use and to configure the settings of these adapters.

The first thing to be decided upon is whether the network connectivity for the Container should be provided in the host-routed or bridged mode. You can also have both types of network interfaces in the Container.

- The host-routed mode is simpler, no additional configuration of the Virtuozzo network is required for the created Containers to be immediately connected to the network. This mode is sufficient in most cases. However, the host-routed Containers cannot get their IP addresses by DHCP because their Virtual Network adapter does not have a unique MAC address.
- In the bridged mode, a Container is a full member of the network. However, a bridged Container must always belong to a Virtual Network that would provide the network connectivity for the Container. Virtual Networks are created (p. 147) and configured (p. 150) separately. So, at least one Virtual Network should be already configured on the Hardware Node for you to be able to use the bridged network mode for the Container being created. The bridged mode also allows you to create more than one virtual Ethernet adapter in the Container (click the **Add New Interface** link for this).

After you have selected either the **Routed Network** or **Bridged Network** checkbox (or both), you should indicate the IP parameters of the relevant interfaces (together with the parameters in the **Global Network** group that pertain to all the Container network interfaces, be they host-routed or bridged):

Parameter	Description
DNS Server IP Address	<p>One or more DNS servers to be used by the Container virtual adapters.</p> <p> For Linux-based Containers, all the DNS servers are common for all the Container virtual adapters.</p> <p> In Windows-based Containers, each virtual adapter can have its own DNS server.</p> <p>Note that the static values in these fields might be overridden if the Container gets the DNS servers from the DHCP server when operating in the bridged network mode.</p>
 WINS Server IP Address	<p>One or more WINS servers to be used by the Container virtual adapters. Each virtual adapter can be assigned its own WINS server.</p>

Search Domain	<p>One or more search domains to be used by the Container virtual adapters.</p> <p>All the search domains are common for all the Container virtual adapters.</p> <p>Note that the static values in these fields might be overridden if the Container gets the search domains from the DHCP server when operating in the bridged network mode.</p>
IP Address/Subnet Mask	<p>One or more IP addresses and subnet masks of the Container virtual adapter. In the bridged mode, if the Get IP Address by DHCP checkbox is selected, you do not have to provide an IP address for the Container; it will be assigned automatically by your DHCP server once the Container is started.</p>
Connect to [Virtual Network]	<p>On this drop-down menu, you should select the Virtual Network to which the Container will be assigned, if you use the bridged network mode.</p>
Default Gateway	<p>If you want the Container to operate in the bridged mode and not use a DHCP server, you should indicate the default gateway for it.</p>

After deciding on the necessary parameters, click **Clone** to start the cloning procedure.

Cloning Multiple Containers

One of the easiest methods of creating new Containers of a certain type or particular configuration is cloning the old ones. Cloned Containers are exact replicas of the prototypes and can be created on the **Clone Containers** screen where you can:

- Specify a name and a hostname for each new Container clone. The number of sections to set these parameters is equal to the number of Containers you want to clone. Mind that the range of symbols for the Container hostname is limited.  For a Windows Node, the hostname may start singularly with a-z, A-Z or an underscore (_), contain further any of the following symbols: a-z, A-Z, 0-9, _ , - and have a-z, A-Z, 0-9 or _ at the end. The maximum number of symbols is 15.  For a Linux-based Container, the hostname should consist of a-z, 0-9, _ , and may have a point in the middle. The number of symbols should not exceed 256.
- If you need to start the clones immediately after they are created, select the **Start the Containers after cloning** checkbox in the **Post Procedures** section.

After entering the necessary data, click **Clone** to begin the cloning procedure, otherwise click **Cancel**.

Reinstalling Container

Container reinstallation means recovering the original state of a Container in case you have unintentionally modified, replaced, or deleted any file that is part of an application or OS template, and the action has brought about the Container malfunction. The Container reinstallation process restores these files as they were at the time when the Container was created or when other applications were added to the Container afterwards, if so.

Reinstallation is likely to bring about some irrevocable changes to your Container, therefore, to be on the safe side, it is recommended to back up your Container before reinstallation.

Click **Next** on the **Reinstall Container** introductory page to review the available options and to decide whether you really need to reinstall your Container and in what way.

Note: To be reinstalled, each Container has to be stopped. The description of all possible Container statuses is provided in the **Container Statuses** section. If it is not stopped, the corresponding screen will inform you of the fact. In this case follow the **Stop Container** link in the **Possible Solutions** section. Afterwards it is recommended to refresh the page by clicking the **Refresh this page** link in the **Other possible actions** section.

Stopping Container Prior to Reinstallation

The given page of the **Reinstall Container** wizard is displayed only if you have selected the **Reinstall Container** option for a running Container. Inasmuch as there is no possibility to reinstall running Containers, on this page you can stop the Container before proceeding to the reinstallation proper.

Press **Next** to stop the Container you are going to reinstall. This will take you to the page where you can view the reinstallation options and select the appropriate ones.

Selecting Reinstallation Type

The page where you should choose the mode of reinstallation is displayed after you click **Next>** on the **Reinstall Container** introductory page. You shall select one of the two reinstallation options and specify whether to preserve or drop your Container password database.

When selecting a reinstallation option, bear in mind that there is one thing both options have in common: the original files of the OS and applications templates are restored in the Container. Pay attention to the fact that any customization changes you have made to these files will be lost during the Container reinstallation. In case you have not seriously modified any system configuration files, reinstalling the original files is likely to solve many problems.

However, you have probably already filled the Container with your personal files. If you are sure these files cannot cause problems or you need them in your Container, select the first option - **Preserve the existing Container contents**. In this case, your Container is created anew with all existing files moved to the /old directory or  c:\reinstall directory inside the Container. You shall be sure there is enough disk space to perform this operation, otherwise, it will fail. Be prepared to move the necessary files from the /old directory or  c:\reinstall directory to the new existing installation manually. If such files are numerous, this may prove a tedious task.

If you think you have nothing to lose at all, select the second option: **Drop the existing Container contents**. Your Container will be erased and recreated from the original template(s). Naturally, all your personal files will be lost. That is why you should select this option only if you have no valuable data in your Container or if you have a backup of your personal files elsewhere.

Pay attention to the **Password Options** group. The **Keep the password database** option retains the information on the Container users and groups. Selecting the **Drop the password database** radio button will purge this information altogether and create only the root account with the password specified in the **Set the administrative account password** and **Retype the password** fields under the radio button. This option may prove useful if your Container has got a corrupted password database.

When you are done, click **Next>** to proceed to the **Reinstall Container: Final confirmation** page.

Confirming Reinstallation

On the third page of the **Reinstall Container** wizard you shall confirm the reinstallation or give it up. The reinstallation option you have chosen at the previous step is displayed for you to have a last chance to revise what you are about to do. Click the **Reinstall** button to begin the reinstallation process.

Do not forget to start the Container when the operation is complete. To see the current status of the operation, click the **Details** link.

Repairing Container

 Repairing a Container is another way to solve problems with the Container functioning. In Virtuozzo Containers terminology, the Container is mounted in the repair mode. This means that a new Container is temporarily created from scratch with the same network and other parameters as the broken Container, and the root directory of the broken Container is mounted as `/repair` into the newly-created Container. Thereafter, the administrator is supposed to connect to the new Container via `ssh` or Parallels Infrastructure Manager file manager (p. 46) using the network and login parameters of the broken Container, go to the `/repair` directory, and perform one of the following actions:

- 1 Find the personal data that needs to be saved and copy it to a safe location elsewhere. Do not copy your personal data directly into your new Container, as it will be destroyed once you exit the repair mode. After quitting the repair mode, the broken Container can be reinstalled and the personal data can further be loaded into it from the place where you have saved them.
- 2 Identify the source of the problem and manually correct it. This method can be recommended to advanced Container administrators, as it presupposes some technical expertise. And it is still recommended to save first your personal data in a safe location, just in case something goes wrong.

Note: When working inside the Container being repaired by means of the Parallels Infrastructure Manager file manager, the file manager root directory (`/`) corresponds to the `/repair` directory of the temporary Container, in other words, it represents the root directory of the problem Container, not that of the newly-created one.

Pressing the **Start Repair** button on the **Repair Container** screen mounts the Container in the repair mode. It is not necessary to stop the Container beforehand; if the Container is running at the moment of pressing the **Start Repair** button, it will be first automatically stopped. The description of all possible Container statuses is provided in the **Container Statuses** section.

When the page is refreshed after pressing the **Start Repair** button, click the **Details** link at the end of the **The Container has been scheduled to start in the repair mode** message to see if the repair mode has been successfully entered. Once the Container enters the repair mode, connect to the new Container via `ssh` or Parallels Infrastructure Manager file manager and do what you deem reasonable inside the Container. After closing your `ssh` session, press the **Repair** link on the Container dashboard once again and press the **Finish Repair** button to exit the repair mode. After the repair mode is exited, the broken Container starts running, and you may check the repairing effect.

Adjusting Container Configuration and Advanced Settings

The **Configure** page allows you to adjust the main settings for your Containers. If the Container was created singularly, you might have provided it with a name and a description. If the Container was one of Containers created as a group, providing names and descriptions were not available. In the **General Configuration** group you can change the name or description of a Container created singularly, or assign a name and a description to a mass-produced Container.

Expand the **Advanced** group to:

-  Have the Container start disabled by selecting the **Disable this Container** checkbox (may be caused by business requirements).
- Make the Container automatically boot at the Hardware Node startup. For this purpose, select the **Start on the Hardware Node boot** checkbox.
-  In the **Capabilities** group you can:
 - switch on/off the network browsing for the Container. The Windows 2003 browser service allows the Container on a Windows 2003 network to view all the network environment available. The browser service maintains a list (called the browse list) of all available domains and computers. The browse list can be viewed using Windows 2003 Explorer and is provided by a browser in the Container. The default for the feature is the off status. You can learn more on the option from the **Network Places overview** article of the Windows 2003 **Help** system invoked by selecting **Help and Support** on the Windows **Start** menu.
 - enable/disable the packet QoS scheduler for the Container. This is one of the Quality of Service components in MS Windows 2003 Server that enable differentiation and preferential treatment for subsets of data transmitted over the network. The packet scheduler is the traffic control module that regulates how much traffic various applications are allowed, essentially enforcing the QoS parameters that are set for each particular application. For instance, you can use the feature to restrict a web site throughput to a certain maximum bandwidth value or differentiate between the data transmitted by critical applications (e.g. Plesk) and excessive data (e.g. multimedia applications), and allow preferential treatment for the important web sites or critical applications. The option is disabled by default. For additional information on the packet scheduler, address the **MSDN Library > Win32 and COM Development > Network Protocols > Quality of Service (QoS)** (http://msdn.microsoft.com/library/default.asp?url=/library/en-us/qos/qos/qos_start_page.asp).

Note: The concept of Quality of Service in MS Windows 2003 Server differs from that of Virtuozzo Quality of Service used to provide a fair share of the main system resources (disk space, CPU time, etc.) among Containers.

- let you know at a glance the ID of the Container to which you have connected by means of RDP. This ID is displayed in the upper right corner of the remote desktop.

- enable/disable the Microsoft Cluster Server (MSCS) software to run inside the Container. The MSCS software integrated into the Windows Server 2003 operating system is designed to allow servers to work together as one server, thus, providing greater reliability for your applications and services. Running one and the same application on two or more servers in the cluster helps ensure high application availability if one of the servers fails. The clustering software controls the failover process so that the application continues running on the second server without any loss of data and without interruption in service. The Virtuozzo Containers software allows you to include Containers in a server cluster so that they can act as full participants (nodes) in the cluster. To learn more about the MSCS software, address [MSDN Library > Servers and Enterprise Development > Windows Server > Windows Server 2003 > Technical Articles > Introducing Microsoft Cluster Service \(MSCS\) in the Windows Server 2003 Family](http://msdn2.microsoft.com/en-us/library/ms952401.aspx) (<http://msdn2.microsoft.com/en-us/library/ms952401.aspx>).

The options in the **Capabilities** group are enabled/disabled by selecting/clearing the corresponding checkboxes.

 The **Terminal Services** group allows you to define in which one of the two standard Windows TS modes (Remote Desktop for Administration and Terminal Server) the created Containers will operate. By default, any Container is automatically set to work in the Remote Desktop for Administration mode during its creation. So, you do not need to perform any additional operations to start connecting to Containers using this mode. Like in any other system with Windows Server 2003 installed, the Remote Desktop for Administration mode allows you to simultaneously open no more than two remote sessions and a console session to any Container on the Hardware Node.

If you are planning to have more than 2 remote sessions to a Container at the same time, you should enable the Terminal Server mode for this Container. You may also need to switch on this mode in case some of the Container applications require Terminal Server for their functioning. While set in the Terminal Server mode, the Container starts using the same Terminal Server License (TSL) server as the Hardware Node does. So, you can log in to the Container in this mode provided the TSL server for the Node is accessible by the Container and has a number of free client access licenses (CALs) installed. You can also redefine the TSL server to be used by the Container or set additional TSL servers for it in the **License Server Address** field.

The **Offline Management** group allows you to set the offline management options by selecting the appropriate radio button. Offline management of the corresponding Container ensures the Container manageability by means of one or more offline services from any browser at its own IP address. After offline management is enabled for the Container, one port of its IP address becomes permanently active whatever the Container state. The currently supported services are `vzpp` and `plesk` (for managing Containers with the Plesk control panel installed in them). You can:

- Disable the offline management of the Container.
- Enable the offline management of the Container via the offline management settings operating on the Hardware Node. Whenever you need to manage the Container offline, its offline management settings will be brought into synchronization with those in effect on the Node. Should any service be removed from the default services list, the Container will be unable to be managed via the service off the list. This option subscribes the Container to the default offline services.
- Manually compose the Container offline services list. You can select the service(s) you would like the Container to be subscribed to in the corresponding checkbox(es).

Press the **Submit** button to save the changes.

Adjusting General Configuration of Multiple Containers

There exist two configuration options that you may apply simultaneously to a multitude of Containers. These options are whether the Containers should be automatically started after the Hardware Node is booted, and whether offline management is enabled for the Containers. This is done on the **Configure: Change Containers General Settings** page. Select the desired options under the **Change "Start on Hardware Node boot"** to, **Change "Offline management Enabled"** to and **Change "Container Enabled"** to groups and click **Submit** for the changes to be applied to your Containers.

CHAPTER 4

Managing Hardware Nodes

Hardware Nodes (or just Nodes) are physical servers where Virtuozzo Containers 4.0 is installed for hosting Containers. The Parallels Infrastructure Manager functionality enables you to register and manage a number of Hardware Nodes via Infrastructure Manager, group them under logical units and consolidate their IP addresses into an IP addresses pool.

The Nodes collectively registered in Parallels Infrastructure Manager are easier to manage because all of them can be available from any single machine where you run Infrastructure Manager. For information on registering Hardware Nodes refer to the **Registering Hardware Nodes** subsection (p. 104).

When you find out that the number of registered Nodes (and, consequently, of Containers run on them) has grown, it can be convenient to divide them into a number of logical units representing certain classes - the Nodes based on a certain architecture, run Containers of a particular type or purposes, etc. To manage your Nodes this way, look at the **Organising Virtuozzo Infrastructure** subsection (p. 18). The IP addresses of the Virtuozzo Group Hardware Nodes united into an IP addresses pool present a more convenient distribution because, when assigning IP addresses to Containers, there will be no IP conflicts and no manually entering IP addresses - they will be selected from the pool. This is described in the **Managing IP Pool** subsection (p. 154).

To distribute workload, you can migrate Containers between the Nodes registered in Infrastructure Manager (p. 76).

On the **Hardware Nodes** screen you can review the Hardware Nodes list currently registered via Infrastructure Manager and see the Nodes details shown as the following table:

Column Name	Description
Hostname	The hostname assigned to the Node.
IP Address	The IP address of the Node used to connect to Infrastructure Management.
VT	The virtualization solution used on the server. Currently, Infrastructure Manager allows you to manage servers running the Virtuozzo Containers software only; it will support other virtualization technologies in the future.
Platform	The operating system, Linux or Windows, installed on the Node.
Operating System	The name and version of the operating system installed on the Hardware Node.
Architecture	The architecture of the microprocessor installed on the Node.
CPU	The percentage of the current CPU load of the Node.
Disk	The percentage of the current disk space usage of the Node.

The information on the resources consumption by Hardware Nodes is retrieved every 10 seconds and

Memory	The percentage of the current Infrastructure Manager memory consumption of the Node. displays the latest values.
Alert	The level of the Node resources usage signalled by a corresponding alert.
Status	The current status of the Node.

Note: If this screen is loaded in the **Logical View**, the Nodes displayed in this table are those which have been added to the **Logical View**, otherwise the Nodes list is empty. To add a Hardware Node to the **Logical View**, click **Add** on the Infrastructure Manager toolbar, select **Hardware Node** from the menu and choose the Node(s) on the screen it opens.

To manage any of the Nodes registered in Parallels Infrastructure Manager, click its name in the leftmost column of the table. To display a certain Node from a long list of Nodes, press the **Show Search** link on top of the table, enter the name of the Node and press the **Search** link; to have the list of the Nodes back, click **Reset Results**.

To stop manage a Hardware Node via Infrastructure Manager, select its checkbox and click **Unregister**; to add a new Node to the list of the Nodes managed via Infrastructure Manager, click the **Add** button on the Infrastructure Manager toolbar. Selecting one or more Hardware Nodes in the table and clicking the **Move** button opens the screen where you can sort the selected Node(s) out by distributing them over Parallels Infrastructure Manager folders (p. 21).

In This Chapter

Registering Hardware Node in Parallels Infrastructure Manager	104
Hardware Node Dashboard Overview	104
Managing Hardware Node Containers	108
Logging In to Hardware Node	111
Monitoring Hardware Node Resources Consumption	113
Rebooting Hardware Node.....	119
Managing Offline Services Configuration	119

Registering Hardware Node in Parallels Infrastructure Manager

You can register in Parallels Infrastructure Manager any Windows or Linux computer providing there is a Virtuozzo Containers installation on it. The newly registered Node will be displayed in the Nodes list on the **Hardware Nodes** screen and accessible via Infrastructure Manager for all the usual managing and monitoring operations Infrastructure Manager functionality provides you with. Besides, Nodes registered in Infrastructure Manager form a joint Hardware Nodes pool which provides for the following collective actions:

- creating a logical structure of Hardware Nodes and the Containers residing on them,
- migrating Containers between Nodes,
- copying OS and application templates from one Node to another,
- making Container samples stored on an Virtual Manager Node available to other registered Hardware Nodes,
- consolidating Node IP addresses into a network address range.

Registering a new Node to be managed through Parallels Infrastructure Manager is simple and all it takes is entering the following information on the new Node:

- The valid IP address of the Node that will be used by Infrastructure Manager to connect to this Node. Enter this IP address to the **Node Address** field in the **Connection to Hardware Node** section;
- In the **Administrative Login to Hardware Node** section you need to indicate the login name and the password which are used to connect to the Hardware Node as the administrator. Write the login name in the **User Name** field and the password in the **Password** field.

Selecting the **Force Registration** checkbox in the **Registration Options** section is the option to choose when the Node you are registering has already been and still is registered in another cluster and you need this Node to be registered in your cluster. If you forcibly register the Node, this Node will be removed from the cluster it currently belongs to.

Pressing the **Register** button initiates the registering procedure.

Hardware Node Dashboard Overview

The Hardware Node dashboard provides an overview of the configuration and the current status of the given Node and enables you to quickly launch the most typical server management tasks.

The **Server Status** table informs you on everything related to resources and updates:

Field	Description
Status	Shows if the Node is running or not.

License	Refers to the state of the Virtuozzo Server license. Click the Install License link if your current license status (a red circle) suggests that you do.
Alerts	Informs you if any of the Containers on this Node consume more of some resource than is specified by the limit on that resource (a red circle) or is coming close to the limit (a yellow circle). To see the resource alerts logs, click the Show link.
Kernel	Displays the number of your OS kernel and informs you about the kernel updates available by following the Check for update link (a yellow circle tells you that kernel updates are possible, a red one - that updating your kernel is critical, a grey one - that there is no information on available updates).
Virtuozzo	Shows you the type of the architecture this Virtuozzo build was made for, the build number and the information on critical (a red circle) and not critical (a yellow circle) Virtuozzo Containers updates. A grey circle shows that there is no information on available updates.
RAM + Swap Usage	The total percentage of the current Hardware Node utilization in terms of both allocated memory and, if swapping is on, swap space.
Disk Usage	The percentage of the available disk space currently in use by the Node.
CPU Usage	The percentage of the CPU power used by the Node at the moment the current Infrastructure Manager page was generated.
 Load Average	The last 1, 5, and 15 minutes system load averages.

The **Server Configuration** table displays the configuration of the Hardware Node:

Field	Description
Group Role	The role of this Node in its Virtuozzo Group. Any Virtuozzo Group consists of one Master Node and one or more Slave Nodes.
Hostname	The hostname of the Hardware Node.
IP Address	Enumerates all the IP addresses the Hardware Node has on all its network interfaces.
Architecture	The description of the processor model(s) installed on the Node.
CPU	The Hardware Node CPU power. If the Node has several processors, the column shows the summation of their powers.
OS	The operating system installed on the Hardware Node.
Uptime	The time that has passed from the last Hardware Node start.

In the **Containers** section you can quickly assess such Container-related details as the number of running and stopped Containers, see how many are depleting Hardware Node resources, so they had better be paid attention to, and the number of Containers your license allows you to run on the Node.

In the **Tasks** section to the right of the **Server Status** section you are provided with a quick access to some of the common server maintenance tasks:

- Configuring the default backup settings that will be used for all the Containers on this Node (the **Container Backup Settings** link). These settings can be overridden individually for each Container on the corresponding screens.
- Changing the SMTP relay server IP address and  the proxy server address or hostname of the current Hardware Node (the **Proxy Settings** link). The Node uses the SMTP mail server to send emails. The reasons to establish an email connection may be different, a password reminder or an alert notification among them.
- Changing the periodicity of refreshing the resources consumption information in the Virtuozzo logs (the **Logging** link).
- Managing the Service Container (the **Service Container** link). The Service Container is a special Container running a special service called Parallels Agent that is responsible for managing all the Containers of the given Hardware Node. To learn more about it, refer to the **Parallels Virtuozzo Containers User's Guide**. If you don't know how to deal with it and why at all, just ignore this link.
- Creating a new Container on this Hardware Node (the **Create New Container** link).
- Uploading and installing templates (the **Install Template** link). A template (or a package set) is a set of original application files (packages) repackaged for mounting over Virtuozzo File System. Application templates are used to install an application or a set of applications in Containers.
- Moving the physical server to the Container with the help of the **Migration** wizard (the **Migrate Server to Container** link).
- Rebooting this Hardware Node (the **Reboot Hardware Node** link). Keep in mind that usually this process takes 3-5 minutes. During this time, the Hardware Node and all Containers residing on it will be unavailable.
- Checking for the available updates for this Virtuozzo Containers installation (the **Software Updates** link).
- Configuring the Hardware Node connection to the Virtual Networks (the **Virtual Networks** link). A Virtual Network is the grouping of several Containers with bridged network interfaces into a single subnet. Virtual networks are also used to single out groups of Containers on a Hardware Node into separate subnets to be invisible to each other.
- Changing the offline management settings of the Hardware Node (the **Offline Services** link). These settings will be applied to all Containers on the Node. The offline management makes it possible to manage the Containers of the current Hardware Node by means of Parallels Power Panel whatever the Container state.
-  Connecting to the Node via SSH (the **Terminal Login** link).
-  Connecting to the Node via the Remote Desktop terminal (the **Remote Desktop** link).

The **Disk** and **Memory** sections inform you about the respective resources consumption on the Hardware Node. The information on the memory usage is displayed in the following way:

Field	Description
Physical memory	The percentage of the current Hardware Node utilization in terms of allocated memory.
Swap Space	The percentage of the current Hardware Node utilization in terms of allocated swap space. The bar is not displayed if swapping is not configured on the Node.
RAM+Swap	The simple average of the resources above.

The information on the disk size usage in all the  partitions or  logical disks existing on your Hardware Node is presented in the following tables (corresponding to the number of partitions/logical disks):

Column Name	Description
Mount Point	The name of the partition/logical disk using the resource.
Used	Used amount of disk size in the partition/logical disk
Free	Free amount of disk size in the partition/logical disk.
Total	The total amount of disk size allocated for the partition/logical disk.

The **Resources Commitments** section provides a summarized information on the disk and memory resources promised to all the Containers hosted on the Node. The **Value** column displays how much resources has been promised, and the **Percentage** column - how much of them is currently in use by the Containers. If at least one Container is promised unlimited resources, the **Value** column shows "Unlimited", and the **Percentage** column - "n/a" for the corresponding resource.

A more detailed information on the Hardware Node resource consumption is provided in the **Monitoring Hardware Node Resources Consumption** section (p. 113).

Apart from the operations available in the **Tasks** section, the Infrastructure Manager toolbar provides you with access to the following operations:

- Changing the Container backup settings (the **Container Backup Settings** link on the **Configure** menu).
- Changing the proxy settings (the **Proxy Settings** link on the **Configure** menu).
- Changing the periodicity of refreshing the resources consumption information in the Virtuozzo logs (the **Logging** link on the **Configure** menu).
-  Updating the Virtuozzo Containers installation with the latest Virtuozzo packages (the **Software Updates** link on the **Manage** menu).
- Reviewing the list of the Virtuozzo Virtual Networks available in Parallels Infrastructure Manager (the **Virtual Networks** link on the **Manage** menu).
- Configuring the offline management settings of the Hardware Node (the **Offline Services** link on the **Manage** menu).
-  Connecting to the Node via SSH (the **Terminal Login** link).
-  Connecting to the Node via a browser-based Remote Desktop client (the **Remote Desktop** link).
- Establishing a private secure connection to the Parallels support team server (the **Get Support** link).

Managing Hardware Node Containers

This screen displays the Containers this Hardware Node hosts.

The information, such as the IP addresses, hostnames, statuses of all the Containers, presented in the **Containers** table is displayed according to the settings made on the **Select Columns** drop-down menu. If all the columns are selected, this table presents the following:

Column Name	Description
ID	The ID assigned to the Container.
Name	The name of the Container.
Hostname	The hostname of the Container.
Description	The description of the Container.
IP Address	The IP address(es) assigned to the Container.

Hardware Node	The hostname or IP address of the Hardware Node where the Container is hosted.
Technology	The virtualization solution the Container is based on. Currently Infrastructure Manager allows you to manage Virtuozzo-based Containers; it will support other virtualization technologies in the future.
Platform	The operating system installed on the host Hardware Node.
Architecture	The microprocessor architecture of the host Hardware Node.
Operating System	The OS template the Container is based on.
Original Sample	The Container sample the Container is based on. The asterisk after the sample name indicates that the Container sample has been customized by changing one or several QoS parameters.
CPU	Presents a visual representation showing how much host Hardware Node CPU time the Container is consuming at the moment.
Disk	Presents a visual representation showing the current host Hardware Node disk space consumption by the Container.
Memory	Presents a visual representation showing the current consumption of the memory resources allocated to the Container.
Alert	Every time a Container consumes more of a resource than is specified by the limit on that resource, or is coming close to that limit, an alert is generated and logged. The green, yellow, or red circle in this column indicates the cumulative resource consumption by the Container. For a more detailed QoS alerts description, refer to the Monitoring Container Principal Resources section.
Enabled	A green tick opposite a Container indicates that this Container is enabled and can be started, a red cross means that the Container is disabled and cannot be started.
Status	The current status of the Container.

Note: The CPU, Disk, and Memory columns provide a simplified representation that gives you a very general idea of the current resource consumption. The information is retrieved every 10 seconds and Parallels Infrastructure Manager displays the latest values. To have a more comprehensive resource consumption report for a Container, click its name to open the Container dashboard and open the Resources tab where you need to click the Overview link to open the screen displaying a minute resource consumption description.

To facilitate working with Containers residing on your Hardware Node, you may have the Containers table display only those Containers that conform to particular parameters. Above the table, click the Show Search link to display the fields where you can specify the parameters the Containers should meet; you can also customize these fields by clicking Customize. Then click on the Search link. To view all the Containers residing on your Hardware Node, click on the Reset Results link to the right of the parameter fields.

To manage several Containers at once, make use of Infrastructure Manager toolbar right above the table. You are able to execute the following operations on Container groups:

- creating any number of Containers at once (the New Container button);
- starting/stopping a Container group depending on the current Container state (the Start/Stop links, correspondingly);
-  stopping any Container(s) without waiting for two minutes for the Container shutdown scripts to be executed. It can be useful, for example, in case a Container is known to be corrupt. The Power Off option is available only for a user with administrative privileges in Infrastructure Manager (for example, root/Administrator);
- restarting the selected Containers (the Restart button);
- configuring general settings for a group of Containers (the Configure link);
- backing up the selected Container(s) (the Back Up link);
- migrating the selected Containers to one of the HNs registered in Infrastructure Manager (the Migrate link);
- cloning the selected Containers (the Clone link);
- deleting a Container group (the Delete link).

To perform anything of the above, select the checkboxes opposite the corresponding Containers and press the appropriate link on the Infrastructure Manager toolbar.

Many more operations can be performed on a single Container through the corresponding Container dashboard.

Logging In to Hardware Node

Using SSH to Connect to Hardware Node

 If you are managing a Hardware Node with the Linux operating system installed, you can use Secure Shell (`ssh`) to remotely connect to the Node you are operating and work inside its directory tree using standard Linux command line tools. To connect to the Hardware Node by `ssh`, you should make sure that you are launching Parallels Infrastructure Manager in Internet Explorer 5.0 or above. SSH connection to the Hardware Node is supported by other browsers only if you have a Java Virtual Machine on your computer.

Note: If you are managing a Hardware Node running Windows 2003 Server, please turn to the [Using Remote Desktop to Connect to Hardware Node](#) section (p. 112) to learn to manage the Hardware Node by means of the Remote Desktop Protocol.

The Terminal Login window is opened upon clicking on the Terminal Login icon on the Hardware Node toolbar or dashboard. You are presented with the Login and Password fields where you should enter the relevant information (`root` or any other user name you might have created for this Node and this user's password) to be passed to the `ssh` server inside the Hardware Node.

After you have filled in these two fields, click the Login button. If you are doing this for the first time, your browser may display a window like this asking you to install additional components:



Figure 3: Installing ActiveX SSH Client

Note: When SSH-connecting to your Hardware Node using a browser other than Internet Explorer, this window does not appear. The SSH connection through browsers on the Mozilla engine is provided by the Java technology.

Click **Yes** in this window and wait for the `ssh` terminal window to appear, whereupon you get connected to the Hardware Node and may start sending commands to it via `ssh`.

Using Remote Desktop to Connect to Hardware Node

 You can use Remote Desktop Connection - a standard Windows application - to connect to the Node by means of the Remote Desktop Protocol (RDP). The feature is available only for Internet Explorer 5.0 or above. It is not supported by other browsers.

Note: If you are managing a Linux-based Hardware Node, please turn to the **Using SSH to Connect to Hardware Node** section (p. 111) to learn to manage the Hardware Node by means of Secure Shell.

The Remote Desktop window is opened upon clicking on the Remote Desktop icon on the Hardware Node toolbar or dashboard. You are presented with the Login button that you should click to open a Remote Desktop session. If you are doing this for the first time, your browser may display a window like this asking you to install additional components:



Figure 4: Infrastructure Manager - Installing Remote Desktop ActiveX Control

Click **Yes** in this window and wait for the Remote Desktop terminal window to appear, whereupon you will be presented with the Login and Password fields. After entering the necessary information (Administrator or any other user name you might have created for this Hardware Node and this user's password) in the fields provided, click **Enter** to get connected to the Hardware Node and start sending commands to it via Remote Desktop.

Monitoring Hardware Node Resources Consumption

The overall CPU, disk and memory-related resources usage of the Hardware Node registered in Parallels Infrastructure Manager are displayed under the **Overview** subtab of the **Resources** tab on the Hardware Node dashboard.

The CPU and memory resources are explained in the following tables:

CPU	Load	The graphical presentation of the CPU load on the Node during the last minute and the percentage of the current Hardware Node utilization.
	 Load Average	The average number of active processes for the past 1, 5, and 15 minutes, respectively. Active processes can be running, i.e., currently executed by the CPU, or runnable, i.e., waiting in the run queue for the CPU. Value 0.00 means that the CPU is idle, 1.00 that the CPU is fully used. Value 2.00 denotes that the CPU load exceeds the nominal value by two times.
Memory	Physical memory	The percentage of the current Hardware Node utilization in terms of allocated memory.
	Swap Space	The percentage of the current Hardware Node utilization in terms of allocated swap space. The bar is not displayed if swapping is not configured on the Node.
	RAM+Swap	The total percentage of the current Hardware Node utilization in terms of both allocated memory and, if swapping is on, swap space.

The information on the disk size usage in all the  partitions/  logical disks existing on your Hardware Node is presented in the following tables (corresponding to the number of  partitions/  logical disks):

Column Name	Description
Resource	The name of the resource.
Used	Consumed disk size ( or the number of inodes) used in the  partition/  logical disk.
Free	Available disk size ( or inodes number) in the partition/logical disk.
Total	The total amount of disk size ( or inodes) allocated to the partition/logical

Note: If you need to free some of the resources, look at the CPU, Disk Space, Memory or Traffic screen showing which of the Containers hosted on the Node snatch the biggest piece of a corresponding resource. Then, depending on how important the operations run on these Containers are, you can suspend some of them. A suspended Container stays put, and so its processes and services do, to be later resumed from the checkpoint. Suspending Containers is a good method to disengage the Hardware Node recourses for a certain period of time or saving the state of current operations which can be quickly launched again afterwards. Remember, that repairing, restarting and reinstalling a suspended Container can change the saved state of the Container, so these actions are not recommended.

Top CPU Resource Consuming Containers

You may run the need to view the most CPU-time consuming Containers. This functionality allows you to avoid the Node overcommit and the consequent Containers operation impairments. Under the CPU subtab you can keep in check the CPU usage on your Hardware Node. The CPU table shows the current CPU utilization:

- Load The graphical presentation of the CPU load on the Node during the last minute and the percentage of the current Hardware Node utilization.
-  Load Average The average number of active processes for the past 1, 5, and 15 minutes, respectively. Active processes can be running, i.e., currently executed by the CPU, or runnable, i.e., waiting in the run queue for the CPU. Value 0.00 means that the CPU is idle, 1.00 that the CPU is fully used. Value 2.00 denotes that the CPU load exceeds the nominal value by two times.

The statistics results are presented in the **Top Resource Consumers** table: The ID assigned to the Container.

Column Name	Description
ID	The ID assigned to the Container.
Container	The name of the Container for which the resource usage log has been generated.
Usage Graph	The bar representing graphically the consumption of the resource.
Relative CPU Share	The percentage of the overall CPU time share used by the Container.
CPU Time	The CPU time consumed by the given Container for the selected timespan.

You can have Parallels Infrastructure Manager display only those parameters you need at the moment. To show or hide certain columns, click the **Select Columns** link and select the parameters you want to be displayed or clear those you do not.

The **View Properties** section allows you to define the following parameters to govern the statistics results by selecting the appropriate value on the drop-down menu:

- the time interval for which you wish to view the disk space usage statistics;
- the number of the Containers characterized by the top disk space consumption;
- the view mode, i.e. configure the scale to display the disk space consumption in bytes or percent.

Note: Setting the view mode to one type of graphical representation for one resource affects the appearance of the usage scale for all the others. Thus, if you select to view the resource statistics against the top consumer, the usage scale bar will show the consumption percentage (the coloured segment of the bar against the total bar length) for the rest of the resources featured under the **Resources** tab.

Top Disk Space Consuming Containers

Under the **Disk Space** subtab you may view the Containers occupying the most of your Hardware Node disk space and inodes. This functionality allows you to avoid the Node overcommit and the consequent Containers operation impairments.

The information on the disk size usage in all the  partitions/  logical disks existing on your Hardware Node is presented in the following tables (corresponding to the number of  partitions/  logical disks):

Column Name	Description
Resource	The name of the resource.
Used	Consumed disk size ( or the number of inodes) used in the  partition/  logical disk.
Free	Available disk size ( or inodes number) in the partition/logical disk.
Total	The total amount of disk size ( or inodes) allocated to the partition/logical

The statistics results are presented in the following table:

Column Name	Description
ID	The ID assigned to the Container.
Container	The name of the Container for which the disk space usage results are displayed.
Usage Graph	The bar representing graphically the usage of the resource in bytes or percent, depending on the view mode selected.
Used Disk Share	The percentage of the disk space usage compared to the total amount of disk space on the Hardware Node.
Used Disk	The usage of the Hardware Node disk space by the Container.

You can have Parallels Infrastructure Manager display only those parameters you need at the moment. To show or hide certain columns, click the **Select Columns** link and select the parameters you want to be displayed or clear those you do not.

The **View Properties** section allows you to define the following parameters to govern the statistics results by selecting the appropriate value on the drop-down menu:

- the time interval for which you wish to view the disk space usage statistics;
- the number of the Containers characterized by the top disk space consumption;
- the view mode, i.e. configure the scale to display the disk space consumption in bytes or percent.

Note: Setting the view mode to one type of graphical representation for one resource affects the appearance of the usage scale for all the others. Thus, if you select to view the resource statistics against the top consumer, the usage scale bar will show the consumption percentage (the coloured segment of the bar against the total bar length) for the rest of the resources featured under the **Resources** tab.

Top Total Memory Consuming Containers

You may run the need to view those Containers that are using extensively your Hardware Node total memory, comprising the physical memory, or RAM, and the swap memory. This functionality allows you to avoid the Node overcommit and the consequent Containers operation impairments. The **Memory** subtab opens a screen where you can monitor the total memory consumption on your Hardware Node. The **Memory** table represents the physical and swap memory consumption:

Physical memory	The percentage of the current Hardware Node utilization in terms of allocated memory.
Swap Space	The percentage of the current Hardware Node utilization in terms of allocated swap space. The bar is not displayed if swapping is not configured on the Node.
RAM+Space	The total percentage of the current Hardware Node utilization in terms of both allocated memory and, if swapping is on, swap space.

The statistics results are presented in the following table:

Column Name	Description
ID	The ID assigned to the Container.
Name	The name of the Container consuming the stated amount of the total Hardware Node memory.
Usage Graph	The bar representing graphically the usage of the resource in bytes or percent, depending on the view mode configured.
Used Memory Share	The percentage of the total memory used by the Container from the overall Hardware Node total memory available.
Used Memory	The total memory consumed by the Container, in megabytes.

You can have Parallels Infrastructure Manager display only those parameters you need at the moment. To show or hide certain columns, click the **Select Columns** link and select the parameters you want to be displayed or clear those you do not.

The **View Properties** section allows you to define the following parameters to govern the statistics results by selecting the appropriate value on the drop-down menu:

- the time interval for which you wish to view the disk space usage statistics;
- the number of the Containers characterized by the top disk space consumption;
- the view mode, i.e. configure the scale to display the disk space consumption in bytes or percent.

Note: Setting the view mode to one type of graphical representation for one resource affects the appearance of the usage scale for all the others. Thus, if you select to view the resource statistics against the top consumer, the usage scale bar will show the consumption percentage (the coloured segment of the bar against the total bar length) for the rest of the resources featured under the **Resources** tab.

Top Incoming Traffic Receiving Containers

You might need to view the most incoming-traffic active Containers on your Hardware Node. This functionality allows you to monitor the traffic used by the Containers on your Hardware Node. Under the **Traffic** subtab you can monitor the Containers incoming traffic.

The statistics results are presented in the **Top Resources Consumers** table:

Column Name	Description
ID	The ID assigned to the Container.
Container	The name of the Container for which the outgoing traffic log has been generated.
Usage Graph	The bar representing graphically the incoming traffic in percent or bytes according to the view mode chosen.
Incoming Traffic Share	The share of the incoming traffic for the given Container from the total incoming traffic received by all the Containers on the Node, in percent.
Incoming Traffic	The amount of the incoming traffic for the Container, in bytes.

You can have Parallels Infrastructure Manager display only those parameters you need at the moment. To show or hide certain columns, click the **Select Columns** link and select the parameters you want to be displayed or clear those you do not.

The **View Properties** section allows you to define the following parameters to govern the statistics results by selecting the appropriate value on the drop-down menu:

- the type of traffic to be shown: selecting **Outgoing traffic** from this drop-down menu loads the screen which displays statistics on the outgoing traffic consumption.
- the time interval for which you wish to view the incoming traffic usage statistics;
- the number of the Containers characterized by the top consumption of the incoming traffic;
- the view mode, which you select to make the usage scale display the incoming traffic statistics for the Containers in bytes or percent.

