



Virtuozzo Automator

Administrator's Guide

September 17, 2024

Virtuozzo International GmbH

Vordergasse 59

8200 Schaffhausen

Switzerland

Tel: + 41 52 632 0411

Fax: + 41 52 672 2010

<https://virtuozzo.com>

Copyright ©2016-2024 Virtuozzo International GmbH. All rights reserved.

This product is protected by United States and international copyright laws. The product's underlying technology, patents, and trademarks are listed at <https://www.virtuozzo.com/legal.html>.

Microsoft, Windows, Windows Server, Windows NT, Windows Vista, and MS-DOS are registered trademarks of Microsoft Corporation.

Apple, Mac, the Mac logo, Mac OS, iPad, iPhone, iPod touch, FaceTime HD camera and iSight are trademarks of Apple Inc., registered in the US and other countries.

Linux is a registered trademark of Linus Torvalds. All other marks and names mentioned herein may be trademarks of their respective owners.

Contents

1. Introduction	1
1.1 About Virtuozzo Automator	1
1.2 About This Guide	2
1.2.1 Organization of This Guide	3
2. Installing and Managing Virtuozzo Automator Components	5
2.1 Virtuozzo Automator Components Overview	5
2.2 System Requirements	6
2.2.1 Master Server Requirements	6
2.2.2 Slave Server Requirements	6
2.2.3 Client Requirements	6
2.3 Installing Virtuozzo Automator Components	6
2.3.1 Installing VA Management Node	7
2.3.2 Installing VA Agent	7
2.3.3 Using Additional Deployment Script Options	8
2.4 Updating Virtuozzo Automator Components	8
2.5 Removing Virtuozzo Automator Components	9
3. Upgrading from Virtuozzo Automator 6.1 to Virtuozzo Automator 7	10
3.1 Upgrading VA Management Node	10
3.2 Upgrading VA Agent	11
4. Getting Started With Virtuozzo Automator	12
4.1 Logging In	12
4.2 Interface Overview	13
4.3 Extending Standard Browser Functionality	14
4.3.1 Using Drag-And-Drop	14
4.3.2 Using Context Menu	15

4.4	Customizing User Profile	16
4.4.1	Defining Interface Settings	16
4.4.2	Defining Personal Settings	17
4.5	Organizing Logical Structure	18
4.5.1	Adding New Folder	20
4.5.2	Editing Folder Properties	21
4.5.3	Moving Folder	21
4.5.4	Moving Physical Servers to Another Folder	21
4.5.5	Adding Physical Servers to Folders	22
4.5.6	Adding Virtual Environments to Folder	22
5.	Organizing Virtuozzo Automator Infrastructure	23
5.1	Viewing Summary Information	23
5.2	Viewing Physical Servers Information	25
5.3	Viewing Virtual Environments Information	27
5.4	Viewing Resource Consumption	28
5.5	Viewing Infrastructure Logs	30
5.5.1	Viewing Infrastructure Task Logs	30
5.5.2	Viewing Infrastructure Alert Logs	30
5.5.3	Viewing Infrastructure Event Logs	34
6.	Managing Physical Servers	35
6.1	Registering Physical Server in Virtuozzo Automator	35
6.2	Managing Disk Images	37
6.2.1	Configuring Disk Image Parameters	38
6.3	Rebooting Physical Server	38
6.4	Physical Server Toolbar Overview	38
6.5	Physical Server Dashboard Overview	41
6.6	Managing Physical Server General Settings	44
6.7	Monitoring Physical Server Resources Consumption	44
6.8	Viewing Resource Consumers	45
6.9	Viewing Physical Server Logs	45
6.9.1	Viewing Physical Server Task Logs	45
6.9.2	Viewing Physical Server Alert Logs	46
6.9.3	Viewing Physical Server Event Logs	46
6.10	Configuring Virtual Environments Host Settings	46

6.11	Managing Offline Services Configuration	47
6.11.1	Creating Offline Service	48
6.11.2	Editing Offline Service	49
7.	Managing Virtual Environments	50
7.1	Starting to Create Virtual Environments	51
7.2	Starting, Stopping, Pausing and Restarting Virtual Environments	52
7.3	Suspending and Resuming Virtual Environments	53
7.4	Changing Virtual Environment Administrative Password	54
7.5	Setting Power Panel Access for Customers	54
7.6	Connecting to Virtual Environments via VNC	55
7.6.1	Using Encrypted VNC Connections	56
7.7	Managing Containers	56
7.7.1	Container Toolbar Overview	56
7.7.2	Container Dashboard Overview	59
7.7.3	Creating Containers	60
7.7.3.1	Defining General Settings	60
7.7.3.2	Specifying Multiple Container IDs, IP Addresses, and Hostnames	65
7.7.3.3	Configuring Network Parameters When Creating Containers	66
7.7.3.4	Customizing Resource Settings When Creating Containers	66
7.7.3.5	Validating Resource Configuration	66
7.7.3.6	Installing Applications into Containers	67
7.7.3.7	Reviewing Container Configuration	67
7.7.4	Managing Container Files and Folders	67
7.7.4.1	Creating Folder	69
7.7.4.2	Creating Text File	69
7.7.4.3	Editing Text File	69
7.7.4.4	Uploading File to Container	69
7.7.4.5	Copying Files and Folders Inside Container	70
7.7.4.6	Moving Files and Folders Inside Container	70
7.7.4.7	Editing File or Folder Properties	70
7.7.5	Managing and Monitoring Container Resources	71
7.7.5.1	Resources Overview	72
7.7.5.2	CPU Resources	73
7.7.5.3	Disk Resources	73
7.7.5.4	Memory Resources	74

7.7.5.5	Changing Container Resource Parameters	78
7.7.5.6	Changing Disk Quota for Multiple Containers	78
7.7.5.7	Applying New Container Templates	79
7.7.6	Viewing Container Logs	80
7.7.6.1	Viewing Container Task Logs	80
7.7.6.2	Viewing Container Alert Logs	81
7.7.6.3	Viewing Container Event Logs	81
7.7.7	Adjusting Container Template Resource Parameters for Multiple Containers	81
7.7.8	Managing Container Services and Processes	81
7.7.8.1	Managing Container Services	82
7.7.8.2	Managing Container Processes	84
7.7.9	Managing Container Applications	86
7.7.9.1	Managing Container Application Templates	86
7.7.9.2	Managing Container Software Packages	87
7.7.9.3	Updating Container Software	89
7.7.10	Managing Plesk Control Panel	90
7.7.10.1	Installing Plesk Control Panel	90
7.7.10.2	Working with Plesk Control Panel	92
7.7.11	Cloning Containers	92
7.7.11.1	Configuring Clone Network Parameters	94
7.7.11.2	Cloning Multiple Containers	94
7.7.12	Migrating Containers	94
7.7.12.1	Migrating Container to Virtuozzo Physical Servers	96
7.7.12.2	Migrating Physical Servers to Containers	96
7.7.13	Reinstalling Containers	101
7.7.13.1	Selecting Reinstallation Type	102
7.7.13.2	Confirming Reinstallation	103
7.7.14	Repairing Containers	103
7.7.15	Adjusting Container Configuration and Advanced Settings	104
7.7.15.1	Adjusting General Configuration of Multiple Containers	105
7.7.16	Managing Container Templates	105
7.7.16.1	Creating Container Templates	106
7.7.16.2	Creating New Templates by Splitting Physical Server	108
7.7.16.3	Cloning Containers to Templates	109
7.7.16.4	Operations on Local Container Templates	110

7.7.16.5	Editing Container Templates	111
7.8	Managing Virtual Machines	113
7.8.1	Virtual Machine Toolbar Overview	113
7.8.2	Virtual Machine Dashboard Overview	115
7.8.3	Creating Virtual Machines	116
7.8.3.1	Defining New Virtual Machine General Settings	117
7.8.3.2	Defining New Virtual Machine Hardware Settings	118
7.8.3.3	Reviewing Virtual Machine Configuration	118
7.8.4	Registering Virtual Machines	118
7.8.5	Unregistering Virtual Machines	119
7.8.6	Installing Virtuozzo Guest Tools in Virtual Machines	119
7.8.7	Monitoring Virtual Machine Resources Consumption	120
7.8.8	Monitoring Virtual Machine Traffic Usage	120
7.8.9	Changing Virtual Machine Configuration	121
7.8.9.1	Defining Virtual Machine General Settings	121
7.8.9.2	Defining Virtual Machine Hardware Settings	125
7.8.10	Reinstalling Virtual Machines	133
7.8.11	Cloning Virtual Machines	134
7.8.11.1	Defining General Settings of Cloned Virtual Machines	134
7.8.11.2	Defining Hardware Settings of Cloned Virtual Machines	134
7.8.11.3	Cloning Multiple Virtual Machines	135
7.8.12	Migrating Virtual Machines	135
7.8.13	Migrating Physical Servers to Virtual Machines	137
7.8.14	Managing Virtual Machine Templates	137
7.8.14.1	Creating Virtual Machine Templates	137
7.8.14.2	Cloning a Virtual Machine to Template	138
7.8.14.3	Converting a Virtual Machine to Template	139
7.8.14.4	Operations on Local Virtual Machine Templates	139
7.8.14.5	Editing Virtual Machine Template	140
7.8.15	Viewing Virtual Machine Logs	141
7.8.15.1	Viewing Virtual Machine Task Logs	141
7.8.15.2	Viewing Virtual Machine Alert Logs	141
7.8.15.3	Viewing Virtual Machine Event Logs	141
7.9	Deleting Virtual Environments	141

8. Managing Virtual Environment Backups 143

8.1	Defining Global Backup Settings	144
8.2	Managing Backups on Infrastructure Level	145
8.3	Managing Backups on Physical Server Level	146
8.3.1	Defining per-Physical Server Backup Settings	146
8.3.2	Creating Virtual Environment Backups	148
8.4	Managing Backups on Virtual Environment Level	149
8.4.1	Creating Backups	151
8.4.2	Viewing Backup Details	152
8.4.3	Browsing Backup Contents	153
8.4.4	Renewing Virtual Environment Backups	154
8.4.5	Restoring Virtual Environments from Backup	154
8.4.5.1	Restoring from Backup on Virtuozzo 6 Servers	155
8.4.5.2	Restoring from Backup on Virtuozzo Hybrid Server 7	155
9.	Managing Resource Library Tools	157
9.1	Viewing the Resource Library Dashboard	157
9.2	Managing File Shares	158
9.2.1	Registering File Share	159
9.2.2	Viewing File Share Details	160
9.2.3	Configuring File Share Parameters	160
9.3	Managing Templates Storage	160
9.3.1	Setting Up an External Templates Storage	162
9.3.2	Creating Template Initial Configuration	162
10.	Managing Product Licenses	164
10.1	Installing License Key	165
10.2	Installing License File	165
10.3	Reviewing Installed Licenses	166
10.4	License Statuses	167
11.	Managing Virtuozzo Automator Security	168
11.1	Understanding Role-Based Access Administration in Virtuozzo Automator	168
11.2	Typical Scenario of Virtuozzo Automator Security Usage	170
11.3	Managing Users	172
11.3.1	Viewing Users	172
11.3.2	Creating New User	173
11.3.3	Viewing User's Details	174

11.3.4	Configuring User's Parameters	175
11.4	Managing Groups	175
11.4.1	Viewing Groups	176
11.4.2	Creating New Group	177
11.4.3	Viewing Group Details	177
11.4.4	Configuring Group Parameters	178
11.5	Managing Roles	178
11.5.1	Viewing Roles	179
11.5.2	Creating New Roles	180
11.5.3	Configuring Role Parameters	189
11.6	Managing Authentication Databases	190
11.6.1	Viewing Authentication Databases	192
11.6.2	Registering New Database	193
11.6.3	Viewing Database Details	194
11.6.4	Configuring Database Details	194
11.7	Managing User/Group Permissions	195
11.7.1	Creating Permissions	196
11.7.1.1	Managing Physical Server Permissions	197
11.7.2	Viewing Physical Server Permissions	197
11.7.3	Creating Physical Server Permissions	198
11.7.3.1	Managing Container Permissions	198
11.7.4	Viewing Container Permissions	198
11.7.5	Creating Container Permissions	198
11.7.5.1	Managing Virtual Machine Permissions	198
11.7.6	Viewing Virtual Machine Permissions	198
11.7.7	Creating Virtual Machine Permissions	199
11.7.7.1	Managing Server Group Permissions	199
11.7.8	Viewing Server Group Permissions	199
11.7.9	Creating Server Group Permissions	199
11.7.9.1	Managing Logical Unit Permissions	200
11.7.10	Viewing Logical Unit Permissions	200
11.7.11	Creating Logical Unit Permissions	200
11.8	Managing Power Panel Policies	200
11.8.1	Managing Policies	201
11.8.2	Performing Main Operation on Policies	202

11.8.3	Creating New Policy	203
11.8.4	Configuring Policy Parameters	204
11.8.5	Managing Policy Assignments	205
12.	Maintaining Virtuozzo Automator Management Tools	207
12.1	Monitoring Operations and Viewing Logs	208
12.1.1	Viewing Tasks Log	208
12.1.2	Viewing Alerts Log	208
12.1.3	Viewing Event logs	208
12.1.4	Viewing Active Tasks	208
12.1.5	Viewing Task Details	209
12.1.6	Viewing Error Details	209
12.2	Scheduling Tasks	210
12.2.1	Choosing Tasks	211
12.2.1.1	Scheduling Backup Tasks	211
12.2.1.2	Scheduling Restart Tasks	213
12.3	Managing Maintenance Tasks	214
12.3.1	Changing Maintenance Tasks	214
12.4	Viewing Virtuozzo Automator User Sessions	216
12.4.1	Viewing Management Server Live User Sessions	216
12.4.2	Viewing Power Panel Live User Sessions	217
12.4.3	Viewing Audit Logs	218
12.4.4	Viewing User Session Properties	218
13.	Managing Virtuozzo Network	220
13.1	Managing Network Adapters on Physical Server	220
13.1.1	Listing Adapters	220
13.1.2	Viewing Physical Adapter Properties	221
13.1.3	Connecting Physical Adapter to Virtual Network	222
13.1.4	Creating VLAN Adapters on Physical Servers	223
13.1.5	Viewing VLAN Adapter Properties	223
13.1.6	Connecting VLAN Adapter to Virtual Network	224
13.2	Managing Virtual Networks	224
13.2.1	Listing Virtual Networks on Physical Server	227
13.2.2	Creating Virtual Network on Physical Server	229
13.2.3	Viewing Virtual Network Details	229

13.2.4	Configuring Virtual Network Parameters on Physical Server	230
13.2.5	Listing Virtual Networks in Server Group	231
13.2.6	Creating New Virtual Network	232
13.2.7	Configuring Virtual Network Parameters	232
13.3	Managing Container Network Parameters	233
13.3.1	Viewing Container Network Parameters	233
13.3.2	Configuring Container Network Parameters	234
13.4	Managing Container Firewall	236
13.4.1	Configuring Firewall in Normal Mode	237
13.4.1.1	Dealing With Misconfigured Firewall	238
13.4.2	Adding Access Rule in Normal Mode	238
13.4.3	Selecting Mode	238
13.4.4	Building Input Chain	239
13.4.5	Building Output Chain	241
13.4.6	Building Forward Chain	242
13.4.7	Adding Rules in Advanced Mode	243
13.4.8	Editing Rules in Advanced Mode	243
13.5	Managing IP Pools	244
13.5.1	Reviewing IP Pools	244
13.5.2	Creating New IP Pool	245
13.5.3	Viewing Leased IP Addresses	245
13.5.3.1	IP Addresses from All IP Pools	245
13.5.3.2	IP Addresses from Specific Pool	246
13.5.4	Viewing IP Pool Summary Information	247
13.5.5	Changing IP Pool Configuration	248
13.6	Managing Network Accounting and Shaping	249
13.6.1	Managing Network Accounting and Shaping for Physical Servers	250
13.6.1.1	Setting Up Network Classes	251
13.6.1.2	Configuring Network Adapters	252
13.6.1.3	Configuring Network Shaping	252
13.6.2	Managing Network Shaping for Containers	253
13.6.2.1	Viewing Network Shaping Settings for Containers	254
13.6.2.2	Configuring Network Shaping for Containers	255
13.6.3	Managing Network Shaping for Virtual Machines	255
13.6.3.1	Viewing Network Shaping Settings for Virtual Machines	256

13.6.3.2	Configuring Network Shaping for Virtual Machines	256
13.7	Managing Email Gateway and Proxy Server	257
13.8	Managing Email Notification Settings	257
13.8.1	Configuring Email Notifications	258
14.	Managing Virtuozzo Containers OS and Application Templates	259
14.1	Managing OS Templates in Group Context	260
14.1.1	Viewing OS Template Properties in Group Context	261
14.2	Managing Application Templates in Group Context	262
14.2.1	Viewing Application Template Properties in Group Context	263
14.3	Managing OS Templates in Physical Server Context	264
14.3.1	Viewing OS Template Properties in Physical Server Context	266
14.4	Managing Application Templates in Physical Server Context	267
14.4.1	Viewing Application Template Properties in Physical Server Context	268
14.5	Uploading and Installing Templates on Physical Servers	268
14.6	Installing Application Templates on Physical Servers	269
14.7	Installing OS Templates on Physical Servers	269
14.8	Caching OS Templates on Physical Servers	270
14.9	Uninstalling Templates From Physical Servers	270
14.10	Adding Application Templates to Containers	271
14.11	Updating Templates on Physical Server	271
15.	Updating Virtuozzo Software	273
15.1	Updating System Software	274
15.2	Installing New OS Templates	274
15.2.1	Displaying OS Template Information	275
15.2.2	Choosing Application Templates for Updates	275
15.2.3	Reviewing OS and Application Templates	276
15.3	Installing New Application Templates	276
16.	Advanced Tasks	277
16.1	Virtuozzo Automator Command-Line Utilities	277
16.1.1	vzagroup	277
16.1.2	vzabackup	280
16.1.3	vzarestore	284
16.2	Monitoring Virtuozzo Objects via SNMP	287
16.2.1	Enabling SNMP Access on Hardware Node	287

16.2.2	Accessing Virtuozzo Objects via SNMP	288
16.2.3	Description of Virtuozzo Objects	289
16.3	Logging In to Physical Servers via SOAP API	290
16.4	Logging In to Virtuozzo Storage Management Panel	291
16.5	Changing Master and Slave Servers IP Addresses	292
16.6	Enabling Support for Virtuozzo 6 Nodes	293
17.	Troubleshooting	294
17.1	Services Inaccessibility	294
17.2	Network Problems	295
17.3	Backup Problems	296
17.4	File Problems	296
17.5	Listing Users	297
17.6	Group Operations	297
17.7	Elusive Problems	298
17.8	Getting Support	298
17.8.1	Submitting Error Codes	298
17.8.1.1	Error Codes Reference	299
18.	Glossary	301

CHAPTER 1

Introduction

This chapter outlines the key features and capabilities of Virtuozzo Automator and briefly describes other chapters of this guide.