Note: Setting the view mode to one type of graphical representation for one resource affects the appearance of the usage scale for all the others. Thus, if you select to view the resource statistics against the top consumer, the usage scale bar will show the consumption percentage (the coloured segment of the bar against the total bar length) for the rest of the resources featured under the **Resources** tab.

Top Outcoming Traffic Handling Containers

There might arise the need for you to view the most outgoing-traffic active Containers on your Hardware Node. This functionality allows you to monitor the traffic used by the Containers on your Hardware Node. Under the **Traffic** subtab you can monitor the Containers outgoing traffic.

The statistics results are presented in the **Top Resources Consumers** table:

Column Name	Description
ID	The ID assigned to the Container.
Container	The name of the Container for which the outgoing traffic log has been generated.
Usage Graph	The bar representing graphically the outgoing traffic in percent or bytes according to the view mode chosen.
Outgoing Traffic Share	The share of the outgoing traffic by the given Container from the total outgoing traffic statistics for all the Containers on the Hardware Node, in percent.
Outgoing Traffic	The amount of the outgoing traffic by the Container, in bytes.

You can have Parallels Infrastructure Manager display only those parameters you need at the moment. To show or hide certain columns, click the **Select Columns** link and select the parameters you want to be displayed or clear those you do not.

The **View Properties** section allows you to define the following parameters to govern the statistics results by selecting the appropriate value on the drop-down menu:

- the type of traffic to be shown: selecting **Incoming traffic** from this drop-down menu loads the screen which displays statistics on the incoming traffic consumption;
- the time interval for which you wish to view the outgoing traffic by one or several Containers;
- the number of the Containers with the top outgoing traffic statistics;
- the view mode, which you select to make the scale display the outgoing traffic statistics by the Containers in bytes or percent.

Note: Setting the view mode to one type of graphical representation for one resource affects the appearance of the usage scale for all the others. Thus, if you select to view the resource statistics against the top consumer, the usage scale bar will show the consumption percentage (the coloured segment of the bar against the total bar length) for the rest of the resources featured under the **Resources** tab.

Rebooting Hardware Node

You may want to reboot your Hardware Node. For example, this may happen if you have installed a new Linux kernel on the Node and wish to start using it.

Before rebooting the Node, keep in mind that usually this process takes 3-5 minutes. During this time, the Hardware Node and all Containers residing on it will be unavailable. To reboot the Node, press the **Submit** button.

Managing Offline Services Configuration

The **Offline Services** subtab available on clicking the **Network** tab on the corresponding Hardware Node dashboard allows you to configure the offline services parameters that will be applied to all Containers on your Node. Offline services ensure the manageability of your Containers from any browser at their IP addresses. By default, the `vzpp` service (for managing Containers by means of Parallels Power Panel) and the `vzpp-plesk` service (for managing Containers by means of the Plesk control panel integrated with Parallels Power Panel) are enabled for all Containers on the Node, which means that you can start using these offline services for managing Containers right after their creation. All offline services currently available on your Hardware Node are listed in the **Offline Services** table:

Column Name	Description
Name	The name of the service.

Destination Container ID	The ID of the destination Container where the requests to/from Containers are redirected. Currently, any Container requests can be redirected thru Container 1 (i.e. thru the Service Container) only.
Redirected Port	The port number inside the Service Container where the requests to/from Containers are redirected.
Global	Shows if the service is enabled or disabled globally.

By default, 20 services are shown on the screen, but you may have more services displayed by pressing the appropriate link on top of the table. You may also have the **Offline Services** table display only those services that have a particular name or conform to some other criteria. On top of the table, press the **Show Search** link to display the fields where you can specify the name or any other parameters of the service you wish to view; then click on the **Search** link. To view all the services, click on the **Reset Results** link to the right of the **Search** link.

You can have Parallels Infrastructure Manager display only those parameters you need at the moment. To show or hide certain columns, click the **Select Columns** link and select the parameters you want to be displayed or clear those you do not.

Note: Before you can start managing your Containers using certain offline services, make sure that the offline management is globally enabled on the Hardware Node. Detailed information on how to globally enable/disable the offline management is provided in the **Configuring Offline Management Parameters** section of the Parallels Management Console Help.

On the **Offline Services** subtab, you can manage your offline services as follows:

- To subscribe all Containers on the Node to an offline service, select the check box next to this service and click **Enable Globally**.
- To unsubscribe all Containers on the Node from an offline service, select the check box next to this service and click **Disable Globally**.
- To create a new offline service on the Node, click **New Offline Service**.
- To edit an existing offline service, click its name in the table.
- To remove an offline service that you do need any more from the Node, select the check box next to this service and click **Delete**.

Creating Offline Service

To create a new offline service on the Node, provide the following information on the service:

- In the **Name** field, specify an arbitrary name for the service.
- In the **Destination Container ID** field, specify the ID of the destination Container where the requests to/from your Containers will be redirected. Currently, any Container requests can be redirected thru Container 1 (i.e. thru the Service Container) only.
- In the **Redirected Port** field, specify the port number inside the Service Container where the requests to/from your Containers will be redirected.
- If necessary, enable the service for all Containers on the Node by selecting the **Use Globally for All Containers** check box.

When you are ready, click the **Submit** button to create the offline service.

Editing Offline Service

To edit an offline service on the Node, provide the following information on the service:

- In the **Destination Container ID** field, specify the ID of the destination Container where the requests to/from your Containers will be redirected. Currently, any Container requests can be redirected thru Container 1 (i.e. thru the Service Container) only.
- In the **Redirected Port** field, specify the port number inside the Service Container where the requests to/from your Containers will be redirected.
- If necessary, enable the service for all Containers on the Node by selecting the **Use Globally for All Containers** check box.

When you are ready, click the **Submit** button to update the configuration of the offline service.

CHAPTER 5

Managing OS and Application Templates

A template is a set of original application files, repackaged for mounting over Virtuozzo File System. Virtuozzo templates allow to share resources among lots of Containers, thus enabling huge savings in terms of disk space and memory.

All Virtuozzo templates are divided into OS templates and application templates. *OS templates* are used to create new Containers. An OS template cannot be installed on a Container, because any Container is already based on some OS template. Typical examples of OS templates are templates containing Red Hat, SUSE, or Windows 2003 Server. *Application templates* are added to Containers after the latter have been created; more than one application template may be installed on one and the same Container. Examples of application templates are the `msde`, `openssh`, `MSSql` templates on Hardware Nodes running Windows 2003 Server or `proftpd`, `MySQL` on Nodes running the Linux operating systems (for example, Red Hat 9), or a template with any other application (possibly more than one application in a single template) not included into the OS template.

You may perform the following operations with OS/application templates by using Parallels Infrastructure Manager:

- List OS/application templates installed on the Hardware Node;
- Delete those OS/application templates that are not needed any more;
- Install new OS/application templates on the Node;
- Install/uninstall an application template to/from the Container;
- View the properties of every OS/application template;
- View OS/application template version details.
-  Select an OS template to be used for creating new Containers by default.
- Update OS/application template to their latest versions;
- Download packages for EZ OS templates;
- Cache EZ OS templates.

In This Chapter

Managing OS Templates in Group Context.....	123
Managing Application Templates in Group Context.....	126
Managing OS Templates in Node Context	128
Managing Application Templates in Node Context.....	131
Uploading and Installing Template on Hardware Node	134
Installing Application Template On Hardware Nodes.....	134
Installing OS Template on Hardware Node.....	135
Caching OS Template on Hardware Nodes	135
Uninstalling Template From Hardware Nodes	136
Adding Application Templates to Containers.....	136
Updating Templates on Hardware Node.....	137

Managing OS Templates in Group Context

Parallels Infrastructure Manager allows you to list OS templates installed on the Hardware Nodes registered in Infrastructure Manager. They may be already used or not used by certain Containers. All OS templates installed on the Hardware Nodes are listed on the **OS Templates** page (displayed on clicking the **Templates** tab of any Infrastructure Manager folder) in the following table:

Column Name	Description
Name	The name of the OS template.
Version	The latest version of the OS template available for installation. Applicable to standard Virtuozzo templates only, because EZ templates do not have versions.
Type	Denotes if it is a standard or an EZ Virtuozzo template. Standard templates carry all the necessary package files inside themselves and have versions. EZ templates have only information about the necessary packages, and the packages themselves are downloaded from a central repository. EZ templates don't have versions.
Description	The description of the OS template.
Platform	Denotes the operating system the template is intended for.
Architecture	The microprocessor architecture.
Available	A template can be installed on several Infrastructure Manager Hardware Nodes. This column shows if there is at least one online Node where the template is installed (Yes). If not, the column says No.
Original Node	The same template can be installed on several Nodes, but only one of them can pass the information on the template to Infrastructure Manager. This column shows which one.

To facilitate working with OS templates, you may have the **Templates** table display only those OS templates that have a particular name or word in their description or conform to some other criteria. On top of the table, click the **Show Search** link to display the fields where you can specify the parameters the OS templates should meet; then click on the **Search** link. To view all OS templates residing on your Hardware Nodes, click on the **Reset Results** link to the right of the parameter fields.

You can have Parallels Infrastructure Manager display only those parameters you need at the moment. To show or hide certain columns, click the **Select Columns** link and select the parameters you want to be displayed or clear those you do not.

With the help of the Infrastructure Manager toolbar you can perform the following operations on OS templates:

- Upload a new template that you have locally and install it on a Hardware Node registered in Infrastructure Manager (the **New Template** button);
- Select some templates in the table and install them on one or more Infrastructure Manager Hardware Nodes at once (the **Install to Nodes** button);
-  Select some templates in the table and cache them on the Nodes where the templates are already installed (the **Cache on Nodes** link);
- Delete those OS templates that are not needed any more. To this effect, select the checkboxes opposite the OS templates you wish to delete and click the **Uninstall from Nodes** button.

Note: If any Container on your Hardware Nodes is based on the OS template you wish to delete, the OS template deletion will fail.

Clicking an OS template name opens the screen where you can cache the template packages and view detailed information on them.

Viewing OS Template Properties

The properties of OS templates are slightly different depending on whether it is a standard Virtuozzo OS template or an EZ template.

The description of the selected OS template is given at the top of the page, after which the **Summary** section provides additional details on the template:

Field Name	Description
Type	Denotes if it is a standard or an EZ Virtuozzo template. Standard templates carry all the necessary package files inside themselves and have versions. EZ templates have only information about the necessary packages, and the packages themselves are downloaded from a central repository. EZ templates do not have versions.
Version	The latest version of the OS template available for installation. Applicable to standard Virtuozzo templates only, because EZ templates do not have versions.
Architecture	The microprocessor architecture.
Platform	Denotes the operating system the template is intended for.

Supported technologies Lists the technologies that the Hardware Node must support for the template to work correctly. For more information see the description of the `TECHNOLOGIES` parameter in the **Container Configuration File** subsection of the **Parallels Virtuozzo Containers Reference Guide**.

The **Installed on Nodes** section enumerates those Hardware Nodes where the given template has been installed. You have the possibility to select any number of Nodes in the table and either  cache the given template on these Nodes (the **Cache Template** button) or uninstall it from them (the **Uninstall Template** button).

 If you are going to cache the template, remember that, first, packages "included" in an EZ template are, actually, meta data pointing to what real packages and from what repository can be downloaded to the Node to make the template work. Second, to be used for creating Containers on its basis, any OS template has to be *cached*. Caching an OS template is preparing it for creating Containers on its basis. When you cache an OS template, you:

- download the packages its meta data refer to from the download repository to your Node (applicable to EZ templates only);
- install them on the Node;
- and compress them into a gzipped archive for further usage.

If the template has already been cached, clicking the **Cache Template** icon launches updating the cached templates.

 If, before doing anything, you want to see what packages the OS template includes, open the **Packages** tab.

Listing Packages Included in OS Template

 The **Packages** tab of the properties page of an OS template lists those packages that make part of the current template. For an EZ template, only the names of the packages are given with no versions, because the package versions do not belong to EZ templates. For more information on working with Virtuozzo EZ templates, see the corresponding chapter in the **Parallels Virtuozzo Containers Template Management Guide**.

The page provides the following possibilities:

- Click on a package name to open a page with additional technical details on that package (EZ templates only).
- On top of the table, click the **Show Search** link to display the field where you can specify the name or part of the name of the package(s) you wish to view; then click on the **Search** link.

Managing Application Templates in Group Context

Parallels Infrastructure Manager allows you to list application templates available in your datacenter by clicking the **Templates** tab of any Infrastructure Manager folder (e.g. **Infrastructure**). The information on application templates is presented in the table with the following columns:

Column Name	Description
Name	The name of the application template.
Version	The latest version of the application template available for installation. Applicable to standard Virtuozzo templates only, because EZ templates do not have versions.
Type	Denotes if it is a standard or an EZ Virtuozzo template. Standard templates carry all the necessary package files inside themselves and have versions. EZ templates have only information about the necessary packages, and the packages themselves are downloaded from a central repository. EZ templates do not have versions.
Description	The description of the application template.
Platform	Denotes whether this is a Windows or a Linux template.
OS	The exact version of the operating system the template is intended for.
Available	A template can be installed on several Infrastructure Manager Hardware Nodes. This column shows if there is at least one online Node where the template is installed (Yes). If not, the column says No .
Original Node	The same template can be installed on several Nodes, but only one of them can pass the information on the template to Infrastructure Manager. This column shows which one.

To facilitate working with application templates, you may have the **Templates** table display only those application templates that have a particular name or word in their description or conform to some other criteria. On top of the table, click the **Show Search** link to display the fields where you can specify the parameters your application template(s) should meet; then click on the **Search** link. To view all the application templates residing on your Hardware Nodes, click on the **Reset Results** link to the right of the parameter fields.

You can have Parallels Infrastructure Manager display only those parameters you need at the moment. To show or hide certain columns, click the **Select Columns** link and select the parameters you want to be displayed or clear those you do not.

With the help of the Infrastructure Manager toolbar you can perform the following operations on application templates:

- Upload a new template that you have locally and install it on a Hardware Node registered in Infrastructure Manager (the **New Template** button);
- Select some templates in the table and install them on one or more Infrastructure Manager Hardware Nodes at once (the **Install to Nodes** button);
- Select some templates in the table and add them to one or more Containers (the **Add to Containers** button);

Note: For a template to be added to a Container, it first should be installed on the Node where the Container is hosted.

- Delete those application templates that are not needed any more. To this effect, select the checkboxes opposite the application templates you wish to delete and click the **Uninstall from Nodes** button.

Clicking an application template name opens the screen where you can view the detailed information on it.

Viewing Application Template Properties

The properties of application templates are slightly different depending on whether it is a standard Virtuozzo application template or an EZ template.

The description of the selected application template is given at the top of the page, after which the **Summary** section provides additional details on the template:

Field Name	Description
Type	Denotes if it is a standard or an EZ Virtuozzo template. Standard templates carry all the necessary package files inside themselves and have versions. EZ templates have only information about the necessary packages, and the packages themselves are downloaded from a central repository. EZ templates don't have versions.
Version	The latest version of the OS template available for installation. Applicable to standard Virtuozzo templates only, because EZ templates do not have versions.
OS Template	The OS template the given template is compatible with.
Platform	Denotes the operating system the template is intended for.

The **Installed on Nodes** section enumerates those Hardware Nodes where the given template has been installed. You have the possibility to select any number of Nodes in the table and uninstall the given template from them (the **Uninstall Template** button).

 If, before doing anything, you want to see what packages the application template includes, open the **Packages** tab.

Listing Packages Included in Application Template

 The **Packages** tab of the properties page of an application template lists those packages that make part of the current template. For an EZ template, only the names of the packages are given with no versions, because the package versions do not belong to EZ templates. For more information on working with Virtuozzo EZ templates, see the corresponding chapter in **Parallels Virtuozzo Containers Template Management Guide**.

The page provides the following possibilities:

- Click on a package name to open a page with additional technical details on that package (EZ templates only).
- On top of the table, click the **Show Search** link to display the field where you can specify the name or part of the name of the package(s) you wish to view; then click on the **Search** link.

Managing OS Templates in Node Context

Infrastructure Manager allows you to list OS templates installed on a particular Hardware Node. They may be already used or not used by certain Containers. All OS templates installed on the Hardware Node are listed on the **OS Templates** page in the following table:

Column Name	Description
Name	The name of the OS template.
Version	The last version of the OS template available for installation. Applicable to standard Virtuozzo templates only, because EZ templates do not have versions.
Type	Denotes if it is a standard or an EZ Virtuozzo template. Standard templates carry all the necessary package files inside themselves and have versions. EZ templates have only information about the necessary packages, and the packages themselves are downloaded from a central repository. EZ templates don't have versions.
Description	The description of the OS template.
Platform	Denotes the operating system the template is intended for.
Architecture	The microprocessor architecture.



Cached

The standard OS template, when installed or updated, comes cached by default. So, the "Yes"/"No" value in this column is relevant mainly for OS EZ templates. If the value is "No", this means that to base Containers on this template you need to cache it first.

To facilitate working with OS templates, you may have the **Templates** table display only those OS templates that have a particular name or word in their description or conform to some other criteria. On top of the table, click the **Show Search** link to display the fields where you can specify the parameters the OS templates should meet; then click on the **Search** link. To view all OS templates residing on your Hardware Node, click on the **Reset Results** link to the right of the parameter fields.

To show or hide certain columns, click the **Select Columns** link, select the parameters you want to be displayed or clear those you do not and click **Save**.

With the help of the toolbar located above the table you can perform the following operations on OS templates:

- install an OS template present as a file on the local computer to Hardware Nodes registered in Infrastructure Manager by clicking **New Template**;
- install an OS template present on this Hardware Node to other Nodes registered in Infrastructure Manager by clicking **Install to Nodes**;
- prepare an OS template (be it EZ or standard) for creating Containers on its basis by selecting it and clicking **Cache**;
- delete those OS templates that are not needed any more from the Node. To do this, select the checkboxes opposite the OS templates you wish to delete and click **Uninstall**.

Note: If any Container on the Hardware Node is based on the OS template you wish to delete, the OS template deletion will fail.

- update an OS template (be it EZ or standard) with new packages from the update repository by selecting it and clicking **Update**.

Clicking an OS template name opens the screen where you can cache the template packages and view detailed information on them.

Viewing OS Template Properties

The properties of OS templates are slightly different depending on whether it is a standard Virtuozzo OS template or an EZ template.

The description of the selected OS template is given at the top of the page, after which the **Summary** section provides additional details on the template:

Field Name	Description
Type	Denotes if it is a standard or an EZ Virtuozzo template. Standard templates carry all the necessary package files inside themselves and have versions. EZ templates have only information about the necessary packages, and the packages themselves are downloaded from a central repository. EZ templates don't have versions.
Version	The latest version of the OS template available for installation. Applicable to standard Virtuozzo templates only, because EZ templates do not have versions.

 Cached	If the template is cached on a particular Node, new Containers can be created on its basis on this Node.
Architecture	The microprocessor architecture.
Platform	Denotes the operating system the template is intended for.
Supported technologies	Lists the technologies that the Hardware Node must support for the template to work correctly. For more information see the description of the <code>TECHNOLOGIES</code> parameter in the Container Configuration File subsection of Parallels Virtuozzo Containers Reference Guide .

The **Added to Containers** table at the bottom of the page enumerates those Containers that were created on the basis of the current OS template.

If you are going to cache the template, remember that, first, packages "included" in an EZ template are, actually, meta data pointing to what real packages and from what repository can be downloaded to the Node to make the template work. Second, to be used for creating Containers on its basis, any OS template has to be *cached*. Caching an OS template is preparing it for creating Containers on its basis. When you cache an OS template, you:

- download the packages its meta data refer to from the download repository to your Node (applicable to EZ templates only);
- install them on the Node;
- and compress them into a gzipped archive for further usage.

If the template has already been cached, clicking the **Cache Template** icon launches updating the cached templates.

 If, before doing anything, you want to see what packages the OS template includes, open the **Included Packages** tab.

Listing Packages Included in OS Template

 The **Included Packages** tab of the properties page of an OS template lists those packages that make part of the current template. For an EZ template, only the names of the packages are given with no versions, because the package versions do not belong to EZ templates. For more information on working with Virtuozzo EZ templates, see the corresponding chapter in **Parallels Virtuozzo Containers Template Management Guide**.

The page provides the following possibilities:

- Click on a package name to open a page with additional technical details on that package (EZ templates only).
- On top of the table, click the **Show Search** link to display the field where you can specify the name or part of the name of the package(s) you wish to view; then click on the **Search** link.

Managing Application Templates in Node Context

Parallels Infrastructure Manager allows you to list application templates installed on the Hardware Node. The information on application templates is presented in the table with the following columns:

Column Name	Description
Name	The name of the application template.
Version	The latest version of the application template available for installation. Applicable to standard Virtuozzo templates only, because EZ templates do not have versions.
Type	Denotes if it is a standard or an EZ Virtuozzo template. Standard templates carry all the necessary package files inside themselves and have versions. EZ templates have only information about the necessary packages, and the packages themselves are downloaded from a central repository. EZ templates do not have versions.
Description	The description of the application template.
Platform	Denotes whether this is a Windows or a Linux template.
OS	The exact version of the operating system the template is intended for.

To facilitate working with application templates, you may have the **Templates** table display only those application templates that have a particular name or word in their description or conform to some other criteria. On top of the table, click the **Show Search** link to display the fields where you can specify the parameters the application templates should meet; then click on the **Search** link. To view all the application templates installed on the Hardware Node, click on the **Reset Results** link to the right of the parameter fields.

You can have Parallels Infrastructure Manager display only those parameters you need at the moment. To show or hide certain columns, click the **Select Columns** link and select the parameters you want to be displayed or clear those you do not.

With the help of the Infrastructure Manager toolbar you can perform the following operations on application templates:

- Upload a new template that you have locally and install it on a Hardware Node registered in Infrastructure Manager (the **New Template** button);
- Install an OS template present on this Hardware Node to other Nodes registered in Infrastructure Manager (the **Install to Nodes** button);
- Select some templates in the table and add them to one or more Containers of the given Hardware Node (the **Add to Containers** button);
- Delete those application templates that are not needed any more. To this effect, select the checkboxes opposite the application templates you wish to delete and click the **Uninstall** button.
-  Update the selected templates with the latest packages from the Parallels update repository (the **Update** button).

Clicking an application template name opens the screen where you can view the detailed information on it.

Viewing Application Template Properties

The properties of application templates are slightly different depending on whether it is a standard Virtuozzo application template or an EZ template.

The description of the selected application template is given at the top of the page, after which the **Summary** section provides additional details on the template:

Field Name	Description
Type	Denotes if it is a standard or an EZ Virtuozzo template. Standard templates carry all the necessary package files inside themselves and have versions. EZ templates have only information about the necessary packages, and the packages themselves are downloaded from a central repository. EZ templates don't have versions.
Version	The latest version of the OS template available for installation. Applicable to standard Virtuozzo templates only, because EZ templates do not have versions.
OS Template	The OS template the given template is compatible with.
Platform	Denotes the operating system the template is intended for.

 **Supported technologies** Lists the technologies that the Hardware Node must support for the template to work correctly. For more information see the description of the `TECHNOLOGIES` parameter in the **Container Configuration File** subsection of **Parallels Virtuozzo Containers Reference Guide**.

The **Added to Containers** section enumerates those Containers where the given template has been added. You have the possibility to select any number of Containers in the table and remove the given template from them (the **Uninstall From Containers** button).

 If, before doing anything, you want to see what packages the application template includes, open the **Included Packages** tab.

Listing Packages Included in Application Template

 The **Included Packages** tab of the properties page of an application template lists those packages that make part of the current template. For an EZ template, only the names of the packages are given with no versions, because the package versions do not belong to EZ templates. For more information on working with Virtuozzo EZ templates, see the corresponding chapter in **Parallels Virtuozzo Containers Templates Management Guide**.

The page provides the following possibilities:

- Click on a package name to open a page with additional technical details on that package (EZ templates only).
- On top of the table, click the **Show Search** link to display the field where you can specify the name or part of the name of the package(s) you wish to view; then click on the **Search** link.

Uploading and Installing Template on Hardware Node

Parallels Infrastructure Manager enables you to upload and install templates on any of Virtuozzo Group Hardware Nodes by clicking the **New Template** button above the table listing available OS and application templates. In case you have one or more new Virtuozzo templates that you would like to install on your Hardware Nodes, you should first have these files accessible from the computer where Infrastructure Manager is launched (e.g. insert the CD-ROM with the templates into the computer CD-ROM drive or copy the templates to the computer hard disk).

To install a new Virtuozzo template to a Virtuozzo Group Hardware Node, do the following:

- 1 Click the **Browse** button and provide the right path to the template (this must be the path accessible from the computer where Parallels Infrastructure Manager is running).
- 2 Select the Hardware Node on which the template will be installed by clicking the icon next to the **Hardware Node** field in the **Select Hardware Node** section and opening the screen where you may choose the Node from the list of Nodes.
 - Select the type of the template you are going to install. This is required to speed up and streamline the process of installing the template. The overall installation procedure is, for its most part, quite the same for both EZ and standard templates. The basic difference between the two is that standard templates are provided as solid entities together with the Virtuozzo Containers software, while the EZ templates are built up from separate chunks of code that are uploaded from the web during installation.

Standard templates may be a better choice if you have a slow Internet connection. However, EZ templates always include the latest security and functionality updates.
- 3 Select the **Force Installation** checkbox if you want to install the template even in case any errors have appeared during the installation process.
- 4 Click **Submit** to upload and install the template.

After the template has been uploaded and installed on one Hardware Node as described above, it can be copied to and installed on any number of Hardware Nodes at once. To do this, go to a list of templates in the Virtuozzo Group context, select the template, and click the **Install to Nodes** button.

Installing Application Template On Hardware Nodes

On the **Install to Nodes** screen you can install the template specified in the **Template to Install** section onto any Hardware Node(s) registered in Infrastructure Manager, or, to use another term, Virtuozzo Group Hardware Nodes. The template will be copied from the Hardware Node it is currently available on and installed to the Hardware Nodes which you may choose in the **Select Hardware Nodes** section: click **Add** and select Nodes from the pop-up window. Click **Install** to launch the process of installation.

Installing OS Template on Hardware Node

On the **Install to Nodes** screen you can install the template specified in the **Template to Install** section onto any Hardware Node(s) registered in Infrastructure Manager, or, to use another term, Virtuozzo Group Hardware Nodes. The template will be copied from the Hardware Node it is currently available on and installed to the Hardware Nodes which you may choose in the **Select Hardware Nodes** section: click **Add** and select Nodes from the pop-up window. Click **Install** to launch the process of installation.

Caching OS Template on Hardware Nodes

 The **Cache on Nodes** screen allows you to cache the given OS template on one or more Hardware Nodes registered in Parallels Infrastructure Manager.

There are two types of caching, which correspond to the two options under the **Select Cache Options** heading:

- Selecting the **Cache OS template for Container creation** option tells Infrastructure Manager to create a tarball of the packages comprising the template, which helps greatly speed up the process of creating new Containers on the Hardware Nodes where this OS template is cached.
- The **Cache application packages** option applies to EZ templates only. Selecting this option makes Parallels Infrastructure Manager download the latest packages comprising the EZ template to the Hardware Node(s) indicated in the **Select Hardware Nodes** section.

Both types of caching are only available on those Nodes where the given template has already been installed. You can define the list of such Nodes in the **Select Hardware Nodes** section with the help of the **Add** and **Remove Selected** buttons.

Note: For standard OS templates, the options described above are not shown, because caching a standard OS template always amounts to creating a Container tarball, which corresponds to the first option for EZ templates.

Click the **Cache** button to initiate the caching procedure.

Uninstalling Template From Hardware Nodes

On the **Uninstall From Nodes** screen you can uninstall the template specified in the **Template to Uninstall** section from any Hardware Node(s) registered in Infrastructure Manager, or, to use another term, Virtuozzo Group Hardware Nodes. The template will be uninstalled from the Hardware Nodes which which you may choose in the **Select Hardware Nodes** section: click **Add** and select Nodes from the pop-up window. Click **Uninstall**..

Note: If any Container on your Hardware Nodes is based on the OS template you wish to delete, the OS template deletion will fail.

Adding Application Templates to Containers

The **Add to Containers** screen enables you to perform the following steps:

- review the templates to be installed to Containers in the **Templates to Install** section;
- choose the Containers these templates are going to be installed to in the **Select Containers** section: click **Add Containers** and select Containers from the pop-up window;
- Install the templates by clicking the **Install** button.

Updating Templates on Hardware Node

 The page where you can update certain templates on a particular Hardware Node is displayed if you go to the **Templates** tab of the Hardware Node dashboard, select the corresponding templates on the templates list and click the **Update** link above. This relates both to OS and application templates, both standard and EZ ones.

While the **Update** screen is being loaded, you can see the Virtuozzo Containers software looking for the available updates.

After the checking procedure is over, its results are displayed in three sections: the first one tells you the exact time of the last update check, the second enumerates the templates for which the update check has just been performed, and the third one informs you if updates are available for these templates.

Note: To obtain the information on the templates updates, the Virtuozzo Containers software establishes connection with the update repository. If the connection fails, it tells you that **Virtuozzo cannot check for template updates now**, the notice being displayed instead of the **Up-to-date Status** section. In this case, you can check the connection with the update repository: follow the advice to **Please check the repository settings** below to open the page where you can configure these settings.

The information on the available templates in this section is organized in the following way:

The first item in the list is the OS templates updates followed by the application templates updates down the list. The number of the updates is shown in brackets. The number of "new" updates corresponds to the number of templates not installed on the Hardware Node at the moment of the updates check and the number of "updates" per se is how many template updates you can download from the Virtuozzo update repository to the Hardware Node. The latter number is reversely dependent on the former: if you do not have a certain template installed on the Node, there are no updates available for this template. If you click the **OS Templates** item, it expands into the list of the OS templates updates and each of them, when expanded, provides you with the information about this template. Similarly, to have the list of application templates updates, click the **Applications for ...** item and then the application short description to learn what this application is used for and the features it includes.

If you want to install anything from the updates list, click the **Install Updates** button.

CHAPTER 6

Virtuozzo Network

In This Chapter

Managing Network Adapters on Node	138
Managing Virtual Networks.....	142
Managing Container Network Parameters	151
Managing IP Pool.....	154
Managing Container Firewall	162
Managing Email Gateway and Proxy Server	170
Managing Email Notifications Settings	171

Managing Network Adapters on Node

Listing Adapters

The Network Adapters subtab (displayed on clicking the Network tab on the Hardware Node dashboard) displays a list of network interface cards (NICs) and VLAN adapters currently available on the Hardware Node. The information on the network adapters is presented in the table having the following columns:

Column Name	Description
Interface	The name assigned to the network adapter (e.g. eth0).
Type	Indicates whether it is a physical adapter ('Physical') or a VLAN adapter ('VLAN').
VLAN ID	The ID assigned to the VLAN adapter. Relevant for VLAN adapters only.
Virtual Network	The name of the Virtuozzo Virtual Network, if any, associated with the network adapter. Note: To learn more about the notion of Virtuozzo Virtual Networks and their relation to physical adapters, VLAN adapters, and Containers, please refer to the Managing Virtual Networks section (p. 142).
IP Addresses	The IP addresses assigned to the network adapter.
MAC Address	The MAC address of the network adapter.

To facilitate your working with network adapters, you can:

- Configure the number of columns to be displayed in the **Network Adapters** table. To this effect, click the **Select Columns** link and clear the check boxes near the column name(s) that you wish to hide.
- Modify the number of network adapters simultaneously displayed in the **Network Adapters** table by clicking the **10**, **20**, **40**, or **80** link at the top of the table.

The **Network Adapters** subtab also allows you to:

-  Remove an existing VLAN adapter by selecting the check box near the corresponding adapter and clicking the **Delete** button.
-  Create a new VLAN adapter by following the **New VLAN Interface** link at the top of the **Network Adapters** table.
- Associate a network adapter with any of the existing Virtuozzo Virtual Networks by clicking the name of the corresponding adapter in the **Network Adapters** table.

Viewing Physical Adapter Properties

The **Physical Interface** screen provides the key information on the physical adapter that you have selected on the **Network** tab of the **Hardware Node** dashboard:

Column Name	Description
Interface	The name assigned to the network adapter (e.g. eth0).
Type	Indicates that it is a physical adapter ('Physical').
Virtual Network	The name of the Virtuozzo Virtual Network, if any, associated with the network adapter. Note: To learn more about the notion of Virtuozzo Virtual Networks and their relation to physical adapters, VLAN adapters, and Containers, please refer to the Managing Virtual Networks section (p. 142).
IP Addresses	The IP addresses assigned to the network adapter.
MAC Address	The MAC address of the network adapter.

The **Configure** button allows you to connect this physical network adapter to any of the available Virtuozzo Virtual Networks. To assign IP addresses and other network parameters to the adapter, use a command-line interface and the `ifconfig` utility.

Connecting Physical Adapter to Virtual Network

The **Configure** screen allows you to connect the physical network adapter existing on the Hardware Node to any of the available Virtuozzo Virtual Networks. This screen can be accessed by clicking the **Network** tab on the Hardware Node dashboard, then clicking the name of the network adapter you wish to join to a Virtual Network, and clicking **Configure**.

Note: To learn more about the notion of Virtuozzo Virtual Networks and their relation to physical adapters, VLAN adapters, and Containers, please refer to the **Managing Virtual Networks** section (p. 142).

On this screen you can connect the physical network adapter to a Virtual Network (and, consequently, to the Containers joined to this Virtual Network) by selecting the name of the corresponding Virtual Network on the drop-down menu in the **Network** field. If you do not wish the adapter to be joined to any Virtual Network, select **Not Assigned** on the drop-down menu.

After deciding on the Virtual Network, click the **Submit** button.

Note: To assign IP addresses and other network parameters to the adapter, use a command-line interface and the `ifconfig` utility.

Creating VLAN Adapter on Node

 The **New VLAN Interface** screen (which can be accessed by clicking the **Network** tab on the Hardware Node dashboard, clicking the **Network Adapters** subtab, and following the **New VLAN Interface** link at the top of the displayed window) allows you to create new VLAN adapters. You can use these adapters later on to connect your Containers to the corresponding virtual local area networks.

To create a new VLAN adapter, you should provide the information in the following fields:

- **VLAN Tag** (mandatory): the ID to be assigned to the virtual local area network (VLAN) which will be associated with the VLAN adapter being created. As a VLAN ID, you can specify any integer in the range from 2 to 4095.
- **Base Interface** (optional): the physical network adapter on the Hardware Node to which the VLAN is to be bound. You can choose any of the Hardware Node physical adapters by selecting its name on the context menu.
- **Assign Virtual Network** (optional): the ID of the Virtuozzo Virtual Network where you wish to connect the VLAN adapter. You can join the VLAN adapter to any of the Virtual Networks available on the Hardware Node.

Note: To learn more about the notion of Virtuozzo Virtual Networks and their relation to physical adapters, VLAN adapters, and Containers, please refer to the **Managing Virtual Networks** section (p. 142).

When you are ready, click the **Submit** button to make the VLAN adapter with the specified parameters. The newly created adapter will be displayed in the **Network Adapters** table on the **Network Adapters** subtab.

Viewing VLAN Adapter Properties

The VLAN Interface screen provides the key information on the VLAN adapter that you have selected on the Network tab of the Hardware Node dashboard:

Column Name	Description
Interface	The name assigned to the network adapter (e.g. eth0).
Type	Indicates that it is a VLAN adapter ('VLAN').
VLAN ID	The ID assigned to the VLAN adapter.
Virtual Network	The name of the Virtuozzo Virtual Network, if any, associated with the network adapter. Note: To learn more about the notion of Virtuozzo Virtual Networks and their relation to physical adapters, VLAN adapters, and Containers, please refer to the Managing Virtual Networks section (p. 142).
IP Addresses	The IP addresses assigned to the network adapter.
MAC Address	The MAC address of the network adapter.

The **Configure** button allows you to connect this VLAN network adapter to any of the available Virtuozzo Virtual Networks. To assign IP addresses and other network parameters to the adapter, use a command-line interface and the `ifconfig` utility.

Connecting VLAN Adapter to Virtual Network

The **Configure** screen allows you to connect the VLAN network adapter existing on the Hardware Node to any of the available Virtuozzo Virtual Networks. This screen can be accessed by clicking the **Network** tab on the Hardware Node dashboard, then clicking the name of the VLAN network adapter you wish to join to a Virtual Network, and clicking **Configure**.

Note: To learn more about the notion of Virtuozzo Virtual Networks and their relation to physical adapters, VLAN adapters, and Containers, please refer to the [Managing Virtual Networks](#) section (p. 142).

On this screen you can connect the VLAN network adapter to a Virtual Network (and, consequently, to the Containers joined to this Virtual Network) by selecting the name of the corresponding Virtual Network on the drop-down menu in the **Network** field. If you do not wish the adapter to be joined to any Virtual Network, select **Not Assigned** on the drop-down menu.

After deciding on the Virtual Network, click the **Submit** button.

Note: To assign IP addresses and other network parameters to the VLAN adapter, use a command-line interface and the `vznetcfg` utility.

Managing Virtual Networks

A Virtual Network is a Virtuozzo notion denoting the grouping of a number of Containers with bridged network interfaces into a single subnet. Using Virtual Networks is also necessary if you want to single out groups of Containers on a Hardware Node into separate subnets to be invisible to each other. General information on the two network modes in which Containers can operate - namely, host-routed and bridged modes - is provided in **Parallels Virtuozzo Containers User's Guide**. Only those Containers that operate in the bridged mode can be united into Virtual Networks. The picture below illustrates different scenarios of how Virtual Networks can be used and what are the effects of this or that toponomy.

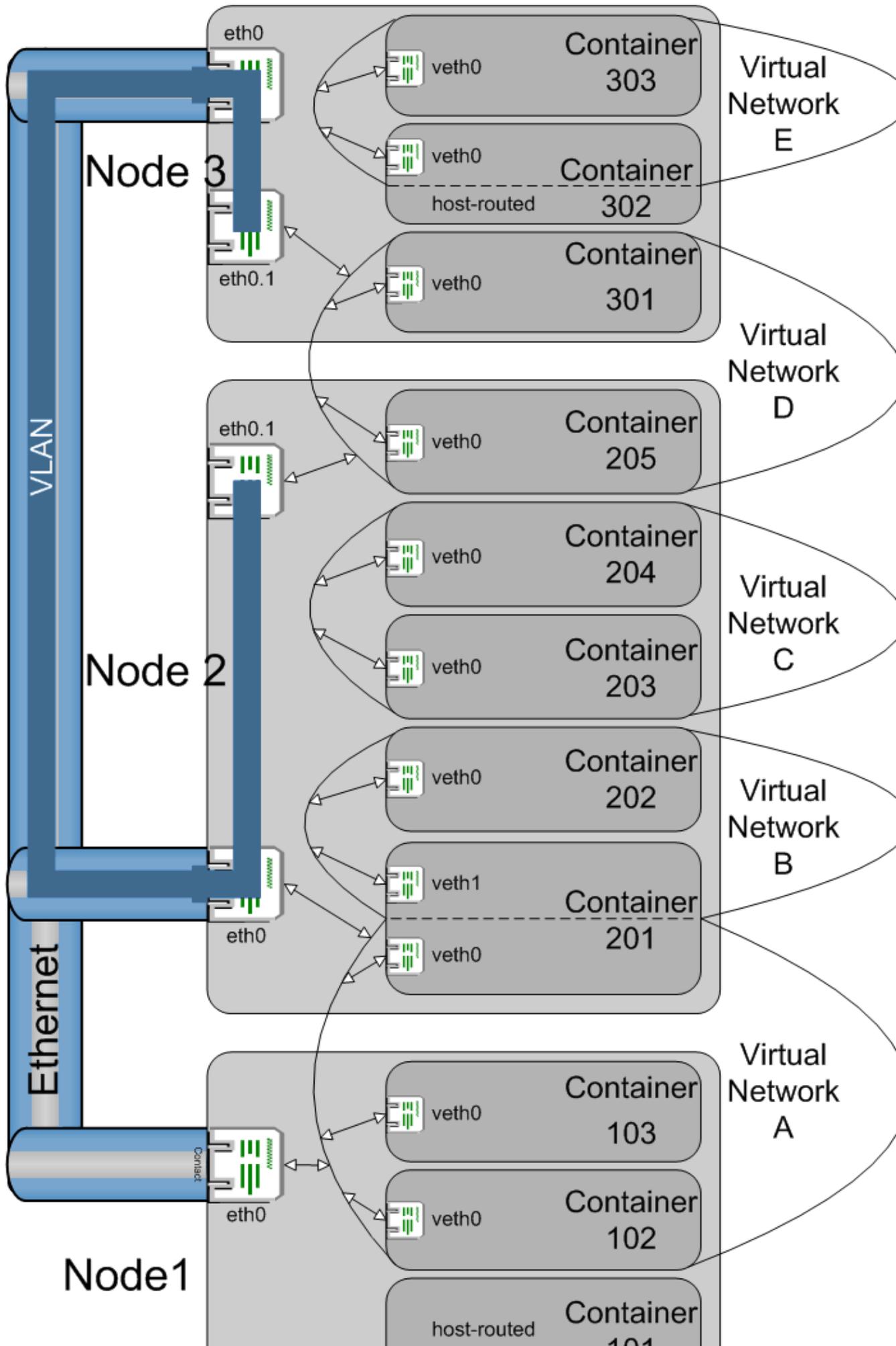


Figure 5: Virtual Networks

The scheme above illustrates three Virtuozzo Hardware Nodes each having a single Ethernet adapter (`eth0`). The Ethernet adapters are physically united into a single network. On the Ethernet adapters of Nodes 2 and 3, a VLAN is set up.

Note:  On a Linux Node, a VLAN can be set up by standard means of the OS, and Parallels Infrastructure Manager provides an interface for creating VLANs on any network adapter.  On Windows Nodes, any suitable third-party tools can be used for creating VLANs. Parallels Infrastructure Manager does not provide an interface to these tools, though it naturally displays the VLAN adapters created in this way.

The steps needed to set up each of the five Virtual Networks shown on the scheme (A-E) are the following:

- 1 A Virtual Network is created either on the general Parallels Infrastructure Manager screen for the whole Virtuozzo Group of Hardware Nodes or on the screen related to a particular Hardware Node. Whatever the screen, the created Virtual Network will be available for all the registered Hardware Nodes. If you use a particular Hardware Node for the Virtual Network creation, you can also specify to what network interface card (NIC) of the current Node the Virtual Network will be assigned, if at all.
- 2 Containers from one or more Hardware Nodes are added to the Virtual Network, thus creating a separate subnet. Only the bridged interfaces of the Containers are involved in this process; host-routed interfaces cannot be added to Virtual Networks. You should make sure that these Containers can also communicate with each other on the IP level, i.e. their IP addresses/net masks are compatible with each other.
- 3 For each Hardware Node that hosts the Containers included in the Virtual Network, the Virtual Network should either be assigned to one of the Node's physical/VLAN adapters or defined locally for the Node (the latter variant is possible if the Containers of only one Node are included in the Virtual Network).

Using the method above, the configuration shown on the scheme can be created. Each of the five Virtual Networks serves to group two or three Containers of one or two Hardware Nodes - this is shown with double-headed arrows connecting the Virtual Network border with the Container bridged interfaces. Each of the Virtual Networks is either local for the Node or bridged to some adapter - the latter case is illustrated with double-headed arrows connecting the Virtual Network border with the Nodes' Ethernet or VLAN interfaces.

Let us see the effects of each of the combinations shown:

- Container 101 has only a host-routed interface and thus is not included in any Virtual Network. It is visible by any Containers and other hosts that can access the `eth0` adapter of Hardware Node 1.
- Containers 102, 103, and 201 are united into Virtual Network A. They can communicate with each other and other hosts because on each Node, Virtual Network A is assigned to the `eth0` adapter.
- Container 201 has two bridged adapters, with the second one included in Virtual Network B together with Container 202. Virtual Network B is not assigned to any interface on the Node, and still Container 202 is able to communicate with the outer world thanks to the fact that Container 201 is bridged to `eth0` on the Node through Virtual Network A. Of course, for this to be possible, all the bridged adapters of Containers 201 and 202 should belong to one and the same IP subnet.

- Virtual Network C with Containers 203 and 204 is another example of a Virtual Network defined locally on the Node, but unlike Virtual Network B, its Containers can only see one another and no other hosts, because there is no bridging to any of the adapters of the Hardware Node.
- Containers 205 and 301 are united into Virtual Network D through the respective adapters of their Hardware Nodes much like the Containers of Virtual Network A. However, Virtual Network D is bridged not to the physical interface on both of the Nodes, but to the VLAN interfaces created on the physical ones. This results in the isolation of Containers 205 and 301 within this VLAN so that they are visible to each other but not to any other external hosts.
- Virtual Network E is the most complex example on this scheme. The Virtual Network is not assigned to any of the Node's interfaces, so it remains local for the Node. In addition to its inclusion in Virtual Network E, Container 302 enjoys a host-routed interface, so it can effectively communicate with the outer world. But what about Container 303? Unlike Container 202 in Virtual Network B, it cannot be simply included in a single IP subnet with the bridged interface of its fellow Container that would be bridged, in its turn, to the Node's interface. For Container 303 to be able to go outside the limits of the Virtual Network, network fine-tuning should take place. In particular, the Ethernet frame that is sent by Container 303 to an external host should come to Container 302, lose its framing, thus becoming a pure IP packet, be routed through the host-routed interface of Container 302 to the Node's adapter eth0, put on a new framing to become again an Ethernet frame (different from the original one because the source MAC address becomes that of the Hardware Node, and not that of Container 303), and go further. Paving the way for a response to get successfully to Container 303 is also a challenge. Thus, if you are not a network guru, chances are Container 303 will remain isolated in the scope of Virtual Network E. Luckily, Parallels Infrastructure Manager provides easier ways of setting up your network, as was illustrated above.

Note: Any interface on the Node can be assigned to only one Virtual Network. If you need to create more Virtual Networks on one Node, either use more physical adapters or create VLANs.

Listing Virtual Networks on Node

The **Virtual Networks** subtab (accessed thru clicking the **Network** tab on the Hardware Node dashboard) displays a list of Virtuozzo Virtual Networks available in Parallels Infrastructure Manager. The information on Virtual Networks is presented in the table having the following columns:

Column Name	Description
Virtual Network	The name assigned to the Virtuozzo Virtual Network.
Connection Status	Indicates whether the Virtual Network is connected to some network adapter (<i>connected</i>), set for usage on the Hardware Node only (<i>local</i>), or not configured.
Network Description	The description of the Virtual Network, if set.
Assigned Interface	If the Virtual Network is connected to some network adapter on the Hardware Node, displays the name of this adapter.

Note: To learn more about the notion of Virtuozzo Virtual Networks and their relation to physical adapters, VLAN adapters, and Containers, please refer to the **Managing Virtual Networks** section (p. 142).

To facilitate your working with Virtual Networks, you can:

- Filter them by the parameters listed in the table above. To this effect, click the **Show Search** link over the table, enter the needed data in the field(s) provided and click **Search**. The Virtual Networks matching the specified criteria will be displayed in the **Connections** table. To have the full list of Virtual Networks back, click **Reset Results**.
- Configure the number of columns to be displayed in the **Connections** table. To this effect, click the **Select Columns** link and clear the check boxes near the column name(s) that you wish to hide.
- Change the Virtual Networks order by clicking the corresponding column name in the **Connections** table.
- Modify the number of network adapters simultaneously displayed in the **Connections** table by clicking the **10, 20, 40, or 80** link at the top of the table.

The **Virtual Networks** subtab also allows you to:

- Create a new Virtuozzo Virtual Network by following the **New Virtual Network** link at the top of the **Connections** table.
- View detailed information on an existing Virtual Network by clicking its name in the **Connections** table.

Creating Virtual Network on Node

Every Virtual Network on the Hardware Node is a class of Containers which can be joined together into a Virtuozzo Virtual Network to have common network configuration. More precisely, each Container can be provided with several virtual interfaces, and each of the latter assigned to a Virtual Network.

On the **New Virtual Network** screen (which can be accessed by clicking the **Network** tab on the Hardware Node dashboard, clicking the **Virtual Networks** subtab, and following the **New Virtual Network** link at the top of the displayed window), you can create a new Virtuozzo Virtual Network. To this effect, you should provide the information in the following fields:

- **Virtual Network Name** (mandatory): specify an arbitrary name to be assigned to the Virtual Network.
- **Description** (optional): provide the Virtual Network description, if necessary.

The **Assign Interface** section enables you to configure the following Virtual Network parameters:

- Select the **Not Configured** radio button if do not wish to connect the Virtual Network to any network adapter on the Hardware Node.
- Select the **Connect via** radio button and, on the drop-down menu, select the network adapter you wish to connect the Virtual Network to. The drop-down menu lists all physical and VLAN adapters available on the Hardware Node.
- Select the **Use on the Node only** radio button if you do not plan to connect the Virtual Network to external networks, however, wish to unite some of your Containers inside this Virtual Network to allow these Containers to communicate with each other.

Note: To learn more about the notion of Virtuozzo Virtual Networks and their relation to physical adapters, VLAN adapters, and Containers, please refer to the **Managing Virtual Networks** section (p. 142).

After you have entered the necessary information, click the **Submit** button to start making the Virtual Network. After a while, the newly created Virtual Network will be displayed in the **Connections** table on the **Virtual Networks** subtab.

Viewing Virtual Network Details

The **Virtual Network** screen (displayed by clicking the **Network** tab on the **Hardware Node** dashboard, clicking the **Virtual Networks** subtab, and clicking the name of the **Virtual Network** whose connection settings you wish to view) allows you to view the following information on the **Virtual Network**:

- The **General Settings** group displays the name and description of the **Virtuozzo Virtual Network** and indicates whether the **Virtual Network** is connected to some network adapter on the **Hardware Node** (*connected*), set for usage on the **Node** only (*local*), or not configured. All these settings can be changed on clicking the **Configure** button.
- Under **Connected Containers**, you can view the **Containers** connected to this **Virtual Network**.

Note: To learn more about the notion of **Virtuozzo Virtual Networks** and their relation to physical adapters, **VLAN** adapters, and **Containers**, please refer to the **Managing Virtual Networks** section (p. 142).

Configure Virtual Network Parameters on Node

The **Configure** screen for the selected **Virtuozzo Virtual Network** is displayed on clicking the **Configure** button on the details screen for this **Virtual Network**.

Note: To learn more about the notion of **Virtuozzo Virtual Networks** and their relation to physical adapters, **VLAN** adapters, and **Containers**, please refer to the **Managing Virtual Networks** section (p. 142).

The **Assign Interface** section enables you to configure the following **Virtual Network** parameters:

- Select the **Not Configured** radio button if do not wish to connect the **Virtual Network** to any network adapter on the **Hardware Node**.
- Select the **Connect via** radio button and, on the drop-down menu, select the network adapter you wish to connect the **Virtual Network** to. The drop-down menu lists all physical and **VLAN** adapters available on the **Hardware Node**.
- Select the **Use on the Node only** radio button if you do not plan to connect the **Virtual Network** to external networks, however, wish to unite some of your **Containers** inside this **Virtual Network** to allow these **Containers** to communicate with each other.

Listing Virtual Networks in Virtuozzo Group

The **Virtual Networks** subtab (accessed thru clicking the **Network** tab on the Infrastructure Manager left menu) displays a list of Virtuozzo Virtual Networks available:

- on a particular Hardware Node if you have only one Node registered in Infrastructure Manager;
- on all Hardware Nodes in the Virtuozzo group if you have more than one Node registered in Infrastructure Manager.

The information on Virtual Networks is presented in the table having the following columns:

Column Name	Description
Name	The name assigned to the Virtual Network.
Description	The description of the Virtual Network, if set.

Note: To learn more about the notion of Virtuozzo Virtual Networks and their relation to physical adapters, VLAN adapters, and Containers, please refer to the **Managing Virtual Networks** section (p. 142).

To facilitate your working with Virtual Networks, you can:

- Filter them by the parameters listed in the table above. To this effect, click the **Show Search** link over the table, enter the needed data in the field(s) provided and click **Search**. The Virtual Networks matching the specified criteria will be displayed in the **Virtual Networks** table. To have the full list of Virtual Networks back, click **Reset Results**.
- Configure the number of columns to be displayed in the **Virtual Networks** table. To this effect, click the **Select Columns** link and clear the check boxes near the column name(s) that you wish to hide.
- Change the **Virtual Networks** order by clicking the corresponding column name in the **Virtual Networks** table.
- Modify the number of network adapters simultaneously displayed in the **Virtual Networks** table by clicking the **10**, **20**, **40**, or **80** link at the top of the table.

The **Virtual Networks** subtab also allows you to:

- Create a new Virtual Network by following the **New Virtual Network** link at the top of the **Virtual Networks** table.
- View detailed information on an existing Virtual Network by clicking its name in the **Virtual Networks** table.

Creating New Virtual Network

Every Virtual Network on the Hardware Node is a class of Containers which can be joined together into a Virtuozzo Virtual Network to have common network configuration. More precisely, each Container can be provided with several virtual interfaces, and each of the latter assigned to a Virtual Network.

On the **New Virtual Network** screen (which can be accessed by clicking the **Network** tab on the Infrastructure Manager menu, clicking the **Virtual Networks** subtab, and following the **New Virtual Network** link at the top of the **Virtual Networks** table), you can create a new Virtual Network. To this effect, you should provide the information in the following fields:

- **Virtual Network Name** (mandatory): specify an arbitrary name to be assigned to the Virtual Network.
- **Description** (optional): provide the Virtual Network description, if necessary.

After you have entered the necessary information, click the **Submit** button to start making the Virtual Network. After a while, the newly created Virtual Network will be displayed in the **Virtual Networks** table on the **Virtual Networks** subtab.

Note: To learn more about the notion of Virtuozzo Virtual Networks and their relation to physical adapters, VLAN adapters, and Containers, please refer to the **Managing Virtual Networks** section (p. 142).

Configuring Virtual Network Parameters

The **Manage Virtual Network** screen allows you to change the description of your Virtual Networks. This screen can be accessed by following the **Network** link on the Infrastructure Manager left menu, selecting the **Virtual Networks** tab on the **Network** screen, and clicking the name of the Virtual Network whose name you wish to modify.

To provide a new description for the Virtual Network, type the needed text in the **Description** field and click the **Submit** button.

Note: To learn more about the notion of Virtuozzo Virtual Networks and their relation to physical adapters, VLAN adapters, and Containers, please refer to the **Managing Virtual Networks** section (p. 142).

Managing Container Network Parameters

Viewing Container Network Parameters

The **Summary** subtab (displayed on clicking the **Network** tab on the Container dashboard) enables you to view the current Container network parameters:

Field Name	Description
Global Network Configuration (the parameters are common for both host-routed and bridged Container adapters)	
Hostname	The hostname assigned to the Container.
DNS Servers	One or more DNS servers the Container is supposed to use (might be overridden if the Container gets the DNS servers from the DHCP server when operating in the bridged network mode).
Search Domains	A list of domains for hostname lookup (might be overridden if the Container gets the search domains from the DHCP server when operating in the bridged network mode).
Routed Network (the parameters are relevant for host-routed Container adapters only)	
IP Addresses	The IP addresses assigned to the Container host-routed adapter.
Bridged Network (the parameters are relevant for bridged Container adapters only)	
Virtual Network	The Virtuozzo Virtual Network where the Virtual Network adapter is connected. Note: To learn more about the notion of Virtuozzo Virtual Networks and their relation to physical adapters, VLAN adapters, and Containers, please refer to the Managing Virtual Networks section (p. 142).
IP Addresses	The IP address(es) assigned to the virtual interface.
Mac Address	The Mac Address assigned to the Virtual Network adapter.

To configure any of the aforementioned parameters, click **Configure** on the Infrastructure Manager toolbar.

Configuring Container Network Parameters

The **Configure Network** screen displayed after clicking the **Network** tab on the Container dashboard and then clicking **Configure** on the Infrastructure Manager action menu allows you to configure the following Container network settings as follows:

- Under the **Global Network** group, you can:
 - Modify the Container hostname in the **Hostname** field. You can type any name you consider suitable, however, pay attention to the existing limitations on the use of symbols in the Container hostname.  For a Windows Node, the hostname may start singularly with a-z, A-Z or an underscore (_), contain further any of the following symbols: a-z, A-Z, 0-9, _ , - and have a-z, A-Z, 0-9 or _ at the end. The maximum number of symbols is 15.  For a Linux-based Container, the hostname should consist of a-z, 0-9, _ , and may have a point in the middle. The number of symbols should not exceed 256.
 - Enter one or more DNS servers that this Container is supposed to use in the **DNS Server IP Address** field or leave it blank. Use the  or  icons to add/remove the DNS servers IP addresses accordingly. Note that the static values in these fields might be overridden if the Container gets the DNS servers from the DHCP server when operating in the bridged network mode.
 - Define a list for hostname lookups in the **Search domain** field. Use the  or  icons to add/remove the lookup parameters for the Container. The search list is normally determined by the domain name(s); by default, it contains the local domain name(s) only. You can also add external domain names for a particular Container. A search query is performed by attempting to use each item in the list in turn until a match is found. Note that this process may be slow and may generate a lot of network traffic if the servers for the listed domains are not local, and that the query might time out if no server is available for one of the domains. Note also that the static values in these fields might be overridden if the Container gets the search domains from the DHCP server when operating in the bridged network mode.

The parameters defined under **Global Network** will apply to the Container regardless of whether it is on a bridged network or depends on the Hardware Node network interface.

- Select the **Routed Network** check box to make the default Container network adapter (venet0) operate in the host-routed. In this mode the Container uses the Hardware Node physical adapter as the default gateway to send and receive data to/from other networks. If the **Routed Network** check box is selected, you can specify an IP address ( and a subnet mask) to be assigned to the Container in the **IP Address** field. The field for the subnet mask is slash-separated from the IP address field. You can assign several IP addresses and, consequently, subnet masks (for a Windows-based Container) to the Container by clicking the  icon to the right of the field containing the information on Container IP addresses ( and subnet masks). Clicking the  icon near the field with the information on Container IP addresses ( and subnet masks) will remove the corresponding IP address and subnet mask (for a Container running Windows) assigned to the Container.  You can leave the **Subnet Mask** field blank after you provide an IP address for the Container. Parallels Infrastructure Manager will use the default 255.255.255.255 subnet mask for the corresponding IP address.

Note: If you have previously consolidated the IP addresses available on your Node into a range (p. 154), it is recommended to check those of them that were assigned to Containers - when creating or configuring - on the **Allocated IPs** screen (p. 155) so that to be aware of the IP addresses already on use.

- Select the **Bridged Network** check box to make the Container Virtual Network adapters (except for the default one) operate in the bridged mode. When functioning in this mode, the Container can be connected to any of the Virtual Networks existing on the Hardware Node and joined thru them to external networks. If the **Bridged Network** check box is selected, you can:
 - Add a new virtual adapter by clicking the **Add New Interface** link and providing the necessary information in the displayed fields.
 - Connect the Virtual Network adapter to any of the existing Virtual Networks on the Node by choosing the corresponding Virtual Network name on the drop-down menu in the **Connect to** field.

Note: To learn more about the notion of Virtuozzo Virtual Networks and their relation to physical adapters, VLAN adapters, and Containers, please refer to the **Managing Virtual Networks** section (p. 142).

- Leave the **Get IP Address by DHCP** check box selected to automatically assign an IP address to the Container adapter using the DHCP protocol or clear the check box and manually set the IP address, subnet mask (for a Windows-based Container), and default gateway for the Container.

After configuring the necessary Container network parameters, click the **Submit** button for the changes to take effect.

Managing IP Pool

The **IP Addresses Pool** tab of the **Network** screen (accessible thru clicking the **Network** link on the **Infrastructure Manager** menu) allows you to manage the IP addresses pool for Containers, thus, helping you to ensure a unified space of Container IP addresses:

- within a particular **Hardware Node** if you have only one **Node** registered in **Parallels Infrastructure Manager**;
- in a **Virtuozzo group** if you have more than one **Hardware Node** registered in **Parallels Infrastructure Manager**.

In the latter case, the database of the IP addresses to be assigned to the Containers belonging to all the **Nodes** of the group is stored on the **Master Node**.

The **Pool Summary Information** section provides you with general statistics about the IP addresses in the IP addresses pool:

- the number of IP addresses from the pool already assigned to the Containers on the **Node** (or in the **Virtuozzo group**);
- the number of free IP addresses in the pool;
- the total number of IP addresses in the pool.

The **IP Address Ranges** table on this screen presents detailed information on each IP address range existing in the pool:

Column Name	Description
First IP Address	The first IP address in the IP address range.
Last IP Address	The last IP address in the IP address range.
Assigned	The number of IP addresses from the IP address range already assigned to the Containers on the Node (or in the Virtuozzo group).
Free	The number of free IP addresses in the IP address range.
Total	The total number of IP addresses in the IP address range .

To facilitate working with IP address ranges, you can:

- Filter them by the parameters listed in the table above. To this effect, click the **Show Search** link over the table, enter the needed data in the field(s) provided and click **Search**. The ranges matching the specified criteria will be displayed in the **IP Address Ranges** table on the **Network** screen. To have the full list of IP address ranges back, click **Reset Results**.
- Configure the number of columns to be displayed in the **IP Address Ranges** table. To this effect, click the **Select Columns** link and clear the check boxes near the column name(s) that you wish to hide.

The **Ranges** tab also allows you to complete the following tasks:

- Remove an existing IP address range by selecting the check box near the corresponding range and clicking the **Delete** button. To delete all the role at once, select the uppermost check box and click the **Delete** button.
- Create a new IP address range by following the **New IP Range** link at the top of the **IP Address Ranges** table or clicking **New** on the **Infrastructure Manager** action menu.

Creating New IP Address Range

On the **New IP Address Range** screen, you can create a new IP address range. To access this screen, follow the **Network** link on the Infrastructure Manager menu, click the **IP Addresses Pool** tab on the **Network** screen, and then click **New IP Range**. This screen allows you to make IP address ranges in one of the following ways:

- Create a new IP address range by selecting the **Specify range** radio button and specifying the first IP address and the last IP address in the range in the **First IP Address** and **Last IP Address** fields, respectively.
- Create a new IP address range by selecting the **Specify count** radio button and entering the first IP address in the range and the number of IP addresses to be included in the IP address range in the **First IP Address** and **IP Addresses Number** fields, respectively.

When you are ready, click the **Submit** button to create the range.

Editing IP Address Range

On the **Manage IP Address Range** screen (which can be accessed by following the **Network** link on the Infrastructure Manager menu, clicking the **IP Addresses Pool** tab on the **Network** screen, and clicking the name of the IP address range whose properties you wish to configure), you can configure the IP address range as follows:

- Select the **Specify range** radio button and change the first and/or last IP addresses in the range by typing the needed values in the **First IP Address** and **Last IP Address** fields, respectively.
- Select the **Specify count** radio button and modify the first IP address in the range and/or the number of IP addresses to be included in the IP address range by typing the needed values in the **First IP Address** and **IP Addressed Number** fields, respectively.

When you are ready, click the **Submit** button for the changes to take effect.

Viewing Allocated IP Addresses

The **Allocated Addresses** tab of the **Network Configuration** window allows you to view the IP addresses from the IP addresses pool that were already assigned to the Containers on your Hardware Node or in the Virtuozzo group (either during the Container creation or while configuring these Containers afterwards). The information on the allocated IP addresses is presented in the table having the following columns:

Column Name	Description
IP Address	The allocated IP address.
Container name	The Container to which the IP address is assigned.

To facilitate working with allocated IP addresses, you can:

- Filter them by the parameters listed in the table above. To this effect, click the **Show Search** link over the table, enter the needed data in the field(s) provided and click **Search**. The IP addresses matching the specified criteria will be displayed in the **Allocated Ranges** table on the **Network Configuration** screen. To have the full list of allocated IP address ranges back, click **Reset Results**.
- Configure the number of columns to be displayed in the **IP Address Ranges** table. To this effect, click the **Select Columns** link and clear the check boxes near the column name(s) that you wish to hide.

Setting Up Network Accounting and Shaping

Parallels Infrastructure Manager allows you to track the inbound and outbound network traffic as well as to shape (limit) the outgoing traffic for Containers. In order to provide the ability to distinguish between domestic and international traffic, a concept of network classes is introduced. It is important to fully understand this notion, because network classes IDs are used in essentially all network traffic parameters. A network class is a range of IP addresses for which the Virtuozzo Containers software counts and shapes the traffic.

Virtuozzo Containers 4.0 can have up to 15 different network classes specified. Each class can contain one or more IP address ranges. It is possible to have different bandwidth shaping settings for each class.

Each network class has an ID represented by an integer number and a range of IP addresses presented in the form of *ip_address/prefix_length* (which conforms to the Classless Inter-Domain Routing scheme).

Class 1 has a special meaning. It is defined by the Virtuozzo Containers software to match any IP address and is always present in the Virtuozzo system. Other classes should be defined after Class 1. They represent exceptions from the "matching-everything" rule of Class 1.

Let us consider one of the possible situations. One of the classes (let it be the default Class 1) corresponds to the domestic traffic, and Class 2 is supposed to account for the foreign traffic. The foreign traffic goes thru the addresses in two ranges: from 10.0.0.0 to 10.255.255.255 and from 11.0.0.0 to 11.255.255.255 with the exception of addresses in the sub-range of 10.10.16.0 to 10.10.16.255, which are treated as domestic traffic, as well as all other IP addresses. Then the classes configuration shall look like the following:

Class Definition	Explanation
1 0.0.0.0/0	Any IP address (all traffic)
2 10.0.0.0/8	Addresses for the "foreign" traffic
2 11.0.0.0/8	More addresses for the "foreign" traffic
1 10.10.16.0/24	Inside the "foreign" network there is a hole belonging to the "local" traffic

As far as the Class 2 addresses in this example are used for foreign routing, the Class 1 addresses are used for local (domestic) routing, by the exclusion method.

Managing Network Accounting and Shaping on Hardware Node

Parallels Infrastructure Manager displays the current status and statistics of network traffic on the Hardware Node. The screen is displayed on the **Traffic** subtab of the **Network** tab of a Hardware Node.

Traffic accounting is always enabled in the Virtuozzo Containers software, i.e. you can always view the statistics on the network traffic going from and to the Hardware Node for each of the network classes (p. 156) specified in the system. The statistics is garnered from the moment of the latest Node boot-up and is displayed in the **Traffic Accounting** table.

The conception of traffic shaping presupposes the limitation of network bandwidth for the traffic going from the Node to the outer world. The **Interfaces Configuration** table enumerates the network interfaces (Ethernet cards) installed on the Node and their bandwidth limit. The most common Fast Ethernet cards have their traffic throughput limited at 100 Mbit/s, which would be indicated in the **Bandwidth** column as 102,400 Kbit/s.

The Virtuozzo Containers software can limit the network bandwidth not for the interface, but for each network class (p. 156) defined in the system and using the given interface. For this reason, the available network classes will be enumerated under each of the existing interfaces in the **Rates Configuration** table. The **Total Rate** column specifies the size of the so-called bandwidth pool for each network class being shaped for the given network adapter. The bandwidth from the pool can be borrowed by Containers when they need more bandwidth for communicating with hosts from the corresponding network class. It is used to limit the total available outgoing traffic Containers can consume; the **Managing Network Shaping for Single Container** subsection (p. 160) explains it in more detail. The default value for Network Class 1 on the first Ethernet adapter is 4Mbit/s.

As to the **Rate Guarantee** column, its value amounts to the number of kilobits per second any Container is guaranteed to receive for outgoing traffic with the corresponding network class on the given Ethernet device. The default value is 8 Kbps, which means that any Container is guaranteed to receive the bandwidth of at least 8 Kbits/s for sending data to Class 1 hosts on the first Ethernet device. This bandwidth is not the limit for a Container (though it is possible to make it the limit) - the Container is able to take the needed bandwidth from the bandwidth pool if it is not used by other Containers.

Apart from viewing the current state of affairs with the Node traffic, the **Traffic** subtab allows you to do the following:

- Define the network classes for the Hardware Node traffic by clicking the **Configure Accounting** button (p. 158);
-  Specify the bandwidth limit for the existing network interface cards by clicking the **Configure Interfaces** button (p. 158);
- Set up the traffic shaping rules for each network interface card on the Hardware Node by clicking the **Configure Rates** button (p. 159);
- Enable traffic shaping for the Hardware Node by clicking the **Enable Shaping** button;

Note: You can enable shaping only if you have already completed the first three actions on this list, namely: defined at least one network class, specified the bandwidth limit for the existing NICs, and configured the outgoing traffic rates for each 'interface-class' pair.

- Disable traffic shaping for the Hardware Node by clicking the **Disable Shaping** button.

Setting Up Network Classes

Network classes (p. 156) can be set on the **Configure Accounting** page accessible by clicking the **Configure Accounting** button on the **Traffic** subtab of the **Network** tab of a **Hardware Node**.

- The **Class ID** field should be filled with an integer from 0 to 15 representing the ID of the class.
- The **Network** field should indicate the hosts of what network are to be treated as belonging to the given class. The network should be specified in the Classless Inter-Domain Routing format, for example, 212.95.68.0/255.255.255.0.
- The  sign allows you to add another **Class ID/Network** line, where you can either define an additional class or an additional network for an already existing class. In the latter case you will have two or more lines with one and the same class ID, but different networks.
- The  icon allows you to delete the given **Class ID/Network** line.

Configuring Network Adapters

The **Configure Interfaces** page (accessible by clicking the **Configure Interfaces** button on the **Traffic** subtab of the **Network** tab of a **Hardware Node**) enables you to define which network adapters installed on the **Node** will be taken into account by Virtuozzo network accounting and shaping policies.

This page lists all the network interface cards installed on the **Node** together with their default (or assigned) bandwidth and IP addresses. You are able to manage these interfaces in two ways:

- 1 Select or clear the checkbox beside the corresponding adapter to include it in or exclude from being part of network accounting and shaping.
- 2 Adjust the bandwidth value to your liking. Mind though that it is recommended to leave the default hardware value, or at least not to increase it, because it might interfere with the correct working of Virtuozzo accounting and shaping. Another restriction in modifying this value consists in that you cannot make it lower than the **Total Rate** value (p. 157) of any class defined for the given interface.

Configuring Network Shaping

The **Configure Rates** page (accessible by clicking the **Configure Rates** button on the **Traffic** subtab of the **Network** tab of a **Hardware Node**) allows you to set up all the parameters that define how much bandwidth will be accessible to the Containers residing on the Node. Only the bandwidth for outgoing traffic is considered here.

 The page is split into separate groups for each of the network adapters present on the Node and selected for being shaped on the **Configuring Interfaces** page (p. 158). If there is only one network adapter, it does not form any group. The following information is given and is customizable for each network adapter:

 The **Bandwidth** field specifies the total bandwidth limit of the adapter (in Kbits per second). The most common Fast Ethernet cards have their traffic throughput limited at 100 Mbit/s, which would be indicated in the **Bandwidth** field as 102,400 Kbit/s. The value in this field corresponds strictly to the value of the **Bandwidth** field on the **Configuring Interfaces** page (p. 158). Thus, it is the second place where you can adjust the total bandwidth throughput of the given network interface.

The Virtuozzo Containers software can limit the network bandwidth not for the interface, but for each network class (p. 156) defined in the system and using the given interface. For this reason, the available network classes are enumerated under each of the existing interfaces. The **Total rate** field specifies the size of the so-called bandwidth pool for each network class being shaped for the given network adapter. The bandwidth from the pool can be borrowed by Containers when they need more bandwidth for communicating with hosts from the corresponding network class. It is used to limit the total available outgoing traffic Containers can consume; the **Managing Network Shaping for Single Container** subsection (p. 160) explains it in more detail. The default value for Network Class 1 on the first Ethernet adapter is 4096, which corresponds to the pool size of 4Mbit/s. Class 1 is always included in the shaping of all adapters, as this class matches all the network addresses not covered by other, user-defined classes. As to all the other classes, they can be excluded from the shaping if you clear the **Enable shaping for this class** checkbox, and included in the shaping if you select the checkbox.

 Finally, the value of the **Rate guarantee** field amounts to the number of kilobits per second any Container is guaranteed to receive for outgoing traffic with the corresponding network class on the given Ethernet device. The default value is 8, which means that any Container is guaranteed to receive the bandwidth of at least 8 Kbits/s for sending data to Class 1 hosts on the first Ethernet device. This bandwidth is not the limit for a Container (though it is possible to make it the limit) - the Container is able to take the needed bandwidth from the bandwidth pool if it is not used by other Containers.

Managing Network Shaping for Single Container

The network shaping (setting limit on the available bandwidth for outgoing traffic) is generally defined for each Container on the given Hardware Node on the **Configure Shaping** page in Parallels Infrastructure Manager (p. 159). The **Traffic Shaping** page (which you can access by following the **Configure Traffic Shaping** link on the **Configuration** tab of the Container dashboard) allows you to redefine some of the shaping parameters for the given particular Container.

Virtuozzo network bandwidth management works in the following way. The bandwidth pool for a given network class (indicated on the page as **Bandwidth** for each network adapter) is divided among the Containers transmitting data proportionally to their **Rate Guarantee** settings. The global **Rate Guarantee** setting is defined on the **Configure Shaping** page, but can be redefined here in the **Container Rate Guarantee** field for this given Container. If the total value of the rate guarantees of all Containers transmitting data does not exceed the bandwidth pool value, each Container gets the bandwidth equal or greater than its rate guarantee (unless the **Use Container Rate Guarantee as limit** radio button is not selected on this page). If the total value of the rate guarantees of all Containers transmitting data exceeds the bandwidth pool, each Container may get less than its rate guarantee.

It is clear from the above-said that the **Use class bandwidth as limit** radio button lets the Container exceed its rate guarantee, if there is enough spare bandwidth in the pool, whereas the **Use Container Rate Guarantee as limit** does not let it do so.

Worth to mention here that each network class beginning with 2 cannot be taken into account for the network shaping of this particular Container, if the **Enable shaping for this class** checkbox is cleared. The default state of this option (selected or cleared) depends on what has been chosen on the **Configure Shaping** page (p. 159).

Viewing Network Shaping Settings for Single Container

The network shaping (setting limit on the available bandwidth for outgoing traffic) is generally defined for each Container on the given Hardware Node on the **Configure Shaping** page in Parallels Infrastructure Manager (p. 159). The **Shaping** subtab of the **Network** tab allows you to view the shaping parameters for the given particular Container. These parameters can either be the default ones or customized already.

The presented table informs you of the Container shaping settings for each of the network classes (p. 156) configured on the Hardware Node. If the table is not present, this means that either traffic shaping is disabled on the Hardware Node, or no network classes are configured.

The **Total Rate** field informs you on the bandwidth limit that is set for the corresponding class on the Hardware Node, which means that the summary outgoing traffic of all the Containers of this Hardware Node to the external addresses belonging to this class cannot exceed this value.

The **Rate Guarantee** value serves as the guaranteed rate for the given Container with this class of addresses (p. 156). Note though that if the total of all the **Rate Guarantee** values of all the Containers exceeds the **Bandwidth** value and all the Containers will demand traffic at the same moment, each Container will have to get less traffic than is guaranteed to it.

Configuring Network Shaping for Single Container

The network shaping (setting limit on the available bandwidth for outgoing traffic) is generally defined for each Container on the given Hardware Node on the **Configure Shaping** page in Parallels Infrastructure Manager (p. 159). The **Configure Traffic Shaping** page (which you can access by clicking the **Configure** button on the **Shaping** subtab of the **Network** tab of the Container dashboard) allows you to define more precisely some of the shaping parameters for the given particular Container. To do this on Linux Nodes, you should first select the **Configure the Container rate guarantees manually** radio button in the **Rate Guarantees Setup** group of options.

Shaping is configured separately for each class. The default state of the **Enable shaping for this class** checkbox (selected or cleared) depends on what has been chosen on the **Configure Shaping** page (p. 159). However, you can redefine if the shaping of this class should be turned on or off for this particular Container by setting this checkbox in the appropriate state.

The **Total Rate** field informs you of the bandwidth limit that is set for the corresponding class on the Hardware Node, which means that the summary outgoing traffic of all the Containers of this Hardware Node to the external addresses belonging to this class cannot exceed this value.

The **Rate Guarantee** value that you can set here will serve as the guaranteed rate for the given Container with this class of addresses (p. 156). Note though that if the total of all the **Rate Guarantee** values of all the Containers exceeds the **Bandwidth** value and all the Containers will demand traffic at the same moment, each Container will have to get less traffic than is guaranteed to it.

 The **Do not allow to exceed the rate guarantees** checkbox, if selected, tells Infrastructure Manager to keep the Container from getting more bandwidth than is defined in its **Rate Guarantee** values, even if there is spare bandwidth on the Hardware Node for this class. Thus, you can efficiently impose bandwidth rate limits on any Container.

Managing Container Firewall

 A firewall is part of your OS and its security. Its main function is to block or permit traffic between two systems or two parts of a network. A firewall is either a program (or a set of programs) or a computer it runs on. The Virtuozzo Containers software has a built-in firewall that can be managed through both Parallels Power Panel and Parallels Infrastructure Manager. Along with - and apart from - the Parallels Power Panel and Parallels Infrastructure Manager web interface, the command line is an effective tool to manage a firewall. Here are the basic principles that make a firewall work.

A firewall applies a control *policy* over the firewalled system. There are three policies:

- *accept* the packet: if the packet is accepted, it gains access to the system;
- *drop* the packet: if the policy is to drop the packet, the packet is denied access to the system;
- *reject* the packet: the system does not let the packet in, notifying the sender of the fact;

The policies, along with ports and protocols, are chains' attributes. A *chain* is a list (or a chain) of rules grouped by the criterion of what type of packets they process. There are three packets types:

- *input*;
- *output*;
- *forward*.

Therefore we can create three chains - the Input chain, the Output chain and the Forward chain. The Input chain examines the incoming packets. If there is a rule to process a packet, the latter is either let in (accept policy) or not (drop/reject policy). Otherwise, the packet is examined by the next rule. If, finally, there is not any rule to match, the default system policy is applied. The first rule applied to a packet is the first one on the list that forms a chain.

If a packet is created inside the system, it is sent to the Output chain.

Packets that pass through the system, traverse the Forward chain.

When configuring a firewall, you can change a rule's position on the list, delete a rule from the list, create, edit and add rules to the list.

To configure the firewall, click on the **Firewall** link on the Container dashboard.

Configuring Firewall in Normal Mode

 In the normal mode the rules you delete or add are called *access rules*. The Container access rules are pre-set groups of standard firewall rules. Each access rule refers to a most widely used service and corresponds to a number of standard firewall rules that ensure the availability of this service. In the normal mode each access rule is dealt with as a single entity. This implies that enabling or disabling an access rule results in enabling or disabling all the standard firewall rules it corresponds to. By default, 8 preset access rules are active:

- 1 Access to outer world;
- 2 DNS server;
- 3 Internal Services;
- 4 Mail server;
- 5 Plesk service;
- 6 POP3 server;
- 7 SSH server;
- 8 WEB server.

The remaining access rules that are not enabled by default can be added on the page, which you can access by clicking **Add Access Rule**.

To delete a rule, select one of the check boxes on the right of the screen, click **Delete** over the check boxes, and then **OK** to confirm. To delete all the rules, select the uppermost check box, click **Delete** over the check boxes, and then **OK** to confirm. Note that no access rules can be permanently deleted from the system. A *deleted* rule is, in fact, temporarily disabled and can be enabled back as described on the **Adding Access Rule in Normal Mode** subsection (p. 164).

To change the mode, click **Firewall Setup**.

Note: If this page informs you that you cannot manage firewall on this Container, refer to the **Dealing With Misconfigured Firewall** subsection (p. 163).

Dealing With Misconfigured Firewall

 If your firewall has not been configured yet, you will most probably have the page informing you of the fact. The page can also appear if you did misconfigure your firewall. The common way to misconfigure a firewall is to add or edit your own specific rules in the advanced mode and then switch to the normal mode without deleting these rules first.

At this point you will have to decide upon one of two basic strategies: to select the normal mode or to select the advanced mode:

- select the normal mode to deny all services except those critical to connecting to the Internet. To select the normal mode, click **Switch the firewall back to the normal mode**.
- select the advanced mode to create a rule to permit, deny, or monitor the access to or from the system for each service you need. If you are going to separately edit each rule, click **Select the advanced firewall mode**.

Adding Access Rule in Normal Mode

 To open this page, follow the **Add Access Rule** link on the **Firewall** page. Here you have the rules that have not been included into the list of active rules you can see on the **Firewall** page. To *add* a rule here means actually to *enable* it. To add a rule, select a check box on the opposite and click **Submit** - or **Cancel** if you want to restore the firewall settings prior to the last action.

Selecting Mode

 If you have only just started using the firewall by clicking the **Firewall** link on the Container dashboard, the **Firewall Setup** page is the first one you have displayed.

On the **Firewall Setup** page, you can choose one of the following modes your firewall operates in:

- The normal mode. If the security strategy you are planning out does not require a complicated system of specific rules and all you are going to do is as simple as providing your system with access to the Internet and the maximum safety, then the best option is the normal mode. Hence, select the normal mode to configure your firewall using the 15 built-in access rules (p. 163) or to fix the firewall rules settings corrupted either in the advanced mode or in the normal mode.
- The advanced firewall mode with default policy **Accept**, or the advanced firewall mode with default policy **Drop**. The advanced mode takes more time and experience to configure, but then there is more flexibility and potential in it to make use of.