1.1 About Virtuozzo Automator

Virtuozzo Automator is a flexible and easy-to-use administration tool for managing groups of physical servers running Virtuozzo. With Virtuozzo Automator, you can manage both physical servers and virtual environments hosted on those using a Web browser.

After Virtuozzo Automator has been installed, you can register available physical servers with it. As physical servers are registered with Virtuozzo Automator, they form a group of physical servers or a group of Hardware Nodes (for the definitions, see *Glossary* on page 301). As an administrator, you can manage both single physical servers and physical server groups. With a group of physical servers, you can perform a number of collective administration tasks, such as:

- creating a logical structure of physical servers and the virtual environments residing on them;
- migrating virtual environments between physical servers;
- copying OS and application templates from one physical server to another;
- making virtual environment template stored on a VM Templates Storage available to other registered physical servers;
- consolidating physical server IP addresses into a network address range.

Virtuozzo Automator user accounts are managed by the administrator. An administrator can add and remove users, and set user access privileges. The access privileges determine what operations a user can or

cannot perform on registered virtual environments.

To use the Virtuozzo Automator for administering a physical server and the virtual environments residing on it, you need to install Virtuozzo on the required physical server. To learn on what operating systems Virtuozzo Automator can be installed, refer to *System Requirements* on page 6. The Virtuozzo software can be installed only on bare metal servers.

With Virtuozzo Automator, you can perform the following actions:

- Customize the interface of Virtuozzo Automator and define personal settings.
- View and install licenses.
- View physical server resource consumption.
- Create new containers and virtual machines.
- Edit container and virtual machine configuration, network parameters, and other settings.
- Manage virtual environment backups.
- Clone a container or a virtual machine.
- Manage container templates and virtual machine templates.
- Manage and monitor virtual environment resources.
- View logs and monitor virtual environment operations.
- Manage container group and perform virtual machine group actions.
- Change a virtual environment's status.
- Reinstall and/or repair a container, etc.

1.2 About This Guide

This guide is aimed at a wide range of users who are new to Virtuozzo Automator or just want to make sure they are doing everything right. The next subsection describes the structure of the guide.

1.2.1 Organization of This Guide

This guide includes the following chapters:

- **Introduction** provides the basic information about the product and the guide itself.
- **Installing and Managing Virtuozzo Automator Components** describes how to install Virtuozzo Automator on your servers as well as update or remove its components.
- **Organizing Virtuozzo Automator Infrastructure** describes how you can use Virtuozzo Automator to manage relationships between different Virtuozzo objects (physical servers, virtual environments, etc.).
- **Managing Physical Servers** explains how to do the following with physical servers:
 - register with Virtuozzo Automator,
 - configure,
 - monitor resources,
 - manage installed OS and application templates,
 - reboot, etc.
- **Managing Virtual Environments** centers on how to do the following with virtual environments:
 - create, clone, configure, start/stop, reinstall, etc.,
 - manage services and running processes,
 - manage and monitor resources,
 - manage virtual environment templates,
 - migrate virtual environments to physical servers and vice versa.
- **Managing Virtual Environment Backups** provides information on the backup hierarchy.
- **Managing Resource Library Tools** explains how to work with file shares, virtual environment templates, IP pools, and virtual networks.
- **Managing Product Licenses** describes how to manage product licenses.
- **Managing Virtuozzo Automator Security** provides instructions on setting up Virtuozzo Automator security.
- **Maintaining Virtuozzo Automator Management Tools** explains how to

- create timetables to automate backup and restarting of virtual environments,
 - monitor virtual environment statuses,
 - view alert and task logs,
 - identify top resource consumers among virtual environments.
- **Managing Virtuozzo Network** describes network-related concepts, such as configuring network accounting and shaping for physical servers and virtual environments, etc.
 - **Managing Virtuozzo OS and Application Templates** provides information on how to manage Virtuozzo templates.
 - **Updating Virtuozzo Software** describes how to check for updates, update system software, etc.
 - **Advanced Tasks** explains how to
 - use Virtuozzo Automator command-line utilities,
 - monitor Virtuozzo objects via SNMP.
 - **Troubleshooting** offers solutions to problems you might encounter while using Virtuozzo Automator.

CHAPTER 2

Installing and Managing Virtuozzo Automator Components

This chapter describes the main components of Virtuozzo Automator, lists their system requirements, and explains how to install, update, and remove them.

2.1 Virtuozzo Automator Components Overview

Virtuozzo Automator consists of the following main components:

- **VA Management Node**, ensures communication between slave servers (see further) and virtual environments hosted on them. The server where the VA Management Node is installed is called the *master server*.
- **VA Control Center**, provides the web-based GUI that enables users to manage Virtuozzo physical servers and virtual environments hosted on them. The VA Control Center is a part of the VA Management Node and is installed together with it.
- **VA Agent**, ensures interaction between the physical server it's installed on, the Master Server, and client computer from which a user logs in to the Control Center. The VA Agent is installed on physical servers running Virtuozzo 6 or 7 which are called *slave servers*. Only Virtuozzo physical servers that have Agent installed can be registered with the master server (and managed from the Control Center).

2.2 System Requirements

Before proceeding to install Virtuozzo Automator, make sure your servers meet the following system requirements.

Note: The VA Management Node and Agent cannot be installed on the same server.

2.2.1 Master Server Requirements

The master server must run Virtuozzo Linux 7 and have the VA Management Node installed. It can be a physical server or Virtuozzo Hybrid Server 7 virtual environment.

2.2.2 Slave Server Requirements

A slave server must run Virtuozzo 6.0.12 (Update 12), 7.0.2 (Update 2) or newer and have the VA Agent installed.

2.2.3 Client Requirements

A client computer must have network access to the VA Management Node and a supported web browser installed: the latest Microsoft Edge, Microsoft Internet Explorer, Apple Safari, Google Chrome, Mozilla Firefox, or Mozilla Firefox ESR 52.

2.3 Installing Virtuozzo Automator Components

If you install Virtuozzo Hybrid Server 7 with CLI management, no Virtuozzo Automator components are installed automatically along with it, but you can do so manually.

Installing Virtuozzo Automator means installing the VA Management Node and VA Agent components on corresponding servers. The following sections explain how to do so.

2.3.1 Installing VA Management Node

To install the VA MN on a physical server or in a virtual environment, download and run the deployment script:

```
# wget http://repo.virtuozzo.com/va-mn/deploy-va-mn/deploy-va-mn
# chmod 755 deploy-va-mn
# ./deploy-va-mn
```

The script will do the following:

1. Add the repository with VA MN packages to the system.
2. Install the VA Management Node package groups from the repository: “VA Management Node” and “VA Control Center”.
3. Attempt to create rules for `firewalld` and open ports required for VA MN (listed in the [Virtuozzo KB article #2509476](#)). If the firewall service is not running during installation but may be launched later, you will need to create the rules and open the ports manually.
4. Start the VA Management Node and Control Center services: `va-mn` and `va-cc`.

The installation log will be saved in `/var/log/deploy-va-mn.log`.

2.3.2 Installing VA Agent

To install the VA Agent on a physical server running Virtuozzo Hybrid Server 7, download and run the deployment script:

```
# wget http://repo.virtuozzo.com/va-agent/deploy-va-agent/deploy-va-agent
# chmod 755 deploy-va-agent
# ./deploy-va-agent
```

The script will do the following:

1. Add the repository with VA Agent packages to the system.
2. Install the VA Agent package group from the repository: “VA Agent”.
3. Attempt to create rules for `firewalld` and open ports required for VA Agent (listed in the [Virtuozzo KB article #2509476](#)). If the firewall service is not running during installation but may be launched later, you will need to create the rules and open the ports manually.
4. Start the VA Agent service: `va-agent`.

The installation log will be saved in `/var/log/deploy-va-agent.log`.

Note: For instructions on installing the VA Agent on a physical server running Virtuozzo 6, refer to the [Virtuozzo Automator 6.1 Installation Guide for Linux and Bare Metal](#).

2.3.3 Using Additional Deployment Script Options

The deployment scripts have additional options that may be of use in certain situations.

- To have a log file saved in a custom location, use the `-l` option:

```
# ./deploy-va-mn -l <custom_log_path>
```

- To skip checking for Internet connection while installing the VA MN, use the `--skip-inet-check` option:

```
# ./deploy-va-mn --l --skip-inet-check
```

This option can be used if you are installing VA MN from a local repository.

2.4 Updating Virtuozzo Automator Components

To update the VA Management Node, run

```
# yum update
```

To update the VA Agent:

- on Virtuozzo Hybrid Server 7, run

```
# yum groupupdate "VA Agent"
```

- on a Virtuozzo 6 server, refer to [Virtuozzo Automator 6.1 Installation Guide for Linux and Bare Metal](#).

2.5 Removing Virtuozzo Automator Components

To remove the VA Management Node, run

```
# yum groupremove "VA Management Node" "VA Control Center"
```

To remove the VA Agent:

- from Virtuozzo Hybrid Server 7, run

```
# yum groupremove "VA Agent"
```

- from a Virtuozzo 6 server, refer to [Virtuozzo Automator 6.1 Installation Guide for Linux and Bare Metal](#).

After removing either VA component, you may also need to delete the `firewalld` rules and close the ports required for Virtuozzo Automator (listed in the [Virtuozzo Knowledgebase](#)).

CHAPTER 3

Upgrading from Virtuozzo Automator 6.1 to Virtuozzo Automator 7

Virtuozzo Automator upgrade procedure comprises two steps:

1. Upgrading VA Management Node.
2. Upgrading VA Agent.

Both steps are described in the following sections.

3.1 Upgrading VA Management Node

You can upgrade the VA 6 Management Node component as follows:

1. Setup a new Master Server with the VA 7 Management Node installed. For details, see *Master Server Requirements* on page 6 and *Installing VA Management Node* on page 7.
2. On the VA 7 Management Node, execute the `vaconfig import-ssh` script with the VA 6 Management Node credentials from script's default location:

```
# /opt/pva/mn/bin/vaconfig import-ssh [--user <user>] [--passwd <passwd>] \  
<VA6_MN_IP_address_or_hostname>
```

The script will collect all the needed data, dump it to a tarball on the VA 6 Management Node, and then import the created tarball to the VA 7 Management Node.

3. Shut down the VA 6 Management Node.
4. Change the VA 7 Management Node IP address to that of the VA 6 Management Node.

Important: The VA 7 Management Node should have the same IP address as the VA 6 Management Node.

All hardware nodes previously registered in Virtuozzo Automator 6.1 will appear in the VA 7 Control Center.

After importing the VA 6 Management Node data to the VA 7 Management Node:

- the previous Virtuozzo Automator 7 setup, including registered slave servers, is replaced with that of Virtuozzo Automator 6.1 (for instructions on how to re-register your physical servers, see [Registering Physical Server in Virtuozzo Automator](#) on page 35),
- the installed Virtuozzo Automator license is lost due to the hardware ID change,

Note: Starting from Update2 Hotfix6, Virtuozzo Automator does not require a separate license.

- the physical server hosting the container with the VA 6 Management Node may be offline in the VA 7 Control Center. The detailed information on this issue is provided in the [Virtuozzo KB article #2762523](#).

3.2 Upgrading VA Agent

The VA 6 Agent component installed on a Virtuozzo 6 server is automatically upgraded with the `vzupgrade` utility during the Virtuozzo 6 upgrade described in the [Virtuozzo Hybrid Server 7 Upgrade Guide](#).

CHAPTER 4

Getting Started With Virtuozzo Automator

4.1 Logging In

The Virtuozzo Automator administrator can log in to Virtuozzo Automator management panel at the IP address (or hostname) of the master server and on the set TCP port (4648 by default).

Note: Master server requires a static IP address. If the IP address changes for some reason, follow the instructions in *Changing Master and Slave Servers IP Addresses* on page 292.

When connecting to the master server, enter the OS administrator credentials and click **Login**.

A Virtuozzo Automator administrator can give other users certain rights and privileges (see *Managing Virtuozzo Automator Security* on page 168). These users can be created in Virtuozzo Automator (stored in the Virtuozzo Internal database) or obtained from an external LDAP-compliant database. Users log in to Virtuozzo Automator at the same IP address/hostname and port as the VA administrator with their respective credentials. Actions these users will be able to perform in Virtuozzo Automator are defined by their privileges.

Note: Domain users can log in by providing usernames as follows: <domain_name>\<username>.

Once a Virtuozzo Internal user logs in to Virtuozzo Automator, they are recommended to provide a valid email address on the **User Profile > Personal Settings** tab (see *Defining Personal Settings* on page 17) to be

able to recover their passwords. To receive password recovery instructions, a user needs to click **Forgot your password?** on the login page and enter their user name and email address provided on the personal settings page.

Note: Password recovery is supported only for users from the Virtuozzo Internal database.

4.2 Interface Overview

The Virtuozzo Automator interface has been designed to let the Virtuozzo administrator quickly perform all possible tasks through an intuitive navigation system.

The main components the Virtuozzo Automator interface consists of are:

- The left menu frame lists all your physical servers and virtual environments. You can access main operations to be performed on them by right-clicking the server or virtual environment.
- The toolbar on top of the right frame allows performing all actions available for the chosen object: a physical server, a virtual environment or any management unit.
- The content part on the right frame displays the content of the chosen object: a physical server, a virtual environment or any management unit.
- The **Tasks** button above the right frame opens the **Active Tasks** window where you can view all operations of the current user that run at the moment or have been finished.

The left menu comprises the following sections:

- **Infrastructure** displays physical servers and virtual environments.
- **Logical View** looks the same way as the Infrastructure menu, the only difference that the virtual environments can be distributed between all folders or physical servers no matter what physical servers they physically belong to.
- **Resource Library** displays the following sub-sections: **Software, Templates, IP Pools,** and **Virtual Networks.**
- **Management** shows the following sub-sections: **Scheduler, Alerts & Events, Task Log, Audit, Updates,** and **Support.**
- **Setup** displays the following sub-sections: **Messaging, Licensing, Security, Power Panel Policies** and

Configure Backups.

The upper most element on the menu is the **Infrastructure** link. If expanded, it displays your hierarchical structure of physical servers and virtual environments hosted on them as lower levels. Each of the physical servers and virtual environments that make up your Virtuozzo Automator infrastructure displays its name on the Infrastructure-oriented left menu, which, if clicked, leads to its dashboard.

The content of the right frame always depends on what option you have clicked on the left menu frame. If you have clicked a physical server, the right frame will show the physical server relating information and operations, for a virtual environment the right frame will display the virtual environment relating sections and operations, and so on. See the *Using Context Menu* on page 15 section.

4.3 Extending Standard Browser Functionality

Virtuozzo Automator extends the basic functionality of standard web browsers by providing you with the following facilities:

- support for the drag-and-drop operation within certain Virtuozzo Automator components;
- support for the use of the Virtuozzo Automator context menu with certain Virtuozzo Automator objects.

4.3.1 Using Drag-And-Drop

Virtuozzo Automator allows you to 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 Virtuozzo Automator provides the drag-and-drop support is given below:

- Moving any physical servers in the **Infrastructure** section to any folders available within this section or the **Logical View** section.
- Moving any virtual environments listed under the corresponding physical servers in the **Infrastructure** section to any folders available within this section or the **Logical View** section.
- Moving physical servers and virtual environments between folders within the **Infrastructure** section.
- Moving a folder in the **Infrastructure** section to another folder within this section.
- Moving physical servers and virtual environments between folders within the **Logical View** section.
- Moving a folder in the **Logical View** section to another folder within this section.

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

1. Place the cursor over the object (e.g. a virtual environment) you wish to drag-and-drop and press the mouse button.
2. Hold down the mouse button and drag the object (e.g. to some folder in the **Logical View** section).
3. Release the mouse button to drop the object.

Upon the successful operation, the object will be shown in the place where it was dropped.

4.3.2 Using Context Menu

Virtuozzo Automator supports quick access to the main features through the context-menus. You can use context-menus to manage physical servers and virtual environments. Below are some common uses for the context menus in Virtuozzo Automator:

- Right-click the **Infrastructure** sub-menu to create a new virtual environment on any of your physical servers, create a new folder in the **Infrastructure** section, or configure the security policy for all the physical servers currently registered in Virtuozzo Automator.
- Right-click a physical server to perform the most common operations on your physical servers: create a new virtual environment, install a new OS or application template, reboot the physical server, configure the security policy for the physical server, etc. The same menu is also available if you right-click a physical server on the **Hardware Nodes** tab of the **Infrastructure** window.
- Right-click virtual environment to perform such operations as starting, stopping, or restarting the virtual environment, creating virtual environment clones, migrating the virtual environment to another physical server, etc. The same menu is also available if you right-click a virtual environment on the **Virtual Environments** tab of the **Infrastructure** window.
- Right-click the **Logical View** sub-menu to create a new folder, physical server, or virtual environment in this section and to configure the security permission for all the physical servers currently registered in Virtuozzo Automator.

If you work with Virtuozzo Automator via the Mozilla Firefox browser, you may encounter the following problem: after right-clicking any of the aforementioned items, you will see the Virtuozzo Automator and the browser context menus displayed. To display only the Virtuozzo Automator context menu, perform the following operations:

1. In the Mozilla Firefox browser, open a new tab, type `about:config` in the address field, and press the

Enter key.

2. Double-click the `dom.event.contextmenu.enabled` parameter to change its value from `false` to `true`.

Now, if you right-click any of the aforementioned items, you will see only the Virtuozzo Automator context menu.

4.4 Customizing User Profile

4.4.1 Defining Interface Settings

On the **Interface Settings** tab of the **User Profile** screen, you can set a number of parameters related to the Virtuozzo Automator interface.

You can access the **User Profile** section by clicking the login name in the upper part of the screen.

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 Virtuozzo Automator is to choose the first screen to be loaded when you log in to Virtuozzo Automator from the Home Page drop-down menu.
Local Time Zone	This setting affects the date and time information found on such Virtuozzo Automator 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 Virtuozzo Automator 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 colour for your Virtuozzo Automator affecting such elements as the Virtuozzo Automator general layout (framed or non-framed), icons and images, and the colour palette.

Continued on next page

Table 4.4.1.1 -- continued from previous page

Option	Description
Menu Details Level	You can choose what items will be displayed under the Infrastructure and the Logical View on the left Virtuozzo Automator menu: folders, the physical servers distributed over them, virtual environments - those that run on the physical servers, in the Infrastructure , and sent to appropriate folders, in the Logical View .
Enable Tooltips	Selecting or clearing this check box defines whether you will see short descriptions of the elements of the Virtuozzo Automator interface when pointing them with the cursor.
Show Top Right Buttons Pane	Selecting this check box makes a button pane always appear at the top right corner of Virtuozzo Automator. You can also call up this pane by clicking an arrow in this corner.
Allow Dynamic Status Updates	Selecting this check box enables the statuses of virtual environments to be updated automatically on the left Virtuozzo Automator menu, the virtual environment dashboard screen and the Tasks pane without refreshing the current page manually. If you have problems with the connection to the Master Server (e.g. the bandwidth is low or the connection is unstable), enabling this function might make your work in Virtuozzo Automator inconvenient and slow. In this case it is better to clear the check box.

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 the current user within the same browser, the default settings will be used until you perform a new customization.

4.4.2 Defining Personal Settings

On the **Personal Settings** tab of the **User Profile** screen, you can configure some personal data.

You can access the **User Profile** section by clicking the login name in the upper part of the screen.

As a Virtuozzo Automator user, on this page you can revise, change or add the following personal data:

- The **Login** field is for information purposes only, you cannot change it.
- To change your password, enter the current password to the **Old Password** field, and a new password into the **Password** and **Retype the password** fields. Please make sure it is difficult enough to pick up,

so using birthdays and relatives' names for a password is not probably the best approach to ensuring your security.

Follow the VA requirements to set up a reliable and secure password:

- Passwords must be at least six characters long.
- Passwords must contain elements from three of the four following types of characters:
 - English uppercase letters (A, B, C, ... Z);
 - English lowercase letters (a, b, c, ... z);
 - Westernized Arabic numerals (0, 1, 2, ... 9);
 - Non-alphanumeric characters (special characters) (\$,!,%,^).

If your user information is taken from an external authentication database registered in Virtuozzo Automator, you cannot change your password as it is taken from this database.

- The **Full Name** and **Description** fields are editable only if your user information is stored in the regular Virtuozzo database. If you are a user of the host OS (including root) or of an external authentication database having access to Virtuozzo Automator, you cannot change your full name as it is taken from the corresponding database.
- The **Email** field should be filled in with a correct email address to enable the functionality of restoring your password, if you forgot it. If your user information is taken from an external authentication database registered in Virtuozzo Automator, you cannot edit your email address as it is taken from this database.

To submit the changes, click **Submit**.

4.5 Organizing Logical Structure

Virtuozzo Automator allows you to organize all your registered physical servers and with virtual environments on them in the following ways:

- 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 virtual environment backups, are automatically filtered to conform to the current level of the object hierarchy.
- The Virtuozzo Automator security policies can be set up not on the physical server or virtual

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

- **Infrastructure** allows you to display the physical organization of the VA infrastructure. For example, all the physical servers will take place one level lower than the datacenter, and all the virtual environments running on a certain physical server 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 physical servers and virtual environments 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. Additionally, physical server or virtual environment may simultaneously appear in any number of folders.

The main operations related to organizing the VA 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 physical server or virtual environment context). Below are the ways to set about:

- Adding a folder. On the left menu, click the folder in which you want to create a new folder. On the top toolbar, click the **Create in this Folder** button and select **Create Subfolder**.
- Renaming a folder. On the left menu, click the folder you wish to rename. On the top toolbar, click the **Manage Folder** button, then click **General Settings**.
- Moving a folder. On the left menu, click the folder you wish to move. On the top toolbar, click the **Manage Folder** button, then click **Move Folder**.
- Deleting a folder. On the left menu, click the folder you wish to delete. On the top toolbar, click the **Manage Folder** button, then select **Delete Folder**.
- Including a physical server in a folder. Click on **Infrastructure** on the left menu and go to the **Hardware Nodes** tab. Select the physical servers you wish to include in a certain folder and click **Move** on top right of the **Hardware Nodes** table. If you are working with **Logical View**, the course of actions is a bit different, because any physical server can belong to any number of folders. On the left menu,

click the folder where you wish to include the physical server. Then click the **Add to Folder** button on the top toolbar, and select **Hardware Nodes**.

- Including a virtual environment in a folder. In the **Infrastructure** section, the virtual environments always go with the physical server on which they are hosted, so you cannot include them separately in folders. In **Logical View**, any virtual environment can belong to any number of folders. On the left menu, click the folder where you wish to include the virtual environment. Then click the **Add to Folder** button on the top toolbar, and select **Virtual Environments**.
- Moving a physical server or a virtual environment 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 physical server or a virtual environment from the **Infrastructure** section. Unregister the corresponding physical server (the **Unregister** button on the **Hardware Nodes** tab) or delete the virtual environment (the **Delete** button on the **Virtual Environments** tab).
- Removing a physical server or a virtual environment from a **Logical View** folder. On the left menu, click the folder from which you wish to delete a physical server/virtual environment, then go to the **Hardware Nodes/Virtual Environments** tab. Select the object(s) you want to remove and click **Remove** on top right of the table.

Using the built-in Virtuozzo Automator functionality, you can create a logical structure of your own:

- create new folders and edit them;
- change the structure hierarchy by moving folders and physical servers;
- change the hierarchy by adding physical servers and virtual environments to folders, i.e. you can group the physical and virtual environments according to your needs.

4.5.1 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** section can be of type **Folder**, **Datacenter**, or **Rack**. Folders created in the **Logical View** section can be of type **Folder** or **Datacenter**.

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

4.5.2 Editing Folder Properties

On the **General Settings** 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, select the radio button next to the desired icon in the **Folder Type** section. Click the **Submit** button to apply any changes, otherwise click **Cancel**.

Any changes made to the folder name or folder type will not affect any physical server or virtual environment settings.

4.5.3 Moving Folder

Folders under the **Infrastructure** and **Logical View** level can be moved to other locations within their corresponding hierarchies. You cannot change the location of the following folders:

- 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 physical server(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 **Infrastructure** of Virtuozzo Automator and **Logical View** trees, refer to *Organizing Logical Structure* on page 18.

4.5.4 Moving Physical Servers to Another Folder

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

For the selected physical server(s) to be included in the folder of your choice, select this folder from the

Destination Folder drop-down menu and click **Submit**. The physical server(s) will be displayed on the left menu as sub-levels of the selected folder.

4.5.5 Adding Physical Servers to Folders

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

4.5.6 Adding Virtual Environments to Folder

On the **Add Virtual Environments** screen you can include any of the existing virtual environments in the current folder of the **Logical View** hierarchy. To do that, press the **Add Virtual Environments** button below the **Virtual Environments** section, select the virtual environments to belong to the folder, click **Use Selected**, and finally click **Save**.

CHAPTER 5

Organizing Virtuozzo Automator Infrastructure

This chapter describes the Infrastructure tabs and management commands available on them.

5.1 Viewing Summary Information

The **Summary** tab of the **Infrastructure** section provides you with general information of all the physical servers and virtual environments. It allows you to quickly and timely assess the current situation and, if necessary, take the required actions. The tab is available by clicking the **Infrastructure** submenu in the navigation tree.

The **Overall Status** section shows the virtual environments that have signaled resources consumption alerts or those physical servers whose licenses have expired or are going to expire.

Note: You can configure Virtuozzo Automator to not show alerts for specific mount points on your system even if disk usage on them is close to or exceeds the set limit. For detailed information on how you can do this, see **Base Types and Interfaces > System Interface and Special Packets > system > Calls > configuration** in the VA Agent XML API Reference guide.

Virtual Environments

The section displays information on all virtual environments registered in the VA infrastructure.

Section	Description
Status	The column displays the number of running and stopped virtual environments. Upon clicking one of the statuses, you are redirected to the Virtual Environments tab, with the virtual environments grouped according to the chosen status.
Technology	The column displays virtualization technologies running on the virtual environments. Upon clicking a technology name, you are redirected to the Virtual Environments tab, with the virtual environments grouped according to the chosen technology.

Hardware Nodes

The section displays information on all physical servers registered in the VA infrastructure.

Section	Description
Status	The column displays the number of online, offline, and requiring attention physical servers. Upon clicking one of the statuses, you are redirected to the Hardware Nodes tab, with the servers grouped according to the chosen status.
Node Type	The column displays virtualization products running on the physical servers. Upon clicking one of the products, you are redirected to the Hardware Nodes tab, with the servers grouped according to the chosen type.

The top toolbar includes a number of links:

- From the **Create in this Folder** drop-down menu you can select:
 - the **Create Subfolder** link to create a new folder in the **Infrastructure** or **Logical View** section;
 - the **New Virtual Environment** link to create another virtual environment;
 - the **New Hardware Node** link to register a physical server in Virtuozzo Automator;
 - the **New Backup** link to select virtual environments to be backed up and to configure various backup options.
- If you are on the **Infrastructure** level, in the **Manage Infrastructure** drop-down menu you can select:
 - the **Global Policies** link to assign Power Panel policies on the Infrastructure level;
 - the **Management Node** link to view detailed information on the Management Server;
- If you are on the **Logical View** level, the **Add To Folder** drop-down menu allows you to perform the following operations:

- Add more virtual environments to the main level of the **Logical View** hierarchies. To do this:
 1. Follow the **Virtual Environments** link and click **Add Virtual Environments**.
 2. In the displayed table, select the check boxes of the virtual environments you want to add to **Logical View**, click **Use Selected**, and then click **Save**.

The chosen virtual environments will be displayed on the **Logical View** main level.

- Add more physical servers to the main level of the **Logical View** hierarchies. To do this:
 1. Follow the **Hardware Nodes** link and click **Add**.
 2. In the displayed table, select the check boxes of the physical servers you want to add to **Logical View**, click **Use Selected**, and then click **Save**.

The chosen physical servers will be displayed on the **Logical View** main level.

If the **Logical View** level contains a folder and you want to add a virtual environment or a physical server to the main level of this folder, go to the folder **Summary** tab and perform the aforementioned operations.

5.2 Viewing Physical Servers Information

Hardware Nodes is a common term for physical servers running Virtuozzo. Virtuozzo software can be installed on bare metal servers only.

The Virtuozzo Automator functionality enables you to register, group under logical units, and manage a number of such servers.

If you deal with a large number of registered physical servers (and virtual environments), it can be convenient to organize them into multiple logical units divided by architecture, virtual environment type or other principles. For details on how to do this, consult *Organizing Logical Structure* on page 18.

You can also set up a convenient and automated structure of IP pools. The IP addresses within these pools can be automatically assigned to the certain groups of virtual environments, thus eliminating possible IP conflicts between virtual environments and physical servers. Doing this will also let you save time on manual IP assignment. For details, see *Managing IP Pools* on page 244.

To distribute workload, you can migrate virtual environments between physical servers registered in the Virtuozzo Automator infrastructure.

On the **Hardware Nodes** screen, you can review the list of physical servers currently registered in Virtuozzo Automator and see the physical server details shown as the following table:

Column	Description
Status	The status of the physical server.
Hostname	The hostname of the physical server.
Description	The description of the physical server.
Default IP Address	The IP address of the physical server used to connect to Master Server (the physical server with the VA Management Server component of Virtuozzo Automator installed).
Operating System	The name and version of the operating system installed on the physical server.
Arch	The microprocessor architecture of the physical server.
CPU	The percentage of the current CPU load on the physical server. Updated every 10 seconds.
Disk	The percentage of the current disk space usage of the physical server. Updated every 10 seconds.
Memory	The percentage of the current memory consumption of the physical server. Updated every 10 seconds.
Alert	The level of the physical server resources usage signaled by a corresponding alert.
Alerted VEs	The number of virtual environments which reside on the physical server and whose level of the resources usage is signaled by a corresponding alert.
Running VEs	The current number of running virtual environments residing on the physical server.
Stopped VEs	The current number of stopped virtual environments residing on the physical server.
Total VEs	The total number of virtual environments residing on the physical server.

Note: If this screen is loaded in the **Logical View** mode, the physical servers displayed in this table are those which have been added to the **Logical View**, otherwise the physical servers list is empty. To add a physical server to the **Logical View**, click **Add To Folder** on the toolbar, select **Hardware Nodes** from the drop-down menu, and click **Add**, choose the physical server(s) in the displayed window, and click **Use Selected**, then **Save**.

To manage any of the physical servers registered in Virtuozzo Automator, click its hostname. To display a certain physical server from a long list, click the **Show Search** link below the table, enter the name of the physical server and click **Search**; to restore the list of the physical servers, click **Reset Results**.