Besides, the **Firewall Setup** page can be reached with the **Firewall Setup** link from both advanced and normal mode pages. If so, the choice is quite the same. The only difference is that in this case the normal mode can also be used as an option to reset to if you want to roll back the changes in the firewall rule(s) settings you have made.

After selecting a mode, click **Submit**. Click **Cancel** to return to the previous screen.

Building Input Chain

 To build and edit the *Input Chain*, select the **Input** tab. When you click either **Advanced firewall mode with default policy Accept** or **Advanced firewall mode with default policy Drop**, on the page described in the **Selecting mode** subsection (p. 164), the first chain of rules is the *Input Chain*. The *Input Chain* is a set of rules for the incoming traffic. If you once applied **Normal firewall mode** before selecting **Advanced firewall mode with default policy Accept/Drop**, the input chain consists of 13 default rules. If you selected **Advanced firewall mode with default policy Accept/Drop** while configuring the Container firewall at the first time, the input chain has the default system policy access rule only.

Here you can edit, add, delete, enable, disable, filter or change its position in the list of any of the default rules. In case you need to come back to the original advanced mode settings, the default rules are:

- 1 Web server input;
- 2 SSH server input;
- 3 Mail server input;
- 4 POP3 server input;
- 5 DNS server tcp input;
- 6 DNS server udp input;
- 7 All tcp input for hi port allowed;
- 8 All udp input for hi port allowed;
- 9 Plesk Panel proxy input;
- 10 Plesk Panel direct input;
- 11 Loopback tcp input;
- 12 Loopback udp input;
- 13 Default system policy.

If, for some reason, you need to have this rule set back, click **Firewall setup** and select the **Normal firewall mode** radio button.

The table below describes the attributes of the rules in the chain:

Name	Description
Name	The name of a specific web service this rule applies to.
Policy	One of three policies: Accept, Drop or Reject.
Protocol	One of two protocols used for package transmission - Transmission Control Protocol (TCP), defined by IETF RFC793 or User Datagram Protocol (UDP), defined by IETF RFC768.
Source Address	The internal address of the packets (e.g.: IPv4 or IPv6 address, the name of a network interface, etc.).
Source Port	The internal port of the packets.
Destination Address	The address where the packets are sent to.

Destination Port	The port where the packets are sent to.
Status	The current status of the rule (Enabled/Disabled).
Move	Moving the rule a level up or a level down from its current position.

The default system policy access rule cannot be changed as this rule decides the packet's destiny - to accept or to drop - when the packet has not any other rule to be processed by.

To edit a rule, click its name in the **Name** column. To add - or replace - a specific rule, click **New Rule** in the **Actions** group. To disable, enable or delete a rule select its check box and then click **Disable**, **Enable** or **Delete**. To move a rule a level up its position, click . To move a rule a level down its position, click . To filter rules by the policy, the protocol, or the current status, click the **Show Search** link. You can have Parallels Infrastructure Manager display only those parameters you need at the moment. To show or hide certain columns, click the **Select Columns** link and select the parameters you want to be displayed or clear those you do not.

You can also switch to the normal mode by clicking **Firewall setup** and selecting normal mode there.

Building Output Chain

 To build and edit the Output Chain, select the **Output** tab. The output chain regulates the outbound access. If you once applied **Normal firewall mode** before selecting **Advanced firewall mode with default policy Accept/Drop**, the output chain consists of 13 default rules. If you selected **Advanced firewall mode with default policy Accept/Drop** while configuring the Container firewall at the first time, the output chain has the default system policy access rule only.

The default rules list is the same as in the **Input Chain** (p. 165), the only difference being the *output*, instead of the *input* characteristic of the rules. The list of rules on this page is this:

- 1 Web server output;
- 2 SSH server output;
- 3 Mail server output;
- 4 POP3 server output;
- 5 DNS server tcp output;
- 6 DNS server udp output;
- 7 All tcp output allowed;
- 8 All udp output allowed;
- 9 Plesk Panel proxy output;
- 10 Plesk Panel direct output;
- 11 Loopback tcp output;
- 12 Loopback udp output;
- 13 Default system policy.

The default system policy access rule cannot be changed as this rule decides the packet's destiny - to accept or to drop - when the packet has not any other rule to be processed by.

If, for some reason, you need to have this rule set back, click **Firewall setup** and select the **Normal firewall mode** radio button.

The attributes of the rules in the chain are described on the **Building Input Chain** subsection (p. 165).

Here you can edit, add, delete, enable, disable, filter or move in the list any or all of the 13 default rules the output chain consists of. To edit a rule, click its name in the name column. To add a specific rule, click **New Rule** in the **Actions** group. To disable, enable or delete a rule select its check box and then click **Disable**, **Enable** or **Delete**. To move a rule a level up its position, click . To move a rule a level down its position, click . To filter rules by the policy, the protocol, or the current status, click the **Show Search** link. You can have Parallels Infrastructure Manager display only those parameters you need at the moment. To show or hide certain columns, click the **Select Columns** link and select the parameters you want to be displayed or clear those you do not.

You can also switch to the normal mode by clicking **Firewall setup** and selecting normal mode there.

Building Forward Chain

 To build and edit the Forward chain, select the **Forward** tab. Unlike the Input and Output chains, the only default rule the forward chain has is **Default system policy**. Conceivably, this one is not to be edited or deleted. Instead, you are free to decide upon any number and kinds of specific rules to create and add to the Forward chain by clicking on the **New Rule** link in the **Actions** group.

After the number of rules in your Forward chain becomes bigger, you may need to sort them out. To do that, click the **Show Search** link and pick the three possible values from the three drop-down menus: the policy, the port, and the current status of the rule(s). You can have Parallels Infrastructure Manager display only those parameters you need at the moment. To show or hide certain columns, click the **Select Columns** link and select the parameters you want to be displayed or clear those you do not. Click  to take a rule a level up its current position in the chain, or  to relocate it a level down. If two or more rules can be applied to the given packet, the uppermost rule takes priority.

The attributes of the rules in the chain are described on the **Building Input Chain** subsection (p. 165).

To switch to the normal mode of managing the firewall, click **Firewall Setup** link in the **Actions** group.

The default forward chain policy is the policy selected on the **Firewall Setup** (p. 164) menu.

Adding Rule in Advanced Mode

 To get to this page, click the **Add Rule** icon on the **Input Chain** (p. 165), **Output Chain** (p. 167), or **Forward Chain** (p. 168) pages. On this page you can elaborate your own specific rule. Below are the basics of the advanced mode rules adding:

- the **Name** field is marked because this field is an obligatory one;
- select one of three policies: **Accept**, **Drop** or **Reject**;
- select one of two protocols for package transmission - **Transmission Control Protocol (TCP)**, defined by IETF RFC793 or **User Datagram Protocol (UDP)**, defined by IETF RFC768.
- **Source Address and Netmask**, **Source Port or Port Range**, **Destination Address and Netmask** and **Destination Port or Port Range** fields are left to your own discretion, but in case of an error there is a pink stripe over the field that has to be corrected;
- the standard format for **Source/Destination Address and Netmask** field is 1.2.3.4/255.255.23.4;
- the standard **Port range** format is 80-123;
- to enable a rule, select the **Enable** check box;
- if you are creating this rule for future purposes, clear this box;
- to include the rule into one of three chains, select **Input**, **Output**, or **Forward** on the drop-down menu;
- on the **The rule's position in the chain** drop-down menu you are to decide what priority this rule will have in its chain. There are two options for you to choose between: the bottom and the top of the chain;
- for the changes you have made to become operational, click **Submit**, to undo the changes and return to the previous page, click **Cancel**.

Editing Rule in Advanced Mode

 The main difference here from the operations described in the **Adding Rule in Advanced Mode** subsection (p. 169) is that the rules you edit are not those you create as you deem it expedient. If you edit a rule (with the exception of renaming it), the rule changes and works differently from the way it did. Before submitting the new settings make sure they meet your security strategy. Otherwise, click **Cancel**.

The other detail to be aware of is the possible consequences of changing the initial (default) firewall settings. If you feel your expertise in the security area permits some future development, do not change them at all. Applying the changes you are not completely certain of may decrease your system's security.

Managing Email Gateway and Proxy Server

There happen situations when a user needs to contact/be contacted via email. The reasons to establish an email connection may be different, a password reminder among them. In order to enable such a connection as the Hardware Node administrator, you have to set up an email gateway by specifying the IP address of the mail relay server to send notifications and other mail through.

The **Proxy** subtab of the **Network** tab of a Hardware Node displays the IP addresses of the email gateway and proxy server of the Hardware Node. To edit any of these, click the **Configure** button on this page or **Configure -> Proxy Settings** on the Infrastructure Manager toolbar.

Specifying Proxy Server and Email Gateway

The **Configure Proxy Settings** page serves to configure the way a particular Hardware Node communicates with the outer world. This page is called either by clicking the **Configure** button on the **Proxy** subtab of the **Network** tab of the corresponding Hardware Node or selecting **Configure -> Proxy Settings** on the Infrastructure Manager toolbar.

- In the **SMTP Relay Server IP Address** field, indicate the IP address or hostname of the SMTP mail server the current Hardware Node uses to send emails. The reasons to establish an email connection may be different, a password reminder or an alert notification among them.
-  The **Proxy Server** field allows you to set or edit the proxy server IP address or hostname, if the current Hardware Node uses a proxy server to establish external connections.

Click **Submit** to save your changes or **Cancel** to return to the **Proxy** subtab.

Managing Email Notifications Settings

To be able to send e-mail notifications from the Hardware Node to external e-mail addresses and to receive notifications from the system at your own e-mail address, you should configure the Parallels Infrastructure Manager mail settings.

Basically, your e-mail address is required for sending notifications about the changes concerning your user account (passwords, user names) and the status for the pending requests for creating one or more Virtual Servers.

The **Messaging** screen (in the **Setup** group on the left Infrastructure Manager menu) shows the current configuration of email notification settings in Parallels Infrastructure Manager:

- Whether email notifications are enabled or disabled in Infrastructure Manager;
- The email address that will be shown in the **From:** field of email messages and used to identify you as the message sender by a person to which the email is sent (the **System Account** field).
- The e-mail address where the system will send administrative notifications (the **Administrative Account** field).

To edit any of these, click the **Configure** button on this page.

Configuring Email Notifications

To configure the email settings in Parallels Infrastructure Manager, follow the **Messaging** link on the Infrastructure Manager left menu and clicking the **Configure** button on the **Messaging** screen.

On the screen displayed, you should perform the following operations:

- 1** Enable the 'Email Notifications' functionality in Infrastructure Manager by selecting the **Enable Email Notifications** checkbox.
- 2** Specify an e-mail address and arbitrary name that will be shown in the **From:** field of the message and used to identify you as the message sender by a person to which the email is sent. To this effect, under the **System Email Account** group on the **Configure** screen:
 - in the **Email User Name** field, specify the name you wish to be displayed in the **From:** field of the sent message;
 - in the **Email Address** field, indicate a valid email address to be displayed in the **From:** field of the sent message.

Note: While specifying the sender's e-mail address, make sure that the messages from this address can be accepted by the mail relay servers (p. 170) your Hardware Nodes use.

- 3 Specify your e-mail address and arbitrary name where the system will send administrative notifications. To this effect, under the **Administrator Email Account** group on the **Configure** screen:
 - in the **Email User Name** field, specify the name to be displayed in the **To:** field of the system message;
 - in the **Email Address** field, indicate a valid email address where system notifications are to be sent.

To ensure the correct delivery of system e-mail messages, you should also have the correct SMTP relay servers (p. 170) set for all the respective Hardware Nodes.

CHAPTER 7

Managing Container Backups

The backups of all the Containers of a Virtuozzo Group or a Hardware Node are listed and can be managed on the **Backups** tab of the Virtuozzo Group (p. 184) or Hardware Node (p. 185), correspondingly.

The backups of a single Container are listed and can be managed on the **Backups** tab of the corresponding Container. (p. 178)

There are two ways to back up one or more Containers in your datacenter:

- 1 Manually. (p. 176) This can be done by selecting the relevant Containers on the Container list in either the Virtuozzo Group or Hardware Node context and clicking **Back Up**.
- 2 As a scheduled job (p. 259).

When creating a backup of one or a multitude of Containers, a number of backup settings can be specified during the backup operation (p. 176). If they are not specified for the given backup operation, the default backup settings of the Hardware Node (p. 175) where each corresponding Container is located are used. The default backup settings of a Hardware Node can in their turn use the default Container backups settings defined for the whole datacenter (p. 174). This means that you can define the backup settings on different levels:

- 1 Globally for your datacenter. Select **Setup --> Backups** on the left Infrastructure Manager menu to define these settings.
- 2 Individually for each Hardware Node. Select the Hardware Node, then click **Configure --> Container Backup Settings** on the Infrastructure Manager toolbar to define these settings.
- 3 During an individual backup operation.

If all the levels are defined for a specific operation, the settings of the lowest level take precedence.

In This Chapter

Defining Global Container Backups Settings	174
Defining per-Hardware Node Backup Settings.....	175
Creating Backups of Multiple Containers	176
Backing Up and Restoring Single Container	178
Managing Parallels Infrastructure Manager Backups	184
Managing Hardware Node Backups	185

Defining Global Container Backups Settings

Provided you have the necessary permissions, you can define the default Container backup settings for the whole Virtuozzo infrastructure on the **Backups** screen (in the **Setup** group on the left Infrastructure Manager menu):

- On the **Backup Type** drop-down menu, select one of the following types of backup:
 - **Full backup.** This type is recommended when doing a backup job for the first time and contains all the data selected for the backup. A full backup storage space and completion time requirements are the highest.
 - **Incremental backup** affects only those files and data which have changed since the last backup and takes less storage space and creation time.
 - **Differential backup** includes only the data modified since the last full backup. (Whereas a differential backup will save the data changed after *any* last backup, be it a full, incremental, or differential, this is only a *full* backup a differential backup considers to be the last one.)
- On the **Compression Level** drop-down menu, choose one of the possible levels:
 - **None.** This level suggests no compression at all and is recommended if you need to perform a fast backup but do not need to save disk space necessary for backups storage;
 - The **normal** level of compression takes a little more time and allows for some disk space saving;
 - While extending the backup creation time, the **high** level of compression saves you even more disk space;
 - The **maximum** compression level means the longest backup creation time and the best backup compression.

Note: It is recommended to choose the backup compression level according to the type of the data the Container stores. The Virtuozzo Containers software will try to compress the backup regardless of the data type, but some data are worth spending time for compression (such as text files and data bases) and some, such as already compressed archives are not. Therefore, select the **None** checkbox when the Container you are backing up stores no data that suggest or need compressing.

- choose the common **Backup Node** for storing Container backups regardless of their Source Nodes.
- enter the number of backups you are going to limit each Container with in the **Number of Backups per Container** field of the **Number of Backups Available From Parallels Power Panel** section.
- enable the backups rotation with the help of the settings in the **Incremental Backup Settings** group. Use the provided checkboxes to specify the number of incremental backups and/or days after which Parallels Infrastructure Manager should create a new full backup, thus annulling the previous incremental backups.

Note: All these settings can also be set individually (p. 175) for each of the Virtuozzo Group Hardware Nodes.

Defining per-Hardware Node Backup Settings

On the **Configure Container Backup Settings** screen displayed individually for each Hardware Node registered in Parallels Infrastructure Manager, you can configure:

- 1 the backup settings that will be used by default during the backing up of the Containers belonging to the current Hardware Node. These settings are defined in the **Default Backup Options**, **Number of Backups Available From Parallels Power Panel**, and **Incremental Backup Settings** groups.
- 2 the location for Container backups that will be used during the backing up of the Containers from any Hardware Node (including this one) provided the current Node is set as the Backup Node for the corresponding backup operation. This setting is defined in the **Local Backups Location Settings** group.

If you are configuring the Master Hardware Node settings, these settings also serve as the global backup settings for the Hardware Nodes group and there is no the **Container Backup Settings** section on this screen. If it is a Slave Hardware Node, you should first decide whether you want to inherit the global Container backup settings for this Node, or to define its individual settings. In the latter case select the **Use local settings for backing up Containers of this Node** radio button in the **Container Backup Settings** section.

After that you can define the following options:

- On the **Backup Type** drop-down menu, select one of the following types of backup:
 - **Full backup.** This type is recommended when doing a backup job for the first time and contains all the data selected for the backup. A full backup storage space and completion time requirements are the highest.
 - **Incremental backup** affects only those files and data which have changed since the last backup and takes less storage space and creation time.
 - **Differential backup** includes only the data modified since the last full backup. (Whereas a differential backup will save the data changed after *any* last backup, be it a full, incremental, or differential, this is only a *full* backup a differential backup considers to be the last one.)
- On the **Compression Level** drop-down menu, choose one of the possible levels:
 - **None.** This level suggests no compression at all and is recommended if you need to perform a fast backup but do not need to save disk space necessary for backups storage;
 - The **normal** level of compression takes a little more time and allows for some disk space saving;
 - While extending the backup creation time, the **high** level of compression saves you even more disk space;
 - The **maximum** compression level means the longest backup creation time and the best backup compression.

Note: It is recommended to choose the backup compression level according to the type of the data the Container stores. The Virtuozzo Containers software will try to compress the backup regardless of the data type, but some data are worth spending time for compression (such as text files and data bases) and some, such as already compressed archives are not. Therefore, select the **None** checkbox when the Container you are backing up stores no data that suggest or need compressing.

- select the **Backup Node** for storing the backups of the Containers of this Node. If you choose to store the backups on this very Node, their exact location will be determined by the local backups location settings below. If you select another Hardware Node, the exact location of the Containers will be determined by the local backups location settings of the corresponding Hardware Node.
- enter the number of backups you are going to limit each Container with in the **Number of Backups per Container** field of the **Number of Backups Available From Parallels Power Panel** section.
- enable the backups rotation with the help of the settings in the **Incremental Backup Settings** group. Use the provided checkboxes to specify the number of incremental backups and/or days after which Parallels Infrastructure Manager should create a new full backup, thus annulling the previous incremental backups.

The **Local Backups Location Settings** group defines the backup location of those Containers that are backed up to the current Node, irrespective of their Source Node. You may select either a local drive with a local path or a network share path with the corresponding network credentials.

Creating Backups of Multiple Containers

To simultaneously back up several Containers, select them on the Containers tab and press the **Back Up** button. This will open the **New Container Backups** screen where you can do the following:

In the **Backup Description** section, enter any commentary you think can be practical for further backup operations.

In the **Backup Options** section, define the level of compression and the type of the backup:

- On the **Backup Type** drop-down menu, select one of the following types of backup:
 - **Full backup.** This type is recommended when doing a backup job for the first time and contains all the data selected for the backup. A full backup storage space and completion time requirements are the highest.
 - **Incremental backup** affects only those files and data which have changed since the last backup and takes less storage space and creation time.
 - **Differential backup** includes only the data modified since the last full backup. (Whereas a differential backup will save the data changed after *any* last backup, be it a full, incremental, or differential, this is only a *full* backup a differential backup considers to be the last one.)

You can also leave here the default **Use Hardware Node Settings** value. In this case, every Container will be backed up with the default backup parameters (p. 175) of its Hardware Node. To view or set the Hardware Node default backup parameters, select a Hardware Node and click **Configure -> Container Backup Settings** on the top toolbar.

- On the **Compression Level** drop-down menu, choose one of the possible levels:
 - **None**. This level suggests no compression at all and is recommended if you need to perform a fast backup but do not need to save disk space necessary for backups storage;
 - The **normal** level of compression takes a little more time and allows for some disk space saving;
 - While extending the backup creation time, the **high** level of compression saves you even more disk space;
 - The **maximum** compression level means the longest backup creation time and the best backup compression.

Note: It is recommended to choose the backup compression level according to the type of the data the Container stores. The Virtuozzo Containers software will try to compress the backup regardless of the data type, but some data are worth spending time for compression (such as text files and data bases) and some, such as already compressed archives are not. Therefore, select the **None** checkbox when the Container you are backing up stores no data that suggest or need compressing.

You can also leave here the default **Use Hardware Node Settings** value. In this case, every Container will be backed up with the default backup parameters (p. 175) of its Hardware Node. To view or set the Hardware Node default backup parameters, select a Hardware Node and click **Configure -> Container Backup Settings** on the top toolbar.

- On the **Backup Node** drop-down menu, select the Hardware Node that will be used for storing the created backups.

You can also leave here the default **Use Hardware Node Settings** value. In this case, every Container will be backed up with the default backup parameters (p. 175) of its Hardware Node. To view or set the Hardware Node default backup parameters, select a Hardware Node and click **Configure -> Container Backup Settings** on the top toolbar.

The **Exclude** section allows you to keep certain files and directories from backing up:

-  Hidden files;
-  System files;
- Single files or directories. If you do not want to back up a whole directory, type it into the corresponding field; to add more directories to be excluded from the backup, click the plus sign.

Warning!  If you exclude one or more system or hidden files/folders from the Container backup (e.g. either the **Hidden files** or **System files** checkbox is selected), you'll be able to restore only separate files from this backup, but not the Container as a whole.

The **Include** section allows you to limit the backup process with a number of selected files or directories inside the Container. In the field provided, type the absolute path to the file or directory you wish to back up. To include additional files or directories, click the plus icon to the right of an existing path and enter a new path.

The backup will contain only those files and directories that you have indicated in the **Include** section. To back up the whole Container, leave the **Include** section empty.

You can also delay the backup operation till the time specified in the **Backup Start** group of options.

To start performing the backup, click **Backup**, otherwise, click **Cancel**.

Backing Up and Restoring Single Container

A regular backing up of the existing Containers is essential for any Container reliability. Any Container is defined by its operating system files, applications installed, configuration files, and personal information. Parallels Infrastructure Manager allows you to back up all these components.

For a Container that has been backed up, a table describing its backups is displayed:

Column Name	Description
Backed Up	The date and time when the backing up was performed.
Backup Node	The Hardware Node where the backup is stored.
Size	The size of the backup.
Description	The description of the backup.
Backup Type	Denotes if it is a full, incremental, or differential backup. An incremental backup stores not all the files and settings of the Container at the given period of time, but only the changes the Container has undergone since the last backup. A differential backup saves the data changed after the last full backup.

To sort out the backups, click the **Show Search** link, enter the date and time of the backup creation, other parameters of the backups you need to display, and click **Search**.

You can have Infrastructure Manager display only those parameters you need at the moment. To show or hide certain columns, click the **Select Columns** link and select the parameters you want to be displayed or clear those you do not.

With the help of the action links above the table you can manage your backups on this page in the following ways:

- The **New Backup** link (or the **New** button on the Infrastructure Manager toolbar) begins the process of backing up the current state of the Container, be it running or not. The description of all possible Container statuses is provided in the **Container Statuses** section. Infrastructure Manager places the backup of the Container onto one of the Nodes registered in Parallels Infrastructure Manager that was set as the default backups storage space (p. 175). For a Parallels Power Panel user, the button is available only if you have not reached the maximum number of allowed backups for the Containers residing on this Hardware Node. If you have, remove one of the backups to yield more extra space (see below for details) or ask your provider for help. The Node administrator can in this case change the number of the backups allowed (p. 175).

Note: Backing up is also available on clicking the **Back up** link above the **Containers** table on the relative page.

- A Parallels Power Panel user who has reached the limit on the number of Container backups he/she is allowed to create can make use of the **Renew Backup** link to renew a Container backup without having to delete any of the existing Container backups. You renew any Container backup by selecting the checkbox opposite the corresponding date and clicking on the **Renew Backup** button. Mind that only one backup can be renewed at a time.
- The **Restore Container** link allows to restore the Container from the backup currently selected in the table. Only one backup should be selected for this operation. The opened page provides instructions to lead you through the process. The Container will be restored with all the values overwritten from the backup, including the hostname, IP address, application set, etc. The changes in the Container made after the date of this backup will be lost after the Container has been restored. Mind that you have to confirm restoring the Container on the **Restore Confirmation** page to accomplish the process.

Note: If you are using a Container IP address to connect to the Container, you may have to reconnect to it with the IP address retrieved from the backup after the Container is restored.

- The **Remove Backups** button removes the Container backups currently selected in the table. Usually this is done to provide extra space for making new Container backups. Use the checkbox at the upper left corner to select/deselect all the backups at once.
- Clicking on a backup date in the table opens the **Backup Details** page where you can also restore or remove the corresponding Container backup.

Creating Container Backup

On the **New Backup** screen you are supposed to define all the parameters of the backup operation.

In the **Backup Description** section, enter any commentary you think can be practical for further backup operations.

In the **Backup Options** section, define the level of compression and the type of the backup:

- On the **Backup Type** drop-down menu, select one of the following types of backup:
 - **Full backup.** This type is recommended when doing a backup job for the first time and contains all the data selected for the backup. A full backup storage space and completion time requirements are the highest.
 - **Incremental backup** affects only those files and data which have changed since the last backup and takes less storage space and creation time.
 - **Differential backup** includes only the data modified since the last full backup. (Whereas a differential backup will save the data changed after *any* last backup, be it a full, incremental, or differential, this is only a *full* backup a differential backup considers to be the last one.)

You can also leave here the default **Use Hardware Node Settings** value. In this case, every Container will be backed up with the default backup parameters (p. 175) of its Hardware Node. To view or set the Hardware Node default backup parameters, select a Hardware Node and click **Configure -> Container Backup Settings** on the top toolbar.

- On the **Compression Level** drop-down menu, choose one of the possible levels:
 - **None.** This level suggests no compression at all and is recommended if you need to perform a fast backup but do not need to save disk space necessary for backups storage;

- The **normal** level of compression takes a little more time and allows for some disk space saving;
- While extending the backup creation time, the **high** level of compression saves you even more disk space;
- The **maximum** compression level means the longest backup creation time and the best backup compression.

Note: It is recommended to choose the backup compression level according to the type of the data the Container stores. The Virtuozzo Containers software will try to compress the backup regardless of the data type, but some data are worth spending time for compression (such as text files and data bases) and some, such as already compressed archives are not. Therefore, select the **None** checkbox when the Container you are backing up stores no data that suggest or need compressing.

You can also leave here the default **Use Hardware Node Settings** value. In this case, every Container will be backed up with the default backup parameters (p. 175) of its Hardware Node. To view or set the Hardware Node default backup parameters, select a Hardware Node and click **Configure -> Container Backup Settings** on the top toolbar.

- On the **Backup Node** drop-down menu, select the Hardware Node that will be used for storing the created backups.

You can also leave here the default **Use Hardware Node Settings** value. In this case, every Container will be backed up with the default backup parameters (p. 175) of its Hardware Node. To view or set the Hardware Node default backup parameters, select a Hardware Node and click **Configure -> Container Backup Settings** on the top toolbar.

The **Exclude** section allows you to keep certain files and directories from backing up:

-  Hidden files;
-  System files;
- Single files or directories. If you do not want to back up a whole directory, type it into the corresponding field; to add more directories to be excluded from the backup, click the plus sign.

Warning!  If you exclude one or more system or hidden files/folders from the Container backup (e.g. either the **Hidden files** or **System files** checkbox is selected), you'll be able to restore only separate files from this backup, but not the Container as a whole.

The **Include** section allows you to limit the backup process with a number of selected files or directories inside the Container. In the field provided, type the absolute path to the file or directory you wish to back up. To include additional files or directories, click the plus icon to the right of an existing path and enter a new path.

The backup will contain only those files and directories that you have indicated in the **Include** section. To back up the whole Container, leave the **Include** section empty.

You can also delay the backup operation till the time specified in the **Backup Start** group of options.

To start performing the backup, click **Backup**, otherwise, click **Cancel**.

Renewing Container Backup

The number of backups you are allowed to create is limited and if the limit is reached, but the Container has still to be backed up and you do not want to spend time on deleting any of the existing backups, you can renew the selected backup on the **Renew Backup** screen.

In the **Backup Description** section, enter any commentary you think can be practical for further backup operations.

In the **Backup Options** section, define the level of compression and the type of the backup:

- On the **Backup Type** drop-down menu, select one of the following types of backup:
 - **Full backup.** This type is recommended when doing a backup job for the first time and contains all the data selected for the backup. A full backup storage space and completion time requirements are the highest.
 - **Incremental backup** affects only those files and data which have changed since the last backup and takes less storage space and creation time.
 - **Differential backup** includes only the data modified since the last full backup. (Whereas a differential backup will save the data changed after *any* last backup, be it a full, incremental, or differential, this is only a *full* backup a differential backup considers to be the last one.)

You can also leave here the default **Use Hardware Node Settings** value. In this case, every Container will be backed up with the default backup parameters (p. 175) of its Hardware Node. To view or set the Hardware Node default backup parameters, select a Hardware Node and click **Configure -> Container Backup Settings** on the top toolbar.

- On the **Compression Level** drop-down menu, choose one of the possible levels:
 - **None.** This level suggests no compression at all and is recommended if you need to perform a fast backup but do not need to save disk space necessary for backups storage;
 - The **normal** level of compression takes a little more time and allows for some disk space saving;
 - While extending the backup creation time, the **high** level of compression saves you even more disk space;
 - The **maximum** compression level means the longest backup creation time and the best backup compression.

Note: It is recommended to choose the backup compression level according to the type of the data the Container stores. The Virtuozzo Containers software will try to compress the backup regardless of the data type, but some data are worth spending time for compression (such as text files and data bases) and some, such as already compressed archives are not. Therefore, select the **None** checkbox when the Container you are backing up stores no data that suggest or need compressing.

You can also leave here the default **Use Hardware Node Settings** value. In this case, every Container will be backed up with the default backup parameters (p. 175) of its Hardware Node. To view or set the Hardware Node default backup parameters, select a Hardware Node and click **Configure -> Container Backup Settings** on the top toolbar.

- On the **Backup Node** drop-down menu, select the Hardware Node that will be used for storing the created backups.

You can also leave here the default **Use Hardware Node Settings** value. In this case, every Container will be backed up with the default backup parameters (p. 175) of its Hardware Node. To view or set the Hardware Node default backup parameters, select a Hardware Node and click **Configure -> Container Backup Settings** on the top toolbar.

The **Exclude** section allows you to keep certain files and directories from backing up:

-  Hidden files;
-  System files;
- Single files or directories. If you do not want to back up a whole directory, type it into the corresponding field; to add more directories to be excluded from the backup, click the plus sign.

Warning!  If you exclude one or more system or hidden files/folders from the Container backup (e.g. either the **Hidden files** or **System files** checkbox is selected), you'll be able to restore only separate files from this backup, but not the Container as a whole.

The **Include** section allows you to limit the backup process with a number of selected files or directories inside the Container. In the field provided, type the absolute path to the file or directory you wish to back up. To include additional files or directories, click the plus icon to the right of an existing path and enter a new path.

The backup will contain only those files and directories that you have indicated in the **Include** section. To back up the whole Container, leave the **Include** section empty.

You can also delay the backup operation till the time specified in the **Backup Start** group of options.

To start performing the backup, click **Backup**, otherwise, click **Cancel**.

Backup Details

The **Backup Details** page provides general information on the Container backup in the following table:

Column Name	Description
Creation Date	The date and time when the backing up was performed.
Backup Size	The size of the backup.
Backup Type	Denotes if it is a full, incremental, or differential backup. An incremental backup stores not all the files and settings of the Container at the given period of time, but only the changes the Container has undergone since the last backup. A differential backup saves the data changed after the last full backup.
Container	The name the Container had at the backup time. If the Container is restored from this backup, this hostname is also restored and replaces the current one.
IP Address(es)	The IP address(es) the Container had at the backup time. If the Container is restored from this backup, these addresses are also restored and replace the current one(s).

Applications Installed	All applications that had been installed in the Container by the backup time. If the Container is restored from this backup, these applications are also restored and replace the current one(s). Shown only in case there are any applications in the given Container backup.
Backup Node	The Hardware Node where the backup is stored.

If this backup has any description, you can view it in the **Backup Description** section.

To manage the backup you can use the following options on the Infrastructure Manager toolbar:

- The **Restore** button restores the Container from the current backup. The changes in the Container made after the date of this backup will be lost after the Container has been restored. Mind that you have to confirm restoring the Container on the **Restore Confirmation** page to accomplish the process.
- The **Browse** button (p. 183) allows you to browse the directory structure of the archived Container as if it had been already restored and to restore only the needed files and folders.
- The **Remove** button removes the current Container backup. Usually this is done to provide extra space for making new Container backups.

Browsing Backup Contents

Parallels Infrastructure Manager allows you to browse the directory structure of any Container backup as if this backup had already been restored and restore only the needed files and folders. The **Browse Backup** page opens after you follow the **Browse** link on the **Backup Details** page (p. 182).

The contents of any directory inside the backup is presented in the table. The first table column indicates if the object is a directory or a file. The remaining columns provide the following information:

Column Name	Description
Name	The name of the directory or file.
Size	The size of the file.
Modified	The date and time of the last modification of the directory or file.
Permissions	 The standard Linux permissions for the directory or file.

Actions	Allows you to download a file to your local computer provided it is not part of an OS or application template.
---------	--

It is worth noting that if you are browsing an incremental backup, the information is shown not only on the files and folders from this backup, but on all the contents of the Container, should it be restored from this incremental backup. In other words, the backed up Container is always presented in its integrity and not as a collections of sporadic changes from the incremental backup.

To restore separate files and folders from the backup to the actual Container, just select them by ticking the corresponding checkboxes in the rightmost column and click the **Restore** link.

Managing Parallels Infrastructure Manager Backups

The **Backups** tab of a Virtuozzo Group lists the Container backups created on all the Hardware Nodes of this group. Any Container is defined by its operating system files, applications installed, configuration files, and personal information. Parallels Infrastructure Manager allows you to back up all these components. A regular backing up of the existing Containers is essential for any Container reliability. If you already have some Container backups, the **Backups** tab displays a table summarizing these backups:

Column Name	Description
Container Name	The name of the Container that was backed up.
Last Backup	The date and time when the last backing up was performed.
Backup Node	The Hardware Node where the last backup of the given Container is stored.
Total Backups	The number of backups of the Container.

You can manage your backups on this page in the following ways:

- The **Restore Container** button allows to restore one or more Containers from their respective backups currently selected in the table. As you may have more than one backup of a Container, any Container backed up with several copies is restored by default from the latest created backup. The opened page provides instructions to lead you through the process. Every Container is restored with all the values overwritten from the backup, including the hostname, IP address, application set, etc. The changes in any Container made after the date of this backup will be lost after the Container has been restored. Mind that you have to confirm restoring the Container(s) on the **Restore Confirmation** page to accomplish the process.
- The **Remove Backups** button removes the Container backup(s) currently selected in the table. Usually this is done to provide extra space for making new Container backups. Use the checkbox at the upper left corner of the table to select/deselect all the backups at once.
- Clicking on a Container hostname or ID in the table opens the **Container Backups** page, which allows you to manage the selected Container backup(s). You can further open the **Backup Details** page where you get a more ample information on the current Container backup(s) and restore or remove or browse the Container backup(s).

You can also back up one or more Containers right from this page by clicking the **New Container Backups** link.

Managing Hardware Node Backups

The **Backups** tab of a Hardware Node lists the Container backups created on this Hardware Node. Any Container is defined by its operating system files, applications installed, configuration files, and personal information. Parallels Infrastructure Manager allows you to back up all these components. A regular backing up of the existing Containers is essential for any Container reliability. If you already have some Container backups, the **Backups** tab displays a table summarizing these backups:

Column Name	Description
Container Name	The name of the Container that was backed up.
Last Backup	The date and time when the last backing up was performed.
Backup Node	The Hardware Node where the last backup of the given Container is stored.
Total Backups	The number of backups of the Container.

You can manage your backups on this page in the following ways:

- The **Restore Container** button allows to restore one or more Containers from their respective backups currently selected in the table. As you may have more than one backup of a Container, any Container backed up with several copies is restored by default from the latest created backup. The opened page provides instructions to lead you through the process. Every Container is restored with all the values overwritten from the backup, including the hostname, IP address, application set, etc. The changes in any Container made after the date of this backup will be lost after the Container has been restored. Mind that you have to confirm restoring the Container(s) on the **Restore Confirmation** page to accomplish the process.
- The **Remove Backups** button removes the Container backup(s) currently selected in the table. Usually this is done to provide extra space for making new Container backups. Use the checkbox at the upper left corner of the table to select/deselect all the backups at once.
- Clicking on a Container hostname or ID in the table opens the **Container Backups** page, which allows you to manage the selected Container backup(s). You can further open the **Backup Details** page where you get a more ample information on the current Container backup(s) and restore or remove or browse the Container backup(s).

You can also back up one or more Containers right from this page by clicking the **New Container Backups** link.

CHAPTER 8

Managing Virtuozzo Licenses

The Licenses table on the Licensing screen shows the information on all your Virtuozzo Server licenses:

Column Name	Description
Serial Number	The string of symbols that serves for both activating the license and as an identifier of the license on the Hardware Node.
Key Number	The key number of the license, which identifies the license on the Parallels Key Authentication (KA) server.
Hardware Node	The Hardware Node on which the license is installed.
Status	The status of the license.
Expiration	The expiration date and time of the license.

The full list of all the parameters (such as, for example, the number of CPUs, Containers, or users your license allows you to have on the Node) is available on the screen which opens if you click the number of the license key or the license serial number. If any of these parameters has or will be changed (say, you upgraded your Hardware Node with more CPUs, or want to extend the limit of the Containers that the Node may host), you will need to update your Virtuozzo Hardware Node license as well.

You may also want to update the license if the data in the **Status** or **Expiration** columns suggest that you do. For example, if the **Status** column tells you that the license is invalid, or expired, or the expiration date displayed in the **Expiration** column is close, this is a good reason to update it. Finally, you can update your trial license. To update your license, select its checkbox on the list and click **Refresh** on the Infrastructure Manager toolbar.

In This Chapter

Entering License Key	187
Uploading License File on Hardware Node.....	187
Installing License Key	188
Reviewing Installed Licenses.....	189
Transferring Licences.....	191
Virtuozzo License Statuses	191

Entering License Key

Depending on the context you operate the Virtuozzo Containers software in, a Virtuozzo license key is a string of symbols used as:

- a license that can be installed on the Hardware Node;
- a password that can be sent to the Parallels licensing server to obtain a license file.

The **Install License: Enter Key** screen allows you to enter your Virtuozzo product key in the **Product Key** field. Clicking the **Next** button will bring you to the screen where you will be able to review your license details and either install the product key on the Hardware Node or send the product key to the Parallels licensing server.

Uploading License File on Hardware Node

A Virtuozzo Server license (or Virtuozzo Hardware Node license) installs on the Hardware Node after a product key is sent to the Parallels licensing server. However, if the Node has no Internet connection at the moment of sending the product key, Parallels Infrastructure Manager displays a message informing you of the fact and containing an installation ID and URL. You will need to use this URL on any computer connected to the Internet to open a Web page where you will be able to manually enter the installation ID and send it to the Parallels server. The server will generate a key file to be either sent to your email address or saved on the disk of the computer that sent the installation ID. For this key file to be installed on the Hardware Node save it on its hard disk (or make it available from there, whatever way you think to be expedient) and install it on the Hardware Node.

To install a new Virtuozzo license on the Node, do the following:

- 1 Either
 - provide the full path to the file (use the **Browse** button to help)or
 - open the new license file by using any text editor and copy its content to the clipboard;
 - place the cursor to the text area of the **Install License: Upload File** screen and paste the copied license text.
- 2 Click the **Next** button.

Installing License Key

On this screen you may select the Hardware Node on which you want to install the license and review your license details: the license usage environment and the conditions of usage.

To select the Node, click the icon next to the **Hardware Node** field in the **Install License** to section.

The **License General Information** section displays the following information about the Virtuozzo Server license (or Virtuozzo Hardware Node license):

Column Name	Description
Key Number	The license key number. This is a unique identifier of the license on the Parallels KA server.
Class	The license type (the current version of the Virtuozzo Containers software makes use of Virtuozzo Hardware Node licenses only).
Expiration	The expiration date and time of the license.

The **Extended Information** section provides the following information on the license:

Column Name	Description
Architectures	Microprocessor architecture(s) suggested by the license.
Backup management allowed	If your license includes backup management, this enables you to schedule backups of certain Containers and assign a Virtuozzo Group Hardware Node, other than the one which hosts the Container to be backed up, to store the backup.
Grace period	The period during which the Virtuozzo Containers software continues functioning after your license has expired, in seconds.
Key number value	The main component of the license key number that is placed between the two dots.
Key number version	The last part of the license key number that is placed after the second dot.
License version	The version of the license (the same as the version of the Virtuozzo Containers software).
Number of Containers	The total number of Containers you can simultaneously run on the Hardware Node.
Number of CPUs	The total number of central processor units installed on the Hardware Node. A dual core CPU or a CPU with Hyper Threading technology is a single CPU; only CPU sockets are regarded as CPUs.
Number of Parallels Management Console users	The number of users able to simultaneously connect to the Node through Parallels Management Console.
Parallels Agent allowed	Indicates if the license allows to use the Parallels Agent functionality.
Parallels Infrastructure Manager allowed	Indicates if the license allows to use Parallels Infrastructure Manager.
Parallels Power Panel allowed	Indicates if the license allows to manage Containers by means of Parallels Power Panel.