Using the buttons above the table, you can manage physical servers as follows:

- to stop managing a physical server via Virtuozzo Automator, tick its check box and click **Unregister**;
- to add a new physical server to the list of the servers managed via Virtuozzo Automator, click **New Hardware Node**;
- to move one or more physical servers to a folder, select them in the table and click **Move**.

5.3 Viewing Virtual Environments Information

The table contains all virtual environments hosted on physical servers registered in Virtuozzo Automator. You can access it from the **Infrastructure > Virtual Environments** screen. Here you can create new virtual environments and delete existing ones, perform various management operations on them.

The **Virtual Environments** table comprises the following information:

Column	Description
ID	The ID assigned to the virtual environment. An ID is a container characteristic only. It can be set manually or automatically generated.
Status	The current status of the virtual environment.
Name	The name of the virtual environment.
Domain	The domain of the virtual environment.
Hostname	The hostname of the virtual environment.
Description	The description of the virtual environment, if any.
IP Addresses	The IP addresses assigned to the virtual environment.
Hardware Node	The hostname or IP address of the physical server where the virtual environment is hosted.
VT	The virtualization solution the virtual environment is based on. Currently, Virtuozzo Automator allows you to manage containers and virtual machines.
Architecture	The microprocessor architecture of the host physical server.
Operating System	The OS template the virtual environment is based on.
Original Template	The virtual environment template the virtual environment is based on.
CPU	Presents a visual representation showing how much host physical server CPU time the virtual environment is consuming at the moment.

Continued on next page

Table 5.3.1 -- continued from previous page

Column	Description
Disk	Presents a visual representation showing the current host physical server disk space consumption by the virtual environment.
Memory	Presents a visual representation showing the current consumption of the memory resources allocated to the virtual environment.
Alert	Every time a virtual environment 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 virtual environment.

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 Virtuozzo Automator displays the latest values. To have a more comprehensive resource consumption report for a virtual environment, click its name to open the virtual environment dashboard and open the **Resources** tab to view a minute resource consumption description.

To show or hide columns, click **Select Columns** and set or clear the respective checkboxes.

To facilitate working with virtual environments residing on your physical servers, you can filter the virtual environments shown in the **Virtual Environments** table. To do that, click **Show Search**, enter search patterns in the search fields, and click **Search**. To change what search fields are displayed, click **Customize**. To view all the virtual environments residing on your physical servers, click **Reset Results**.

5.4 Viewing Resource Consumption

Knowing how virtual environments consume host resources may help you prevent physical servers from overusing resources and reducing the performance of virtual environments.

The **Resource Consumers** table keeps track of the resource usage on the physical servers. Access the **Resources** page by going to **Infrastructure > Resources** tab.

In the **List Settings** section, you can specify the time interval for which you want to view the resource consumption statistics. To specify the time interval, choose one of the following items from the corresponding drop-down menu:

- Last Hour
- Last Day
- Last Week

In the **Resource Consumers** section, you can see information such as disk usage, memory usage, incoming and outgoing traffic of all the virtual environments. This information is presented in the **Virtual Environments** table and 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	Description
Virtual Environment	The virtual environment name.
Hardware Node	The physical server that hosts the virtual environment.
CPU Usage	The host CPU time consumed by the given virtual environment for the selected time frame.
Disk Host Usage	The host disk space consumed by the given virtual environment, in percents.
Disk Quota Usage	The percentage of the disk space usage compared to the total amount of disk space allocated to the virtual environment.
Disk Usage	The usage of the disk space by the virtual environment.
Memory Host Usage	The host memory consumed by the virtual environment, in percents.
Memory Quota Usage	The percentage of the memory usage compared to the total amount of memory allocated to the virtual environment.
Memory Usage	The usage of the memory by the virtual environment.
Incoming Traffic	The amount of the virtual environment incoming traffic, in bytes.
Outgoing Traffic	The amount of the virtual environment outgoing traffic, in bytes.

If you click a column name, you will see an upward triangle displayed to the right of the column name and virtual environments consuming the corresponding resource in ascending order. If you click the column name once again, you will see a downward triangle displayed to the right of the column name and virtual environments consuming this resource in descending order.

5.5 Viewing Infrastructure Logs

This section provides information on the Infrastructure level logs.

5.5.1 Viewing Infrastructure Task Logs

You may turn to the **Tasks** subtab to check the status of any Virtuozzo Automator operation recently performed.

The tasks list is presented as the following table:

Column	Description
Time	The date and time when the execution of the task was started.
Hardware Node	The physical server or the Master Server where the task is performed. This option is available only at the Infrastructure level.
Object	The name of the virtual environment or other object that is performing the task.
Task	The kind of the task.
User	The user who initiated the process.
Status	Indicates whether the task was successful or failed.
Details	The detailed information on a particular task. Click the Details link opposite the needed task to view the details.

To show or hide columns, click **Select Columns** and set or clear the respective checkboxes.

By default, 20 records are displayed on a page. To change the number of records shown per page, click the appropriate link below the table. You can also filter the log records shown in the **Tasks** table. To do that, click **Show Search**, enter search patterns in the search fields, and click **Search**. To change what search fields are displayed, click **Customize**. Click **Reset Results** to view all log records.

5.5.2 Viewing Infrastructure Alert Logs

The **Alerts** subtab enables you to view the physical and virtual environment resource consumption.

Every time a physical server or any of its virtual environments 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. You shall pay attention to the problem resource and correct the situation.

The **Alerts** table provides you with the following data:

Column	Description
Time	The date and time when the alert was generated.
Object	The physical server the alert was logged for.
Category	One of the two alert categories: <i>Resource</i> (alert on a single virtual environment's resource consumption) or <i>Group</i> (alert on the whole Group's resource consumption).
Details	The problem description.
Type	The alert sign displays the type of alert for the given virtual or physical server. See the detailed description below.
Parameter	The type of the resource that required the consumption value alert due to its overusage.

To show or hide columns, click **Select Columns** and set or clear the respective checkboxes.

You can filter the alerts shown in the **Alerts** table. To do that, click **Show Search**, enter search patterns in the search fields, and click **Search**. To change what search fields are displayed, click **Customize**. Click **Reset Results** to view all alerts.

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 differs slightly depending on the parameter under alert.

For CPU-related parameters the meaning of the three zones is the following:

Zone	Description
Green	The physical server (or virtual environment) consumes less than 85% of the CPU time allowed to it. This means that you can run more applications inside the physical server (or virtual environment) without violating the performance of the current ones. If the physical server consumes more than 85% of the allowed CPU time, but for an insignificant time, the color remains green as this situation is not dangerous.

Continued on next page

Table 5.5.2.2 -- continued from previous page

Zone	Description
Yellow	The physical server (or virtual environment) consumes between 85% and 95% 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 physical server might experience shortage of available CPU power. You may need to consider the possibility of cutting down the number of processes.
Red	The physical server (or virtual environment) consumes more than 95% 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 physical server caused by a temporary task. For example, this may happen if you are compiling a package in the physical server (or virtual environment) 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 VA System processes page to determine which processes 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 physical server (or virtual environment) consumes less than 85% of disk resources allowed to it. This means that the physical server has currently no problem with disk resources.

Continued on next page

Table 5.5.2.3 -- continued from previous page

Zone	Description
Yellow	The physical server (or virtual environment) is using between 85% and 95% of the disk resources available to it on the physical server. The situation is rather dangerous since the next disk resource allocation request can be refused by the physical server (or virtual environment). Therefore, you should erase unnecessary data from the physical server immediately. A physical server (or virtual environment) is allowed to consume more than 95% 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 physical server will be denied some of the disk resources and you might lose valuable data.
Red	The physical server (or virtual environment) has exceeded the soft limit and a disk resource allocation has been refused by it. This might have resulted in a loss of some valuable data or other problems inside the physical server. To discontinue this very serious situation, you should erase unnecessary data from the physical server immediately.

For memory-related parameters the meaning of the three zones is the following:

Zone	Description
Green	The physical server (or virtual environment) consumes less than 85% of the memory-related resource allowed to it.
Yellow	The physical server (or virtual environment) consumes between 85% and 95% 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 physical server 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 physical server (or virtual environment) has been denied this memory-related resource due to its overusage. This might have resulted in application crashes or other problems inside the physical server (or virtual environment).

By default, the zone threshold values (the soft and hard limits) are 85% and 95% of the resource. It is possible to customize these values for a single node or for all nodes registered in Virtuozzo Automator.

You can change zone threshold values for a single node as follows:

1. On a slave node, change the `yellow_alerts_threshold` and `red_alerts_threshold` values in the `/var/opt/pva/agent/etc/vzagent.conf` file as required.

2. Restart VA Agent:

- on a Virtuozzo 6 node

```
# service pvaagentd restart
```

- on Virtuozzo Hybrid Server 7 node

```
# systemctl restart va-agent
```

If you want to change zone threshold values for all nodes in the infrastructure, for example, to 80% for the soft limit and to 90% for the hard limit, run the following commands in the VA Management Node console:

```
# vzagroup reconfigure /data/resource_alert_monitor/configuration/yellow_alerts_threshold 80
# vzagroup reconfigure /data/resource_alert_monitor/configuration/red_alerts_threshold 90
```

5.5.3 Viewing Infrastructure Event Logs

The **Events** subtab keeps track of all the changes in the statuses of all the virtual environments registered on Virtuozzo Automator physical servers. These changes may happen due to the virtual environment routine management via Virtuozzo Automator, command line operations, or due to the operation of some programs.

The **Status Changes** table on the **Events** subtab displays the information on the physical server and virtual environment changes as follows:

Column	Description
Time	The time when the status of a physical server or virtual environment was changed.
Object	The name of a physical server or virtual environment whose status was changed.
Old Status	The previous status of a physical server or virtual environment.
Status Obtained	The current status of a physical server or virtual environment.

To show or hide columns, click **Select Columns** and set or clear the respective checkboxes.

By default, 20 records are displayed on a page. To change the number of records shown per page, click the appropriate link below the table. You can also filter the log records shown in the **Events** table. To do that, click **Show Search**, enter search patterns in the search fields, and click **Search**. To change what search fields are displayed, click **Customize**. Click **Reset Results** to view all records.

CHAPTER 6

Managing Physical Servers

This chapter describes ways to register and manage physical servers.

6.1 Registering Physical Server in Virtuozzo Automator

If you have installed Virtuozzo Hybrid Server 7 with GUI management, physical servers with the **Compute** role are registered in the Virtuozzo Automator infrastructure automatically. If you have chosen the installation with CLI management, you need to register your slave servers manually.

To register a physical server in Virtuozzo Automator, the following firewall ports should be opened:

- on slave servers: 4433, 4434, 4435;
- on a master server: 4533, 4534.

Note: For the proper functioning of the registered server, you may need to open more ports. To learn information on other ports, refer to <http://kb.virtuozzo.com/en/9516>.

Registering a new physical server in Virtuozzo Automator is a simple action which needs entering the following information on a new server:

- The valid IP address of the physical server that will be used by Virtuozzo Automator to connect to this physical server. The physical server's IP address can be either of version 4 or of version 6. Enter this IP address to the **Node Address** field in the **Connection to Hardware Node** section.

Note:

1. It is recommended to configure static IP addresses for slave servers as registered physical servers will appear offline in the VA infrastructure as soon as their IP addresses change. If the IP address of a slave server changes for some reason, follow the instructions in *Changing Master and Slave Servers IP Addresses* on page 292.
 2. To change the hostname of a registered physical server, unregister it from Virtuozzo Automator, change the hostname, and re-register it in VA.
-

- 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 physical server as the administrator. Write the login name in the **User Name** field and the password in the **Password** field.
- Selecting the **Force registration even if Node is already registered in another Server Group** checkbox is the option to choose when the physical server you are registering has already been and is still registered on another physical server and you need this physical server to be registered from your physical server. If you forcibly register the physical server, this physical server will be removed from the cluster it currently belongs to.

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

The newly registered physical server will be displayed in the physical server list on the **Hardware Nodes** screen and accessible via Virtuozzo Automator for all the usual managing and monitoring VA operations. Besides, physical servers registered in Virtuozzo Automator form a joint physical servers pool which provides with the following collective actions:

- creating a logical structure of physical servers and the virtual environments residing on them;
- migrating virtual environments between physical servers;
- copying OS and application templates from one physical server to another;
- making virtual environment templates stored on a Virtual Manager Server available to other registered physical servers;
- reserving pools of IP addresses and organizing IP ranges inside them.

6.2 Managing Disk Images

If you have any file shares registered in Virtuozzo Automator, the CD/DVD disk images available on these shares will be displayed on the **CD/DVD Images** tab of the **Software** screen.

The **Disk Images** table shows the following information:

Column	Description
Name	The name of the disk image.
Description	The description of the disk image.
Full Path	The full path to the place where the disk image is stored.
Share	The name of the file share hosting the corresponding disk image.
Size	The size of the corresponding disk image.
Enabled	A green tick opposite a disk image indicates that this disk image is enabled and can be used, a grey circle means that the disk image is disabled and cannot be used.
Status	The current status of the disk image.

To show or hide columns, click **Select Columns** and set or clear the respective checkboxes.

To facilitate working with CD/DVD disk images available on the file shares registered in Virtuozzo Automator, you can filter the images shown in the **Disk Images** table. To do that, click **Show Search**, enter search patterns in the search fields, and click **Search**. To change what search fields are displayed, click **Customize**. To view all the CD/DVD disk images available on the file shares registered in Virtuozzo Automator, click **Reset Results**.

To manage multiple disk images at once, use the buttons above the table to:

- Enable disk images (the **Enable** button).
- Disable disk images (the **Disable** button). You may need to disable disk images because they have become corrupted or to prevent other users from mounting them to virtual environments.

Clicking the disk image name in the **Name** column will lead you to the **Configure Disk Image** screen described in the following subsection.

6.2.1 Configuring Disk Image Parameters

The **Configure Disk Image** screen allows you to do the following:

- In the **General Settings** group, you can:
 - Review the disk image name, the network path to the place where the disk image is stored, and the disk image size.
 - Add some description to the disk image or modify the existing one.
 - Specify whether the disk image is enabled or not by selecting or deselecting the **Enabled** check box.
- In the **File Share Information** group, you can review the name of the file share storing the disk image and the network path to the share.

Click the **Save** button to save the changes, otherwise, click **Cancel**.

6.3 Rebooting Physical Server

You may want to reboot your physical server. For example, this may happen if you have installed the latest kernel updates on the physical server.

Before rebooting the physical server, keep in mind that usually this process takes 3-5 minutes. During this time, the physical server and all virtual environments residing on it will be unavailable. To reboot the physical server, click **Operate > Reboot Node** on the top toolbar.

Note: When a physical server is accidentally powered off, the VA system generates an alert message and notifies that the physical server resources are not available. The alert is generated after 10-15 minutes after the physical server failure.

6.4 Physical Server Toolbar Overview

In Virtuozzo Automator, the physical server toolbar lets you quickly access some of the common server maintenance tasks:

- In the **Operate** drop-down menu:

Option	Description
New Virtual Environment	Create a new virtual environment.
Register Virtual Machine	Register the virtual machine on the physical server. Only virtual machines can be registered on the physical server.
Migrate Server to Container	Migrate a physical server to a container with the help of the Virtuozzo Transporter tool. Note: This feature is only supported for Virtuozzo 6 servers.
Migrate Server to Virtual Machine	Migrate a physical server to a virtual machine with the help of the Virtuozzo Transporter tool. Note: This feature is only supported for Virtuozzo 6 servers.
Reboot Node	Reboot the physical server. Note that rebooting can take considerable time during which the virtual environment hosting on this server won't be available.
Unregister Node	Unregister the physical server from Virtuozzo Automator.

- In the **Configure** drop-down menu:

Option	Description
General Settings	Configure general settings, such as physical server description.
Virtual Environments Host Settings	Manage the general server settings for Virtuozzo virtual machines and containers.
Backup Settings	Configure the default backup settings that will be used for all the virtual environments on this physical server. These settings can be overridden individually for each container or virtual machine on the corresponding screens.
Logging	Change the periodicity of refreshing the resources consumption information in the logs.

Continued on next page

Table 6.4.2 -- continued from previous page

Option	Description
Proxy Settings	Change the SMTP relay server IP address and the proxy server address or hostname of the current physical server. The physical server 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.

- In the **Manage** drop-down menu:

Option	Description
Virtual Machine Templates	Virtuozzo host specific. Manage virtual machine templates.
Container Flavors	Manage container flavors.
Software Updates	Check for software updates.
Install App/OS Templates	Upload and install new templates on the physical server.
Virtual Networks	Create and manage virtual networks.
Offline Services	Create new and configure the offline management policies. <hr/> Note: This feature is only supported for Virtuozzo 6 servers. <hr/>
Power Panel Policies	Assign new policies and manage the existing policy rules for Power Panel usage. <hr/> Note: This feature is only supported for Virtuozzo 6 servers. <hr/>
Install license key	Install a new license for the virtualization solution running on the server.