Platform	The operating system installed on the Hardware Node
Product key	The string of symbols that serves for both activating the license and as an identifier of the license on the Hardware Node.
Products	Indicates that this is the Virtuozzo Containers technology that the license applies to.

Workflow management allowed Indicates if the license allows Container requesting.

The Hardware Node selected and the license information reviewed, you can install it to the Node by clicking the **Install** button. This will either install the key directly on your Node, or send it to the Parallels licensing server, which, in turn, will generate a license file, send it back to the Hardware Node the product key has been sent from, and install it on this Hardware Node.

If, for some reasons, the Hardware Node is not connected to the Internet at the moment of sending the product key, Parallels Infrastructure Manager displays a message informing you of the fact and containing an installation ID and URL. You will need to use this URL on any computer connected to the Internet to open the Web page where you will be able to manually enter the installation ID and send it to the Parallels server. The server will generate a key file to be either sent to your email address or saved on the disk of the computer that sent the installation ID. For this key file to be installed on the Hardware Node, save it on its hard disk (or make it available from there, whatever way you think to be expedient) and upload it on the Hardware Node.

Reviewing Installed Licenses

On this screen you may review your license details. The **License General Information** section allows you to view the main information on your license:

Column Name	Description
Key Number	The license key number. This is a unique identifier of the license on the Parallels KA server.
Class	The license type (the current version of the Virtuozzo Containers software makes use of Virtuozzo Hardware Node licenses only).
Hardware Node	The Hardware Node on which the license is installed.
Target	The Hardware Nodes on which the license can be installed.
Status	The status of the license.
Expiration	The expiration date and time of the license.

The **Extended Information** section provides the following information on the license:

Column Name	Description
Architectures	Microprocessor architecture(s) suggested by the license.
Backup management allowed	If your license includes backup management, this enables you to schedule backups of certain Containers and assign a Virtuozzo Group Hardware Node, other than the one which hosts the Container to be backed up, to store the backup.

Grace period	The period during which the Virtuozzo Containers software continues functioning after your license has expired, in seconds.
Key number value	The main component of the license key number that is placed between the two dots.
Key number version	The last part of the license key number that is placed after the second dot.
License version	The version of the license (the same as the version of the Virtuozzo Containers software).
Number of Containers	The total number of Containers you can simultaneously run on the Hardware Node.
Number of CPUs	The total number of central processor units installed on the Hardware Node. A dual core CPU or a CPU with Hyper Threading technology is a single CPU; only CPU sockets are regarded as CPUs.
Number of Parallels Management Console users	The number of users able to simultaneously connect to the Node through Parallels Management Console.
Parallels Agent allowed	Indicates if the license allows to use the Parallels Agent functionality.
Parallels Infrastructure Manager allowed	Indicates if the license allows to use Parallels Infrastructure Manager.
Parallels Power Panel allowed	Indicates if the license allows to manage Containers by means of Parallels Power Panel.
Platform	The operating system installed on the Hardware Node
Product key	The string of symbols that serves for both activating the license and as an identifier of the license on the Hardware Node.
Products	Indicates that this is the Virtuozzo Containers technology that the license applies to.
Workflow management allowed	Indicates if the license allows Container requesting.

The license you are reviewing can be installed on any of the Hardware Nodes registered in Parallels Infrastructure Manager. The Virtuozzo licensing scheme allows changing the Hardware Node where the license is installed, which can be performed, for example, when you transfer the Virtuozzo Server license from a non-functional Node, or the one you are not going to use in the nearest future, to a Node running a trial version of Virtuozzo Containers when the trial period is drawing to a close.

To transfer the license to another Hardware Node, click **Transfer** on the Infrastructure Manager toolbar.

Transferring Licences

The **Transfer** screen lets you transfer the selected license to another Hardware Node. This screen is displayed on clicking the **Transfer** button on the license details screen (p. 189).

Click the icon next to the **Hardware Node** field in the **Destination Hardware Node** section and choose the Node from the list displayed on the pop-up window.

Clicking **Submit** transfers the license to the selected Node.

The Node the license is to be transferred to has to be started and connected to the network.

Note: The Hardware Node the license is transferred from stops performing the functions stipulated by the license.

Virtuozzo License Statuses

When viewing information on the license, you should pay special attention to the license status that can be one of the following:

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

CHAPTER 9

Managing Virtuozzo Security

This chapter contains information on how to organize and control the process of granting the users access to Hardware Nodes and their Containers thru Parallels Infrastructure Manager.

In This Chapter

Understanding Role-Based Access Administration in Parallels Infrastructure Manager	193
Typical Scenario of Virtuozzo Containers Security Model Usage	194
Managing Virtuozzo Users	196
Managing Virtuozzo Groups.....	199
Managing Roles	202
Managing Authentication Databases.....	214
Managing User/Group Permissions	218

Understanding Role-Based Access Administration in Parallels Infrastructure Manager

As the Virtuozzo datacenter administrator, you can use the credentials of the  `root/` `Administrator` user having a full administrative access to the Hardware Nodes to manage these Nodes and all their Containers by means of Parallels Infrastructure Manager. However, you may want to grant the rights to other users to perform certain operations on a Hardware Node and/or its Containers. For example, you can allow some user to manage certain Containers only without having access to the remaining Containers on the Node and/or to the Node itself or to complete only a restricted set of tasks in the Container context (e.g. start, stop, and restart a Container without having the right to back up this Container or configure its resources).

To achieve this goal, a well-balanced user authentication and authorization strategy has been implemented in Virtuozzo 4.0. This strategy is based on the following main components:

- users;
- groups;
- permissions;
- roles;
- authentication databases;
- scopes.

The relationship among these components is described as follows. *Users* are objects characterized by the *roles* delegated to them in a certain *scope*. *Users* can be members of *groups*. *Users* and *groups* can be retrieved either from local databases or from databases on external computers in your network. The information on these databases is stored on the Node in the form of *authentication databases*. *Roles* are sets of abstract privileges that can be assigned to a *user* or a *group* to form a *permission*. *Permissions* enable *users* or *groups* to perform certain operations in different *scopes*, which can be represented by one of the following entities:

- Containers;
- Hardware Nodes;
- Logical units;
- Virtuozzo Group.

Parallels Infrastructure Manager allows you to manage any of the aforementioned components in the following way:

- View the users currently existing on the Node, create a new user, edit its properties (e.g. add users to groups), and remove an existing user from the Node.
- View the groups currently existing on the Node, create a new group, edit its properties, and remove an existing group from the Node.
- View the roles currently existing on the Node, create a new role, edit its properties, and remove an existing role from the Node.
- View the authentication databases currently existing on the Node, create a new realm, set the default realm, and remove an existing realm from the Node.

- Grant users access to certain scopes and define what rights the users will have within these scopes (in other words, create permissions).

Detailed information on how to perform these operations is given in the following subsections.

Typical Scenario of Virtuozzo Containers Security Model Usage

A typical course of actions to make use of the Virtuozzo Containers security model is described below:

- 1 Think over and create the roles you will then assign to your users. A role is a set of privileges or actions that a user is allowed to perform. However, no role has information about particular objects (Hardware Nodes, Containers) on which the user is allowed to perform the actions defined by the role.
- 2 If you plan to join your users to certain groups, you should create these groups or use the groups pre-created in Parallels Infrastructure Manager for your convenience.
- 3 Create new users and join them to the corresponding groups, if necessary.
- 4 If you are going to grant access to the Hardware Node to users from external authentication databases, you should additionally register one or more authentication databases on the Node.
- 5 Assign a role to a user/group, thus, granting this user/group the right to manage the Hardware Node and/or its Containers in accordance with the privileges deduced from the assigned role.

Let us see how it all works with a common 'Container Administrator' role.

- 1 The 'Container Administrator' role should be common for virtually every datacenter, so no wonder it is one of the built-in roles in Infrastructure Manager. This role defines a set of privileges the user will be able to perform in the Container context. However, there is no information in this role about the particular Containers that this or that user will be able to administer. As this role is built-in, you do not have to create it, but you may want to see what privileges are included in this role, by default, and modify them, if necessary:
 - Click **Security** in the **Setup** group on the left Infrastructure Manager menu.
 - Click the **Roles** tab.
 - Click the **Container Administrator** role to view its properties.
 - Overview the privileges included in this role in the **Rights** group. You are free to modify these privileges at your discretion.
 - Click **Submit**.

So we have made sure that the role we need exists in Infrastructure Manager and the necessary privileges are included in it.

- 2 Next, we should think about user groups. User groups are necessary if we create a permission for a number of users at once. However, the Container Administrator role suggests that a particular Container will be managed by a particular user and another Container will be managed by another user. So it would be logical to create a user group (p. 200) only if we are going to grant two or more users to administer the same Container, otherwise, groups will be of no use.
- 3 The users to whom you will later assign the Container Administrator role should all be defined on the **Users** tab of the **Security** screen. This screen has a number of subtabs corresponding to the available authentication databases. This number may vary depending on the number of authentication databases available, but two databases are always present: *Parallels Internal* and *System*. The users in the *Parallels Internal* database are those that you create in *Parallels Infrastructure Manager* specifically for *Virtuozzo Containers* management. On a fresh *Virtuozzo Containers* installation, this database is empty. The users in the *System* database are the regular system users of the Master Node of the *Virtuozzo Group*.

So, you can either create the necessary number of *Virtuozzo Containers* users (p. 197) or just have the users from external databases (listed on the respective tabs).

Note: To be able to use *Parallels Infrastructure Manager* for the Container administration, the users should also have the privilege to log in to *Parallels Infrastructure Manager*, which can be defined in the global (*Virtuozzo Group*) scope only. The easiest way to do this is to include the users in the precreated **Parallels Infrastructure Manager Users** group.

- 4 To have more users available without the need to create them, you can connect *Parallels Infrastructure Manager* to other authentication databases (p. 216), e.g. to a Windows Active Directory database.
- 5 Finally, a particular user (or group of users) should be given the right to administer a particular Container. For this, a new permission should be created. Before creating a permission we should think of the scope of this permission. It can be easily seen that among the four possible scopes (*Virtuozzo Group*, *Logical Unit*, *Hardware Node*, *Container*) the *Container* scope is the one to choose. Thus, you should:
 - Display a list of Containers you have in the datacenter/logical unit/ on a Hardware Node and click the needed Container to display its control panel.
 - Click the **Security** tab on the Container dashboard and follow the **New Permission** link.
 - On the **Add Permission** screen, fill the **Users and Groups** area with the users and groups allowed to manage this Container. Normally, it will be just one user.
 - Move the Container Administrator role to the right pane in the **Assigned Roles** group and click **Save**.

Thus, the user we have chosen has got the right to administer this particular Container.

It can be seen from the scenario above that essentially the first four steps (defining the *Infrastructure Manager* roles, users, groups, and authentication databases) serve to prepare you as the *Infrastructure Manager* administrator for working with particular permissions in *Infrastructure Manager*. These four steps are likely to be performed in a detailed manner only once, namely, when you are setting up the *Infrastructure Manager* security model, and then only maintained from time to time. The last step (creating a permission) is done each time you are granting or denying certain rights to particular users/groups.

Managing Virtuozzo Users

A user is an object containing the following information: the user name, password, and group(s) where the user is included, if any. Any user can be assigned a role defining her/his rights in respect of the corresponding Hardware Node and/or Container(s). Parallels Infrastructure Manager allows you to manage users in one of the following ways:

- view the information on the users currently existing on the Hardware Node; (p. 196)
- remove an existing user; (p. 196)
- create a new user (p. 197);
- configure the user's parameters (p. 197).

Viewing Users

The users currently existing on the Node can be viewed on the Users tab of the Security screen displayed by following the Security link on the Infrastructure Manager menu. There are two default subtabs on this screen allowing you to list the users from two databases (these databases are automatically created on the Hardware Node during the Virtuozzo Containers installation):

- The **Parallels Internal** subtab: this database contains Parallels-specific users created during the Virtuozzo Containers installation and all users that you have manually created (p. 197) in Infrastructure Manager.
- The **System** subtab: this database is fully identical to the system database created by any operating system on any computer. It contains the information on the users registered in the Host OS and defines the rights these users have in respect of the system administration.

The information on users is presented in the table having the following columns:

Name	Description
Login	The name used to log in to Infrastructure Manager.
Full Name	The full name of the user.
Distinguished name	The distinguished name assigned to the user and uniquely identifying this user among other users in the LDAP-compliant database. This column is relevant only for users from external authentication databases.
EMail	The user's valid email address.
Description	A short description of the user.

Warning! If the users from an external authentication database are not listed on this tab, chances are the *objectClass=user* attribute is not set for the users in this database. Make sure all the database users have this attribute set for these users to be listed on the **Users** tab of Infrastructure Manager.

To facilitate your working with users, you can:

- Filter them by the parameters listed in the table above (e.g. by their full names or emails). To this effect, click the **Show Search** link over the table, enter the needed data in the field(s) provided and click **Search**. The users matching the specified criteria will be displayed in the **Users** table on the **Security** screen. To have the full list of users back, click **Reset Results**.
- Change the users order by clicking the corresponding column name in the **Users** table.
- Modify the number of users simultaneously displayed in the **Users** table on the **Security** screen by clicking the **10**, **20**, **40**, or **80** link at the top of the table.

The **Users** tab also allows you to:

- Remove an existing user by selecting the check box near the corresponding user and clicking the **Delete** button. When deleting users, please keep in mind that you cannot remove built-in users (i.e. any of the users displayed on the **System** subtab).
- Create a new user (p. 197) by following the **New User** link at the top of the **Users** table.

Creating New User

The **New User** screen allowing you to create new users in Parallels Infrastructure Manager opens on following the **Security** link on the Infrastructure Manager menu, clicking the **Users** tab on the **Security** screen, and then clicking **New** on the Infrastructure Manager toolbar. To make a new user, you should fill in the following field:

- **Login** (mandatory): specify the name to be used to log in to Infrastructure Manager.
- **Full name** (optional): indicate the full name of the user.
- **Description** (optional): enter any commentary on the user.
- **Email** (optional): enter the user's valid email.
- **Type Password** (mandatory): provide the password to be used by the user to log in to Infrastructure Manager.
- **Retype Password** (mandatory): retype the password entered in the **Type Password** field.

On this screen, you can also include the user to any of the groups existing on the Node. To this effect, select the group where you wish to add the user being created in the **Available** table under **Member of Groups** and click the **>>** button. To cancel the performed action, select the added group in the **Selected** table and click the **<<** button.

Note: To be able to use Infrastructure Manager, the user should have the privilege to log in to Infrastructure Manager, which can be defined in the global (Virtuozzo Group) scope only. The easiest way to do this is to include the user in the precreated **Parallels Infrastructure Manager Users** group, which is done by default during the user's creation by means of Infrastructure Manager. If you do not want the created user to have this privilege (e.g. you want the user to be able to use Parallels Management Console only), remove the user from this group.

After specifying the necessary parameters, click the **Submit** button to start making the user. The newly created user will be displayed in the **Users** table on the **Security** screen.

Viewing User's Details

The **User** screen allows you to view detailed information on a Virtuozzo Containers user. To display this page, follow the **Security** link on the Infrastructure Manager menu, click an authentication database subtab on the **Users** tab, and then click the name of the user whose details you wish to view in the **Users** table.

The information on the group is presented in the following fields:

- The **Login** field shows the name used by the user to log in to Infrastructure Manager.
- The **Full Name** field displays the full name of the user, if set.
- The **Description** field displays the general arbitrary information about the user.
- The **Distinguished Name** field indicates the distinguished name assigned to the user and uniquely identifying this user in the authentication database.
- The **Email** field shows the user's e-mail address, if set.
- The **Member of** field displayed the groups where the user is currently included, if any.

Configuring User's Parameters

The **Configure** screen allows you to configure the current user's parameters. To access this screen, follow the **Security** link on the Infrastructure Manager menu, click an authentication database subtab on the **Users** tab, click the name of the user whose parameters you wish to configure, and then click the **Configure** button. On this screen you can configure the user's parameters as follows:

- in the **Login** field, change the user name to be used to log in to Infrastructure Manager;
- in the **Full name** field, modify the full name of the user;
- in the **Description** field, provide an arbitrary general information about the user;
- in the **Email** field, change the user's email;
- in the **Type Password** and **Retype Password** fields, set a new password to be used by the user to log in to Infrastructure Manager;
- under **Member of Groups**, use the **>>** and **<<** button to include the user in new groups or exclude her/him from existing ones, respectively.

After configuring the user's parameters, click **Submit** for the changes to take effect; otherwise, click **Cancel**.

Managing Virtuozzo Groups

In the Virtuozzo security model, a group is a collection of user accounts and/or other groups with a defined set of access rights to certain scope resources. Using groups can simplify the administration of Virtuozzo-based systems by assigning a common set of permissions and rights to several user accounts at once, rather than assigning permissions and rights to each account individually.

Parallels Infrastructure Manager allows you to manage groups in one of the following ways::

- view the groups currently existing on the Hardware Node; (p. 199)
- create a new group; (p. 200)
- view group details; (p. 200)
- edit the parameters of an existing group. (p. 201)

Viewing Groups

The groups currently existing on the Node can be viewed on the **Groups** tab of the **Security** screen displayed by following the **Security** link on the Infrastructure Manager menu. There are two subtabs on this screen allowing you to list the groups from two Parallels databases (these databases are automatically created during the Virtuozzo Containers installation):

- The **Parallels Internal** subtab: this database contains Parallels-specific groups created during the Virtuozzo Containers installation and all groups that you have manually created (p. 200) in Parallels Infrastructure Manager.
- The **System** subtab: this database is fully identical to the system database created by any operating system on any computer. It contains the information on the groups registered in the Host OS and defines the rights these groups have in respect of the system administration.

The information on groups is presented in the table having the following columns:

Name	Description
Name	The name assigned to the group.
Description	The group description.

To facilitate your working with groups, you can:

- Filter them by their names and description. To this effect, click the **Show Search** link over the table, enter the group name and/or description in the fields provided and click **Search**. The groups matching the specified criteria will be displayed in the **Groups** table on the **Security** screen. To have the full list of groups back, click **Reset Results**.
- Change the groups order by clicking the corresponding column name in the **Groups** table.
- Modify the number of groups simultaneously displayed in the **Groups** table on the **Security** screen by clicking the **10**, **20**, **40**, or **80** link at the top of the table.

The **Group** tab also allows you to:

- Remove an existing group by selecting the check box near the corresponding group and clicking the **Delete** button. When deleting groups, please keep in mind that you cannot remove built-in groups (i.e. any of the groups displayed on the **System** subtab).
- Create a new group (p. 200) by following the **New Group** link at the top of the **Groups** table.

Creating New Group

You can create a new group in Parallels Infrastructure Manager on the **New Group** screen which can be accessed by following the **Security** link on the Infrastructure Manager menu, clicking the **Groups** tab on the **Security** screen, and then clicking the **New Group** link on the subtab corresponding to the authentication database where you wish to create a group.

To create a new group, you should specify an arbitrary name to be assigned to the group in the **Name** field. You are also recommended to provide the group description in the **Description** field.

The **Add User** and **Add Group** buttons serve to fill the group being created with users and/or groups already existing in the given authentication database.

When you are ready, click the **Submit** button.

After the group has been successfully created, it is displayed in the **Groups** table on the **Security** screen. Please note that all new groups do not have any permissions assigned to them and, therefore, do not have access to the Hardware Nodes or any of their Containers.

Viewing Group Details

The **Group** screen allows you to view detailed information on a Virtuozzo Group. To display this page, follow the **Security** link on the Infrastructure Manager menu, click the **Groups** tab on the **Security** screen, and then click the name of the group whose details you wish to view in the **Groups** table.

The **Group Details** section provides the general information on the group - its name and description.

The information on users and/or groups included in the current group is presented in the **Users and Groups** table having the following columns:

Name	Description
Login	The name of the user or group.

Full Name	The full name of the user.
E-Mail	The user's valid email address.
Description	The description of the user or group.
Distinguished name	The distinguished name assigned to the user and uniquely identifying this user among other users in the LDAP-compliant database. This column is relevant only for users from external authentication databases.

To facilitate your working with users and groups, you can:

- Filter them by the parameters listed in the table above (e.g. by their full names or emails). To this effect, click the **Show Search** link over the table, enter the needed data in the field(s) provided and click **Search**. The users matching the specified criteria will be displayed in the **Users** table on the **Security** screen. To have the full list of users back, click **Reset Results**.
- Change the users' order by clicking the corresponding column name in the **Users and Groups** table.
- Modify the number of users simultaneously displayed in the **Users and Groups** table on the **Security** screen by clicking the **10**, **20**, **40**, or **80** link at the top of the table.

If you want to change the name and description of the group, click the **Configure** icon on the Infrastructure Manager toolbar (available only for modifiable databases, like the Parallels internal one).

Configuring Group Parameters

You can edit the properties of an existing group on the **Configure** screen which can be accessed by following the **Security** link on the Infrastructure Manager menu, clicking the **Groups** tab on the **Security** screen, clicking the name of the group whose parameters you wish to configure in the **Groups** table, and, in the displayed window, clicking the **Configure** button on the Infrastructure Manager toolbar.

The **Configure** screen allows you to edit the following group parameters:

- Change the name of the group by typing the desired name in the **Name** field.
- Modify the group description by providing the desired information in the **Description** field.
- Define what users and/or groups from the given authentication database should be included in the group with the help of the **Add User**, **Add Group**, and **Remove Selected** buttons.

After you have configured the group parameters in the proper way, click **Submit** for the changes to take effect. Otherwise, click **Cancel**.

Managing Roles

Roles used in the Virtuozzo Containers role-based access control model are system objects defining the privileges a particular user is endowed with. In other words, roles define all possible actions the user may perform on or within a certain *scope* (Hardware Node, Container, Virtuozzo Group, or Logical Unit). Parallels Infrastructure Manager allows you to manage roles in one of the following ways:

- view the roles currently existing on the Hardware Node; (p. 202)
- create a new role (p. 204);
- configuring the parameters of an existing role (p. 209);
- remove an existing role. (p. 202)

Viewing Roles

Roles used in the Virtuozzo Containers security model are system objects created to embody a certain multitude of *permissions*, i. e. the parameters that ultimately define the scope of the privileges the user is endowed with. In other words, roles are users' attributes and are made up of permissions. Permissions are all possible actions that a user or administrator is allowed to perform in the Hardware Node or Container context. You can create any number of roles at your discretion - as long as your own permissions allow you to do so.

To view a list of roles currently existing on the Hardware Node, follow the **Security** link on the Infrastructure Manager menu and then click the **Roles** tab on the **Security** screen. The information on each role is presented in the table having the following columns:

Column name	Description
Name	The name of the role.
Description	The role description.
Built-in	Indicates whether the given role has been manually created by you or any other user ('No') or it is a built-in role ('Yes').

To facilitate working with roles, you can:

- Filter them by their names and description. To this effect, click the **Show Search** link over the table, enter the role name and/or description in the fields provided and click **Search**. The roles matching the specified criteria will be displayed in the **Roles** table on the **Security** screen. To have the full list of roles back, click **Reset Results**.
- Configure the number of columns to be displayed in the **Roles** table. To this effect, click the **Select Columns** link and clear the check boxes near the column name that you wish to hide.
- Change the roles order in the **Roles** table by clicking the corresponding column name.

The **Roles** tab also allows you to complete the following tasks:

- Create a new role (p. 204) by following the **New Role** link at the top of the **Roles** table.
- Clone a role by selecting the check box near the corresponding role and clicking the **Clone** button. Upon the operation completion, the cloned role will be displayed in the **Roles** table with **Copy of** preceding the role name. To clone all the roles at once, select the uppermost check box and click the **Clone** button.
- Remove an existing role by selecting the check box near the corresponding role and clicking the **Delete** button. To delete all the roles at once, select the uppermost check box and click the **Delete** button. When deleting roles, please keep in mind the following:
 - You cannot delete a role which is still assigned to any existing user.
 - You cannot delete any of the built-in roles.

Creating New Role

You can create any number of roles at your discretion provided your own permissions allow you to do so. You can create a new role on the **New Role** page which can be accessed by following the **Security** link on the Infrastructure Manager menu, clicking the **Roles** tab on the **Security** screen, and then clicking the **New Role** button over the **Roles** table.

There are three groups on this page: the **General Parameters** group, the **Privileges** group, and the **Included Roles** group.

Under the **General Parameters** group of parameters, you must enter the name to be assigned to the role in the **Name** field and can provide the role description in the **Description** field.

The **Privileges** and **Included Roles** groups allow you to define the privileges to be assigned to the role:

- If the privileges of an existing role represent a subset of the privileges to be assigned to the new role, you can save your time by adding the previously created role to the new one. To this effect, expand the **Included Roles** group by clicking the  icon, select the name of the role you wish to include in the new one in the **Available** table and click the **>>** button. The selected role will be moved to the **Selected** table. To cancel your action, select the role in the **Selected** table and click the **<<** button.
- If there are no roles that can be used as the basis for the role being created, you can manually specify what privileges are to be assigned to the role. In this case you should browse thru the hierarchy of available privileges under the **Privileges** group and select the check boxes near those privileges that you wish to have included in the role. Each privilege represents the possibility (if the corresponding check box is selected) or impossibility (if the corresponding check box is cleared) to perform a certain action in the scope context. For example, you can select the check box near the **Container Management** privilege to include the right of performing any operations in the **Container** context (e.g. to create or destroy a **Container**) in the role. Please keep in mind that selecting a check box which stand for a higher level set of privileges will automatically add the privileges from all lower level sets to the role. So, the **Container Management** privilege includes all the lower level privileges (**Configure Container**, **Delete Container**, etc.).

When setting up Virtuozzo Containers roles, you should have a clear idea about the scope where these roles will be assigned to users/groups to form permissions. Thus, it is necessary to know in what scope this or that privilege can be applied and what exactly is implied by the privilege. E.g. it bears little sense to include the "Log in to Infrastructure Manager" privilege in the role intended for Container administrators and, therefore, used in the Container scope only.

The table below describes all the available privileges and indicates the scopes where they can be used:

Privilege	G	U	N	C	Description
Full Control	+	+	+	+	Provide the user with full control over the given scope.
Control Panels	+	+	+	+	Allow the user to log in to various control panels on the given scope.
Log in to Parallels Infrastructure Manager	+	-	-	-	Allow the user to log in to Parallels Infrastructure Manager.

Log in to Parallels Power Panel	+ + + +	Allow the user to log in to Parallels Power Panel for any Container included in the given scope.
Log in to Container terminal	+ + + +	Allow the user to log in to any Container included in the given scope via SSH or RDP.
Log in to Plesk	+ + + +	Allow the user to log in to the Plesk control panel for any Container included in the given scope.
Log in to Sitebuilder	+ + + +	Allow the user to log in to the Sitebuilder control panel for any Container included in the given scope.
Log in to Confixx	+ + + +	Allow the user to log in to the Confixx control panel for any Container included in the given scope.
Log in via SOAP	+ + + +	Allow the user to log in to the Node using the SOAP API (Application Programming Interface).
Container Management	+ + + +	Provide the user with all the various Container management permissions enumerated below.
New Container	+ + + +	Allow the user to create a new Container using the various methods enumerated below. In a non-global scope, this privilege only allows to clone an existing Container.
Create Container	+ - - -	Allow the user to create a new Container.
Clone Container	+ + + +	Allow the user to clone any Container included in the given scope.
Migrate physical server to Container	+ - - -	Allow the user to create a new Container on the basis of an existing physical server.
View Container properties	+ + + +	Allow the user to view the properties of any Container included in the given scope and to have the corresponding Container displayed in the lists of Containers. Note: This privilege is necessary for all the other Container Management privileges to work.
View extended resources	+ + + +	Allow the user to view the resources consumption and configuration on any Container included in the given scope.
Operate Container	+ + + +	Allow the user to start, stop, suspend, resume, and migrate any Container included in the given scope.
Start and stop Container	+ + + +	Allow the user to start and stop any Container included in the given scope.
Migrate Container	+ + + +	Allow the user to migrate any Container included in the given scope to another Hardware Node registered in Infrastructure Manager, provided the user has the privilege to access the Destination Node.
Configure Container	+ + + +	Allow the user to set up the various Container settings enumerated below.
Configure Container general settings	+ + + +	Allow the user to configure the general settings of any Container in the given scope: name and description, offline management, networking, and resources.
Manage applications	+ + + +	Allow the user to manage the software packages inside any Container in the given scope.
Manage devices	+ + + +	Allow the user to mount and unmount disk volumes in any Container in the given scope.
Maintenance	+ + + +	Allow the user to enter the repair mode for any Container included in the given scope.

Repair Container	+ + + +	Allow the user to enter the repair mode for any Container included in the given scope.
Backups Management	+ + + +	Allow the user to manage the backups of any Container included in the given scope.
List Container backups	+ + + +	Allow the user to view the backups of any Container included in the given scope.
Back up Container	+ + + +	Allow the user to back up any Container included in the given scope.
Restore Container	+ + + +	Allow the user to restore the backup of any Container included in the given scope.
Remove Container backups	+ + + +	Allow the user to delete the backups of any Container included in the given scope.
Manage files and services	+ + + +	Allow the user to manage the files and services in any Container included in the given scope.
Delete Container	+ + + +	Allow the user to delete any Container included in the given scope.
Node Management	+ + + -	Provide the user with all the various Node management permissions enumerated below.
View Node properties	+ + + -	Allow the user to view the properties of any Hardware Node included in the given scope and to have the corresponding Node displayed in the lists of Hardware Nodes. Note: This privilege is necessary for all the other Node Management privileges to work.
Configure Node	+ + + -	Allow the user to configure the email gateway, network settings, and application templates for any Hardware Node included in the given scope.
Configure email and notifications	+ + + -	Allow the user to configure the email gateway for any Hardware Node included in the given scope.
Configure network	+ + + -	Allow the user to configure the network settings for any Hardware Node included in the given scope: traffic accounting and shaping, proxy settings, network interfaces. Note: To allow the user to configure the proxy server settings, you should additionally enable the Configure email and notifications privilege.
Manage Templates	+ + + -	Allow the user to perform all the available operations on the application templates for any Hardware Node included in the given scope.
Backups Administration	+ + + -	Allow the user to administer any Node included in the given scope as a Backup Node.
Configure backups	+ + + -	Allow the user to configure the way of storing backups for any Hardware Node included in the given scope.
List backups	+ + + -	Allow the user to view the backups stored on any Hardware Node included in the given scope.
Store backups	+ + + -	Allow the user to place Container backups on any Hardware Node included in the given scope.
Remove backups	+ + + -	Allow the user to delete the Container backups from any Hardware Node included in the given scope.
Update System	+ + + -	Allow the user to configure the update repository settings for any Hardware Node included in the given scope.

Reboot		+ + + -	Allow the user to reboot any Hardware Node included in the given scope.
Logical Structure		+ + - -	Provide the user with all the possible privileges to build up the logical structure of the Virtuozzo datacenter.
List units		+ + - -	<ul style="list-style-type: none"> ▪ In the unit scope, allows the user to view the corresponding logical unit on the left Infrastructure Manager menu and view its contents. ▪ In the global scope, allows the user to view all logical units and their contents.
Manage Containers and Hardware Nodes in unit		+ + - -	Allow the user to manage the Hardware Nodes and Containers in any logical unit included in the given scope. Unlike the Administer unit privilege, this privilege does not allow the user to remove logical units.
Administer unit		+ + - -	Allow the user to manage the Hardware Nodes and Containers in any logical unit included in the given scope and remove the corresponding unit.
Manage sub-units		+ + - -	Allow the user to add sub-units to any logical unit included in the given scope and to remove sub-units from it.
Infrastructure		+ - - -	Provide the user with all the possible privileges to set up the Virtuozzo datacenter infrastructure.
Manage Virtuozzo Group		+ - - -	Allow the user to manage the whole Infrastructure Manager system of Hardware Nodes and Containers: view them, register and unregister Hardware Nodes, etc. Warning! This privilege should be included in the role intended for Virtuozzo administrators only.
Manage IP addresses pools		+ - - -	Allow the user to perform all the available operations on IP addresses pools.
Manage virtual networks		+ - - -	Allow the user to create, edit, and delete Virtuozzo virtual networks, as well as set up bridged networking on Hardware Nodes. Note: This kind of privilege is normally granted to a single person, so included in one role only.
Manage licenses		+ - - -	Allow the user to install and remove Virtuozzo licenses. Note: This kind of privilege is normally granted to a single person, so included in one role only.
Manage Container samples		+ - - -	Allow the user to perform all the available operations on Container configuration samples.
Set up messaging		+ - - -	Allow the user to configure the email messaging system.
Workflow		+ + + +	Provide the user with a set of privileges related to Container requesting and troubleshooting enumerated below.
Request new Container		+ - - -	Allow the user to submit a request for a new Container for themselves. Note: If Container requesting is enabled in Infrastructure Manager, it is natural to include this privilege in every role.
Process Container requests		+ - - -	Allow the user to fulfil or cancel the requests for new Containers. Note: This kind of privilege is normally granted to a single person, so included in one role only.

Troubleshooting	+ + + +	<ul style="list-style-type: none"> ▪ In the Container scope, allow the user to reinstall the Container. ▪ In the Hardware Node and unit scope, additionally allow the user to establish a support channel on any Node included in the given scope. ▪ In the global scope, additionally allow the user to report a problem and see the descriptions of Infrastructure Manager error codes.
Security	+ + + +	Allow the user to manage the Infrastructure Manager security policy. Warning! This privilege should be included in the role intended for Virtuozzo administrators only.
Manage users and groups	+ + + +	Allow the user to change the administrative password of any Container included in the given scope or set the administrative password during its reinstallation.
Manage roles	+ - - -	Allow the user to create, modify, and delete roles and create permissions on their basis in any scope. Warning! This privilege should be included in the role intended for Virtuozzo administrators only.
Manage authentication databases	+ - - -	Allow the user to register, configure, and unregister authentication databases in Parallels Infrastructure Manager.
Log Operations	+ + + +	Allow the user to view the logs and cancel the running tasks relevant to the given scope.
View logs	+ + + +	Allow the user to view the tasks logs, alerts, and events related to any Container included in the given scope.
Cancel running tasks	+ + + +	Allow the user to cancel the tasks initiated for any Container included in the given scope.

The table indicates whether using a particular privilege makes sense in each of the 4 available scopes:

- G - the Global scope;
- U - the scope of a single logical or infrastructure Unit;
- N - the scope of a single Hardware Node;
- C - the scope of a single Container.

When you are ready, click the **Submit** button to start creating the role with the specified parameters.

Configuring Role Parameters

The **Manage Role** page allows you to configure the parameters of any roles existing in Parallels Infrastructure Manager. To display this page, follow the **Security** link on the Infrastructure Manager menu, click the **Roles** tab on the **Security** screen, and then click the name of the role you wish to edit in the **Roles** table.

-
- Notes:**
1. To edit a role, you need to have your own permission to do so.
 2. You cannot modify or rename the built-in roles. If you want to have a modified built-in role, you should clone this role first and then change its parameters.
-

In this window you can configure the following parameters of a role:

- The **General Parameters** group of parameters allows you to change the name and description of the role by typing the desired information in the fields provided.
- The **Privileges** and **Included Roles** groups of parameters enable you to modify the role privileges:
 - Browse thru the hierarchy of available privileges under the **Privileges** group and select or clear the check boxes of those privileges that you wish to include in the role or to exclude from the role, respectively.
 - Expand the **Included Roles** group and use the >> and << buttons to include/exclude any of the existing roles to the role you are editing, respectively.

When setting up Virtuozzo Containers roles, you should have a clear idea about the scope where these roles will be assigned to users/groups to form permissions. Thus, it is necessary to know in what scope this or that privilege can be applied and what exactly is implied by the privilege. E.g. it bears little sense to include the "Log in to Infrastructure Manager" privilege in the role intended for Container administrators and, therefore, used in the Container scope only.

The table below describes all the available privileges and indicates the scopes where they can be used:

Privilege	G	U	N	C	Description
Full Control	+	+	+	+	Provide the user with full control over the given scope.
Control Panels	+	+	+	+	Allow the user to log in to various control panels on the given scope.
Log in to Parallels Infrastructure Manager	+	-	-	-	Allow the user to log in to Parallels Infrastructure Manager.
Log in to Parallels Power Panel	+	+	+	+	Allow the user to log in to Parallels Power Panel for any Container included in the given scope.
Log in to Container terminal	+	+	+	+	Allow the user to log in to any Container included in the given scope via SSH or RDP.
Log in to Plesk	+	+	+	+	Allow the user to log in to the Plesk control panel for any Container included in the given scope.
Log in to Sitebuilder	+	+	+	+	Allow the user to log in to the Sitebuilder control panel for any Container included in the given scope.
Log in to Confixx	+	+	+	+	Allow the user to log in to the Confixx control panel for any Container included in the given scope.

Log in via SOAP	+ + + +	Allow the user to log in to the Node using the SOAP API (Application Programming Interface).
Container Management	+ + + +	Provide the user with all the various Container management permissions enumerated below.
New Container	+ + + +	Allow the user to create a new Container using the various methods enumerated below. In a non-global scope, this privilege only allows to clone an existing Container.
Create Container	+ - - -	Allow the user to create a new Container.
Clone Container	+ + + +	Allow the user to clone any Container included in the given scope.
Migrate physical server to Container	+ - - -	Allow the user to create a new Container on the basis of an existing physical server.
View Container properties	+ + + +	Allow the user to view the properties of any Container included in the given scope and to have the corresponding Container displayed in the lists of Containers. Note: This privilege is necessary for all the other Container Management privileges to work.
View extended resources	+ + + +	Allow the user to view the resources consumption and configuration on any Container included in the given scope.
Operate Container	+ + + +	Allow the user to start, stop, suspend, resume, and migrate any Container included in the given scope.
Start and stop Container	+ + + +	Allow the user to start and stop any Container included in the given scope.
Migrate Container	+ + + +	Allow the user to migrate any Container included in the given scope to another Hardware Node registered in Infrastructure Manager, provided the user has the privilege to access the Destination Node.
Configure Container	+ + + +	Allow the user to set up the various Container settings enumerated below.
Configure Container general settings	+ + + +	Allow the user to configure the general settings of any Container in the given scope: name and description, offline management, networking, and resources.
Manage applications	+ + + +	Allow the user to manage the software packages inside any Container in the given scope.
Manage devices	+ + + +	Allow the user to mount and unmount disk volumes in any Container in the given scope.
Maintenance	+ + + +	Allow the user to enter the repair mode for any Container included in the given scope.
Repair Container	+ + + +	Allow the user to enter the repair mode for any Container included in the given scope.
Backups Management	+ + + +	Allow the user to manage the backups of any Container included in the given scope.
List Container backups	+ + + +	Allow the user to view the backups of any Container included in the given scope.
Back up Container	+ + + +	Allow the user to back up any Container included in the given scope.
Restore Container	+ + + +	Allow the user to restore the backup of any Container included in the given scope.

Remove Container backups	+	+	+	+	Allow the user to delete the backups of any Container included in the given scope.
Manage files and services	+	+	+	+	Allow the user to manage the files and services in any Container included in the given scope.
Delete Container	+	+	+	+	Allow the user to delete any Container included in the given scope.
Node Management	+	+	+	-	Provide the user with all the various Node management permissions enumerated below.
View Node properties	+	+	+	-	Allow the user to view the properties of any Hardware Node included in the given scope and to have the corresponding Node displayed in the lists of Hardware Nodes. Note: This privilege is necessary for all the other Node Management privileges to work.
Configure Node	+	+	+	-	Allow the user to configure the email gateway, network settings, and application templates for any Hardware Node included in the given scope.
Configure email and notifications	+	+	+	-	Allow the user to configure the email gateway for any Hardware Node included in the given scope.
Configure network	+	+	+	-	Allow the user to configure the network settings for any Hardware Node included in the given scope: traffic accounting and shaping, proxy settings, network interfaces. Note: To allow the user to configure the proxy server settings, you should additionally enable the Configure email and notifications privilege.
Manage Templates	+	+	+	-	Allow the user to perform all the available operations on the application templates for any Hardware Node included in the given scope.
Backups Administration	+	+	+	-	Allow the user to administer any Node included in the given scope as a Backup Node.
Configure backups	+	+	+	-	Allow the user to configure the way of storing backups for any Hardware Node included in the given scope.
List backups	+	+	+	-	Allow the user to view the backups stored on any Hardware Node included in the given scope.
Store backups	+	+	+	-	Allow the user to place Container backups on any Hardware Node included in the given scope.
Remove backups	+	+	+	-	Allow the user to delete the Container backups from any Hardware Node included in the given scope.
Update System	+	+	+	-	Allow the user to configure the update repository settings for any Hardware Node included in the given scope.
Reboot	+	+	+	-	Allow the user to reboot any Hardware Node included in the given scope.
Logical Structure	+	+	-	-	Provide the user with all the possible privileges to build up the logical structure of the Virtuozzo datacenter.
List units	+	+	-	-	<ul style="list-style-type: none"> ▪ In the unit scope, allows the user to view the corresponding logical unit on the left Infrastructure Manager menu and view its contents. ▪ In the global scope, allows the user to view all logical units and their contents.

Manage Containers and Hardware Nodes in unit	+ + - -	Allow the user to manage the Hardware Nodes and Containers in any logical unit included in the given scope. Unlike the Administer unit privilege, this privilege does not allow the user to remove logical units.
Administer unit	+ + - -	Allow the user to manage the Hardware Nodes and Containers in any logical unit included in the given scope and remove the corresponding unit.
Manage sub-units	+ + - -	Allow the user to add sub-units to any logical unit included in the given scope and to remove sub-units from it.
Infrastructure	+ - - -	Provide the user with all the possible privileges to set up the Virtuozzo datacenter infrastructure.
Manage Virtuozzo Group	+ - - -	Allow the user to manage the whole Infrastructure Manager system of Hardware Nodes and Containers: view them, register and unregister Hardware Nodes, etc. Warning! This privilege should be included in the role intended for Virtuozzo administrators only.
Manage IP addresses pools	+ - - -	Allow the user to perform all the available operations on IP addresses pools.
Manage virtual networks	+ - - -	Allow the user to create, edit, and delete Virtuozzo virtual networks, as well as set up bridged networking on Hardware Nodes. Note: This kind of privilege is normally granted to a single person, so included in one role only.
Manage licenses	+ - - -	Allow the user to install and remove Virtuozzo licenses. Note: This kind of privilege is normally granted to a single person, so included in one role only.
Manage Container samples	+ - - -	Allow the user to perform all the available operations on Container configuration samples.
Set up messaging	+ - - -	Allow the user to configure the email messaging system.
Workflow	+ + + +	Provide the user with a set of privileges related to Container requesting and troubleshooting enumerated below.
Request new Container	+ - - -	Allow the user to submit a request for a new Container for themselves. Note: If Container requesting is enabled in Infrastructure Manager, it is natural to include this privilege in every role.
Process Container requests	+ - - -	Allow the user to fulfil or cancel the requests for new Containers. Note: This kind of privilege is normally granted to a single person, so included in one role only.
Troubleshooting	+ + + +	<ul style="list-style-type: none"> ▪ In the Container scope, allow the user to reinstall the Container. ▪ In the Hardware Node and unit scope, additionally allow the user to establish a support channel on any Node included in the given scope. ▪ In the global scope, additionally allow the user to report a problem and see the descriptions of Infrastructure Manager error codes.
Security	+ + + +	Allow the user to manage the Infrastructure Manager security policy. Warning! This privilege should be included in the role intended for Virtuozzo administrators only.

Manage users and groups	+ + + +	Allow the user to change the administrative password of any Container included in the given scope or set the administrative password during its reinstallation.
Manage roles	+ - - -	Allow the user to create, modify, and delete roles and create permissions on their basis in any scope. Warning! This privilege should be included in the role intended for Virtuozzo administrators only.
Manage authentication databases	+ - - -	Allow the user to register, configure, and unregister authentication databases in Parallels Infrastructure Manager.
Log Operations	+ + + +	Allow the user to view the logs and cancel the running tasks relevant to the given scope.
View logs	+ + + +	Allow the user to view the tasks logs, alerts, and events related to any Container included in the given scope.
Cancel running tasks	+ + + +	Allow the user to cancel the tasks initiated for any Container included in the given scope.

The table indicates whether using a particular privilege makes sense in each of the 4 available scopes:

- G - the Global scope;
- U - the scope of a single logical or infrastructure Unit;
- N - the scope of a single Hardware Node;
- C - the scope of a single Container.

After you have configured the role parameters, click the **Submit** button for the changed to take effect.

Managing Authentication Databases

The Virtuozzo Containers security authentication mechanism allows you to grant access to Hardware Nodes and their Containers to both:

- users on your local computer and
- users stored in external Microsoft Active Directory databases.

Note: Other LDAP-compliant databases, like OpenLDAP for Linux, are supported with some restrictions, see below.

During its installation on the Hardware Node, the Virtuozzo Containers software creates two special databases containing the information on local user accounts:

- The 'System' database: this database is fully identical to the system database created by any operating system and containing the information on the users and groups registered in the Host OS and defining the rights these users and groups have in respect of the system administration;
- The 'Parallels Internal' database: this database contains Parallels-specific users and groups.

Along with the user databases created by the Virtuozzo Containers software by default, you can also register external user databases located virtually on any computer on your network and allow the users from these databases to access Hardware Nodes and their Containers. So, you do not need to manually create these users and add them to the 'Parallels Internal' database. The only requirement that should be met by a database to be registered in Parallels Infrastructure Manager is that it must be based on the Microsoft Active Directory technology. For example, if the user's login information is stored on an external domain controller running an Active Directory (AD) server, you can register this controller in Parallels Infrastructure Manager and allow the users registered in the AD directory to be authenticated thru the controller itself rather than go thru the authentication process on the Node. The user authorization, however, will take place on the Hardware Node (or on the Master Node in the case of a Virtuozzo Group) and the user will get the rights and privileges in accordance with the role(s) assigned to them on this Node.

If you wish to use an OpenLDAP directory in Linux environments in a similar way, you should make sure that this directory complies with the Microsoft Active Directory schema. In particular, it must have the following attribute types:

`objectSid, groupType, userPrincipalName, userParameters, preferredOU`

and the following object classes:

`container, securityPrincipal, User, Group, foreignSecurityPrincipal, domainDNS.`

For additional details on these attribute types and object classes, please consult the official Microsoft Active Directory schema, if needed.

Parallels Infrastructure Manager allows you to manage authentication databases as follows:

- view detailed information on the authentication database currently registered on the Hardware Node;

- remove a registered authentication database from the Hardware Node;
- register a new authentication database on the Hardware Node.

Viewing Authentication Databases

The **Authentication Databases** tab (displayed on following the **Security** link on the Infrastructure Manager main menu) allows you to view a list of user databases currently registered on the Hardware Node and used to authenticate the users trying to log in to the Hardware Node (or Virtuozzo Group, or Container) thru Parallels Infrastructure Manager.

The general information on Infrastructure Manager authentication databases is given in the **Managing Authentication Databases** subsection.

The information on databases is presented in the table having the following columns:

Column name	Description
Name	The name assigned to the authentication database.
Address	The hostname or IP address of the server where the LDAP-compliant user database is residing.
Port	The port number to be used to connect to the database on the server. The default port for databases hosted by Windows Active Directory and Linux LDAP is 389.

To facilitate your working with authentication databases, you can:

- Filter them by the parameters listed in the table above. To this effect, click the **Show Search** link over the table, enter the needed data in the field(s) provided and click **Search**. The databases matching the specified criteria will be displayed in the **Authentication Databases** table on the **Security** screen. To have the full list of databases back, click **Reset Results**.
- Change the databases order by clicking the corresponding column name in the **Authentication Databases** table.
- Modify the number of databases simultaneously displayed in the **Authentication Databases** table on the **Security** screen by clicking the **10, 20, 40, or 80** link at the top of the table.

The **Authentication Databases** tab also allows you to:

- Remove an existing database by selecting the check box near the corresponding realm and clicking the **Delete** button.
- Register a new database (p. 216) by following the **Register Database** link at the top of the **Authentication Databases** table.

Registering New Database

Along with the databases registered by Virtuozzo by default, you can register your own user databases, thus, allowing users' authentication through external servers. The requirements for these databases can be found in the **Managing Authentication Databases** section. You can register a new authentication database on the **Register Authentication Database** screen which can be displayed by following the **Security** link on the Infrastructure Manager menu, clicking the **Authentication Database** tab, and following the **Register Database** link at the top of the **Authentication Databases** table. On this screen you should provide the following parameters for the database:

- **Database Name** (mandatory): specify an arbitrary name to be assigned to the database; you can choose any descriptive name you like. This name will be displayed in the **Authentication Databases** table and identify the given database among other databases registered in Infrastructure Manager.
- **Server Address** (mandatory): enter the hostname or IP address of the server storing the user database.
- **Port** (mandatory): indicate the port number to be used to connect to the user database on the server. The default port for databases hosted by Windows Active Directory and Linux LDAP is 389.
- **Login**: type the name of the user with the administrative credentials for the server indicated above.
- **Password**: enter the password of the user specified in the **Login** field.
- **Domain**: enter the name of the domain, if any, where the server hosting the user database resides.

Note: If the Infrastructure Manager Master Node is running Linux, and you are registering a Windows Active Directory database, you must fill in this field. If you are registering an OpenLDAP database, you must leave this field empty. Doing otherwise will make it impossible to import the users information into Parallels Infrastructure Manager.

- **Base DN** (mandatory): specify a distinguished name uniquely identifying the entry of the user specified in the **Login** field in the authentication database.
- **Default DN**: indicate the default distinguished name used for the user's entry in the authentication database.

After providing the necessary information, click the **Submit** button to start registering the database. After a while, the registered database will be displayed in the table on the **Authentication Databases** tab of the **Security** screen.

Note: To be able to use Infrastructure Manager, users should have the privilege to log in to Infrastructure Manager, which can be defined in the global (Virtuozzo Group) scope only. The easiest way to do this is to include the corresponding users from the external database in the precreated **Parallels Infrastructure Manager Users** group.

Viewing Database Details

On this screen you may review the detailed information on any authentication database currently registered on the Hardware Node. To display this page, follow the **Security** link on the Infrastructure Manager menu, click the **Authentication Databases** tab on the **Security** screen, and then click the name of the database whose details you wish to view.

Field	Description
Server Address	The hostname or IP address of the server storing the database.
Port	The port number to be used to connect to the database on the server. The default port for databases hosted by Windows Active Directory and Linux LDAP is 389.
Login	The name of the user with the administrative credentials for the server indicated above.
Domain	The name of the domain, if any, where the server hosting the database resides.
Base DN	The distinguished name uniquely identifying the database entry of the user specified in the Login field (the name of the root directory).
Default DN	The default distinguished name used for the user's entry in the database (the complete navigation path to the users' storage directory).

If you want to change the details of the database, click the **Configure** icon on the Infrastructure Manager toolbar (not available for the Parallels Internal authentication database).

Configuring Database Details

You can edit the properties of an existing database on the **Configure** screen which can be accessed by following the **Security** link on the Infrastructure Manager menu, clicking the **Authentication Databases** tab on the **Security** screen, clicking the name of the database whose parameters you wish to configure in the **Authentication Databases** table, and, in the displayed window, clicking the **Configure** button on the Infrastructure Manager toolbar.

Note: You cannot modify the details of the Parallels Internal and the System databases. These databases are automatically created on the Hardware Node during the Virtuozzo Containers software installation.

The **Configure** screen allows you to edit the following database details:

- In the **General Settings** section, you can change the name of the database by typing the desired name in the **Database Name** field.
- In the **Connection Settings** section, you can change the address of the server storing the database by typing another domain name or IP address in the **Server Address** field. In this section you can also specify another port number to be used to connect to the database in the server.
- In the **Login Settings** section, you can rename the user with the administrative credentials for the server storing the database, enter a password for it and enter the name of the domain, if any, where the server resides.
- In the **Directory Settings** section, you can change the distinguished name uniquely identifying the database entry of the user with the administrative credentials and the default distinguished name used for the users' entries.

After you have configured the database parameters in the proper way, click **Submit** for the changes to take effect. Otherwise, click **Cancel**.

Managing User/Group Permissions

The main idea of the role-based access control functionality consists in granting a user (or several users within one and the same group) access to the Hardware Node or its Containers, thus, allowing them to log in to this Node/Container(s) by means of Parallels Infrastructure Manager and to perform a number of operations on them in accordance with the rights and permissions assigned to the user (or group). So, in the Virtuozzo security model any user/group is characterized by the permissions deduced from the roles assigned to the user (group) and allowing her/him to complete certain tasks in the Hardware Node/Container context.

Managing Permissions for Hardware Node

Viewing Permissions for Hardware Node

You can view the permissions of a user (group) to perform certain operations in the Hardware Node context on the **Permissions** tab of the **Security** window which can be accessed by following the **Security** link on the Hardware Node dashboard. The **Permissions** table on this tab displays all the permissions currently existing in respect of the Node. The information on permissions is presented in the following columns:

Column Name	Description
User or Group	The user/group possessing the given permission.
Assigned Role	The role assigned to the user/group and defining the set of privileges for this user/group.
Authentication Database	The name of the authentication database the user/group belongs to.

To facilitate your working with permissions, you can:

- Filter them by the parameters listed in the table above. To this effect, click the **Show Search** link over the table, enter the needed data in the field(s) provided and click **Search**. The permissions matching the specified criteria will be displayed in the **Permissions** table on the **Security** screen. To have the full list of permissions back, click **Reset Results**.
- Change the permissions order by clicking the corresponding column name in the **Permissions** table.
- Modify the number of permissions simultaneously displayed in the **Permissions** table on the **Security** screen by clicking the **10**, **20**, **40**, or **80** link at the top of the table.

The **Permissions** tab also allows you to:

- Remove an existing permission by selecting the check box near the corresponding user and clicking the **Delete** button.
- Create a new permission by following the **New Permission** link at the top of the **Users** table.

Creating New Permission for Hardware Node

The **New Permission** screen allows you to assign roles to users/groups, thus, endowing these users/groups with certain rights in respect of the Hardware Node. This screen can be accessed by following the **Security** link on the Hardware Node dashboard, clicking the **Permissions** tab on the **Security** screen, and clicking **New Permission** on this tab. To make a new permission, you should perform the following operations:

- 1 In the **Assigned Roles** table, select the role you wish to assign to the user/group and click the **>>** button.
- 2 Specify the user(s)/group(s) in the **Users and Groups** table. To this effect:
 - click the **Add User/Add Group** button;
 - in the displayed window, select the check box near the user/group you wish to assign the selected role to;

- click **Submit**.
- 3** Click the **Save** button.

After a while, the newly created permission will be displayed in the table on the **Permission** tab of the **Security** screen.

Managing Permissions for Containers

Viewing Container Permissions

You can view the permissions of a user (group) to perform certain operations in the Container context on the **Permissions** tab of the **Security** window which can be accessed by following the **Security** link on the Container dashboard. The **Permissions** table on this tab displays all the permissions currently existing in respect of the given Container. The information on permissions is presented in the following columns:

Column Name	Description
User or Group	The user/group possessing the given permission.
Assigned Role	The role assigned to the user/group and defining the set of privileges for this user/group.
Authentication Database	The name of the authentication database the user/group belongs to.

To facilitate your working with permissions, you can:

- Filter them by the parameters listed in the table above. To this effect, click the **Show Search** link over the table, enter the needed data in the field(s) provided and click **Search**. The permissions matching the specified criteria will be displayed in the **Permissions** table on the **Security** screen. To have the full list of permissions back, click **Reset Results**.
- Change the permissions order by clicking the corresponding column name in the **Permissions** table.
- Modify the number of permissions simultaneously displayed in the **Permissions** table on the **Security** screen by clicking the **10**, **20**, **40**, or **80** link at the top of the table.

The **Permissions** tab also allows you to:

- Remove an existing permission by selecting the check box near the corresponding user and clicking the **Delete** button.
- Create a new permission by following the **New Permission** link at the top of the **Users** table.

Creating New Container Permission

The **New Permission** screen allows you to assign roles to users/groups, thus, endowing these users/groups with certain rights in respect of the given Container. This screen can be accessed by following the **Security** link on the Container dashboard, clicking the **Permissions** tab on the **Security** screen, and clicking **New Permission** on this tab. To make a new permission, you should perform the following operations:

- 1 In the **Assigned Roles** table, select the role you wish to assign to the user/group and click the **>>** button.
- 2 Specify the user(s)/group(s) in the **Users and Groups** table. To this effect:
 - click the **Add User/Add Group** button;
 - in the displayed window, select the check box near the user/group you wish to assign the selected role to;
 - click **Submit**.
- 3 Click the **Save** button.

After a while, the newly created permission will be displayed in the table on the **Permission** tab of the **Security** screen.

Managing Permissions for Virtuozzo Group

Viewing Global Permissions

You can view the permissions of a user (group), allowing her/him to perform certain operations on all Hardware Nodes included in the Virtuozzo group, on the **Global Permissions** tab of the **Security** window which can be accessed by following the **Security** link on the Infrastructure Manager main menu. The **Permissions** table on this tab displays all the permissions currently existing in respect of the Virtuozzo group. The information on permissions is presented in the following columns:

Note: If you have one Hardware Node registered in Infrastructure Manager, the **Permissions** table will display the permissions for this Hardware Node only.

Column Name	Description
User or Group	The user/group possessing the given permission.
Assigned Role	The role assigned to the user/group and defining the set of privileges for this user/group.
Authentication Database	The name of the authentication database the user/group belongs to.

To facilitate your working with permissions, you can:

- Filter them by the parameters listed in the table above. To this effect, click the **Show Search** link over the table, enter the needed data in the field(s) provided and click **Search**. The permissions matching the specified criteria will be displayed in the **Permissions** table on the **Security** screen. To have the full list of permissions back, click **Reset Results**.
- Change the permissions order by clicking the corresponding column name in the **Permissions** table.
- Modify the number of permissions simultaneously displayed in the **Permissions** table on the **Security** screen by clicking the **10**, **20**, **40**, or **80** link at the top of the table.

The **Permissions** tab also allows you to:

- Remove an existing permission by selecting the check box near the corresponding user and clicking the **Delete** button.
- Create a new permission by following the **New Permission** link at the top of the **Users** table.

Creating New Global Permission

The **New Permission** screen allows you to assign roles to users/groups, thus, endowing these users/groups with certain rights to manage all the **Hardware Nodes** included in the **Virtuozzo** group and all their **Containers**. This screen can be accessed by following the **Security** link on the **Infrastructure Manager** main menu, clicking the **Global Permissions** tab on the **Security** screen, and clicking **New Permission** on this tab. To make a new permission, you should perform the following operations:

- 1** In the **Assigned Roles** table, select the role you wish to assign to the user/group and click the **>>** button.
- 2** Specify the user(s)/group(s) in the **Users and Groups** table. To this effect:
 - click the **Add User/Add Group** button;
 - in the displayed window, select the check box near the user/group you wish to assign the selected role to;
 - click **Submit**.
- 3** Click the **Save** button.

After a while, the newly created permission will be displayed in the table on the **Permission** tab of the **Security** screen.

Managing Permissions for Logical Units

Viewing Permissions for Logical Unit

You can view the permissions of a user (group), allowing her/him to perform certain operations on all Hardware Nodes and Containers included in the given logical unit, on the **Permissions** tab of the **Logical View** window which can be accessed by following the **Logical View** link on the Infrastructure Manager main menu. The **Permissions** table on this tab displays all the permissions currently existing in respect of this logical unit. The information on permissions is presented in the following columns:

Column Name	Description
User or Group	The user/group possessing the given permission.
Assigned Role	The role assigned to the user/group and defining the set of privileges for this user/group.
Authentication Database	The name of the authentication database the user/group belongs to.

To facilitate your working with permissions, you can:

- Filter them by the parameters listed in the table above. To this effect, click the **Show Search** link over the table, enter the needed data in the field(s) provided and click **Search**. The permissions matching the specified criteria will be displayed in the **Permissions** table on the **Security** screen. To have the full list of permissions back, click **Reset Results**.
- Change the permissions order by clicking the corresponding column name in the **Permissions** table.
- Modify the number of permissions simultaneously displayed in the **Permissions** table on the **Security** screen by clicking the **10**, **20**, **40**, or **80** link at the top of the table.

The **Permissions** tab also allows you to:

- Remove an existing permission by selecting the check box near the corresponding user and clicking the **Delete** button.
- Create a new permission by following the **New Permission** link at the top of the **Users** table.

Creating New Permission for Logical Unit

The **New Permission** screen allows you to assign roles to users/groups, thus, endowing these users/groups with certain rights to manage all the Hardware Nodes and Containers included in the given logical unit. This screen can be accessed by following the **Logical View** link on the Infrastructure Manager main menu, clicking the **Permissions** tab on the **Logical View** screen, and clicking **New Permission** on this tab. To make a new permission, you should perform the following operations:

- 1 In the **Assigned Roles** table, select the role you wish to assign to the user/group and click the **>>** button.
- 2 Specify the user(s)/group(s) in the **Users and Groups** table. To this effect:
 - click the **Add User/Add Group** button;

- in the displayed window, select the check box near the user/group you wish to assign the selected role to;
- click **Submit**.

3 Click the **Save** button.

After a while, the newly created permission will be displayed in the table on the **Permission** tab of the **Security** screen.

Managing Container Samples

The Virtuozzo Containers software allows you to create new Containers on the basis of the configuration sample files, called also Container samples.

 Currently, on Hardware Nodes running Windows 2003 Server, you can create new Containers by using the following configuration sample files:

- `basic` - to be used for creating standard Containers;
- `MSDE` - to be used for creating Containers that are to run Microsoft SQL Server Desktop Engines;
- `Oracle` - to be used for creating Containers that are to run Oracle database servers;
- `Plesk` - to be used for creating Containers that are to run the Plesk application;
- `SharePoint` - to be used for creating Containers that are to run SharePoint Portal Server 2003.

 For Hardware Nodes with the Linux operating system installed, the following configuration sample files are provided:

- `basic` - to be used for common Containers;
- `slm.256MB` - to be used for creating Containers with 256 Mb of virtual RAM;
- `slm.512MB` - to be used for creating Containers with 512 Mb of virtual RAM;
- `slm.1024MB` - to be used for creating Containers with 1024 Mb of virtual RAM;
- `slm.2048MB` - to be used for creating Containers with 2048 Mb of virtual RAM;
- `slm.plesk` - to be used for creating Containers with the Plesk control panel;
- `cpanel` - to be used for creating Containers that are to run cPanel control panels;
- `confiXX` - to be used for creating Containers that are to use the ConfiXX control panels.

You can perform a number of operations on Container samples by using Parallels Infrastructure Manager:

- Create new Container samples;
- List the Container samples currently existing on the Hardware Node;
- Copy Container samples within the Hardware Node;
- Delete those Container samples that are not needed any more;
- Upload new samples onto the Hardware Node.

In This Chapter

Creating New Container Sample.....	226
Creating New Container Sample by Splitting Hardware Node	234
Operations on Container Samples.....	235
Uploading Container Sample on Hardware Node.....	237
Editing Container Sample	237

Creating New Container Sample

If you are not satisfied with the Container samples shipped with the Virtuozzo Containers software, you can create your own ones. Parallels Infrastructure Manager provides a special wizard for creating Container samples. The **New Container Sample** wizard will guide you through the process and gather all the necessary information. To launch the wizard, click the **Container Samples** link on the Infrastructure Manager left menu, then click the **New Sample** link on the Container Samples screen.

Choosing Sample Configuration Source

The first page of the **New Container Sample** wizard enables you to define the main parameters for the Container sample being created.

In the **Initial Configuration** section, you can select one of the radio buttons to:

- Choose one of the Container samples currently existing on the Hardware Node to create a new Container sample on its basis. In this case the new Container sample will inherit all the properties of the Container sample selected on the drop-down menu. The information on the default sample files shipped with the Virtuozzo Containers software is provided in the **Managing Container Samples** section (p. 225).
- Select a Container hosted on the Hardware Node to copy its resources configuration settings to the Container sample being created. You can read more on Container resources in the **Managing and Monitoring Container Resources** section. Click on the small folder icon next to the **Container** field and select a Container in the pop-up window. The resource parameters configuration page presented next for adjustment will feature the resource parameters values from the selected Container.

To proceed with the sample creation, click **Next**.

Defining Container Sample General Settings

The second page of the **New Container Sample** wizard enables you to define the Container general settings. In the **General** group, you should:

- Enter a name for the Container sample being created.
- Give a brief description of the Container sample.
- Select on the pop-up menu the OS template and its version the Container sample will be based on. If you do not want the Container sample to depend on any specific OS template, leave this field intact.

The information provided in the **General** group will be displayed in the **Container Samples** table and **Container Summary** table.

The **Advanced** group allows you to make the Container to be at will based on this Container sample automatically start on the Hardware Node boot.

The **Offline Management** group allows you to set the offline management options by selecting the appropriate radio button. Offline management of the corresponding Container ensures the Container manageability by means of one or more offline services from any browser at its own IP address. After offline management is enabled for the Container, one port of its IP address becomes permanently active whatever the Container state. The currently supported services are `vzpp` and `plesk` (for managing Containers with the Plesk control panel installed in them). You can:

- Disable the offline management of the Container.
- Enable the offline management of the Container via the offline management settings operating on the Hardware Node. Whenever you need to manage the Container offline, its offline management settings will be brought into synchronization with those in effect on the Node. Should any service be removed from the default services list, the Container will be unable to be managed via the service off the list. This option subscribes the Container to the default offline services.
- Manually compose the Container offline services list. You can select the service(s) you would like the Container to be subscribed to in the corresponding checkbox(es).

After you have provided the necessary information, click on the **Next** button.

Setting Network Parameters

The **New Sample:Network** page lets you define all the major network parameters of the Container you are creating.

- In the **Global Network** section you can assign a search domain and  a DNS server IP address to the Container sample. These IP addresses will be used by the Container based on this sample regardless of whether it is on a bridged network or depends on the host Node network interface.
-  Indicate one or more DNS servers that the Container based on this sample is supposed to use in the **DNS Server IP Address** field or leave it blank. Use the  or  icons to add/remove the DNS servers IP addresses accordingly. For Linux-based Containers, all the DNS servers are common for all the Container virtual adapters. Note that the static values in these fields might be overridden if the Container gets the DNS servers from the DHCP server when operating in the bridged network mode.
- Define a list for hostname lookup in the **Search domain** field. Use the  or  icons to add/remove the lookup parameters for the Container. The search list is normally determined by the domain name(s); by default, it contains the local domain name(s) only. You can also add external domain names for a particular Container. A search query is performed by attempting to use each item in the list in turn until a match is found. Note that this process may be slow and may generate a lot of network traffic if the servers for the listed domains are not local, and that the query might time out if no server is available for one of the domains. Note also that the static values in these fields might be overridden if the Container gets the search domains from the DHCP server when operating in the bridged network mode.
- To set the Container based on this sample to be connected to the host Node NIC by the agency of the `venet0` virtual adapter, select the check-box next to the **Routed Network** section. This adapter will be assigned an IP address taken from the IP pool (p. 154).

 You can specify the following parameters for a routed network adapter:

- Indicate one or more DNS servers that the Container based on this sample is supposed to use in the **DNS Server IP Address** field or leave it blank. Use the  or  icons to add/remove the DNS servers IP addresses accordingly. In Windows-based Containers, each virtual adapter can have its own DNS server.
- Specify one or more WINS servers that the Container based on this sample is supposed to use in the **WINS Server IP Address** field or leave it blank. Use the  or  icons to add/remove the WINS servers IP addresses accordingly.
- Selecting the **Bridged Network** checkbox connects the Container based on this sample to the Virtuozzo bridged network through a virtual interface. Multiple virtual interfaces are possible per Container and can be added by clicking the **Add New Interface** link in this section. When a Container is provided with a virtual interface and is connected to a bridged network, its in- and outbound traffic is processed by the bridge of the Virtual Network to be selected in the **Connect to** field. In case no Virtual Networks has been created as yet, click **Network** on the Infrastructure Manager left menu, select the **Virtual Networks** subtab, and click the **New Virtual Network** link.

You can specify the following parameters for a bridged network adapter:

- The **IP Address Allocation** drop-down menu lets you choose whether the IP addresses for bridged interfaces will be leased from an IP addresses pool or assigned by a DHCP server (or servers).

-  Indicate one or more DNS servers that this Container is supposed to use in the DNS Server IP Address field or leave it blank. Use the  or  icons to add/remove the DNS servers IP addresses accordingly. Note that the static values in these fields might be overridden if the Container gets the DNS servers from the DHCP server when operating in the bridged network mode.
-  Specify one or more WINS servers that the Container based on this sample is supposed to use in the WINS Server IP Address field or leave it blank. Use the  or  icons to add/remove the WINS servers IP addresses accordingly.
- Enter the default gateway IP address if the Container based on this sample is not supposed to use a DHCP server.

After you have provided the necessary information, click the **Submit** button.

Customizing Resources Settings

Next, you will be presented with the screen allowing you to adjust resource parameters for the Containers based on the sample being created.

The CPU-related resource management is based on the following parameters:

Parameter	Description
<code>cpuunits</code>	This is a positive integer number that determines the minimal guaranteed share of the CPU time your Container will receive.
<code>cpulimit</code>	This is a positive number indicating the CPU time in percent the corresponding Container is not allowed to exceed.
 <code>burst_cpulimit</code>	The CPU power limit, in percent, the Container cannot exceed. The limitations set in this parameter are applied to the Container when it exceeds the limit specified in the <code>burst_cpu_avg_usage</code> parameter.
 <code>burst_cpu_avg_usage</code>	The CPU usage limit, in percent, set for the Container. This limit is calculated as the ratio of the current Container CPU usage to the CPU limit (i.e to the value of the <code>CPULIMIT</code> parameter) set for the Container. If the limit is not specified, the full CPU power of the Hardware Node is considered as the CPU limit. Upon exceeding the <code>burst_cpu_avg_usage</code> limit, the <code>burst_cpulimit</code> limit is applied to the Container.
 <code>cpuguarantee</code>	This is a positive integer number indicating the CPU time, in percent, the corresponding Container is guaranteed to receive. If both the <code>cpuguarantee</code> and <code>cpuunits</code> parameters are set, the <code>cpuguarantee</code> parameter is first taken into account when distributing processor(s) time among the Containers existing on the Node; the remaining CPU time, if any, is given to the Containers in accordance with the value of the <code>cpuunits</code> parameter.
<code>cpus</code>	The number of CPUs set to handle all the processes inside the given Container. By default, any Container is allowed to consume the CPU time of all processors on the Node.

The disk-related resource management is based on the following parameters:

Parameter	Description
diskspace	Total size of disk space consumed by the Container.  When the space used by the Container hits the soft limit, the Container can allocate additional disk space up to the hard limit during the grace period indicated by the <code>quotatime</code> parameter value.
 diskinodes	Total number of disk inodes (files, directories, and symbolic links) allocated by the Container. When the number of inodes used by the Container hits the soft limit, the Container can create additional inodes up to the hard limit during the grace period indicated by the <code>quotatime</code> parameter value.
 <code>quotauidlimit</code>	Number of user/group IDs allowed for the Container internal disk quota. If set to 0, UID/GID quota will not be enabled.
 <code>quotatime</code>	The grace period for the disk quota overusage defined in seconds. The Container is allowed to temporarily exceed its quota soft limits for no more than the <code>QUOTATIME</code> period.
 <code>ioprio</code>	The Container priority for disk I/O operations. The allowed range of values is 0-7. The greater the priority, the more time the Container has for writing to and reading from the disk. The default Container priority is 4.

The memory-related resource management parameters are divided into 4 groups: memory parameters, primary system parameters, secondary system parameters, and auxiliary system parameters.

 Windows-based Containers use only the primary system parameters.

 For Linux-based Containers, this screen displays the memory-based, or the system-based, or both memory- and system-based Container resources data, depending on your memory management configuration:

- If the memory management mode is enabled for the Container, it can be allocated memory in much the same way as a certain amount of physical memory is installed on a physical computer. This is the recommended mode for managing Containers for most administrators.
- If the system management mode is enabled, the Container's performance depends on the values of quite a number of fine-grained parameters. The primary parameters are the starting point for defining the relative power of a Container. The secondary parameters are dependent on the primary ones and are calculated from them according to a set of constraints. The auxiliary parameters help improve fault isolation among applications in a Container and the way applications handle errors and consume resources.
- If both resource management modes are used, the more restrictive value is taken into account each time the system makes the decision whether to allocate this or that resource to the Container.

 *Memory parameters*

Parameter	Description
<code>slmmemorylimit</code>	An approximation of the size of the physical memory allocated to the Container. In other words, the Container performance is similar to the performance of a physical computer with as much physical memory installed as is indicated in this parameter.

Primary system parameters

Parameter	Description
numproc	The maximal number of processes the Container may create.
 numsessions	The number of simultaneous terminal sessions that can be opened to the Container.
 vprvmem	The size of private (or potentially private) memory allocated by the Container. The memory that is always shared among different applications is not included in this resource parameter.
 numtcpsock	The number of TCP sockets (PF_INET family, SOCK_STREAM type). This parameter limits the number of TCP connections and, thus, the number of clients the server application can handle in parallel.
 numothersock	The number of sockets other than TCP ones. Local (UNIX-domain) sockets are used for communications inside the system. UDP sockets are used, for example, for Domain Name Service (DNS) queries. UDP and other sockets may also be used in some very specialized applications (SNMP agents and others).
 vmguarpages	The memory allocation guarantee, in pages. Container applications are guaranteed to be able to allocate additional memory so long as the amount of memory accounted as privvmpages (see the auxiliary parameters) does not exceed the configured barrier of the vmguarpages parameter. Above the barrier, additional memory allocation is not guaranteed and may fail in case of overall memory shortage.
 avnumproc	The average number of processes and threads.

 *Secondary system parameters*

Parameter	Description
kmemsize	The size of unswappable kernel memory allocated for the internal kernel structures for the processes of a particular Container. Note: For the Virtuozzo Containers 64-bit version for IA-64 processors, it takes 4 (four) times more the size of the kernel memory than that for the Virtuozzo Containers 32-bit version to handle one and the same process.
tcpsndbuf	The total size of send buffers for TCP sockets, i.e. the amount of kernel memory allocated for the data sent from an application to a TCP socket, but not acknowledged by the remote side yet.
tcprecvbuf	The total size of receive buffers for TCP sockets, i.e. the amount of kernel memory allocated for the data received from the remote side, but not read by the local application yet.
othersockbuf	The total size of UNIX-domain socket buffers, UDP, and other datagram protocol send buffers.
dgramrecvbuf	The total size of receive buffers of UDP and other datagram protocols.
oomguarpages	The out-of-memory guarantee, in pages. Any Container process will not be killed even in case of heavy memory shortage if the current memory consumption (including both physical memory and swap) does not reach the oomguarpages barrier.

`privvmpages` The size of private (or potentially private) memory allocated by an application. The memory that is always shared among different applications is not included in this resource parameter.

 *Auxiliary system parameters*

Parameter	Description
<code>lockedpages</code>	The memory not allowed to be swapped out (locked with the <code>mlock()</code> system call), in pages.
<code>shmpages</code>	The total size of shared memory (including IPC, shared anonymous mappings and tmpfs objects) allocated by the processes of a particular Container, in pages.
<code>numfile</code>	The number of files opened by all Container processes.
<code>numflock</code>	The number of file locks created by all Container processes.
<code>numpty</code>	The number of pseudo-terminals, such as an ssh session, screen or xterm applications, etc.
<code>numsiginfo</code>	The number of siginfo structures (essentially, this parameter limits the size of the signal delivery queue).
<code>dcachesize</code>	The total size of dentry and inode structures locked in the memory.
<code>numiptent</code>	The number of IP packet filtering entries.

Notes: The parameters containing "pages" in their names are measured in 4096-byte pages in the Virtuozzo Containers 32-bit version and in 16384-byte pages in the Virtuozzo Containers 64-bit version for IA-64 processors.

In the Virtuozzo Containers 64-bit versions, all the system parameter values are 64-bit and, therefore, can exceed the values in the Virtuozzo Containers 32-bit version (where the parameters values are 32-bit). For example, the limit of the `oomguarpages` parameter in the Virtuozzo Containers 64-bit version for IA-64 processors can be maximally set to 9223372036854775807 instead of 2147483647 in the Virtuozzo Containers 32-bit version. To learn more about the difference between the Virtuozzo Containers 64-bit and 32-bit versions turn to the [Virtuozzo Containers for 64-bit Processors](#) section of the [Parallels Virtuozzo Containers User's Guide](#).

The information on the available parameters is presented in the table with the following columns:

Column Name	Description
Parameter	The name of the resource parameter.
Limited	If this checkbox is cleared, the limits on the corresponding resource are not set for the Container.
 Limit	The limit on the consumption of the given resource by the Container. The units in which the limit is measured are specified in the Units column.
 Soft Limit	The limit on the consumption of the given resource by the Container that can be exceeded only if the system is not fully loaded. The units in which the limit is measured are specified in the Units column.
 Hard Limit	The limit on the consumption of the given resource by the current Container that cannot be exceeded under any circumstances. The units in which the limit is measured are specified in the Units column.

Units	The units in which the resource values are measured.
Description	The description of the resource parameter.

 The **Memory Management Configuration** group lets you choose the way of managing memory-related resource of the Container that will be based on this sample:

- The **Old-style UBC resource management** option tells the system to use all those fine-grained parameters for system resources allocation that have always been part of the Virtuozzo traditional resource management.
- The **SLM-only resource management** option allows you to reduce a set of memory-related parameters to a single `slmmemorylimit` parameter, which essentially denotes the amount of RAM the given Container is allowed to use.
- The **Use both UBC and SLM simultaneously** option validates both of the schemes above for putting restrictions on the usage of system resources by the Container.

Note: This group of options is displayed only if SLM is globally enabled on the Hardware Node.

 You can use the **Validate** button at the foot of the page to display if any constraint violations (p. 40) have been found and learn the corresponding constraints on the resource management parameters.

If you have entered new values for one or several resource parameters and then decided to change them to the default values from the Container sample, you can reset the new values by clicking the curved arrow against the corresponding parameter(s).

After you have customized the Container parameters and checked their interdependencies, click **Next**.

Choosing Applications

On the fifth page you can choose one or more applications that will be automatically added to the Container created from the current sample configuration. All applications available on your Hardware Node are listed in the **Available Applications** table in the left part of the displayed page. The number of applications vary depending on the OS template the Container will be based on, i.e. only those applications are displayed that are compatible with the given OS template.

To add any applications to the Container sample, tick the checkboxes opposite the applications in the **Available Applications** table and click the **>>** button. After that, the applications appears in the **Included Applications** table in the right part of the page. Ticking one or several checkboxes opposite the corresponding applications in the **Included Applications** table and clicking the **<<** button removes the applications from the Container sample.

After you have selected the applications to be added to and/or removed from the Container sample, click the **Next** button.

Note: This window is displayed only if you have chosen the OS template (on the first page of the wizard) the Container sample will be based on.

Reviewing Container Sample Configuration

The last screen of the **New Container Sample** wizard lets you review all the data you provided on the previous steps. If you are satisfied with the entered information, click **Submit** to start creating the Container sample. Otherwise, you can return to the previous steps by clicking the **Back** button and change the corresponding parameters.

Creating New Container Sample by Splitting Hardware Node

 It is possible to create a Container configuration file that roughly represents a given fraction of the Hardware Node. Splitting the Hardware Node allows you to share your Hardware Node resources equally between a certain number of Containers based on this configuration file. You may use the option to create identical Containers on your Hardware Node and distribute the resources available on a fair basis between them. Or you can simply benefit from it to easily create a new Container sample with a certain share of the Node resources to use it later for one or more Containers. A special two-step **Splitting Hardware Node** wizard will guide you through the process.

Specifying General Parameters

 On this page of the **Splitting Hardware Node** wizard, you are asked to set the general parameters for the Container sample being created. Please enter the relevant information into the following fields:

Section	Field Name	Information to Provide
Hardware Selection	Node Hardware Node	Select the Infrastructure Manager Node you want to split.
Container Configuration	Sample Name (required)	The name of the Container sample you are going to create by splitting your Hardware Node.
	Description (optional)	Any relevant additional information about the sample that may be helpful to identify the sample at once.
Number of Containers	Number (required)	The number of Containers among which you want to divide the Node resources.

The 'offline management', 'starting Container on the Hardware Node boot' and 'choosing OS template' parameters are disabled by default. However, you can switch on these options later on for the Container created and edit its name and description (p. 239).