6.5 Physical Server Dashboard Overview

The physical server **Summary** page shows the current status of the physical server and virtual environments residing on it as well as server configuration and resource consumption.

The **Server State** section informs you on everything related to resources and updates:

Field	Description
Status	Shows if the physical server is running (online) or not (powered off, offline). If the physical server goes offline, the status is changed automatically. Note: If Virtuozzo 6 nodes appear offline, make sure that the use of TLS 1.0 is allowed as described in <i>Enabling Support for Virtuozzo 6 Nodes</i> on page 293.
Software Status	The current status of VA packages installed on server. Packages that do not need to be updated are marked Up-to-date .
RAM + Swap Usage	The total percentage of the current physical server 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 server.
CPU Usage	The percentage of the CPU power used by the physical server at the moment the current Virtuozzo Automator page was generated.
CPU Load Average	The last 1, 5, and 15 minutes system load averages.
Uptime	The time that has passed from the last physical server start.

The **License** section shows the information on the physical server license:

Field	Description
Status	The status of the license. You can click the status link, to install a new license (if no license is installed on the physical server), or to view the installed license details.
Expiration	The expiration date and time of the license.
Limits	

Continued on next page

Table 6.5.2 -- continued from previous page

Field	Description
Running Virtual Environments	The total number of virtual environments you can simultaneously run on the physical server. Note: This parameter is only supported for Virtuozzo Hybrid Server 7.
Running Containers	The total number of containers you can simultaneously run on the physical server. Note: This parameter is only supported for Virtuozzo 6 servers.
Running Virtual Machines	The total number of virtual machines you can simultaneously run on the physical server. Note: This parameter is only supported for Virtuozzo 6 servers.

The **Server Configuration** section displays the configuration of the physical server:

Field	Description
Software	
Automation Product	The automation software installed on the physical server.
Virtualization Product	The virtualization product installed on the physical server.
Hardware	
Architecture	The description of the processor model(s) installed on the server.
Network	
Hostname	The hostname of the physical server.
IP Addresses	Enumerates all the IP addresses the server has on all its network interfaces.

In the **Virtual Environments** section, you can see the number of running and stopped virtual environments.

The **Resource Alerts** section provides information on the server resource consumption:

- green circle: the server operates normally,
- yellow circle: some server resource is approaching its soft limit,
- red circle: some server resource has exceeded its soft limit.

Column	Description
Alert	The name of the resource parameter that has generated the alert.
Current	The current value of the resource parameter.
Soft Limit	The limit on the resource parameter that can be temporarily exceeded.
Hard Limit	The limit on the resource parameter that cannot be exceeded under any circumstances.

For details on resource alerts, refer to [Viewing Infrastructure Alert Logs](#) on page 30.

The **Disk Partitions** and **Memory** sections inform you about the respective resources consumption on the physical server.

The information on the **Disk Partitions** size usage in all the partitions existing on your physical server is presented in the following tables (corresponding to the number of partitions):

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

The information on the **Memory** usage is displayed in the following way:

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

The **Resources Commitments** section provides summarized information on the disk and memory resources

promised to all the virtual environments hosted on the physical server. The **Value** column displays how much resources have been promised; the **Percentage** column shows how much of them are currently being used by virtual environments. If at least one virtual environment is promised unlimited resources, the **Value** column shows “Unlimited”, and the **Percentage** column - “n/a” for the corresponding resource.

For more details on the physical server resource consumption, see [Monitoring Physical Server Resources Consumption](#) on page 44.

6.6 Managing Physical Server General Settings

The **Configure General Settings** page allows specifying some general configuration settings.

In the **Hardware Node Description**, you can add some details on the physical server.

When finished, click **Submit** to save the changes.

6.7 Monitoring Physical Server Resources Consumption

The **Hardware Node Monitor** subtab on the **Resources** tab shows the graphical statistics on the resource consumption of the virtual environments on this physical server, i.e. the physical server resources consumed by all virtual machines or containers on this physical server and by the host system itself. The resource consumption is shown in percentage.

Note: The consumption changes are shown with regards to your time zone. If time is incorrect, check **User Profile** settings.

Select Graph subsection

- **CPU, Disk and Memory Usage.** Each of the three resources has its own colour on the chart. If you need to monitor the changes only for one resource, whatever it is, you can disable the others.
- **Disk I/O Usage.** The chart shows the density of Hard Drive usage, i.e. the amount of read/write kilobytes.
- **Traffic Usage.** The chart shows the volume of the incoming/outgoing traffic through the network. If

you view a daily, monthly or annual chart, the history changes are shown per hour, day and month, accordingly.

Graph Period subsection

The chart can show the changes for the defined period. The chart can include the data for a particular date, month, year or for any other period of time. To implement the changes, click **Apply**. The chart will change its appearance.

Partially, the information on memory and disk resource consumption is available on the physical server dashboard (see *Physical Server Dashboard Overview* on page 41).

Operations subsection

The **Export Data** link allows you to save the graphical data in the format of a plain text (.csv file) on your computer.

6.8 Viewing Resource Consumers

Knowing how virtual environments consume host resources may help you prevent physical servers from overusing resources and reducing the performance of virtual environments.

To view resource consumption of the selected physical server, click **Infrastructure** > physical server > **Resources** tab > **Resource Consumers** subtab. For detailed information on monitored resources, see *Viewing Resource Consumption* on page 28.

6.9 Viewing Physical Server Logs

6.9.1 Viewing Physical Server Task Logs

The **Tasks** subtab lists recent operations on virtual environments hosted on the selected physical server. For more details on information shown, see *Viewing Infrastructure Task Logs* on page 30.

6.9.2 Viewing Physical Server Alert Logs

The **Alerts** subtab lists resource consumption alerts for the selected physical server and virtual environments hosted on it. For more details on information shown, see *Viewing Infrastructure Alert Logs* on page 30.

6.9.3 Viewing Physical Server Event Logs

The **Events** subtab lists status changes of the selected physical server and virtual environments hosted on it. For more details on information shown, see *Viewing Infrastructure Event Logs* on page 34.

6.10 Configuring Virtual Environments Host Settings

The **Configure Virtual Environments Host Settings** page enables the administrator (or privileged users) to change the physical servers' general settings specific to the virtual environments residing on them. Click **Configure > Virtual Environments Host Settings** on the physical server toolbar to open the page and configure the following settings:

- In the **Virtual Environments Settings** subsection, you can specify or select the following:
 - In the **Virtual Machines Folder** field, the directory where newly created virtual machines will be placed. Existing virtual machines stored in a different location will not be moved to the new one automatically (you can move them manually if required).
 - In the **Container Folder** field, the directory where private areas of newly created containers will be placed.
 - In the **Backups Folder** field, the directory where virtual machine and container backups will be stored.

If the Virtuozzo Storage integration plugin is installed on the VA Management Node, you can store your virtual environments and their backups in datastores in Virtuozzo Storage clusters. To do this, select the **Virtuozzo Storage** radio button and choose the desired datastore in the drop-down list. This feature only applies to Virtuozzo Hybrid Server 7. For instructions on how to install the integration plugin, refer to *Logging In to Virtuozzo Storage Management Panel* on page 291. To learn more about datastores, refer to *Managing Datastores*.

- In the **Virtuozzo Service Settings** subsection, you can set the memory limit that will apply to every virtual machine stored on this physical server. This subsection only applies to and is shown for Virtuozzo 6 servers.
 - **Auto.** The memory will be automatically allocated to a virtual machine depending on its needs.
 - **Manually.** Specify the amount of the memory that each virtual machine will use and will not be able to exceed.
- With the help of the **Virtual Machine Console Service Settings**, you can set up VNC connections to virtual machines.
 - In the **Default Service Address** field, specify the IP address to connect to virtual machines via VNC. You may need to do it if the physical server has multiple IP addresses of which only one is needed.
 - In the **Service Base Port** field, specify the base port, starting from which the running virtual machines will be assigned port numbers.
- You can also select the checkbox **Try applying these settings to all the hardware nodes connected to this VA Management Node** to apply the configured parameters to all physical servers in the Virtuozzo Automator infrastructure. Make sure that physical servers registered in Virtuozzo Automator are joined to the same Virtuozzo Storage cluster. This option only applies to Virtuozzo Hybrid Server 7.

When finished, click **Submit** to save the changes.

6.11 Managing Offline Services Configuration

Note: This feature is only supported for Virtuozzo 6 servers.

The **Offline Services** subtab available on clicking the **Network** tab on the corresponding physical server dashboard allows you to configure the offline services parameters that will be applied to all virtual environments on your physical server. Offline services ensure the manageability of your virtual environments from any browser at their IP addresses. Configuring the offline services is supported for the virtual environments with IPv4 and IPv6 addresses.

By default, the `vzpp` service (for managing virtual environments via Virtuozzo Power Panel), `vzpp-desktop` service (for managing virtual environments via an encrypted VNC connection), and the `vzpp-plesk` service (for managing containers via the Plesk control panel integrated with Virtuozzo Power Panel) are enabled for all

virtual environments on the physical server, which means that you can start using these offline services for managing virtual environments right after their creation. All offline services currently available on your physical server are listed in the **Offline Services** table:

Column	Description
Name	The name of the service.
Destination container ID	The ID of the destination container where the requests to/from virtual environments are redirected.
Redirected Port	The port number inside the container where the requests to/from virtual environments are redirected.
Global	Shows if the service is enabled or disabled globally.

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

- To subscribe all virtual environments on the physical server to an offline service, select the check box next to this service and click **Enable Globally**.
- To unsubscribe all virtual environments on the physical server from an offline service, select the check box next to this service and click **Disable Globally**.
- To create a new offline service on the physical server, click **New Offline Service**.
- To edit an existing offline service, click its name in the table.
- To remove an offline service that you do not need anymore from the physical server, select the check box next to this service and click **Delete**.

6.11.1 Creating Offline Service

To create a new offline service on the physical server, 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.
- In the **Redirected Port** field, specify the port number inside the container where the requests to/from your containers will be redirected.
- If necessary, enable the service for all virtual environments on the physical server by selecting the **Use**

Globally for All Containers check box.

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

6.11.2 Editing Offline Service

To edit an offline service on the physical server, 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.
- In the **Redirected Port** field, specify the port number inside the container where the requests to/from your containers will be redirected.
- If necessary, enable the service for all virtual environments on the physical server 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 7

Managing Virtual Environments

Virtual environment is a generic term for containers and virtual machines. A virtual environment is created on the basis of a virtualization technology and can be managed via Virtuozzo Automator. Physical servers running Virtuozzo can host both containers and virtual machines.

You can find the list of all virtual environments hosted on servers registered in Virtuozzo Automator on the **Infrastructure > Virtual Environments** screen (see *Viewing Virtual Environments Information* on page 27). On this screen, you can either right-click a virtual environment and select an operation from the context menu or select multiple virtual environments and click an operation button on the toolbar above the list. Available operations include:

- Create one or more virtual environments (**New Virtual Environment**):
- Start/restart/stop the selected virtual environments (**Start/Restart/Stop**).
- Pause the selected virtual environments (**Pause**). Pausing frees up the host CPU resources while the consumption of other resources remains the same.
- Stop the selected virtual environments without executing shutdown scripts (**Power Off**). This operation is only available to users with administrative privileges in Virtuozzo Automator. It can be used, for example, if a virtual environment has become broken and cannot be shut down properly.
- Suspend the selected virtual machines or Linux-based containers (**Suspend**). This operation is similar to putting a regular computer to sleep. The current virtual environment state (including the state of all running applications and processes) is saved to a special file on the host. After returning from the suspended mode, the virtual environment resumes operation from the same state it has been in before suspension.
- Back up the selected virtual environments (**Back Up**).

- Migrate the selected virtual environments to a physical server registered in Virtuozzo Automator (**Migrate**).
- Clone the selected virtual environments (**Clone**).
- Delete the selected virtual environments (**Delete**).
- Configure the general settings of the selected virtual environments (**Configure**).
- Convert the selected virtual machines to templates (**Convert to template**).
- Clone the selected virtual environments to templates (**Clone to template**).

Note:

1. You can perform operations on multiple virtual environments only if they are based on the same virtualization technology.
 2. You can also perform operations on a single virtual environment from its summary screen accessible by clicking that virtual environment's name.
-

The sections of this chapter describe operations on multiple virtual environments in more detail. For operations specific to containers or virtual machines, see *Managing Containers* on page 56 and *Managing Virtual Machines* on page 113, respectively.

7.1 Starting to Create Virtual Environments

Virtualization Technology Selection

Choose the type of virtual environments to create: a container or a virtual machine.

Hardware Node Selection

Select the physical server where the created virtual environment is to reside. You can choose one of the following options:

- **Select Hardware Node Automatically.** Check this option to let the wizard automatically choose a physical server from the list of servers registered in VA Control Center.
- **Select Hardware Node Manually.** Check this option if you wish to select the physical server yourself. In this case, you will be able to select the desired physical server in the **Select Node** list.

Virtual Environment Configuration

Specify the number of virtual environments you wish to create. By default, only one virtual environment is created. You can additionally select the template to be used as the basis for the virtual environment creation in the **Virtual Environment Template** list. If you create a virtual environment on the basis of a template, a new MAC address, different from the template's MAC, will be generated.

To proceed with the virtual environment creation, click **Next**. Your further steps will differ depending on whether you are creating a container (see [Creating Containers](#) on page 60) or a virtual machine (see [Creating Virtual Machines](#) on page 116).

7.2 Starting, Stopping, Pausing and Restarting Virtual Environments

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

Status	Description
Running	The virtual environment is running; therefore, it may only be restarted or stopped.
Down	The virtual environment is stopped; therefore, it may only be started.
Repairing	The virtual environment is being repaired. You cannot perform any action on the virtual environment until you click the Finish Repair button on the Start Container in Repair Mode page (see Repairing Containers on page 103).

The current status of the virtual environment is available in the **Status** section of the virtual environment dashboard. The history of the status changes can be viewed from the **Logs > Tasks** page of the virtual environment.

Note: Some operations are available either for virtual machines or containers. For example, only virtual machines can be paused.

Besides these states, during virtual environment operations a virtual environment may be in one of the

transitional states: mounting, starting, stopping, etc. When in a transitional state, you cannot perform any action on the virtual environment until the operation is finished.

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

If you wish to stop your virtual environment, bear in mind that there is a two-minute timeout for the virtual environment shutdown scripts to be executed. If the virtual environment is not stopped in two minutes, the system forcibly kills all the processes in the virtual environment. The virtual environment will be stopped in any case, even if it is seriously damaged. To avoid waiting for two minutes if you are operating a virtual environment that is known to be corrupt, use the **Operate > Power Off** link on the virtual environment toolbar.

7.3 Suspending and Resuming Virtual Environments

A virtual environment can be suspended or resumed like an ordinary computer. Depending on the virtual environment state, only those operations are accessible that comply with its current state. For example, a running container cannot be resumed for obvious reasons, and so on.

You may temporarily suspend the virtual environments if you need to restart the physical server hosting them. After the restart, the virtual environments can be easily resumed.

To suspend a virtual environment, you can do one of the following:

- Expand the name of any physical server listed in the **Infrastructure** or **Logical View** sections in the left menu and choose **Suspend** from the context menu.
- Click the **Operate > Suspend** link on the virtual environment toolbar.
- Click the **Infrastructure** item, go to the **Virtual Environments** tab, select the check box to the left of the virtual environment you want to suspend, and click the **Suspend** button above the table.
- Select a physical server, go to the **Virtual Environments** tab, select the check box to the left of the virtual environment you want to suspend, and click the **Suspend** button above the table.

To resume a virtual environment, you can do one of the following:

- Expand the name of any physical server listed in the **Infrastructure** or **Logical View** sections in the left menu and choose **Start** from the context menu.

- Click the **Operate** > **Start** button link on the virtual environment toolbar.
- Click the **Infrastructure** item, go to the **Virtual Environments** tab, select the check box to the left of the virtual environment you want to resume, and click the **Start** button above the table.
- Select a physical server, go to the **Virtual Environments** tab, select the check box to the left of the virtual environment you want to resume, and click the **Start** button above the table.

7.4 Changing Virtual Environment Administrative Password

The **Change Administrative Password** screen is accessible by clicking **Configure** > **Password** on the virtual environment toolbar. To change the password, enter a new root/administrator password into the fields provided and click **Change**.