Checking Container Sample Resource Parameters

 The **Split Hardware Node: Final** page allows you to review the resource parameters that are going to be allotted to the Container sample being created. The resources are grouped by their relations to five computer subsystems: **CPU Parameters**, **Disk Quota**, **Primary System Parameters**, **Secondary System Parameters** and **Auxiliary System Parameters**. Information on the Container parameters is presented in the table with the following columns:

Column Name	Description
Soft Limit	The limit on the consumption of the given resource by the Container that once reached or exceeded can lead to grave problems inside the Container. Depending on the considered parameter, either some process might be killed at any time in the Container, or the next resource allocation request might be refused to it. However, the Container is allowed to temporarily exceed its quota soft limit for the Disk Space and Disk Inodes resources without any damage to the Container processes for the grace period, set in the <code>quotatime</code> parameter in the Disk Quota table.
Hard Limit	The limit on the consumption of the given resource by the current Container that cannot be exceeded in any circumstances.
Units	The units in which the value of the Soft Limit and/or Hard Limit column is measured.

Detailed information on all resources is provided in the **Customizing Resources Settings** section (p. 229).

To edit the resource parameters values that do not meet your demand, go **Back** to change the number of Containers you have split your **Hardware Node** into. If you are satisfied with the resources allocation, click **Submit** to initiate the creation of the Container sample with the parameters you have set and reviewed.

Note: Later on, you can configure any of the resource parameters of the newly created Container sample.

Operations on Container Samples

You may want to list the Container samples that are currently available on any of the **Hardware Nodes** registered in **Infrastructure Manager**. The whole list of Container samples (p. 225) present on your **Hardware Nodes** is given in the **Container Samples** table on the **Container Samples** page:

Column Name	Description
Name	The name of the Container sample.
Platform	The platform (Linux or Windows) on which the Node storing the sample is based and the type of Container that can be created on base of this sample.

Architecture	The microprocessor architecture of the Node where the sample is stored.
Description	The explanatory text intended to help users understand the Container sample purpose or to provide additional information on it.
OS Template	The operating system the Container sample is based on.

 Parallels Infrastructure Manager allows you to download any Container sample from your Hardware Node onto your computer. Downloading a Container sample may come handy when you need to forward the Container sample file by email or other network means or upload the sample onto another Hardware Node. Clicking the diskette icon in the **Save** column opposite a sample saves it as a text file on your hard disk.

To edit a sample, click its name in the **Name** column.

To facilitate working with Container samples, you may have the **Container Samples** table display only those Container samples that have the corresponding name or a certain word in their comment. On top of the table, click the **Show Search** link to display the fields where you can specify the parameters your Container sample should meet; then click on the **Search** link. To view all available Container samples, click on the **Show All** link to the right of the parameter fields. By default, 20 Container samples are listed, but you may have more/less Container samples displayed by clicking the corresponding link above the table. You can have Parallels Infrastructure Manager display only those parameters you need at the moment. To show or hide certain columns, click the **Select Columns** link and select the parameters you want to be displayed or clear those you do not.

The Parallels Infrastructure Manager toolbar buttons this screen loads are placed there to let you quickly perform the following operations.

- to create a new sample, click **New** and select **Sample**;
- to upload a Container sample onto your Hardware Node from the computer running the current Infrastructure Manager session as a text file, click **Upload**;
- to create a new sample by dividing the Hardware Node resources by a specified number of Containers, click the **Split Hardware Node** link;
- there can be situations when the existing Container sample does not fully satisfy your requirements. In this case Infrastructure Manager provides you with the opportunity to quickly create a new Container sample that will inherit all the properties of the Container sample installed on the Hardware Node. After that, you can adjust its properties to meet your demands. To this effect, select the checkbox opposite the corresponding Container sample and click **Clone**.
-  to set a Container sample to be used as the default basis for creating a new Container, select the checkbox opposite the corresponding Container sample and click the **Set as default** button.
- to delete those Container samples that are not needed any more, select the checkboxes next to the corresponding Container samples and click **Delete**.

If you are planning to have users contacting you for Containers to be created on their personal requests, click **Workflow** on the Infrastructure Manager left menu and open the screen where you can enable or disable the Container requesting and choose the Container samples you want to be available for Containers requests.

Uploading Container Sample on Hardware Node

Parallels Infrastructure Manager enables you to upload and install Container samples on your Hardware Node. In case you have one or more new Container samples that you would like to install on your Hardware Node, you should first have these files accessible from the computer where Parallels Infrastructure Manager is launched (e.g. insert the CD-ROM with the Container samples into the computer CD-ROM drive or copy the samples to the computer hard disk) and then open the **Upload Container Sample** page.

To install a new Container sample on your Hardware Node, click the **Browse** button next to the **File** field and provide the right path to the text file with the sample (i.e. the path on the computer where Infrastructure Manager is running), provide the sample name in the **Name** field (it will be further displayed in the Container samples listings), and then click **Submit**.

Editing Container Sample

The **Container Sample** dashboard allows you to edit the given Container sample in the following ways:

- change the name, the description, and the operating system of the current Container sample;
- change the operating system, or its version run by the current Container sample;
- define Container sample network settings;
- adjust resource parameters for the Container sample;
- specify if the Container based on the given Container sample should start on the Hardware Node boot;
- enable/disable the offline management for any Container based on the given Container sample;
-  add applications and remove them from the Container sample.

Detailed information on the selected Container sample is presented in the **Sample Summary**, **Global Network**, **Routed Network** and **Bridged Network** tables:

Sample Summary

Column Name	Description
Name	The name of the Container sample.
Description	The description of the Container sample.
Platform	The platform (Linux or Widows) on which the Node storing the sample is based and the type of Containers that can be created on base of this sample.
OS Template	The operating system the Container sample is based on.

 **Memory Management Mode** The memory management mode that will be used inside the Container based on this sample. To learn more about memory management configuration, read the **Customizing Resources Settings** subsection. (p. 241)

Applications Included All applications included in the Container sample.

Global Network

Column Name	Description
 DNS Servers	One or more DNS servers that the Container based on this sample is supposed to use. For Linux-based Containers, all the DNS servers are common for all the Container virtual adapters.
Search Domains	The list for hostname lookups.

Routed Network

Column Name	Description
Status	The status of the routed network settings. In the routed mode, the Container uses the Hardware Node physical adapter as the default gateway to send and receive data to/from other networks.
 DNS Servers	One or more DNS servers that the Container based on this sample is supposed to use. In Windows-based Containers, each virtual adapter can have its own DNS server.

Bridged Network

Column Name	Description
Status	The status of the Container sample bridged network settings. In the bridged mode, the Container can be connected to any of the Virtual Networks existing on the Hardware Node and joined thru them to external networks.
Virtual Network	The Virtual Network the Container based on this sample will be connected to.
IP Allocation	Shows whether IP addresses for bridged interfaces of the Container based on this sample will be leased from an IP addresses pool, or assigned by a DHCP server (or servers).
 DNS Servers	One or more DNS servers that the Container based on this sample is supposed to use. In Windows-based Containers, each virtual adapter can have its own DNS server.

To have the sample saved on your computer as a text file, click **Download** on the Infrastructure Manager toolbar.

Configuring Container Sample General Settings

The **General Settings** page enables you to change Container sample basic properties.

In the **General** group, you can:

- Change the name of the Container sample it will be referred to by typing a new name in the **Name** field. This name will be displayed in the **Container Sample** and **Container Summary** tables.
- Edit the description of the Container sample in the **Description** field. The information entered in the field will be provided in the **Container Samples** and **Container Summary** tables.
- Change the operating system or its version the Container sample is based on. This change will be reflected in the **Container Sample** and **Container Summary** tables.

The **Advanced** group allows you to make the Container that will be based on this Container sample automatically start on the Hardware Node boot.

The **Offline Management** group allows you to set the offline management options by selecting the appropriate radio button. Offline management settings ensure the manageability of the Container based on this sample by means of one or more offline services from any browser at its own IP address. After offline management is enabled for the Container, one port of its IP address becomes permanently active whatever the Container state. The currently supported services are `vzpp` and `plesk` (for managing Containers with the Plesk control panel installed in them). You can:

- Disable the offline management of the Container based on this sample.
- Enable the offline management of the Container based on this sample via the offline management settings operating on the Hardware Node. Whenever you need to manage the Container offline, its offline management settings will be brought into synchronization with those in effect on the Node. Should any service be removed from the default services list, the Container will be unable to be managed via the service off the list. This option subscribes the Container to the default offline services.
- Manually compose the Container offline services list. You can select the service(s) you would like the Container based on this sample to be subscribed to in the corresponding checkbox(es).

After you have made the necessary changes, click **Submit**.

Defining Container Sample Network Settings

On the screen opened after clicking the **Network** tab, you can change the default network settings which will be active for all the Containers you will create on the base of the sample you are configuring.

- In the **Global Network** section you can assign a search domain and  a DNS server IP address to the Container sample. These IP addresses will be used by the Container based on this sample regardless of whether it is on a bridged network or depends on the host Node network interface.
-  Indicate one or more DNS servers that the Container based on this sample is supposed to use in the **DNS Server IP Address** field or leave it blank. Use the  or  icons to add/remove the DNS servers IP addresses accordingly. For Linux-based Containers, all the DNS servers are common for all the Container virtual adapters. Note that the static values in these fields might be overridden if the Container gets the DNS servers from the DHCP server when operating in the bridged network mode.
- Define a list for hostname lookup in the **Search domain** field. Use the  or  icons to add/remove the lookup parameters for the Container. The search list is normally determined by the domain name(s); by default, it contains the local domain name(s) only. You can also add external domain names for a particular Container. A search query is performed by attempting to use each item in the list in turn until a match is found. Note that this process may be slow and may generate a lot of network traffic if the servers for the listed domains are not local, and that the query might time out if no server is available for one of the domains. Note also that the static values in these fields might be overridden if the Container gets the search domains from the DHCP server when operating in the bridged network mode.
- To set the Container based on this sample to be connected to the host Node NIC by the agency of the `venet0` virtual adapter, select the check-box next to the **Routed Network** section. This adapter will be assigned an IP address taken from the IP pool (p. 154).

 You can specify the following parameters for a routed network adapter:

- Indicate one or more DNS servers that the Container based on this sample is supposed to use in the **DNS Server IP Address** field or leave it blank. Use the  or  icons to add/remove the DNS servers IP addresses accordingly. In Windows-based Containers, each virtual adapter can have its own DNS server.
- Specify one or more WINS servers that the Container based on this sample is supposed to use in the **WINS Server IP Address** field or leave it blank. Use the  or  icons to add/remove the WINS servers IP addresses accordingly.
- Selecting the **Bridged Network** checkbox connects the Container based on this sample to the Virtuozzo bridged network through a virtual interface. Multiple virtual interfaces are possible per Container and can be added by clicking the **Add New Interface** link in this section. When a Container is provided with a virtual interface and is connected to a bridged network, its in- and outbound traffic is processed by the bridge of the Virtual Network to be selected in the **Connect to** field. In case no Virtual Networks has been created as yet, click **Network** on the Infrastructure Manager left menu, select the **Virtual Networks** subtab, and click the **New Virtual Network** link.

You can specify the following parameters for a bridged network adapter:

- The **IP Address Allocation** drop-down menu lets you choose whether the IP addresses for bridged interfaces will be leased from an IP addresses pool or assigned by a DHCP server (or servers).
-  Indicate one or more DNS servers that this Container is supposed to use in the **DNS Server IP Address** field or leave it blank. Use the  or  icons to add/remove the DNS servers IP addresses accordingly. Note that the static values in these fields might be overridden if the Container gets the DNS servers from the DHCP server when operating in the bridged network mode.
-  Specify one or more WINS servers that the Container based on this sample is supposed to use in the **WINS Server IP Address** field or leave it blank. Use the  or  icons to add/remove the WINS servers IP addresses accordingly.
- Enter the default gateway IP address if the Container based on this sample is not supposed to use a DHCP server.

After you have provided the necessary information, click the **Submit** button.

Customizing Resources Settings

On the **Configure Resources** page you can manage the resource parameters for the currently selected Container sample.

The CPU-related resource management is based on the following parameters:

Parameter	Description
cpuunits	This is a positive integer number that determines the minimal guaranteed share of the CPU time your Container will receive.
cpulimit	This is a positive number indicating the CPU time in percent the corresponding Container is not allowed to exceed.
 burst_cpulimit	The CPU power limit, in percent, the Container cannot exceed. The limitations set in this parameter are applied to the Container when it exceeds the limit specified in the <code>burst_cpu_avg_usage</code> parameter.
 burst_cpu_avg_usage	The CPU usage limit, in percent, set for the Container. This limit is calculated as the ratio of the current Container CPU usage to the CPU limit (i.e to the value of the <code>CPULIMIT</code> parameter) set for the Container. If the limit is not specified, the full CPU power of the Hardware Node is considered as the CPU limit. Upon exceeding the <code>burst_cpu_avg_usage</code> limit, the <code>burst_cpulimit</code> limit is applied to the Container.
 cpuguarantee	This is a positive integer number indicating the CPU time, in percent, the corresponding Container is guaranteed to receive. If both the <code>cpuguarantee</code> and <code>cpuunits</code> parameters are set, the <code>cpuguarantee</code> parameter is first taken into account when distributing processor(s) time among the Containers existing on the Node; the remaining CPU time, if any, is given to the Containers in accordance with the value of the <code>cpuunits</code> parameter.
cpus	The number of CPUs set to handle all the processes inside the given Container. By default, any Container is allowed to consume the CPU time of all processors on the Node.

The disk-related resource management is based on the following parameters:

Parameter	Description
diskspace	Total size of disk space consumed by the Container.  When the space used by the Container hits the soft limit, the Container can allocate additional disk space up to the hard limit during the grace period indicated by the <code>quotatime</code> parameter value.
 diskinodes	Total number of disk inodes (files, directories, and symbolic links) allocated by the Container. When the number of inodes used by the Container hits the soft limit, the Container can create additional inodes up to the hard limit during the grace period indicated by the <code>quotatime</code> parameter value.
 <code>quotauidlimit</code>	Number of user/group IDs allowed for the Container internal disk quota. If set to 0, UID/GID quota will not be enabled.
 <code>quotatime</code>	The grace period for the disk quota overusage defined in seconds. The Container is allowed to temporarily exceed its quota soft limits for no more than the <code>QUOTATIME</code> period.
 <code>ioprio</code>	The Container priority for disk I/O operations. The allowed range of values is 0-7. The greater the priority, the more time the Container has for writing to and reading from the disk. The default Container priority is 4.

The memory-related resource management parameters are divided into 4 groups: memory parameters, primary system parameters, secondary system parameters, and auxiliary system parameters.

 Windows-based Containers use only the primary system parameters.

 For Linux-based Containers, this screen displays the memory-based, or the system-based, or both memory- and system-based Container resources data, depending on your memory management configuration:

- If the memory management mode is enabled for the Container, it can be allocated memory in much the same way as a certain amount of physical memory is installed on a physical computer. This is the recommended mode for managing Containers for most administrators.
- If the system management mode is enabled, the Container's performance depends on the values of quite a number of fine-grained parameters. The primary parameters are the starting point for defining the relative power of a Container. The secondary parameters are dependent on the primary ones and are calculated from them according to a set of constraints. The auxiliary parameters help improve fault isolation among applications in a Container and the way applications handle errors and consume resources.
- If both resource management modes are used, the more restrictive value is taken into account each time the system makes the decision whether to allocate this or that resource to the Container.

 *Memory parameters*

Parameter	Description
<code>slmmemorylimit</code>	An approximation of the size of the physical memory allocated to the Container. In other words, the Container performance is similar to the performance of a physical computer with as much physical memory installed as is indicated in this parameter.

Primary system parameters

Parameter	Description
numproc	The maximal number of processes the Container may create.
 numsessions	The number of simultaneous terminal sessions that can be opened to the Container.
 vprvmem	The size of private (or potentially private) memory allocated by the Container. The memory that is always shared among different applications is not included in this resource parameter.
 numtcpsock	The number of TCP sockets (PF_INET family, SOCK_STREAM type). This parameter limits the number of TCP connections and, thus, the number of clients the server application can handle in parallel.
 numothersock	The number of sockets other than TCP ones. Local (UNIX-domain) sockets are used for communications inside the system. UDP sockets are used, for example, for Domain Name Service (DNS) queries. UDP and other sockets may also be used in some very specialized applications (SNMP agents and others).
 vmguarpages	The memory allocation guarantee, in pages. Container applications are guaranteed to be able to allocate additional memory so long as the amount of memory accounted as privvmpages (see the auxiliary parameters) does not exceed the configured barrier of the vmguarpages parameter. Above the barrier, additional memory allocation is not guaranteed and may fail in case of overall memory shortage.
 avnumproc	The average number of processes and threads.

 *Secondary system parameters*

Parameter	Description
kmemsize	The size of unswappable kernel memory allocated for the internal kernel structures for the processes of a particular Container. Note: For the Virtuozzo Containers 64-bit version for IA-64 processors, it takes 4 (four) times more the size of the kernel memory than that for the Virtuozzo Containers 32-bit version to handle one and the same process.
tcpsndbuf	The total size of send buffers for TCP sockets, i.e. the amount of kernel memory allocated for the data sent from an application to a TCP socket, but not acknowledged by the remote side yet.
tcprecvbuf	The total size of receive buffers for TCP sockets, i.e. the amount of kernel memory allocated for the data received from the remote side, but not read by the local application yet.
othersockbuf	The total size of UNIX-domain socket buffers, UDP, and other datagram protocol send buffers.
dgramrecvbuf	The total size of receive buffers of UDP and other datagram protocols.
oomguarpages	The out-of-memory guarantee, in pages. Any Container process will not be killed even in case of heavy memory shortage if the current memory consumption (including both physical memory and swap) does not reach the oomguarpages barrier.

`privvmpages` The size of private (or potentially private) memory allocated by an application. The memory that is always shared among different applications is not included in this resource parameter.

 *Auxiliary system parameters*

Parameter	Description
<code>lockedpages</code>	The memory not allowed to be swapped out (locked with the <code>mlock()</code> system call), in pages.
<code>shmpages</code>	The total size of shared memory (including IPC, shared anonymous mappings and tmpfs objects) allocated by the processes of a particular Container, in pages.
<code>numfile</code>	The number of files opened by all Container processes.
<code>numflock</code>	The number of file locks created by all Container processes.
<code>numpty</code>	The number of pseudo-terminals, such as an ssh session, screen or xterm applications, etc.
<code>numsiginfo</code>	The number of siginfo structures (essentially, this parameter limits the size of the signal delivery queue).
<code>dcachesize</code>	The total size of dentry and inode structures locked in the memory.
<code>numiptent</code>	The number of IP packet filtering entries.

Notes: The parameters containing "pages" in their names are measured in 4096-byte pages in the Virtuozzo Containers 32-bit version and in 16384-byte pages in the Virtuozzo Containers 64-bit version for IA-64 processors.

In the Virtuozzo Containers 64-bit versions, all the system parameter values are 64-bit and, therefore, can exceed the values in the Virtuozzo Containers 32-bit version (where the parameters values are 32-bit). For example, the limit of the `oomguarpages` parameter in the Virtuozzo Containers 64-bit version for IA-64 processors can be maximally set to 9223372036854775807 instead of 2147483647 in the Virtuozzo Containers 32-bit version. To learn more about the difference between the Virtuozzo Containers 64-bit and 32-bit versions turn to the [Virtuozzo Containers for 64-bit Processors](#) section of the [Parallels Virtuozzo Containers User's Guide](#).

The information on the available parameters is presented in the table with the following columns:

Column Name	Description
Parameter	The name of the resource parameter.
Limited	If this checkbox is cleared, the limits on the corresponding resource are not set for the Container.
 Limit	The limit on the consumption of the given resource by the Container. The units in which the limit is measured are specified in the Units column.
 Soft Limit	The limit on the consumption of the given resource by the Container that can be exceeded only if the system is not fully loaded. The units in which the limit is measured are specified in the Units column.
 Hard Limit	The limit on the consumption of the given resource by the current Container that cannot be exceeded under any circumstances. The units in which the limit is measured are specified in the Units column.

Units	The units in which the resource values are measured.
Description	The description of the resource parameter.

 The **Memory Management Configuration** group lets you choose the way of managing memory-related resource of the Container that will be based on this sample:

- The **Old-style UBC resource management** option tells the system to use all those fine-grained parameters for system resources allocation that have always been part of the Virtuozzo traditional resource management.
- The **SLM-only resource management** option allows you to reduce a set of memory-related parameters to a single `slmmemorylimit` parameter, which essentially denotes the amount of RAM the given Container is allowed to use.
- The **Use both UBC and SLM simultaneously** option validates both of the schemes above for putting restrictions on the usage of system resources by the Container.

Note: This group of options is displayed only if SLM is globally enabled on the Hardware Node.

 You can use the **Validate** button at the foot of the page to display if any constraint violations (p. 40) have been found and learn the corresponding constraints on the resource management parameters.

If you have entered new values for one or several resource parameters and then decided to change them to the default values from the Container sample, you can reset the new values by clicking the curved arrow against the corresponding parameter(s).

After you have customized the Container parameters and checked their interdependencies, click **Submit**.

Adding Applications to Samples

On the **Applications Templates** page, you can choose those applications that will be included in the corresponding Container sample. These applications will be automatically installed in all the Containers created on the basis of this Container sample.

All available applications that can be added to the Container sample are listed in the **Available Applications** table in the left part of the displayed page. To add any of them to the Container sample, tick the checkboxes opposite the applications you wish to add and click the **>>** button. After that, these applications appear in the **Included Applications** table in the right part of the page.

At the same time, you may want to exclude one or several applications from the Container sample which, you are sure, will be of no use to you. To remove any application from the Container sample, tick its checkbox in the **Included Applications** table in the right part of the **Applications** page and click on the **<<** button.

After you have selected the application(s) to be added to or removed from the Container sample, click on the **Submit** button.

Maintaining Virtuozzo Infrastructure

The Management dashboard is divided into the following sections:

- **Workflow.** The links here lead to the screen, **Workflow**, as well, where you may check the pending Container requests list (the **Manage Container requests** link) and set Container requesting options (the **Configure workflow** link).
- **Scheduler.** The **Manage scheduled operations** link opens the screen where you can set certain Containers to be backed up or restarted according to your timetable.
- **Alerts and Events.** Follow these links to see the Container resources consumption dynamic reflected in alerts signs (**View alerts log**) and changes in Container statuses (**View events log**).
- **Tasks.** The **View tasks log** link opens the screen listing operations that both have already been and are still to be completed.
- **Updates.** The **Update Virtuozzo software** link displays the Infrastructure Manager screen where you can select the Hardware Node and update its Virtuozzo Containers installation.
- **Support.** The **Report a problem** link opens the wizard that helps you send the details of a technical issue to the Parallels support team. The **Look up Parallels Infrastructure Manager error descriptions** link opens the one displaying the details of a certain error that occurred during a Infrastructure Manager session and a standard way to fix it. To quickly have the path to a screen of which you know only the ID or the name, click **Find the screen by its ID**. The **Download files and documentation** link leads to the screen where you may obtain the Virtuozzo documentation and software.

In This Chapter

Provisioning Containers	247
Updating Virtuozzo Software	251
Scheduling Regular Backups	258
Monitoring Operations and Viewing Logs.....	265
Getting Support	270

Provisioning Containers

Requesting Containers is a self-service oriented feature that allows a maximum control over the process of granting internal clients access to Containers by the Hardware Node administrator while taking him/her a minimum effort to participate in the process. Container requesting enables enterprise Node administrators deliver Containers to internal clients and plan the Hardware Node resources expenditures, provides centralized management, administration and security of Containers usage across the enterprise network and ensures end-to-end monitoring, analysis and reporting of the whole process of requesting and granting Containers within an enterprise. Container requesting is a role-based administration feature which helps the Node administrator to interactively create and assign thousands of Containers to any number of users. Some part of the work to be done is entrusted to users. Here is a stereotyped requesting scenario.

Scenario: A client requests a Container using the login the Node administrator previously provided him with.

- 1** A client places a Container request. S/he selects a Container sample for the Container s/he requests, enters a password to access the Container s/he requests and leaves comments for the administrator.
- 2** The placement of the request launches generating and sending the Node administrator an email informing of the fact.
- 3** When informed, the Node administrator checks the list of placed requests and accepts or declines the request.
- 4** Both accepting and declining sends the client an email informing him/her whether the placed request has been accepted or not.
- 5** The client checks the list of the requests s/he placed. Has the Node administrator carried out the request, the corresponding Container is ready to be used.

The settings and steps necessary for this scenario are:

- 1** To allow the clients to place Container requests, the Node administrator enables the Container Requesting and sets (p. 209), or creates the users roles (p. 204) reserved for those clients who are suggested to request Containers. These roles must include the privilege to request Containers.
- 2** To exchange Container request emails with clients, the Node administrator enables the email notification (p. 171).
- 3** To check the list of Container requests, the Node administrator follows the direction given in the Container Requests subsection (p. 249).
- 4** To process a request, the Node administrator selects the request and follows the direction given in the Viewing and Processing Pending Requests subsection (p. 250).

Setting Up Container Requesting

As a Hardware Node Administrator, you have the privilege to carry out the users requests for creating more Containers for them to manage. To have this option in effect, use the following options on the **Setup** tab (accessible by following the **Workflow** link in the **Management** group on the left Infrastructure Manager menu):

- 1** to make it possible to request Containers, select the **Enable Container Requests** check button in the **General** group.
- 2** In the **Container Samples** table, select one or more Container configuration samples (p. 225) which users requesting a Container will be able to choose for their Container creation. To this effect, select the corresponding template name(s) in the **Container Samples** table and click the **>>** button.
- 3** The **Container Owner Default Role** menu further defines the future users' administrative privileges they will have in respect of the Container that will be possibly created for them. On this menu you will find roles that either have been previously created or are built-in. The built-in roles are:
 - Administrator;
 - Node Administrator;
 - Helpdesk;
 - Container Administrator;
 - Plesk Administrator;
 - Workflow User;
 - PIM User;
 - Power Panel User.

Each of these roles covers a certain number of tasks supposed to be routinely performed on the Hardware Nodes registered in Parallels Infrastructure Manager and/or the Containers residing on them.

- 4** the **Hostname Input** option allows you to define whether entering the future Container hostname, when making a Container request, is:
 - required (select **Visible, Required** from the **Hostname Input** drop-down menu);
 - impossible (select **Hidden**);
 - optional (select **Visible, Optional**).

To save the changes, click **Submit**, to discard the changes, click **Cancel**.

After you have enabled Container requests and set up their properties, Containers can be requested by Infrastructure Manager users by following the **New Container Request** link on the **Container Requests** page. However, for the user to be able to request a Container in this way, they should have the **Workflow User** role defined globally in Infrastructure Manager (p. 222).

Checking Container Requests

If you are logged in to Parallels Infrastructure Manager with the necessary permissions and want to check the Container requests submitted by Infrastructure Manager users, the **Workflow** screen lists the pending and fulfilled requests arranged as the following table:

Column Name	Description
Posted	The date of placement of the request.
Owner	The username of the user for whom the Container is requested.
Status	Informs you if the request has been processed.
Container	If there is a Container ID, the request processing has been started, otherwise it has not.
Container Sample	The sample the requested Container is or will be based on.
Container Hostname	Either entered by the user when requesting the Container or assigned by the Hardware Node administrator when creating the requested Container. This column is shown in the table only if the Containers hostnames can be entered by the users requesting these Containers.

To create a requested Container or further process a request, click the link with the date of placement.

To delete a request from the list, select the corresponding checkbox and click **Reject Requests** on the Infrastructure Manager toolbar.

Processing Container Request

To have more detailed information on a Container request which has been or can be processed, consider the following information:

The **Request Details** section shows:

- the date of placing the request;
- the current status of the request, i. e. whether it has already been processed or not;

The information about the user who requested the Container is displayed in the **Owner Details** section:

- the user's name and email.
- the IP address of the computer used to place the request;

The **Container Configuration** section contains:

- the Container ID (displayed if entered when the request was placed by the user or assigned by the Node administrator);
- the Container hostname (displayed if entered by the user when requesting the Container or by the Node administrator when processing the request);
- the Container sample the requested Container will be or has been based on;

In the **Description** section you may read the comments the user has left for you, if any.

If you are checking a request you have not yet processed and going to create the requested Container, click the **New Container** button; otherwise, click **Reject Request**. The rejected request is deleted from the requests list. If you decided to create the requested Container, the following steps will be those described in the **Creating New Container** chapter.

The **Reopen Request** option allows you to further manage the accepted requests, which may be needed when:

- You have started creating the requested Container and the process hung;
- You have handed the created Container over to another user (by means of the Security Manager). In this case you will need this request to stop being misleadingly displayed in the list of Container requests related to the former user. To this effect, reject the request after reopening it, which will eliminate the invalid relation between the user and the Container. The created Container will be left intact.
- Errors during the creation of the Container rendered the Container non-functional. To create the Container anew, the corresponding request has also to be rejected after reopening.

Updating Virtuozzo Software

Parallels Infrastructure Manager provides a GUI update management instrument for updating your Virtuozzo Containers software. You can find out whether there are available updates. You can query your current Virtuozzo software to determine its current update level. And you can install such updates as:

- kernel updates;
- new Virtuozzo Containers releases;
- new or updated Virtuozzo command-line utilities;
- OS template updates;
- application template updates.

To install kernel updates, new Virtuozzo releases and Virtuozzo utilities, go to a Hardware Node dashboard and click **Manage -> Software Updates** on the Infrastructure Manager toolbar; to update OS/application templates on your Node, click additionally the **Template Updates** tab.

Updating System Software

You might have access to the latest updates for the Virtuozzo Containers software installed on your Node by means of an Parallels web repository or any other place. On the **Virtuozzo Updates** tab of the **Software Updates** screen you can check if there are available updates for your installation and, if necessary, apply them. As soon as this page opens, Virtuozzo starts checking for available updates. The updates search is performed if:

- it has never been performed before;
- 24 hours elapsed since the last update check has been performed;
- you are opening this page following a Virtuozzo Containers software update;
- the connection to the update repository was insecure.

And, finally, the Virtuozzo Containers software starts looking for updates if you click the **Check For Updates** button on the Infrastructure Manager toolbar.

Virtuozzo Containers updates can be of three types:

- Virtuozzo Containers release: available only for major Virtuozzo Containers releases, so this kind of update is rather infrequent;
- Virtuozzo Containers core update: latest patches to the Virtuozzo Containers kernel;
- Virtuozzo tools update: latest versions of Virtuozzo command-line utilities.

The **Install New Version** and **Install Updates** buttons on the Infrastructure Manager toolbar let you proceed to the **Install: Review** page, where you can adjust some update parameters and review them. Before deciding on applying this or that update, you can learn more information on it by following the **View Details** link.

Customizing Update Process

Warning: Installing a new major Virtuozzo Containers version involves stopping the vz service on the Hardware Node and, consequently, all the Containers. Be prepared for a certain downtime of all the Containers while your system is being updated.

Updating OS and Application Templates

While the **Template Updates** screen is being loaded, you can see the Virtuozzo Containers software looking for the available updates of the OS and/or application templates of all the Linux distributions Virtuozzo supports. The updates search is performed if:

- it has never been performed before;
- 24 hours elapsed since the last update check has been performed;
- you are opening this page following a Virtuozzo Containers software update;
- the connection to the update repository was insecure.

And, finally, the Virtuozzo Containers software starts looking for updates if you click the **Check For Updates** button on the Infrastructure Manager toolbar. After the checking procedure is over, its results are displayed in two sections: the first one tells you the exact time of the last update check and the second lists the available updates, the number of which is given in brackets at the end of the name of the section, **Available Template Updates**.

Note: To obtain the information on the templates updates, the Virtuozzo Containers software establishes connection with the update repository. If the connection fails, it tells you that **Virtuozzo cannot check for template updates now**, the notice being displayed instead of the **Available Template** section. In this case, you can check the connection with the update repository: follow the advice to **Please check the repository settings** below to open the page where you can configure these settings.

The information on the available templates in this section is organized in the following way:

The first item in the list is the OS templates updates followed by the application templates updates down the list. The number of the updates is shown in brackets. The number of "new" updates corresponds to the number of templates not installed on the Hardware Node at the moment of the updates check and the number of "updates" per se is how many template updates you can download from the Virtuozzo update repository to the Hardware Node. The latter number is reversely dependent on the former: if you do not have a certain template installed on the Node, there are no updates available for this template. If you click the **OS Templates** item, it expands into the list of the OS templates updates and each of them, when expanded, provides you with the information about this template. Similarly, to have the list of application templates updates, click the **Applications for ...** item and then the application short description to learn what this application is used for and the features it includes.

If you want to install anything from the updates list, click the **Install Updates** button.

Choosing Updates

If you decided to install some OS/application template(s) update(s) on the Hardware Node and pressed the **Install Updates** button on the **Template Update** screen, this opens the **Install Updates: Select** screen where you can choose the template updates to be installed. Initially, the updates are presented in the **Templates Updates** group as a list of the names of the Linux distributions supported by the Virtuozzo Containers software. If you need to install some specific packages from an update, click this update name, to first see its version in the yyyy/mm/dd format. This date being the date of the template update creation, you can decide whether you need to update the corresponding template to this version. If it does not tell you much about the update and whether you need its every package, click the update version to expand it into the list of the templates updates for the given Linux distribution, the OS template preceding the application templates. Finally, clicking the **View Details** link under the update name opens a pop-up window where you have an exhaustive information on a template update.

Note: The application templates updates are installed on the Node with the view to be further installed on the Containers based on the OS templates these application templates correspond to. Therefore, if your Node hosts no Containers based on a certain OS template, it does not make much sense to install an update of an application template for this OS template. So, if you select an "OSless" application template update, the corresponding OS template is automatically selected as well to be installed together with this application template update.

After deciding which template updates you need, select the corresponding checkboxes and click the **Next** button to proceed with the installation process.

Installing Updates

On the **Install Updates: Summary** screen you can install the OS and/or application template updates you have selected in the **Install Updates: Select** screen. The summarized information on the updates you are going to install is presented as the following table:

Column Name	Description
Template Name	The name of an OS application or template update which will be installed on the Hardware Node.
Version	The date of the update issue in the yyyy/mm/dd format.
Type	Tells you whether this an OS or application template update.
Description	The name and the version of the Linux distribution for OS template updates and the name, version and/or the sphere of usage for application template updates.

The **Template Name**, **Version** and **Type** items are presented in the A-Z order, reversible by clicking a column name.

To install the updates described in this table, click the **Install** button, which, while installing the updates, will also bring you to the **Template Updates** screen. To return to the **Install Updates: Select** screen, click **Back**. For the log of the updates installation, click the **Tasks** link in the **Management** section on the Infrastructure Manager left menu.

Configuring Access to Update Repository

You are able to configure all the network and security parameters for accessing the Virtuozzo update repository on the **Configure** page opened on clicking the **Configure** button on the **Repository Settings** screen (p. 257). The configurable parameters are dependent on the platform of a particular Hardware Node.

 The following parameters can be set up for a Linux Node:

Parameter	Description
Repository: URL	The URL used for the connection.
Repository: Login	The user name for accessing the update server.
Repository: Password	The password for accessing the update server.
Proxy Server: URL	The proxy server address, if you use this server.
Proxy Server: Login	The user name used by the HTTP proxy server for your authentication.
Proxy Server: Password	The password of the user specified in the Proxy Server: Login field and used for your authentication by the HTTP proxy server.

 The following parameters can be set up for a Windows Node:

In the **Up-to-Date Service** group:

- The **Enable Updates** checkbox, if selected, turns on the Virtuozzo Containers update service on the corresponding Hardware Node, which will ensure this Node will get the latest Virtuozzo Containers updates.
- The **Check for updates** menus let you define the schedule of checking for Virtuozzo Containers updates.
- The **Automatic reboot** checkbox, if selected, authorizes the Virtuozzo Containers update service to reboot the Hardware Node if certain Virtuozzo Containers updates require the Node to be rebooted for their coming into effect.

The **Proxy Server** group allows you to do one of the following:

- Select the **Do not use proxy server** radio button if your Hardware Node does not use a proxy server, i.e. it is directly connected to the Internet.
- Select the **Load Internet Explorer proxy settings** radio button to use your Internet Explorer proxy settings to connect to the Virtuozzo Update Center. This option is selected by default.
- Select the **Specify a proxy server** radio button to use a proxy server differing from the one specified in your Internet Explorer proxy settings to connect to the Virtuozzo Update Center. In this case you should specify the IP address and the port of the proxy server you are going to use to connect to the Internet in the **URL** field and the corresponding credentials in the **Login** and **Password** fields.

In the **Parallels Virtuozzo Containers for Windows 4.0**, **Virtuozzo for Windows Tools 4.0**, **Parallels Management Console 4.0** groups, you should select the update mode for the respective components:

- **Update Mode: Automatic.** Select this option if you wish Virtuozzo Containers updates to be automatically downloaded and installed on your Hardware Node on the schedule you specified above.
- **Update Mode: Download only.** Select this option if you wish the Virtuozzo Containers update service to automatically download the updates in the background of your system on the schedule you specified above.
- **Update Mode: Manual.** Select this option if you wish the Virtuozzo Containers update service to check the Virtuozzo Update Center for available updates on the schedule you specified above and to inform you in case it finds any updates for your Node.
- **Update Mode: Disabled.** Select this option to disable the automatic update of the Virtuozzo Containers software and to manually update your Virtuozzo Containers software on the **Software Updates** screen.
- In the **Repository** section, you can configure the location of the repository storing Virtuozzo Containers updates. By default, the Virtuozzo Update Center accessible at the Parallels web site is used to check for the available Virtuozzo Containers updates (the **Standard location** radio button is selected). However, you can select the **Custom location** check box and specify the URL to another location with Virtuozzo Containers updates. For example, if you have a local VUS server set up in your local network, you can specify the URL of this server to configure the Hardware Node to obtain Virtuozzo Containers updates from your local VUS server. Detailed information on how to deploy a local VUS server is provided in the **Deploying Local VUS Server** section of the **Parallels Virtuozzo Containers User's Guide**.

- The **Download Location** button allows you to modify the folder where Virtuozzo Containers updates are to be downloaded before they are installed on your Hardware Node. By default, the `X:\Program Files\SWsoft\Virtuozzo\Updates` folder is used.

Click **Submit** after you have provided the necessary information to record it and return to the **Repository Settings** tab.

Checking Update Repository Settings

The Virtuozzo Containers software installed on a particular Hardware Node can be updated to the latest versions available from the Parallels updates repository server.

The **Repository Settings** tab of the **Software Updates** screen allows you to check the current settings for reaching the updates repository server. The settings are dependent on the platform of a particular Hardware Node.

 For a Linux Hardware Node, the current URL to the update repository is shown in the **Repository Settings** section. If you are sure the address is right but want to see how it works, click the **Click to test the connection** link in the **Test Connection** section.

 The following parameters are shown for a Windows Node:

In the **Up-to-Date Service** group:

- The **Status** field indicates if the Virtuozzo Containers update service on the corresponding Hardware Node is enabled or disabled. This service ensures that this Node gets the latest Virtuozzo Containers updates.
- The **Check for updates** field defines the schedule of checking for Virtuozzo Containers updates.
- The **Automatic reboot** field indicates if the Virtuozzo Containers update service is authorized to reboot the Hardware Node if certain Virtuozzo Containers updates require the Node to be rebooted for their coming into effect.

The **Proxy Server** group shows what proxy server is set up for the corresponding Hardware Node.

In the **Parallels Virtuozzo Containers for Windows 4.0**, **Virtuozzo for Windows Tools 4.0**, **Parallels Management Console 4.0** groups, the update mode for the respective components is indicated:

- **Update Mode: Automatic.** This setting means that Virtuozzo Containers updates are automatically downloaded and installed on your Hardware Node on the schedule specified above.
- **Update Mode: Download only.** This setting means that the Virtuozzo Containers update service automatically downloads the updates in the background of your system on the schedule specified above.
- **Update Mode: Manual.** This setting means that the Virtuozzo Containers update service checks the Virtuozzo Update Center for available updates on the schedule specified above and informs you in case it finds any updates for your Node.
- **Update Mode: Disabled.** This setting means that the automatic update of the Virtuozzo Containers software is disabled and you have to manually update your Virtuozzo Containers software on the **Software Updates** screen.
- The **Repository** field shows the location of the repository storing Virtuozzo Containers updates.
- The **Download Location** field indicates the folder where Virtuozzo Containers updates are downloaded before they are installed on your Hardware Node.

To edit the update settings, click the **Configure** button.

Scheduling Regular Backups

To automate such a routine maintenance operation as backing up your Containers, use Parallels Infrastructure Manager **Scheduler**.

On the **Scheduler** screen you can create a new task or review the tasks you have already assigned Infrastructure Manager to perform regularly, if any.

The current system date and time for your convenience is displayed on top of the screen.

The existing tasks are displayed in the **Scheduled Tasks** section as the following table:

Column Name	Description
Title	The name of the task.
Description	The description of the task.
Action	The action Infrastructure Manager will perform in the framework of this task.
Container(s)	The Containers to be backed up by the task. If you see the inscription Deleted , the Containers that this task is applied to were deleted from the Node after the task was created.
Next Start	The nearest date and time when the task is to be performed.
Enabled	This column shows the current status of the task.

To filter the tasks by their assigned time spans, statuses, names, and the names of the Containers involved, click the **Show Search** link, enter the necessary searching criteria and click **Search**. To have all the tasks back, click **Show All**. You can have Parallels Infrastructure Manager display only those parameters you need at the moment. To show or hide certain columns, click the **Select Columns** link and select the parameters you want to be displayed or clear those you do not.

- To schedule an operation, click the **New Task** link.
- To run a task immediately, select its checkbox (or the uppermost checkbox to run all the tasks at once) and click **Run Now**.
- To enable or disable a task, select its checkbox (or the uppermost checkbox to enable or disable all the tasks) and click **Enable** or **Disable**.
- To delete a task, select its checkbox (or the uppermost checkbox to delete all the tasks) and click **Delete**.

You can change the timetable of a task and the Containers list it performs on by clicking its name.

Scheduling Backup Task

To back up certain Containers at a certain time, you can schedule a backup with the parameters to be entered on the **New Task: Back Up Containers** screen.

In the **Task Configuration** section, enter the name and the description of the task and indicate if the task is enabled. If you are just drafting a possible task, clear the **Enabled** checkbox.

In the **First Run (or Next Run)** section, specify:

- the time when the task will be launched first;
- the date when the task will be launched first selected from the **Select date** window: to set the task to be run the very day you make these settings, press **Today** at the bottom of the **Select date** pop-up window.

In the **Recurrence Pattern** section, you may set the task to be performed once, or on a daily or weekly basis by selecting the corresponding radio button:

- if you select the **Run once** radio button, the task will be performed at the time and date set in the **First Run** section;
- if you select the **Daily** radio button, this opens the **Repeat Daily** section below where you can set the task to be run:
 - either once in a certain number of days to be entered into the corresponding field (the **Every** radio button);
 - or on working days only (the **Every weekday** radio button);
 - or on weekends only (the **Every weekend day** radio button).
- if you select the **Weekly** radio button, this opens the **Repeat Weekly** section to set over what number of weeks (the **Recur every** field) and what day of week the task will be run;

The **End Date** section is displayed only if the task is to be launched more than once. In this section choose if the task will be:

- repeatedly performed until it is manually disabled, removed or edited (the **No end date** radio button);
- or launched for the first time on the date set in the **Task Details** section and for the last time on the date selected from the **Select date** window next to the **End Date** radio button.

The Containers the task is addressed to can be selected in the **Back up Containers** section. Click the **Add Containers** button and select the Containers you want to perform the task on from the pop-up window. To take a Container out of the list, select it and click the **Remove Selected** button.

In the **Backup Options** section, define the level of compression and the type of the backup:

- On the **Backup Type** drop-down menu, select one of the following types of backup:
 - **Full backup.** This type is recommended when doing a backup job for the first time and contains all the data selected for the backup. A full backup storage space and completion time requirements are the highest.
 - **Incremental backup** affects only those files and data which have changed since the last backup and takes less storage space and creation time.

- Differential backup includes only the data modified since the last full backup. (Whereas a differential backup will save the data changed after *any* last backup, be it a full, incremental, or differential, this is only a *full* backup a differential backup considers to be the last one.)

You can also leave here the default **Use Hardware Node Settings** value. In this case, every Container will be backed up with the default backup parameters (p. 175) of its Hardware Node. To view or set the Hardware Node default backup parameters, select a Hardware Node and click **Configure -> Container Backup Settings** on the top toolbar.

- On the **Compression Level** drop-down menu, choose one of the possible levels:
 - **None**. This level suggests no compression at all and is recommended if you need to perform a fast backup but do not need to save disk space necessary for backups storage;
 - The **normal** level of compression takes a little more time and allows for some disk space saving;
 - While extending the backup creation time, the **high** level of compression saves you even more disk space;
 - The **maximum** compression level means the longest backup creation time and the best backup compression.

Note: It is recommended to choose the backup compression level according to the type of the data the Container stores. The Virtuozzo Containers software will try to compress the backup regardless of the data type, but some data are worth spending time for compression (such as text files and data bases) and some, such as already compressed archives are not. Therefore, select the **None** checkbox when the Container you are backing up stores no data that suggest or need compressing.

You can also leave here the default **Use Hardware Node Settings** value. In this case, every Container will be backed up with the default backup parameters (p. 175) of its Hardware Node. To view or set the Hardware Node default backup parameters, select a Hardware Node and click **Configure -> Container Backup Settings** on the top toolbar.

- On the **Backup Node** drop-down menu, select the Hardware Node that will be used for storing the created backups.

You can also leave here the default **Use Hardware Node Settings** value. In this case, every Container will be backed up with the default backup parameters (p. 175) of its Hardware Node. To view or set the Hardware Node default backup parameters, select a Hardware Node and click **Configure -> Container Backup Settings** on the top toolbar.

The **Exclude** section allows you to keep certain files and directories from backing up:

-  Hidden files;
-  System files;
- Single files or directories. If you do not want to back up a whole directory, type it into the corresponding field; to add more directories to be excluded from the backup, click the plus sign.

Warning!  If you exclude one or more system or hidden files/folders from the Container backup (e.g. either the **Hidden files** or **System files** checkbox is selected), you'll be able to restore only separate files from this backup, but not the Container as a whole.

The **Include** section allows you to limit the backup process with a number of selected files or directories inside the Container. In the field provided, type the absolute path to the file or directory you wish to back up. To include additional files or directories, click the plus icon to the right of an existing path and enter a new path.

The backup will contain only those files and directories that you have indicated in the **Include** section. To back up the whole Container, leave the **Include** section empty.

To save the task configuration, click **Save**, otherwise click **Cancel**.

Managing Maintenance Task

On the screen displaying the details of the task you want to edit, you can perform the following actions with the tasks from your maintenance timetable:

- launch the task immediately, without waiting for its time to come by clicking **Run Now** on the Infrastructure Manager toolbar;
- change the timetable of the task and the list of Container(s) it is to be performed on by clicking **Configure** on the Infrastructure Manager toolbar.

The **Task Details** section displays the following task details:

Field	Description
Title	The name of the task.
Enabled	The current status of the task.
Next start	The nearest date and time when the task is to be performed.
Action	The action Parallels Infrastructure Manager will perform in the framework of this task.
Containers to process	The Container(s) to back up.

If the task has a description, you can also find the **Description** section after the **Task Details** section.

In the **Logged Operations** section you can analyse the information on the last execution of the task.

Changing Maintenance Task

On the **Configure Task** screen you can do the following.

In the **Task Configuration** section, enter the name and the description of the task and indicate if the task is enabled. If you are just drafting a possible task, clear the **Enabled** checkbox.

In the **First Run** (or **Next Run**) section, specify:

- the time when the task will be launched first;
- the date when the task will be launched first selected from the **Select date** window: to set the task to be run the very day you make these settings, press **Today** at the bottom of the **Select date** pop-up window.

In the **Recurrence Pattern** section, you may set the task to be performed once, or on a daily or weekly basis by selecting the corresponding radio button:

- if you select the **Run once** radio button, the task will be performed at the time and date set in the **First Run** section;
- if you select the **Daily** radio button, this opens the **Repeat Daily** section below where you can set the task to be run:
 - either once in a certain number of days to be entered into the corresponding field (the **Every** radio button);
 - or on working days only (the **Every weekday** radio button);
 - or on weekends only (the **Every weekend day** radio button).
- if you select the **Weekly** radio button, this opens the **Repeat Weekly** section to set over what number of weeks (the **Recur every** field) and what day of week the task will be run;

The **End Date** section is displayed only if the task is to be launched more than once. In this section choose if the task will be:

- repeatedly performed until it is manually disabled, removed or edited (the **No end date** radio button);
- or launched for the first time on the date set in the **Task Details** section and for the last time on the date selected from the **Select date** window next to the **End Date** radio button.

The Containers the task is addressed to can be selected in the **Back up Containers** section. Click the **Add Containers** button and select the Containers you want to perform the task on from the pop-up window. To take a Container out of the list, select it and click the **Remove Selected** button.

In the **Backup Options** section, define the level of compression and the type of the backup:

- On the **Backup Type** drop-down menu, select one of the following types of backup:
 - **Full backup**. This type is recommended when doing a backup job for the first time and contains all the data selected for the backup. A full backup storage space and completion time requirements are the highest.
 - **Incremental backup** affects only those files and data which have changed since the last backup and takes less storage space and creation time.

- Differential backup includes only the data modified since the last full backup. (Whereas a differential backup will save the data changed after *any* last backup, be it a full, incremental, or differential, this is only a *full* backup a differential backup considers to be the last one.)

You can also leave here the default **Use Hardware Node Settings** value. In this case, every Container will be backed up with the default backup parameters (p. 175) of its Hardware Node. To view or set the Hardware Node default backup parameters, select a Hardware Node and click **Configure -> Container Backup Settings** on the top toolbar.

- On the **Compression Level** drop-down menu, choose one of the possible levels:
 - **None**. This level suggests no compression at all and is recommended if you need to perform a fast backup but do not need to save disk space necessary for backups storage;
 - The **normal** level of compression takes a little more time and allows for some disk space saving;
 - While extending the backup creation time, the **high** level of compression saves you even more disk space;
 - The **maximum** compression level means the longest backup creation time and the best backup compression.

Note: It is recommended to choose the backup compression level according to the type of the data the Container stores. The Virtuozzo Containers software will try to compress the backup regardless of the data type, but some data are worth spending time for compression (such as text files and data bases) and some, such as already compressed archives are not. Therefore, select the **None** checkbox when the Container you are backing up stores no data that suggest or need compressing.

You can also leave here the default **Use Hardware Node Settings** value. In this case, every Container will be backed up with the default backup parameters (p. 175) of its Hardware Node. To view or set the Hardware Node default backup parameters, select a Hardware Node and click **Configure -> Container Backup Settings** on the top toolbar.

- On the **Backup Node** drop-down menu, select the Hardware Node that will be used for storing the created backups.

You can also leave here the default **Use Hardware Node Settings** value. In this case, every Container will be backed up with the default backup parameters (p. 175) of its Hardware Node. To view or set the Hardware Node default backup parameters, select a Hardware Node and click **Configure -> Container Backup Settings** on the top toolbar.

The **Exclude** section allows you to keep certain files and directories from backing up:

-  Hidden files;
-  System files;
- Single files or directories. If you do not want to back up a whole directory, type it into the corresponding field; to add more directories to be excluded from the backup, click the plus sign.

Warning!  If you exclude one or more system or hidden files/folders from the Container backup (e.g. either the **Hidden files** or **System files** checkbox is selected), you'll be able to restore only separate files from this backup, but not the Container as a whole.

The **Include** section allows you to limit the backup process with a number of selected files or directories inside the Container. In the field provided, type the absolute path to the file or directory you wish to back up. To include additional files or directories, click the plus icon to the right of an existing path and enter a new path.

The backup will contain only those files and directories that you have indicated in the **Include** section. To back up the whole Container, leave the **Include** section empty.

To save the task configuration, click **Save**, otherwise click **Cancel**.

Monitoring Operations and Viewing Logs

Parallels Infrastructure Manager helps the administrator to keep track on every system event and watch the system resources distribution to consider and opportunely take the steps vital for the Containers he manages to work efficiently. To this end, click the **Monitoring Manager** link on the Infrastructure Manager menu and choose the necessary operation(s) from the following options:

Infrastructure Manager is able to display four kinds of logs maintained for the Containers residing on the Hardware Node:

- **Load Statistic.** This log helps you analyse the Hardware Node resources distribution among the Containers to find out which of the Containers on the Hardware Node uses the most of the resources allocated to them.
- **Status Changes.** This log reflects such changes as starting, stopping, rebooting Containers, or mounting them in the repair mode. These changes may have been invoked either through Infrastructure Manager or by other means.
- **Resource Alerts.** This log reflects those states of Containers when they hit limits on some hardware resource. To know more about resources, read the **Monitoring Container Principle Resources** section.

You may view the first three logs by following the corresponding links from the **Monitoring Manager** dashboard. In addition to the options available from the **Monitoring Manager** dashboard, you can display the logs of the actions through the corresponding link on the Infrastructure Manager main menu and the traffic log which allows you to display the network traffic statistics of a Container for a specified period of time. The **Actions** log reflects only those actions related to Container management that were performed by means of Infrastructure Manager. The traffic log is related to a single Container only, so it can be accessed from the corresponding Container dashboard through the **Logs** tab. This tab also provides access to the three other kinds of logs for this particular Container.

You can also monitor the Container operations that are either currently under way or have already been completed by viewing:

- **Active Tasks.** This monitor provides the information on any Container operation currently under way.
- **Task Details.** This monitor lets you see details not only on the real-time Container operations but on the ones already completed as well. It provides information on the Virtuozzo utilities messages when during this or that operation performance.
- Infrastructure Manager also provides specific information in case of an operation failure for you to learn the error cause(s).

Viewing History of Container Status Changes

The **Events** subtab keeps track of all the changes in the statuses of all Hardware Nodes and Containers that exist on them. These changes may happen due to the Hardware Node or Container routine management via Parallels Infrastructure Manager, Parallels Management Console, command line operations, or due to the operation of some programs. The **Status Changes** table on the **Events** subtab displays the information on the Hardware Node and Container changes as follows:

Column Name	Description
Time	The time when the status of a Hardware Node or Container was changed.
Object	The name of a Hardware Node or Container whose status was changed.
Old Status	The previous status of a Hardware Node or Container. The description of all possible Hardware Node and Container statuses is provided in the Hardware Node and Container Statuses section.
Status Obtained	The current status of a Hardware Node or Container. The description of all possible Hardware Node and Container statuses is provided in the Hardware Node and Container Statuses section.

By default, the table shows 20 records, but you may have more records displayed by clicking the appropriate link above the table.

You may also have the **Status Changes** table display only those log records that have a particular date and time. On top of the table, click the **Show Search** link to display the fields where you can specify the boundaries of the time interval for which you wish to view the log; then click the **Search** link. To view all the status changes again, follow the **Reset Results** link.

Viewing Alerts Log

Every time a Container consumes more of a resource than is specified by the limit on that resource, or is coming close to that limit, an alert is generated and logged. Turn to the **Managing and Monitoring Container Resources** section (p. 49) to know more about the limits for the corresponding resources. You shall pay attention to the problem resource and correct the situation.

Note: The same information for a single Container is also accessible if you follow the **Resource Alerts** link on the **Logs** tab of the corresponding Container dashboard.

You may have the **Alerts** table display only those alerts that have a particular date, relate to a particular category or parameter, are logged for the Container with a particular ID or hostname, or for a particular Hardware Node. Over the table, click the **Show Search** link to display the fields where you can specify the parameters that the log should meet; then click the **Search** link.

The **Alerts** table provides you with the following data:

Time	The date and time when the alert was generated.
Category	One of the two alert categories: <i>Resource</i> (alert on a single Container's resource consumption) or <i>Group</i> (alert on the whole Virtuozzo Group's resource consumption).

Details	Detailed information on the alert.
Hardware Node	The Node hosting the Container that has generated the alert.
Container	The name or ID of the Container that has generated the alert.
Type	The alert sign displays the type of alert for the given Container. See the detailed description below.
Parameter	The type of the Container resource that required the consumption value alert due to its overusage.

There are three alert types in total that have a visual representation in the **Type** column and correspond to the three resource consumption zones. A green circle with a white tick means the green zone, an orange circle with a white exclamation mark points to the yellow zone, and a red circle with a white exclamation mark refers to the red zone.

The meaning of these zones differ slightly depending on the parameter under alert.

For CPU-related parameters the meaning of the three zones is the following:

Zone	Description
Green	The Container consumes less than 90% of the CPU time allowed to it. This means that you can run more applications inside the Container without violating the performance of the current ones. If the Container consumes more than 90% of the allowed CPU time, but for an insignificant time, the color remains green as this situation is not perilous.
Yellow	The Container consumes between 90% and 100% of the CPU power allowed to it for a relatively long while. Usually this means that the running processes consume too much CPU power. It is up to you to decide whether this situation suits you, but you should bear in mind that additional applications launched inside the Container might experience shortage of available CPU power. You may need to consider the possibility of cutting down the number of processes.
Red	The Container consumes 100% of the CPU power allowed to it, i.e. all the available CPU power, for a long time. Usually this means that currently there is some CPU-intensive process inside the Container caused by a temporary task. For example, this may happen if you are compiling a package in the Container or in similar cases. In this case you should simply wait for this task to complete.

However, if you do not know the reason for the CPU overconsumption, turn to the **Parallels Infrastructure Manager System processes** page to determine which process(es) are causing the problem and take the corresponding measures. For example, you might want to terminate or kill the offending process. Otherwise, the system performance may continue low for a long while.

For disk-related parameters the meaning of the three zones is the following:

Zone	Description
Green	The Container consumes less than 90% of disk resources allowed to it. This means that the Container has currently no problem with disk resources.
Yellow	The Container is using between 90% and 100% of the disk resources available to it on the Hardware Node. The situation is rather dangerous since the next disk resource allocation request might be refused to the Container. Therefore, you should erase unnecessary data from the Container immediately. On a Linux Node, a Container is allowed to consume more than 100% of its disk quota only during the grace period (see the <code>quotatime</code> parameter in the resources consumption details). If you do not solve the problem during this time, the Container will be denied some of the disk resources and you might lose valuable data.

Red The Container has exceeded the soft limit and a disk resource allocation has been refused to it. This might have resulted in a loss of some valuable data or other problems inside the Container. To discontinue this very serious situation, you should erase unnecessary data from the Container immediately.

For memory-related parameters the meaning of the three zones is the following:

Zone	Description
Green	The Container consumes less than 90% of the memory-related resource allowed to it.
Yellow	The Container consumes between 90% and 100% of the memory-related resource allowed to it. It is up to you to decide whether this situation suits you, but you should bear in mind that additional applications launched inside the Container might experience shortage of the corresponding resource. Judging by the offending resource, you might determine the reason for its shortage and take the corresponding measures.
Red	The Container has been denied this memory-related resource due to its overusage. This might have resulted in application crashes or other problems inside the Container.

Viewing Tasks Log

The Tasks screen available on clicking the Tasks link on the left Infrastructure Manager menu keeps track of the latest operations performed by means of Infrastructure Manager. You may consult this page to check the status of any Infrastructure Manager operation recently performed.

By default, 20 records are shown, but you may have more records displayed by pressing the appropriate link on top of the table. You may also have the Tasks table display only those log records that have a particular date or refer to a specific operation status. On top of the table, click the Show Search link to display the fields where you can specify the boundaries of the time interval and the status of the operation you are interested in; then click on the Search link. You can have Parallels Infrastructure Manager display only those parameters you need at the moment. To show or hide certain columns, click the Select Columns link and select the parameters you want to be displayed or clear those you do not. Click the Reset Results button to check all the operations performed.

The tasks list is presented as the following table:

Column Name	Description
Time	The date and time when the execution of the task was started.
Hardware Node	The Hardware Node the task relates to.
Container	The name of the Container the task relates to.
Task	The name of the task.
Status	Indicates whether the task was successful or failed.

To stop a running task, select its checkbox and click Cancel Tasks on the Infrastructure Manager toolbar.

Viewing Active Tasks

Almost all Parallels Infrastructure Manager pages, except for those containing an error report, allow you to check for any Container operations currently under way. The **Active Tasks** window can be accessed by pressing the **Active Tasks** icon (,  or ) or clicking the **Active Tasks** link at the right end of the title bar of a Infrastructure Manager page. Note that the icons vary according to the interface skin selected. If you are planning to perform any operation on a Container, it is a good idea to check the **Active Tasks** window and wait for the tasks to complete, if there are any. The window is refreshed every few seconds.

By default, 20 operations are listed, but you may have more operations displayed by pressing the appropriate link on top of the table. You may also have the **Active Tasks** table display only those operations that are executed by a particular Container, or have a particular status. On top of the table, press the **Show Search** link to display the fields where you can specify the Container ID, or the status of the operation you wish to view the information on; then click on the **Search** link.

The information on the active tasks is presented as a table with the following columns:

Column	Description
Started	The date and time when the operation was started.
Container#	The ID of the Container performing the operation.
Operation	The name of the operation.
Status	Indicates the operation status. At present the only one possible is "In Progress", which means that the operation is under way.

The **Details** link beside a task leads to the **Task Details** page, where you can view the details of the operation.

When the operation is successfully completed or fails, the table is closed, and the `No active tasks at the moment` message appears.

Viewing Task Details

The **Task Details** page provides information on the Virtuozzo utilities messages when performing this or that operation. In other words, these messages would be displayed as if you performed a Container operation not by means of Parallels Infrastructure Manager, but by means of the command line (for example, over ssh).

The task details are presented as a table with the following columns:

Column Name	Description
Time	The time when a certain operation stage began.
Operation	The corresponding Virtuozzo utility message.
Status	The status of each of the steps the operation the operation consists of- In progress , Completed , or Failed .

The table is preceded by a heading informing you of the operation outcome, that is, whether it is **In progress**, **Completed**, or **Failed**

Viewing Error Details

The **Error Details** page provides specific information in case of an operation failure. When you are trying to perform an operation on a **Parallels Infrastructure Manager** page and the operation fails, the corresponding **Parallels Infrastructure Manager** page is refreshed with a thick red line across the page informing you of the failure and providing the **Details** link to learn more about this failure.

This page presents a complete response as to why the operation failed. This response might help you understand the reason for the failure.

If an operation fails, and a green line is displayed informing that the operation has been scheduled, it means that the failure occurred after the operation had been scheduled. That is why, it is desirable to always check the status of the scheduled operation by following the **Details** link at the right end of the green line to make sure that the operation has been successfully completed.

Getting Support

Reporting Problem to Technical Support

Parallels Infrastructure Manager is equipped with a special GUI tool enabling you to compile a detailed report, in case you have any **Virtuozzo**-related problems, and to automatically forward it to the **Parallels** support team. The team will send you back a reply with a detailed problem solution scenario.

Note: You should have a valid support contract with **Parallels** to be able to send problem reports with the help of **Parallels Infrastructure Manager**.

Each problem you are forwarding to the **Parallels** support team for solution should correspond to a ticket in the **Parallels** helpdesk ticketing system. On the **Report Problem** tab of the **Support** screen you should indicate if a ticket ID has already been created for the problem. If you haven't yet created a ticket, select **Submit a new support request** and click **Next** to open a pop-up window where you'll be able to create it. Then return to the **Report Problem** tab, select the second option, and specify the ID of the ticket you've just created.

On providing an existing ticket ID under the **Submit more information on the following support request**: radio button and clicking **Next**, you'll proceed to the next step of the wizard, where you'll be able to describe your problem and send the report.

Specifying Contact Information and Problem Details

On the current step of the **Report Problem** wizard you are expected to provide your contact information and define the problem.

In the **Your Contact Information** group enter your name, e-mail address, and the name of your company into the corresponding fields. Make sure that you type a valid e-mail address; otherwise, the Parallels support team will not be able to contact you.

The **Problem Details** section is obligatory for filling in. First, select the **Hardware Node** with which you are experiencing troubles. In the **Subject** field, you have to specify what Virtuozzo problem you encountered. Additional information for facilitating the problem solution should be provided in the **Problem Description** field. If there is already an open support issue in the Parallels ticket reporting system, select the **This ticket is based on the old one** checkbox and provide the number of the ticket.

All the fields filled, you can click **Report** to forward the information to the technical support.

Getting Report Status and Problem ID

After Parallels Infrastructure Manager has gathered all the necessary information and dispatched the report to the Parallels technical support team, the **Report Problem** page informs you of the process completion and the ID assigned to the problem reported. You can use this ID later on when contacting the Parallels support to uniquely identify your problem among the others.

Note: There may happen situations when, for some reason, the problem report cannot be automatically sent to the Parallels support (e.g. problems with the Internet connection). In this case the corresponding warning message will be displayed telling you the path to the file on the Node where the generated message is located. Please send this file manually to the support team to support@swsoft.com.

Click **Close** to get back to the **Support** dashboard when you have saved the problem ID.

Submitting Error Codes

If, at some point of your Parallels Infrastructure Manager session, you encountered an error with a particular number, the **Error Codes** tab of the **Management -> Support** screen lets you get more information on this error by entering its code in the corresponding field in the **Enter Error Code** section and clicking **Submit**. In the **Error Details** section this will display:

- the code of the error;
- the problem it refers to;
- the cause of the error;
- and the standard approach to how to deal with this problem.

In the **Error Codes Reference** subsection you can find an explicit description of these errors.

Error Codes Reference

If, when performing an operation in Parallels Infrastructure Manager, you are presented with an unknown error code, refer to the following table:

Code	Problem	Reason	Solution
900	Any problem not specified in this table.	Unknown	Click the Actions Logs link in the Other group of options. On the Actions Logs screen click the Details link of the problem Container. In the pop-up window you will find the information on all the operations performed on this Container. Use these logs to single out an operation likely to be the source of the error.
1001	The password reminder is not available.	The mail relay server is not specified.	Log in to Parallels Infrastructure Manager as the administrator, go to the Hardware Node/Configuration/Email and Notifications screen and fill in the Relay Server IP Address field.
1002	The password reminder is not available.	Email notifications are disabled by the administrator.	Log in to Infrastructure Manager as the administrator, go to the Configuration Manager/Messaging screen, and select the Enable Email Notifications checkbox.
1003	A Container user cannot log in to Infrastructure Manager.	The communication with vzadmin/Authm is broken.	Log in to the Hardware Node as root and run the <code>./vzagent_ctl restart</code> command.
1004	A user cannot log in to a Container via the Plesk control panel.	The communication with the Plesk control panel is broken.	Click the Plesk control panel link on the Container dashboard, the Services tab, to start the Plesk control panel in the Container.
1005	The password restoration is not available.	The communication with the Plesk control panel is broken.	Click the Plesk control panel link on the Container dashboard, the Services tab to start the Plesk control panel in the Container.

- 1100

Placing a request for a VZA/mailc, a Infrastructure Container completed with an error.

Infrastructure Manager component, returned an error when Infrastructure Manager tried to send an email notification

Most likely, the relay server IP address is wrong. In this case, you need to log in to Infrastructure Manager as the Hardware Node administrator, go to the Hardware Node/Configuration/Email and Notifications screen and edit the relay server IP address value. If it does not help, look at vzcp/vzagent.log and find the full error description received after the mailc/post/message command.

The **Downloads** page allows you to download a set of documents on the current release of the Virtuozzo Containers software, including the **Parallels Infrastructure Manager** and **Parallels Power Panel** guides, as well as additional software for managing your Hardware Node and all Containers residing on it. To this effect, click the corresponding button in the displayed window.

Setting Up Support Channel

The Virtuozzo Containers software provides you with an ability to establish a private secure connection to the Parallels support team server via a support channel. After establishing such a channel, the support team will be able to quickly and securely connect to your Node to diagnose and solve your problem. The secure connection to your computer is achieved through a Virtual Private Network (VPN) created between the Parallels support team server and your Hardware Node. The **Support Channel** page is invoked by clicking the Hardware Node name on the left Infrastructure Manager menu and following the **Get Support** link on the Infrastructure Manager toolbar.

To establish the channel, you should ask Parallels for a special certificate which will uniquely identify you as a Virtuozzo user. Certificates are issued by Parallels in the form of files and should be installed on your Node. Requesting and further installing the certificate as well as establishing or abolishing the support channel is available on the **Support Channel** page.

To request a certificate, you need to follow the link in the **Support Certificate** section and fill in the form on the opened page. Enter your name, company name, email address and phone number in the corresponding fields. You may also type in your sales representative name and give comments related to the problem you have come across in the appropriate fields. Click **Submit** to forward the request form when you are done.

On receiving the certificate at the email address specified in the form described above, upload the certificate text file on your local computer. Then you need to go back to the **Support Channel** page and click **Install New Certificate**. On the opened screen browse for the certificate file on your computer and click **Submit** to install it on your Hardware Node. You are free to set the support channel now.

The **Support Channel** page allows you to view the status of the support channel (established/canceled). To set a support channel, click the **Establish Channel** button. Likewise, the channel is called off by clicking **Close Channel**.

Installing Certificate on Hardware Node

 After you have requested a certificate to establish a support channel and saved the certificate text file on your computer, you need to install it on your Hardware Node for the Parallels technical support to identify you as a Virtuozzo user. Only then you will be able to establish the private secure connection to the technical support. The **Install New Certificate** page enables you to browse for the certificate text file on your computer and further install it on the Node by clicking the **Submit** button.

All this successfully completed, move up to the **Support Channel** page and establish the secure connection to the technical support team as instructed.

Searching for Screens

The Screen Finder tab of the **Support** window allows you to quickly find the necessary screen in Parallels Infrastructure Manager, learn about its purpose and the way to access the screen. You might need this functionality to quickly determine the screen by its ID (for example, when coming across screen IDs in support-related correspondence) or to find out the place where this or that Infrastructure Manager feature can be accessed.

The available search parameters are the following:

- **ID** - The screen identifier found in the top right corner of every Infrastructure Manager screen.
- **Title** - The screen title provided in bold font in the top left corner of every Infrastructure Manager screen or as the tab name (if the main screen has multiple tabs).
- **Description** - The screen description provided directly under the screen title in regular typeface.

You should indicate the parameter by which you wish to search for the screen in the corresponding field and click the **Find Screen** button. After a while, the information on all the screens matching the entered parameter will be displayed. This includes the exact ID, title, and description of the screen as well as the way to access it in Infrastructure Manager.

Troubleshooting

Parallels Infrastructure Manager is an indispensable means for solving various kinds of problems related to the Container functioning. It is still more flexible due to its ability to work with not running Containers. The common groups of problems lending themselves readily to be handled by Parallels Infrastructure Manager boil down to the following:

- Services inaccessibility;
- Elusive problems.

You can also consult the **Network Problems** section to try to find out why the Container is inaccessible by network, and the **File Problems** section.

Note: The problem situations described in this chapter mainly concern Container with the Linux operating system installed. However, it can be also of use for those managing the Containers running Windows 2003 Server.

In This Chapter

Services Inaccessibility	277
Network Problems.....	277
Invalid Credentials	278
File Problems	278
Listing Users	279
Group Operations	279
Elusive Problems.....	280

Services Inaccessibility

Various tasks you are accustomed to perform by means of a Container (accessing your web site or sending email and the like) may fail if the corresponding services are inaccessible.

Try consecutively the following three steps to determine the reason for this and do away with the trouble:

- 1 Check if the Container is running. To this effect, log in to Infrastructure Manager and check the Container status in the **Status** field in the **Containers** table (p. 23) or in the **Container Summary** table on the Container dashboard (p. 25). You can also determine if the Container is running or down with the help of the **Service Unavailable** screen by clicking the corresponding link provided on this screen. If the Container is down, click the **Start/Stop Container** link on the menu and press the **Start Container** button. Wait a little for the Container and all the services to start.
- 2  Go to the **Services** page (p. 68) and check the status of the service in question. The service must be running for the corresponding functionality to be accessible. For example, `psa` and `mysqld` must be running for the Plesk control panel to handle your requests, `httpd` - for your web site to function properly, `sshd` - for the Container to be accessible by `ssh`, `sendmail` - for you to be able to send email, `popa3d` - to receive email by the POP3 protocol, etc. You may also try to stop the `iptables` service to see if it solves the problem, because some `iptables` rules might prevent certain network connections.
- 3 Go to the **Resources** page to determine if the Container is short of any resources. If some of the resources are marked yellow or red, this is a hazardous situation that should be resolved immediately.

If the Plesk control panel is installed inside the Container you are managing and you are working with this panel, the **Service Unavailable** screen may sometimes be displayed when you are trying to perform this or that Plesk-related operation. This situation is normally handled as described above. However, in case none of the recommended measures works, you may have to reinstall the Plesk control panel into the Container, as the Plesk installation might be corrupted.

Network Problems

Problem

The Container you want to manage is inaccessible by its hostname or IP address.

Solution

- If you are using the hostname, try to use the IP address, and vice versa.
- Ping the inaccessible Container.
- Log in to Infrastructure Manager and check the problem Container hostname and IP address.
- Log in to Infrastructure Manager and change the Container root/Administrator password (p. 99).
-  Log in to Infrastructure Manager and disable the `iptables` service inside the problem Container.

Note: Remember that each Container user with the privileges of an administrator exercises full control over his/her Container, has his/her own user credentials (name and password) to access the Container and enjoys an unlimited access to other user accounts inside this Container, i.e. s/he has any right granted to a privately owned physical server as opposed to the Hardware Node administrator's authority or the rights of the other Containers users in regard to the given Container. Any Container user can be a member of an Active Directory domain (e.g. access any of the network shares to which the Container user has rights).

Invalid Credentials

Problem

A Parallels internal user who is given the right to manage a particular Container cannot log in to this Container via Parallels Power Panel.

Solution

To log in to Parallels Power Panel, an internal user's credentials should be used ( `root/`  Administrator). The users defined outside this particular Container cannot log in to it by means of Parallels Power Panel.

File Problems

Parallels Infrastructure Manager is tuned to not allow giant files to be uploaded to Containers or the Hardware Node. This setting can be controlled in the `/etc/vzcp/httpd.conf` file inside the Service Container:

```
# grep Limit httpd.conf
LimitRequestBody 536870912
```

The `LimitRequestBody` parameter specifies the maximal file size (in bytes) allowed to be uploaded to a Container by means of Parallels Infrastructure Manager. The default value of the example above is 512 Mb. If you need to allow Container administrators to upload larger (or smaller, for that matter) files to their Containers, change this value at your discretion.

Listing Users

Problem

When viewing a list of users on the Users tab of the Parallels Infrastructure Manager Security module, the list is empty.

Solution

- Check if the authentication database the users of which you are trying to view is empty. If the database is empty, no users will be displayed in Infrastructure Manager.
- If the database is not empty, check if the users in this authentication database have the *objectClass=user* attribute set. Some LDAP databases employ other attributes, in which case their users will not be displayed in Infrastructure Manager. If it is possible, set this attribute manually for the users to be displayed in Infrastructure Manager.
- Try to delete the authentication database from Infrastructure Manager and register it again changing the value of the **Domain** parameter. If you indicated the domain when registering the database for the first time, leave this field empty this time. And vice versa, if you didn't indicate the domain during the first registration, fill it in this time.

Group Operations

Problem

Some Parallels Infrastructure Manager functions work incorrectly if two or more Hardware Nodes are registered. Among these functions are viewing logs, viewing top resource-using Containers, managing licenses, and some others.

Solution

Many Infrastructure Manager group operations rely on the system time being synchronized among all the Hardware Nodes constituting the Group. If the Hardware Nodes have different system time, various problems might occur. You should keep the system time synchronized among the Nodes with the help of built-in operating system tools or third-party solutions.

Elusive Problems

Sometimes it is hard to determine the exact reason for a problem. The problem might persist despite any actions undertaken. Such problems call for going back to an earlier state of the Container with these problems missing. This change-over is usually effected by means of:

- 1 Restoring the Container from a working backup (p. 178);
- 2 Reinstalling the Container (p. 96);

Note: It is for you to decide which way suits you most. Generally, these two options are applicable if you can start your Container to copy the valuable information from it. To assure a safe data saving in the situation where you cannot start the Container, repairing your Container is the most advisable problem-solving option.

- 3 Mounting your Container in the repair mode and copying the valuable personal data to a secure place outside the Container. Using the repair mode is covered in the **Repairing Container** section (p. 98).

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*.

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

Hardware Node (or *Node*) is a 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*.

Package set is a synonym for *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.

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

Service 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.

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

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

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

UBC is an abbreviation of *User Beancounter*.

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

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

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

- Active Tasks Monitoring • 269
- Alerts Log • 266
- Applications Managing
 - installing and uninstalling • 85
 - installing at Container creation • 41
 - uninstalling packages in Containers based on EZ OS templates • 86

B

- Backing Up Container • 178
 - incremental backups • 178
 - Scheduling Backing Up • 258
 - selective backup • 183
- Backing Up VE Groups • 185, 258
- Backup Details • 182

C

- Configuration and Advanced Settings
 - Adjusting • 99
- Confirming VE Reinstallation • 97
- Confixx Control Panel
 - logging in • 75
- Container Dashboard Overview • 25
- Container Groups Management • 23
- Container Managing
 - backing up Container • 178
 - cloning • 93, 95
 - creating • 28
 - dashboard overview • 25
 - editing general parameters • 99
 - editing network parameters • 152
 - installing/uninstalling applications • 85
 - migrating between Nodes • 76
 - rebooting • 41
 - reinstalling • 96
 - repairing • 98
 - requesting • See Requesting Container
 - restarting • 41
 - starting • 41
 - stopping • 41
 - suspending • 25
- Container Template

- adding applications • 245
- available operations • 235
- changing Container template • 62
- creating • 226
 - general • 225

- Containers List • 23
- Creating New Container • 28

D

- Directories Operations • See Folders Operations
- Downloading Documents and Software • 273

E

- Error Code • 271
- Error Details Information • 270
- EZ Templates
 - Application EZ Templates
- packages • 133
- properties • 132
 - OS EZ Templates
- packages • 130
- properties • 129
- uninstalling packages in Containers based on EZ OS templates • 86

F

- Files Operations • 46
 - adding files • 48
 - copying files • 48
 - creating text file • 47
 - editing file properties • 49
 - editing text file • 48
 - moving files • 48
- Firewall
 - access rules • 163
 - chains • 162
 - editing rules in advanced mode • 169
 - editing rules in normal mode • 163
 - general notions • 162
 - selecting mode • 164
- Folders Operations • 46

- copying folders • 48
 - creating folder • 47
 - editing folder properties • 49
 - moving folders • 48
- G**
- General Settings of Container
 - adjusting configuration and advanced group • 99
 - customizing network group • 152
 - defining at Container creation • 29
- H**
- Hardware Node
 - general notion • 102
 - licenses managing • 186
 - node dashboard overview • 104
 - node resources monitoring • 113
 - OS • 122
 - rebooting • 119
 - registering in Infrastructure Manager • 104
 - History of Container Status Changes • 266
- I**
- Infrastructure Manager Interface Overview • 13
 - Infrastructure Manager Interface Customizing • 14
 - Introduction • 9
 - IP Addresses
 - managing IP addresses • 154, 155
- L**
- License
 - general information • 186
 - installing • 187
 - license statuses • 191
 - Logging In to Container • 12
 - Logs
 - alerts log • 266
 - history of Container status changes • 266
- M**
- Migrating Physical Server to Container • 77
 - checking physical server configuration • 78
 - configuring Container • 81
 - connecting to physical server • 78
 - customizing migration • 79
 - presetting post-migration options • 84
 - Resource customizing • 229
- N**
- Network Parameters Customization • 152
 - Network Problems • 277
- O**
- Operations Monitoring
 - active tasks monitoring • 269
 - error details • 270
 - task details • 269
 - OS Template Versions
 - general managing • 122
- P**
- Plesk Control Panel
 - installing • 73
 - logging in • 74
 - Processes Managing • 72
- R**
- Remote Desktop Connection
 - accessing Container • 44
 - Requesting Container • 247
 - managing requests • 248
 - orders details • 249, 250
 - rejecting request • 250
 - restarting requested Container creation • 250
 - Resources
 - customizing • 36
 - modifying • 55
 - validating • 40
 - Resources of Container
 - applying new Container template • 62
 - constraint violations • 40
 - modifying resources • 55
 - overview • 49
 - validating resource settings • 40
 - Restoring Groups of Containers • 185
 - Restoring Individual Container • 178
- S**
- Selecting Reinstallation Type • 97
 - Service Container • 12
 - Service Container User • 12
 - Services
 - managing • 68
 - service details • 70
 - Services and Processes Managing • 67
 - Services Inaccessibility • 277
 - Signals • 72
 - SLM • 99
 - SSH
 - connecting to Container • 43
 - Standard Templates
 - Application Template
 - installing on Hardware Node • 134

- operations on application templates • 131
- overall managing • 122
- properties • 132
- updating • 252
 - OS Templates
- installing on Node • 134
- operations on OS templates • 128
- overall managing • 122
- properties • 129
- updating • 251
- Starting and Stopping Container • 41
- Stopping Container Prior to Reinstallation • 96

T

- Task Details • 269
- Traffic Managing
 - configuring network adapters • See configuring network interfaces
 - configuring network interfaces • 158
 - network classes • 156
 - traffic limiting • See traffic shaping
 - traffic shaping • 157
- Troubleshooting • 276

U

- Updating Container
 - update single Container • 89
 - updating multiple Containers • 89
- Updating Hardware Node • 251
- Updating Node • 251
- User Accounts
 - creating user • 197
 - creating user group • 200
 - creating user role • 204
 - editing user • 198
 - editing user group • 201
 - editng user role • 209
 - email reports • 171
 - general concept • 192