Important: Virtuozzo Automator does not check passwords strength. If you use short or simple passwords, you do so entirely at your own risk. It is recommended to create root/administrator passwords from a random mix of lowercase and uppercase letters, digits, and allowed punctuation marks. The following punctuation marks are allowed: ! " \$ % & , () * + - . / ; : < = > ? [\] ^ _ { | }. Not allowed are the whitespace, #, and @. The password should be 5 to 14 characters long.

Note: The password of the Virtuozzo hosts 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 toolbar.

7.5 Setting Power Panel Access for Customers

Note: Virtuozzo Power Panel is only supported for Virtuozzo 6 servers.

Providing a particular customer with an access to a particular virtual environment stands for sending the customer the virtual environment administrator login and password after the virtual environment has been

created. The privacy of this information ensures the customer is the only user of said virtual environment.

Virtuozzo Automator does not provide any built-in tools for binding specific customer to specific virtual environments.

When creating a virtual environment, be aware of the notes concerning the functionality of control panels (Virtuozzo Power Panel and Plesk Control Panel). For example, Virtuozzo Power Panel can be used only with **Host-Routed** network adapters.

After the virtual environment creation, provide the customer with the IPv4 or IPv6 address (or hostname) and TCP port of the virtual environment proper.

Additionally, the Power Panel Policy (see *Managing Power Panel Policies* on page 200) functionality is aimed at creating a set of rules (i.e. a policy) that restrict users access to certain functionality in Virtuozzo Power Panel or set limitations on performing certain operations in the virtual environment context. You can create a Power Panel policy to be assigned deliberately to a specific virtual environment or use one and the same policy for multiple virtual environments.

7.6 Connecting to Virtual Environments via VNC

Virtuozzo Automator allows you to connect to and manage running virtual environments via the built-in VNC client accessible on the **Console** tab.

You can enable VNC access to a virtual environment when creating it or by configuring its settings in the **Remote Display** group on the **General Settings** screen. For the detailed information, see *Defining General Settings* on page 60 and *Defining Virtual Machine General Settings* on page 121.

To view the virtual environment console in full screen, click **Fullscreen**. To exit the fullscreen mode, press Esc.

To open the virtual environment console in a new browser window, click **Detach Console**.

To send a key combination to a virtual environment, choose one from the **Send key combination** drop-down list below the console and click **Send keys**.

7.6.1 Using Encrypted VNC Connections

Important: Encryption is enabled for the entire physical server.

To configure VNC encryption on Virtuozzo Hybrid Server 7, perform the following steps on said server:

1. Generate private and public keys:

```
# openssl genrsa -out vz7-1.key 1024
# openssl req -new -key vz7-1.key -out vz7-1.csr
# openssl x509 -req -days 365 -in vz7-1.csr -signkey vz7-1.key -out vz7-1.crt
```

2. Assign the created keys to VNC connections:

```
# prlsrvctl set --vnc-public-key vz7-1.crt --vnc-private-key vz7-1.key
```

3. Restart all running virtual environments on the server.

To disable encryption, run the following command on the slave server:

```
# prlsrvctl set --vnc-public-key "" --vnc-private-key ""
```

For Virtuozzo 6 servers, VNC encryption is configured by enabling the `vzpp-desktop` offline service for the corresponding virtual environment or globally for the entire physical server (see [Managing Offline Services Configuration](#) on page 47).

7.7 Managing Containers

This section contains information on how to create, use, and manage Virtuozzo containers.

7.7.1 Container Toolbar Overview

In Virtuozzo Automator, the container toolbar provides quick access to the following operations:

- In the **Configure** drop-down menu:

Option	Description
General Settings	Change the container name, description, OS template version and start-up options.
Password	Change the container root password.
Network	Change the container hostname, IP address, DNS server IP address and search domains and configure the mode of the Virtual Network adapters.
Shaping	Configure the network bandwidth of the outgoing traffic for this container.
Resources	Change the resources share allocated to the container.
Firewall	Activate the firewall and configure its mode.
Apply Template	Configure the container resources by changing the template the container is based on.

- In the **Maintenance** drop-down menu:

Option	Description
Resources Monitor	Get the detailed information on the container resource consumption.
Back Up	Configure all the parameters of the backup operation and perform this operation on the current container.
Repair	Save important data from the damaged container and repair the container by creating a new temporary container.
Reinstall	Recover 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.
Migrate	Move the container to another physical server.

- In the **Operate** drop-down menu:

Option	Description
Start/Stop	Start or stop the container. Depending on the container state, only that operation is accessible that complies with its current state.
Restart	Restart the container.

Continued on next page

Table 7.7.1.3 -- continued from previous page

Option	Description
Suspend	Suspend the container: 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.
Power Off	If you wish to stop your virtual environment, bear in mind that there is a two-minute timeout for the virtual environment shutdown scripts to be executed. If the virtual environment is not stopped in two minutes, the system forcibly kills all the processes in the virtual environment. The virtual environment will be stopped in any case, even if it is seriously damaged. To avoid waiting for two minutes if you are operating a virtual environment that is known to be corrupt, you may use the Power Off link.

Note: The availability of the start/stop/restart/suspend operations depends on the container current status.

- In the **Manage** drop-down menu:

Option	Description
Open Console	Log in to the container via the built-in VNC console.
Software	Install new applications to or uninstall existing ones from the container.
Services	Manage the services running on the container except for the xinetd-dependent services.
Files	Manage the container files and folders.
Backups	Back up the container, renew or remove the existing backup, restore the container.
Power Panel Policies	Assign new policies and manage the existing policy rules for Power Panel usage. <hr/> Note: This feature is only supported for Virtuozzo 6 containers. <hr/>

Continued on next page

Table 7.7.1.4 -- continued from previous page

Option	Description
Clone	Create a container clone.
Clone to Template	Clone a container to template.
Delete	Remove the container if you don't need it any more.

- In the **Log in...** drop-down menu:

Option	Description
Open Power Panel	Log in to the container via Virtuozzo Power Panel. Note: This feature is only supported for Virtuozzo 6 containers.
Open Plesk Panel	Log in to the container via the Plesk control panel.

7.7.2 Container Dashboard Overview

The container dashboard is divided into four sections, each reflecting the following container details:

Status

The section shows:

- The current status of the container.
- 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 physical server 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 total period of time during which the container has been on without rebooting or stopping.
- The last performed and next scheduled backups.

General Settings

The section shows container name and ID (to set new, click **Change**), configuration sample (to change, click

Change), OS template (to update, click **Update**), and installed application templates (to add or remove, click **Add/Remove**).

Network Configuration

The section shows:

- 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.

Resource Alerts

The section provides information on the container resource consumption:

- green circle: the container operates normally,
- yellow circle: some container resource is approaching its soft limit,
- red circle: some container resource has exceeded its soft limit.

For details on resource alerts, refer to [Viewing Infrastructure Alert Logs](#) on page 30.

Resources

The section shows a consumption summary for container's CPU, memory, and disk shares. 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 value on the Hardware Node, but in proportion to the quota on using the resource by the container.

7.7.3 Creating Containers

Having chosen to create a container as described in [Starting to Create Virtual Environments](#) on page 51, you can proceed to define general and network settings, customize and validate resource settings, install applications, and review the resulting configuration. This section describes these operations in detail.

7.7.3.1 Defining 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 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 (see *Adjusting Container Configuration and Advanced Settings* on page 104).
- Choose an OS template and its version you wish the container to be based on.
- Start the container after its creation;

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**

Option	Description
Assign container IDs automatically	Virtuozzo Automator will assign container IDs randomly.
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. Other 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**

Option	Description
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.
Set names manually for every Container	On the following screen you will be able to specify the container names manually for each container.

- **Hostnames**

Option	Description
Assign hostnames based on a specified template	On the following screen you will be able to specify a template for assigning container hostnames, with the container ID as the changing part.
Set hostnames manually for every container	On the following screen you will be able to specify the container hostnames manually for each container.

• Routed Interface IP Addresses

Option	Description
Assign according to the container template	The host-routed interface settings are taken from the container template 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.
Get from the global IP addresses pool	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).
Assign from a specified IP addresses range	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.
Specify manually for every container	On the following screen you will be able to specify the IP addresses manually for each container.

• Bridged Interface IP addresses

Option	Description
Assign according to the container template	The bridged interface settings are taken from the container template 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.
Get from the DHCP server	The IP addresses for the bridged interfaces will be received from the DHCP server.

Continued on next page

Table 7.7.3.1.5 -- continued from previous page

Option	Description
Get from the global IP addresses pool	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).
Assign from a specified IP addresses range	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.
Specify manually for every container	On the following screen you will be able to specify the IP addresses manually for each container.

In the **Administrative Password** group, you should define and confirm the root password. You will need this password to access the container in the future.

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

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 physical server. 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.

- Specify the paths to the container Private Area and Root Directory;
- Have the container started on every boot of the physical server.

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

The **Remote Display** group allows you to configure the settings to be used to remotely control a container via the VNC protocol.

Choose the settings in the **Remote Display Service** list:

- **Enabled with default settings.** Use physical server's network settings (shown on physical server's **Network** pane).
- **Enabled with custom settings.** Use your own settings. In this case, specify the following parameters:

Parameter	Description
IP Address	The IP address of the server where the container is hosted.
Port	A unique port number to be used by the container. It must be a numeric value in the 5700-6900 range.

- **Disabled.** Forbid connections to the container via the VNC protocol.

If required, set a password to secure the VNC connection.

(For Virtuozzo 6 servers) The **Offline Management** group allows you to set the offline service options by selecting the appropriate option. Offline Service 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 service is enabled for the container, one port of its IP address becomes permanently active whatever the container state. You can:

- Disable the offline service of the container.
- Enable the offline service of the container via the offline service settings operating on the physical server. Whenever you need to manage the container offline, its offline service settings will be brought into synchronization with those in effect on the physical server. 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 **Feature Management** group allows you to toggle various features supported in Linux-based containers.

The **Device Access Management** group allows you to set access rights for devices attached to the container.

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 Virtuozzo Automator 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.

7.7.3.2 Specifying Multiple Container IDs, IP Addresses, and Hostnames

The **New Containers: Multiple Configuration** screen comes after determining the general container settings.

You need to set the following:

- **Container IDs.** Depending on what you have specified on the General Settings screen, you will let Virtuozzo Automator assign container IDs automatically or will need to manually specify the starting container ID, or every container ID.
- Container **Names** and **Hostnames**.

When assigning container names and hostnames, remember that both fields should contain the `@ctid@` tags. Those tags will be automatically replaced with suitable IDs for all containers you are creating. For example, if you are creating 4 containers and have entered `MYCT@ctid@` in the hostname field, and 105 is the highest container ID on the hardware node, then containers with the following hostnames will be created: `MYCT106`, `MYCT107`, `MYCT108`, and `MYCT109`.

- **Network** parameters.

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 have entered `10.10.0.1` to the **IP Address / Subnet Mask** field, then the containers will be created with these IP addresses: `10.10.0.1`, `10.10.0.2`, `10.10.0.3`, and `10.10.0.4`.

Click **Next** to proceed to customizing container resources.

7.7.3.3 Configuring Network Parameters When Creating Containers

The **Network Configuration** page lets you define all the major network parameters of the container you are creating. For more information, see *Configuring Container Network Parameters* on page 234.




7.7.3.4 Customizing Resource Settings When Creating Containers

The **Resources Customization** screen allows you to adjust the resources the container being created. For more information, see the descriptions of **CPU**, **disk**, and **memory** resources in *Resources Overview* on page 72.

7.7.3.5 Validating Resource 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:

Severity	Description
 Recommendation	A non-critical suggestion for the container or physical server 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.

7.7.3.6 Installing Applications into Containers

The **New Containers: 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 container OS template.

To add the applications you need to the container, tick the check boxes opposite the applications you wish to add and click the **»** button. After that, the applications appear in the **Scheduled for Installation** table in the right part of the page. To remove any application from the container being created, tick its check box in the **Scheduled for Installation** table and click the **«** button. If you are not sure what applications you need to add to the container, you can add them after the container has been created, as is described in *Managing Container Applications* on page 86.

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

7.7.3.7 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.

7.7.4 Managing Container Files and Folders

For a running container, you can navigate inside its directory structure, list the files and directories and perform all essential file operations on the **File Manager** page. The main information on the directory/drive contents is presented in the form of a table.

Column	Description
Type	The type of the object: a folder or a file.
Name	The name of the directory or file.
Size	The size of the file.

Continued on next page

Table 7.7.4.1 -- continued from previous page

Column	Description
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 through 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, 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;
- Create a new text file in the current directory;
- Edit existing text files;
- Upload a file from your local computer to the current container directory;
- 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;
- Move any number of files or folders to another directory inside the container;
- Edit the properties of any folder or file;

- 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 check boxes. The uppermost check box allows you to select all the directories and files at once.

7.7.4.1 Creating Folder

On the **Create Folder** screen, you can add a new folder and specify its name in the **Folder Name** field. Upon finishing the operation, click **Create** to save the changes. The new folder will be created in the current directory (designated above the field).

You can access the **Create Folder** screen from the **File Manager** section by clicking the **Create Folder** button.

7.7.4.2 Creating Text File

The **Create File** page allows you to create simple text files directly inside the container, without uploading 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.

7.7.4.3 Editing Text File

Virtuozzo Automator allows you to edit any text file inside your container directly through the Virtuozzo Automator 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.

7.7.4.4 Uploading File to Container

The current version of Virtuozzo Automator 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.

7.7.4.5 Copying Files and Folders Inside Container

The **Copy Files** 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 check boxes on the **File Manager** page and clicking **Copy**.

On the **Copy Files** 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.

7.7.4.6 Moving Files and Folders Inside Container

The **Move Files** 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 check boxes on the **File Manager** page and clicked **Move**.

On the **Move Files** 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.

7.7.4.7 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.

Continued on next page

Table 7.7.4.7.1 -- continued from previous page

Field	Description	Editable
Path	The path to the file or folder inside the container.	No. See <i>Moving Files and Folders Inside Container</i> 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.

7.7.5 Managing and Monitoring Container Resources

To open the **Container Monitor** subtab, go to **Infrastructure** > physical server > container > **Resources** tab > **Container Monitor** subtab.

The **Container Monitor** screen shows the graphical statistics on CPU, memory and disk resource consumption in percentage, i.e. how much of the physical server resources this container consumes.

Also, the **Container Monitor** screen allows viewing the disk and traffic incoming/outgoing statistics for the specified period.

Each resource has its own colour on the chart. If you need to monitor the changes only for one resource, whatever it is, you can disable the others. Use the **Select Graph** subsection.

The chart shows the changes for the defined period. In the **Graph Period** subsection, select whether to show the data for a particular date, month, year or for any other period of time. To implement the changes, click **Apply**. The chart will change its appearance.

Partially, the information on resource consumption is available on the container **Summary** page.

The **Export Data** link allows you to export the graphical data in the CSV format.

Note: The container network and system resources can also be monitored via SNMP. For more information,

see *Monitoring Virtuozzo Objects via SNMP* on page 287.

7.7.5.1 Resources Overview

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

Column	Description
CPU	<p>CPU Usage shows current CPU utilization in percent.</p> <p>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.</p>
Memory Usage	This is a cumulative figure presenting the average consumption of a number of critical memory-related parameters by your container.
Disk Usage	<p>Disk Space is a 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.</p> <p>Disk Inodes is a total number of disk inodes (files, directories, and symbolic links) allocated to 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.</p>

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

Column	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 the number of inodes.
Total	The total amount of memory, disk size or the number of inodes.

7.7.5.2 CPU Resources

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 virtual environment will receive.
cpulimit cpulimit_mhz	This is a positive number indicating the CPU time, in percent or megahertz, the corresponding virtual environment is not allowed to exceed.
burst_cpulimit	The CPU power limit, in percent, the virtual environment cannot exceed. The limitations set in this parameter are applied to the virtual environment 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 virtual environment. This limit is calculated as the ratio of the current virtual environment CPU usage to the CPU limit (i.e to the value of the <code>CPULIMIT</code> parameter) set for the virtual environment. If the limit is not specified, the full CPU power of the physical server 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 virtual environment.
cpus	The number of CPUs set to handle all the processes inside the given virtual environment. By default, any virtual environment is allowed to consume the CPU time of all processors on the physical server.

7.7.5.3 Disk Resources

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

Parameter	Description
diskspace	Total size of disk space consumed by the virtual environment. When the space used by the virtual environment hits the soft limit, the virtual environment can allocate additional disk space up to the hard limit during the grace period indicated by the <code>quotatime</code> parameter value.

Continued on next page

Table 7.7.5.3.1 -- continued from previous page

Parameter	Description
diskinodes	Total number of disk inodes (files, directories, and symbolic links) allocated by the virtual environment. When the number of inodes used by the virtual environment hits the soft limit, the virtual environment 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 virtual environment 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 virtual environment is allowed to temporarily exceed its quota soft limits for no more than the <code>QUOTATIME</code> period.
ioprio	The virtual environment priority for disk I/O operations. The allowed range of values is 0-7. The greater the priority, the more time the virtual environment has for writing to and reading from the disk. The default virtual environment priority is 4.
iolimit	The bandwidth the virtual environment is allowed to use for its disk input and output operations.
iopslimit	The maximum number of disk input and output operations per second a container is allowed to perform.

7.7.5.4 Memory Resources

This screen displays information on the memory-based or system-based virtual environment resources, or both, depending on your memory configuration:

- If the memory management mode is enabled for the virtual environment, 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 virtual environments for most administrators.
- If the system management mode is enabled, the virtual environment'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 virtual environment. 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 virtual environment 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 virtual environment.

Memory parameters

Parameter	Description
slmemorylimit	An approximation of the size of the physical memory allocated to the virtual environment. In other words, the virtual environment 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 threads the virtual environment may create.
vmguarpages	The memory allocation guarantee, in pages. <i>r</i> applications are guaranteed to be able to allocate additional memory so long as the amount of memory accounted as <code>privvmpages</code> (see the auxiliary parameters) does not exceed the configured barrier of the <code>vmguarpages</code> parameter. Above the barrier, additional memory allocation is not guaranteed and may fail in case of overall memory shortage.
avnumproc	The average number of threads.
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. Note: This parameter is only supported for Virtuozzo 6 containers.

Continued on next page

Table 7.7.5.4.2 -- continued from previous page

Parameter	Description
numothersock	<p>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).</p> <hr/> <p>Note: This parameter is only supported for Virtuozzo 6 containers.</p> <hr/>

Secondary system parameters

Parameter	Description
privvmpages	<p>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.</p>
tcpsndbuf	<p>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.</p> <hr/> <p>Note: This parameter is only supported for Virtuozzo 6 containers.</p> <hr/>
tcprcvbuf	<p>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.</p> <hr/> <p>Note: This parameter is only supported for Virtuozzo 6 containers.</p> <hr/>

Continued on next page

Table 7.7.5.4.3 -- continued from previous page

Parameter	Description
othersockbuf	The total size of UNIX-domain socket buffers, UDP, and other datagram protocol send buffers. Note: This parameter is only supported for Virtuozzo 6 containers.
dgramrcvbuf	The total size of receive buffers of UDP and other datagram protocols. Note: This parameter is only supported for Virtuozzo 6 containers.

Auxiliary system parameters

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

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

Column	Description
Parameter	The name of the resource parameter.

Continued on next page

Table 7.7.5.4.5 -- continued from previous page

Column	Description
Current Usage	Indicates the consumption of the corresponding resource by the container at the moment of calling the current Virtuozzo Automator page. The units in which the consumption is measured are specified in the Units column. If the current usage is not available (n/a), it means that either the container is not running, or the nature of the resource does not suggest its changing over time.
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.

7.7.5.5 Changing Container Resource Parameters

This screen allows you to adjust the resources of the selected virtual environment. For more information, see the descriptions of **CPU**, **disk**, and **memory** resources in *Resources Overview* on page 72.

7.7.5.6 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.

7.7.5.7 Applying New Container Templates

Any container is configured by means of its own container template (a configuration file used as an archetype to reproduce all its settings for a container based on it). The **Apply template to Container** page enables you to change the container template 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 template** table at the top of the page, you can view the name and description of the current container template the container is based on.

The **Select Library Container template** table allows you to choose another configuration template to base

the container on by selecting the radio button against the corresponding container template. All available container templates listed are supplied with the following information: the name and brief description of the container template.

To facilitate working with container templates, you can filter the container templates shown in the **Select Library Container template** table. To do that, click **Show Search**, enter search patterns in the search fields, and click **Search**. To change what search fields are displayed, click **Customize**. To view all available container templates, click **Reset Results**. To show or hide columns, click **Select Columns** and set or clear the respective checkboxes..

The **Advanced Options** group allows you to have the container restarted if the parameters setup for the selected template requires restarting.

Note: Before applying a new container template to a container, make sure you are aware of the resource values defined in this container template and to be set for the container. Detailed information on container templates is provided in *Managing Container Templates* on page 105.

Applying New Container Template to Multiple Containers

You can specify a new container template for a bunch of your containers at once on the **Configure: Apply Container template** page.

You should select the relevant container template on the **Container templates** list, then click **Next** to choose from the template parameters to be applied to the containers, if needed.

7.7.6 Viewing Container Logs

7.7.6.1 Viewing Container Task Logs

The **Tasks** subtab lists recent operations on the selected container. For more details on information shown, see *Viewing Infrastructure Task Logs* on page 30.

7.7.6.2 Viewing Container Alert Logs

The **Alerts** subtab lists resource consumption alerts for the selected container. For more details on information shown, see *Viewing Infrastructure Alert Logs* on page 30.

7.7.6.3 Viewing Container Event Logs

The **Events** subtab lists status changes of the selected container. For more details on information shown, see *Viewing Infrastructure Event Logs* on page 34.

7.7.7 Adjusting Container Template Resource Parameters for Multiple Containers

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

For the description of resources, refer to these subsections:

- *CPU Resources* on page 73,
- *Disk Resources* on page 73,
- *Memory Resources* on page 74.

7.7.8 Managing Container Services and Processes

Virtuozzo Automator 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.
- Create or change your firewall settings by clicking on the **Firewall** link.

- If the name-based hosting is enabled on the physical server, you can edit the **Name-Based Hosting** settings for this container.

7.7.8.1 Managing Container Services

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 displayed on a page. To change the number of services shown per page, click the appropriate link below the table. You can also filter the services shown in the **System Services** table. To do that, click **Show Search**, enter search patterns in the search fields, and click **Search**. To change what search fields are displayed, click **Customize**. To show or hide columns, click **Select Columns** and set or clear the respective checkboxes.

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

Column	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.

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

- Start the service by selecting its check box and clicking **Start Service**.
- Restart the service by selecting its check box and clicking **Restart Service**.
- Stop the service by selecting its check box and clicking **Stop Service**.
- Enable/disable the autostart feature by selecting the service(s) and clicking **Enable/Disable Autostart**.

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

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 displayed on a page. To change the number of services shown per page, click the appropriate link below the table. You can also filter the services shown in the **System Services** table. To do that, click **Show Search**, enter search patterns in the search fields, and click **Search**. To change what search fields are displayed, click **Customize**. To show or hide columns, click **Select Columns** and set or clear the respective checkboxes.

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

Column	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.

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

- Enable the service by selecting its check box and clicking on the **Enable** button on the Virtuozzo Automator toolbar. Only disabled services are subject to this action.
- Disable the service by selecting its check box and clicking on the **Disable** button on the Virtuozzo Automator 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.

7.7.8.2 Managing Container Processes

You can see and manage processes inside a running container on the **System Processes** page accessible by clicking **Service > System Processes**. The following table describes information on processes shown on the page.

Column	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. The range is from 0 (the highest priority) to 39 (the lowest priority). The usual process priority is 30.
RSS	(Resident Segment Size) The size of physical memory the process really uses (in Kilobytes).

Continued on next page

Table 7.7.8.2.1 -- continued from previous page

Column	Description
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 Virtuozzo Automator page.

Note: The table is available only for a running container.

You may select any number of processes by ticking the check boxes against the corresponding processes (tick the uppermost check box 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.

7.7.9 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** subtab of the container **Software** tab allows you to do the following:

- view the applications added to the container as application templates 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 physical server), update them by clicking the **Update Container Software** button on the toolbar.
- add more applications available on the physical server or delete unnecessary ones by clicking **Manage Applications** and performing these actions on the screen that opens.

7.7.9.1 Managing Container Application Templates

The **Manage Applications** button on the **Applications** 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 check boxes 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 check box 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.

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 Install** 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 physical servers where the respective containers are situated.
2. They should be compatible with all the containers for which this operation is performed.

Select the check boxes 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 check boxes 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.

7.7.9.2 Managing Container Software Packages

Virtuozzo Automator 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	Description
Name	The name of the package.

Continued on next page

Table 7.7.9.2.1 -- continued from previous page

Column	Description
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 Virtuozzo Automator toolbar. To update all those packages that you can see on the page, select the uppermost check box 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 toolbar.

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

Installing Software Packages in Container

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

Column	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 check box (or the uppermost check box, to install all the packages shown in the table) and click **Install**.

7.7.9.3 Updating Container Software

The **Update Software** page allows you to update the OS and application packages in the given container directly. The **Update Software** page is available on clicking the **Update Container Software** link on the 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 two ways:

- If no updated templates for the given container have been installed on the physical server or no updated packages are found in the repository, the page just informs you of this fact.
- If 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 directly. 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.

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.

7.7.10 Managing Plesk Control Panel

You can install the Plesk control panel on a Virtuozzo server as a template and then add this template to any container hosted on the server.

After the template is installed, the Plesk control panel can be managed on the **Control Panels** subtab of the container **Software** tab.

For Virtuozzo 6 servers, the legacy Plesk EZ templates (pp12-*, pp11-*, and pp10-*) are included in the EZ template repository. You need only to install the Plesk control panel in the container to start using it.

7.7.10.1 Installing Plesk Control Panel

To be able to manage containers with Plesk, you need to install the Plesk application templates on the Virtuozzo server where the required container is hosted and then install the Plesk control panel into the container itself.

To install the Plesk application templates on Virtuozzo Hybrid Server 7, do as follows:

1. On Virtuozzo Hybrid Server 7, add the `/etc/yum.repos.d/plesk-ez-templates.repo` repository with the following lines:

```
[plesk-ez-templates]
name=Plesk EZ templates
baseurl=http://autoinstall.plesk.com/ez-templates/
enabled=1
gpgcheck=1
gpgkey=http://autoinstall.plesk.com/plesk.gpg

[ez-templates.vz6]
name=Virtuozzo - EZ templates
mirrorlist=http://updates.virtuozzo.com/mirrors/templates-x86_64
enabled=0
gpgcheck=0
gpgkey=file:///etc/pki/rpm-gpg/PARALLELS_GPG_KEY

[ez-templates-32.vz6]
name=Virtuozzo - EZ templates (32 bits)
mirrorlist=http://updates.virtuozzo.com/mirrors/templates-i386
enabled=0
```

```
gpgcheck=0
gpgkey=file:///etc/pki/rpm-gpg/PARALLELS_GPG_KEY
```

Note: Plesk does not provide the legacy panel EZ templates for Virtuozzo Hybrid Server 7. However, you can install the legacy Plesk panel at your own risk:

- 1.1. Add the Virtuozzo 6 EZ templates repositories to Virtuozzo Hybrid Server 7 by enabling `ez-templates.vz6` and `ez-templates-32.vz6` in the `/etc/yum.repos.d/plesk-ez-templates.repo` file.
- 1.2. Create the required link with `ln -s /etc/vz/vz.conf /etc/sysconfig/vz`.

2. On Virtuozzo Hybrid Server 7, install the Plesk application template compatible with the container OS template. For example, to install the Plesk Onyx EZ templates for the CentOS 7 container, execute

```
# yum install pp17-*centos-7-x86_64-ez
```

To install the legacy Plesk EZ templates for CentOS 6, execute

```
# yum install pp12-*centos-6-x86_64-ez
```

3. On the Management Node, install the Plesk plugin for VA Control Center:

```
# yum install va-cc-plesk
```

Now you can install the Plesk control panel into a container. However, make sure that the following prerequisites are met:

1. The Plesk application template on the physical server must be compatible with the current container OS template.
2. The container must have a hostname and a host-routed IP address specified.
3. The container must have enough available resources (no less than is set in the `/etc/opt/pva/cc/pvacc.conf` configuration file).

To install Plesk in a container, open container's **Software > Control Panels** subtab and click **Install**. On the **Install Plesk Control Panel** screen that opens, click **Install**.

7.7.10.2 Working with Plesk Control Panel

To start working in Plesk, click **Manage** on container's **Software > Control Panels** subtab.

Logging In to Plesk Control Panel

Having installed the Plesk control panel inside the container, you can click **Log In to Plesk** on the **Control Panels** subtab or **Log in... > Open Plesk Panel** on the toolbar to start a Plesk control panel session. A new browser window with the Plesk control panel will open, and you will be able to start managing the container.

Note:

1. Before logging in to the Plesk control panel, make sure the container is running and the ports listed in the [Plesk KB article](#) are opened inside it.
2. No user name and password are required to log in since you have already been identified by your Virtuozzo Automator user credentials.

To log in to the legacy Plesk control panel, you can also use legacy VA Power Panel. This requires enabling the Plesk service in the container offline management settings (see [Defining General Settings](#) on page 60). After clicking the **Log In to Plesk** link, the user is redirected to Power Panel with several Plesk addons inside.

Changing Plesk Administrator Password

Note: Changing passwords regularly is recommended to improve container security.

To change the Plesk administrator's password, click **Change Password** on the **Plesk Control Panel** page, then type and retype the new password in the corresponding fields. The password must be at least 5 characters long and difficult enough to guess. Click **Change** to apply the changes.

7.7.11 Cloning Containers

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, 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. 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.

The **Advanced Settings** section lets you:

- Specify the container ID, a 32-bit (ranging from 0 to 4294967295) integer number over 100;
- Start the container after cloning.

(For Virtuozzo 6 servers) The **Offline Management** group allows you to set the offline service options by selecting the appropriate option. Offline Service 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 service is enabled for the container, one port of its IP address becomes permanently active whatever the container state. You can:

- Disable the offline service of the container.
- Enable the offline service of the container via the offline service settings operating on the physical server. Whenever you need to manage the container offline, its offline service settings will be brought into synchronization with those in effect on the physical server. 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 Service** radio button is set to the option used by the container being cloned. You can change it to use another offline service mode for the new container.

Note: The rest of the container general settings 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.

7.7.11.1 Configuring Clone Network Parameters

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. For more information, see [Configuring Container Network Parameters](#) on page 234.

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

7.7.11.2 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. 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** check box in the **Post Procedures** section.

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

7.7.12 Migrating Containers

The cases when you need to move your containers from one physical server to another can be quite numerous. A migration can be performed to distribute the workload between physical servers, etc. On the **Migrate Containers** screen, you need to select the physical server you are going to move the container to and select some additional options.

Note:

1. The physical server must be registered in the infrastructure. If you need to migrate containers to a physical server that has not been registered yet, this has to be done first.
 2. You can migrate only stopped and suspended Virtuozzo 6 containers to Virtuozzo Hybrid Server 7.
 3. Migration of Virtuozzo Hybrid Server 7 virtual environments to Virtuozzo 6 servers is not supported.
 4. If remote display is configured in the container to be migrated live, it is recommended to either disable this feature until live migration is finished or revert its configuration to the default by selecting **Configure General Settings > Remote Display Service > Enabled with Default Settings**.
-

Irrespective of the container state, the following options are available in the **Migration Options** section:

- **Perform migration with Container restart.** By default, if the container is running before the migration, it will be migrated live. But you can also perform offline migration by selecting this option. In this case, the container will be stopped before migration and restarted automatically when migration is over. This can be useful if online migration fails (for example, when the source and destination servers have incompatible processors).
- **Remove the private areas from the source Hardware Node after the migration.** You can remove the containers private areas (the directories to store the containers files and other data) from the source physical server 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 physical server intact until you ascertain the migrated container operates normally.
- **Do not start the Container after the migration.** When offline migration is complete, the container is automatically restarted. If needed, you can leave it stopped to perform some additional operations on it by choosing this option.

Note: This option applies only to offline migration.

- **Force the migration. Ignore possible conflicts in IP addresses applications.** The container migration happens even if its IP address might cause conflicts on the destination physical server or if the templates the container uses are not installed there. Keep in mind that though it is possible to force the migration of such a container, it might not be able to start on the destination physical server until

the problems with IP addresses and/or templates are resolved.

Click the **Migrate** button if you are ready to initiate the containers migration, otherwise click **Cancel**.

7.7.12.1 Migrating Container to Virtuozzo Physical Servers

To migrate a container to a Virtuozzo physical server, do the following:

1. In the **Migration From** section, choose the Virtuozzo 6 or 7 physical server that will host the container from the **To Hardware Node** drop-down list.
2. Specify the settings in the **Migration Options** section, if needed.
3. Click **Migrate** to continue.

7.7.12.2 Migrating Physical Servers to Containers

Note: This feature is only supported for Virtuozzo 6 servers.

Virtuozzo Automator provides you with an effective tool - Virtuozzo Transporter - for a fast and reliable migration from a physical server to a container. Migration of a stand-alone physical server to a virtual environment may be useful for a server using its available resources only partially, as the usage of the resources on the physical server hosting virtual environments is distributed efficiently among the virtual environments. Therefore the physical server is never idle at the same time allotting the virtual environments enough resources to operate. You can benefit from the physical server to virtual environment 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. virtual environment 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 Virtuozzo Transporter which can be

invoked by clicking **Operate > Migrate Server to Container** on the physical server toolbar.

Setting Up Connection to Physical Servers

The starting point of the migrating procedure with Virtuozzo Transporter 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 (in the **Administrator Name** and **Administrator Password** fields) you use to log in to the migrating server. The default user name is `root`, 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 root user is endowed with. Finally, specify the physical server that will host the target container. If there is only one physical server that can host the container, it will be filled in by default, and the field is grayed out.

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

Note: To secure a successful connection, the source physical server should have either of the following ports open: 4434 or 4435, and port 22.

Reviewing Physical Server Configuration

In the second step Virtuozzo Transporter 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	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 **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.

After you have reviewed the physical server system information, click **Next** to proceed to the customization of the server migration procedure.

Customizing Migration Procedure

In the third step you have an opportunity to edit the details of the migration process. On this page 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). Virtuozzo Transporter 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.

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 plus icon to the right of the field. Clicking the cross 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 Destination Containers

The **Virtuozzo Transporter: Configure Container** page allows you to configure a container into which you can migrate your physical server.

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 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, Virtuozzo Automator 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 plus icon to the right of the **IP Address** field. At the same time, clicking the cross 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 plus or cross 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. 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. To enable the feature, select its check box.

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

Configuring Network Parameters When Migrating Containers

This step lets you define all the major network parameters of the container you are migrating the physical server to. For more information, see [Configuring Container Network Parameters](#) on page 234.

Customizing Resource Settings When Migrating Containers

The **Virtuozzo Transporter: Container Resources Customization** page, where you can check or edit the future container resource parameters, can only be displayed if you have selected the **Customize resource**

settings check box 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.

Reviewing Configuration and Setting Post-migration Start/Stop Option

In the final step you can review the physical and virtual environments 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 environments 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 environment if you want to check the migration results, e.g. compare the files in the source migrated machine and target virtual environment.

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

7.7.13 Reinstalling Containers

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 **Prepare to Reinstall** on the **Reinstall: Introduction** page to review the available options and to decide

whether you really need to reinstall your container and in what way.

Note: In order to be reinstalled, each container has to be stopped first. If a container 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.

7.7.13.1 Selecting Reinstallation Type

The page where you should choose the mode of reinstallation is displayed after you click **Next** on the **Reinstall Container** 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 - **Keep the existing Container contents**. In this case, your container is created anew with all existing files moved to the `/o1d` 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 `/o1d` 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.

7.7.13.2 Confirming Reinstallation

Finally 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.

7.7.14 Repairing Containers

Repairing a container is another way to solve problems with the container functioning. In Virtuozzo 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 VNC or Virtuozzo Automator file manager 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 Virtuozzo Automator 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.

Clicking 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.

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 VNC or Virtuozzo Automator file manager and do what you deem reasonable inside the container. After closing the VNC session, click the **Maintenance > Repair** link on the container toolbar 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.

7.7.15 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.

If you created a container by migrating a physical server into a container, the name and description fields were also left empty.

In the **General Configuration** group, you can specify the name or description of a container.

Use the **Advanced** group to:

- Change container ID.
- Have the container start disabled by selecting the **Disable this Container** check box.
- Make the container automatically boot at physical server startup. For this purpose, select the **Start on the Hardware Node boot** check box.

The **Remote Display** group allows you to configure the settings to be used to remotely control a container via the VNC protocol. For more information, see *Defining General Settings* on page 60.

(For Virtuozzo 6 servers) The **Offline Management** group allows you to set the offline service options by selecting the appropriate option. For more information, see *Defining General Settings* on page 60.

The **Feature Management** group allows you to toggle various features supported in containers.

The **Device Access Management** group allows you to set access rights for devices attached to the container.

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

7.7.15.1 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 physical server is booted, and whether offline service 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 service Enabled” to** and **Change “Container Enabled” to** groups and click **Submit** for the changes to be applied to your containers.

7.7.16 Managing Container Templates

The Virtuozzo software allows you to create new containers on the basis of the configuration template files, called also container flavors.

The following configuration template files are provided:

- `basic` - to be used for standard containers;
- `vswap.256MB` - to be used for creating containers with 256 Mb of virtual RAM;
- `vswap.512MB` - to be used for creating containers with 512 Mb of virtual RAM;
- `vswap.1024MB` - to be used for creating containers with 1024 Mb of virtual RAM;
- `vswap.2048MB` - to be used for creating containers with 2048 Mb of virtual RAM;
- `vswap.plesk` - to be used for creating containers with the Plesk control panel;
- `confiXX` - to be used for creating containers that are to use the Confixx control panels.

You can perform a number of operations on container templates by using Virtuozzo Automator:

- Create new container templates;
- List the container templates currently existing on the physical server;
- Copy container templates within the physical server;
- Delete those container templates that are not needed any more;
- Upload new templates onto the physical server.

7.7.16.1 Creating Container Templates

Creating a container template starts with defining the initial template configuration on the **New Template: Begin** screen which is accessible by clicking **Templates** in the **Resource Library** section in the left menu. Having decided on the template configuration, proceed to the general template settings.

Defining Container Template General Settings

The second page of the **New Container Template** wizard enables you to define the container general settings. In the **General** group, you should:

- Enter a name for the container template being created.
- Give a brief description of the container template.
- Select on the pop-up menu the OS template and its version the container template will be based on. If you do not want the container template to depend on any specific OS template, leave this field intact.

The information provided in the **General** group will be displayed in the **Container templates** table and **Container Summary** table.

The **Advanced** group allows you to make the container that will be based on this container template automatically start on the physical server boot.

(For Virtuozzo 6 servers) The **Offline Management** group allows you to set the offline service options by selecting the appropriate option. Offline Service 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 service is enabled for the container, one port of its IP address becomes permanently active whatever the container state. You can:

- Disable the offline service of the container.
- Enable the offline service of the container via the offline service settings operating on the physical server. Whenever you need to manage the container offline, its offline service settings will be brought into synchronization with those in effect on the physical server. 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 **Feature Management** group allows you to toggle various features supported in containers.

The **Device Access Management** group allows you to set access rights for devices attached to the container.

After you have provided the necessary information, click on the **Next** button.

Configuring Network Parameters When Creating Container Templates

The **New Template: Network** page lets you define all the major network parameters of the container you are creating. For more information, see *Configuring Container Network Parameters* on page 234.

After you have provided the necessary information, click **Next**.

Customizing Resource Settings When Creating Container Templates

Next, you will be presented with the **New Template: Resources** screen allowing you to adjust resource parameters for the containers based on the template being created. For more information, see the descriptions of **CPU**, **disk**, and **memory** resources in *Resources Overview* on page 72.

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 template configuration. All applications available on your physical server 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 template, tick the check boxes opposite the applications in the **Available Applications** table and click the » button. After that, the applications appear in the **Included Applications** table in the right part of the page. Ticking one or several check boxes opposite the corresponding applications in the **Included Applications** table and clicking the « button removes the applications from the container template.

After you have selected the applications to be added to and/or removed from the container template, 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 template will be based on.

Reviewing Template Configuration

The last screen of the **New Container template** wizard lets you review all the data you provided on the previous steps. If you are satisfied with the entered information, click **Create** to start creating the container

template. Otherwise, you can return to the previous steps by clicking the **Back** button and change the corresponding parameters.

7.7.16.2 Creating New Templates by Splitting Physical Server

It is possible to create a container configuration file that roughly represents a given fraction of the physical server. Splitting the physical server allows you to share your physical server resources equally between a certain number of containers based on this configuration file. You may use the option to create identical containers on your physical server and distribute the resources available on a fair basis between them. Or you can simply benefit from it to easily create a new container template with a certain share of the physical server resources to use it later for one or more containers. A special two-step **Split Hardware Node** wizard will guide you through the process.

Specifying General Parameters

On this page of the **Split Hardware Node** wizard, you are asked to set the general parameters for the container template being created. Please enter the relevant information into the following fields:

Section	Field	Information to Provide
HN Selection	Hardware Node	Select the Virtuozzo Automator physical server you want to split.
Virtual Environment Template Configuration	Name (required)	The name of the virtual environment template you are going to create by splitting your physical server.
	Description (optional)	Any relevant additional information about the template that may be helpful to identify the template at once.
Number of Virtual Environments	Number (required)	The number of virtual environments among which you want to divide the physical server resources.

The **Offline service**, **Starting container on the physical server 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.

Checking Container Template Resource Parameters

The **Split Hardware Node: Final** page allows you to review the resource parameters that are going to be

allotted to the container template 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	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.

For more details on resources, see *Editing Container Templates* on page 111.

To edit the resource parameters values that do not meet your demand, go **Back** to change the number of containers you have split your physical server into. If you are satisfied with the resources allocation, click **Submit** to initiate the creation of the container template with the parameters you have set and reviewed.

Note: Later on, you can configure any of the resource parameters of the newly created container template.

7.7.16.3 Cloning Containers to Templates

The **Clone to Template** page allows you to create a template of the chosen container.

With this option, you can have a functioning container and its clone with the template characteristics at the same time.

Before you create a template, you should decide where to store it:

- **Clone Container to Library Template.** In this case, the template will be placed to the **Resource**

Library folder accessible to all users who have enough rights. In future, these users will be able to create a container using this template and to place it on any physical server.

- **Clone Container to Local Template.** In this case, the template will be created locally on the same physical server the container belongs to. Such a template is visible from the hosting physical server only. To find the list of such templates, click **Container Flavors** on the the physical server toolbar. In future, the container created from this template will be placed on this physical server.

When you click **Clone**, the process of cloning starts. If you have chosen to create a library template, you will find it in the **Resource Library > Templates** folder. If you have chosen to create a local template of the container, you will find it in the local library on the physical server the container initially belonged to.

7.7.16.4 Operations on Local Container Templates

Click **Manage > Container Flavors** on the physical server toolbar to monitor and manage the state of all the templates stored locally on this physical server. This is a storage for local templates only.

The templates are listed in the table that has two columns: Name and Description. To add or remove any of the columns, use the **Select Columns** button above the table.

The **Search** section also comprises two fields: Name and Description. This allows you to search the templates according to any of the parameters. If you use only some of these fields, you can add or remove them according to your needs with the help of the **Customize** button. If you do not need the search section at all, just hide it with the **Hide Search** button below the table. To restore the **Search** section, click the **Show Search** button that appears on the place of the **Hide Search** one.

On the **Container Flavors** page, you can perform any of the following actions:

- Create a clone of the template and store it in the Library (the **Clone to Library** button);
- Create a clone of the template and store it on the same physical server (the **Clone** button);
- Delete a template (the **Delete** button).

To perform an action, you should select one or more templates by enabling the check box in the left column.

If you click a template name, the template **Summary** page will open.

7.7.16.5 Editing Container Templates

The template dashboard allows you to edit the given container template as follows:

- change the name, the description, and the operating system of the current container template;
- change the operating system, or its version run by the current container template;
- define container template network settings;
- adjust resource parameters for the container template;
- specify if the container based on the given container template should start on the physical server boot;
- enable/disable the offline service for any Virtuozzo 6 container based on the given container template;
- add applications and remove them from the container template.

Configuring General Settings

The **General Settings** page enables you to change the basic properties of the container template:

Column	Description
Name	The name of the container template.
Description	The description of the container template.
OS Template	The operating system the container template is based on.
Memory Management Mode	The memory management mode that will be used inside the container based on this template. For more details on memory management configuration, see Editing Container Templates on page 111.
Applications Included	All applications included in the container template.

In the **General** group, you can:

- Change the name of the container template it will be referred to by typing a new name in the **Name** field. This name will be displayed in the **Container template** and **Container Summary** tables.
- Edit the description of the container template in the **Description** field. The information entered in the field will be provided in the **Container templates** and **Container Summary** tables.
- Change the operating system or its version the container template is based on. This change will be reflected in the **Container template** and **Container Summary** tables.

The **Advanced** group allows you to make the container that will be based on this template automatically

start on the physical server boot.

(For Virtuozzo 6 servers) The **Offline Service** group allows you to set the offline service options by selecting the appropriate radio button. Offline service settings ensure the manageability of the container based on this template by means of one or more offline services from any browser at its own IP address. After offline service is enabled for the container, one port of its IP address becomes permanently active whatever the container state. You can:

- Disable the offline service of the container.
- Enable the offline service of the container via the offline service settings operating on the physical server. Whenever you need to manage the container offline, its offline service settings will be brought into synchronization with those in effect on the physical server. 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 services you would like the container to be subscribed to in the corresponding check boxes.

After you have made the necessary changes, click **Submit**.

Configuring Network Parameters When Editing Container Templates

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 template you are configuring. For more information, see [Configuring Container Network Parameters](#) on page 234.

After you have provided the necessary information, click the **Submit** button.

Customizing Resource Settings When Editing Container Templates

On the **Configure Resources** page you can manage the resource parameters for the currently selected container template. For more information, see the descriptions of **CPU**, **disk**, and **memory** resources in [Resources Overview](#) on page 72.

Adding Applications to Templates

On the **Applications Templates** page, you can choose those applications that will be included in the corresponding container template. These applications will be automatically installed in all the containers created on the basis of this container template.

All available applications that can be added to the container template are listed in the **Available Applications** table in the left part of the displayed page. To add any of them to the container template, tick

the check boxes 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 template which, you are sure, will be of no use to you. To remove any application from the container template, tick its check box 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 template, click on the **Submit** button.

7.8 Managing Virtual Machines

7.8.1 Virtual Machine Toolbar Overview

In Virtuozzo Automator, the virtual machine toolbar provides quick access to the main operations:

- In the **Configure** drop-down menu:

Option	Description
General Settings	Change the virtual machine name, description, guest operating system, etc.
Hardware Settings	Configure the virtual hardware of the virtual machine.
Password	Change the virtual machine administrative password.
Install Guest Tools	Install guest OS tools inside the virtual machine.

- In the **Maintenance** drop-down menu:

Option	Description
Resources Monitor	View the details on the virtual machine resources consumption.
Back Up	Create the virtual machine backup.
Reinstall	Reinstall the virtual machine.
Migrate	Move the virtual machine to another physical server.

- In the **Operate** drop-down menu:

Option	Description
Start/Stop	Start or stop the virtual machine. Depending on the virtual machine state, only that operation is accessible that complies with its current state.
Restart	Restart the virtual machine.
Suspend	Suspend the virtual machine: a suspended virtual machine stays put, and so its processes and services do, to be later resumed from the checkpoint. Suspending virtual machines 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 restarting or reinstalling a suspended virtual machine can change the saved state of the virtual machine, so this action are not recommended for suspended virtual machines.
Pause	Pause the virtual machine.
Power Off	If you wish to stop your virtual environment, bear in mind that there is a two-minute timeout for the virtual environment shutdown scripts to be executed. If the virtual environment is not stopped in two minutes, the system forcibly kills all the processes in the virtual environment. The virtual environment will be stopped in any case, even if it is seriously damaged. To avoid waiting for two minutes if you are operating a virtual environment that is known to be corrupt, you may use the Power Off link.

Note: The availability of the start/stop/restart/suspend/pause operations depends on the virtual machine current status.

- In the **Manage** drop-down menu:

Option	Description
Open Console	Open the remote VNC console to the virtual machine.
Clone	Create a virtual machine clone.
Convert to Template	Convert a virtual machine to template.
Clone to Template	Clone a virtual machine to template.
Backups	Back up the virtual machine.

Continued on next page

Table 7.8.1.4 -- continued from previous page

Option	Description
Power Panel Policies	Assign new policies and manage the existing policy rules for Power Panel usage. Note: This feature is only supported for Virtuozzo 6 virtual machines.
Unregister	Unregister the virtual machine from Virtuozzo Automator.
Delete	Remove the virtual machine from the physical server.

- In the **Log in...** drop-down menu:

Option	Description
Open Power Panel	Log in to the container via Virtuozzo Power Panel. Note: This feature is only supported for Virtuozzo 6 virtual machines.

7.8.2 Virtual Machine Dashboard Overview

The virtual machine **Summary** page allows you to exercise the overall control on the virtual machine activity, state, and configuration.

For your convenience, the parameters on the **Summary** page are divided into five logical sections.

Status

The section displays:

- The current status of the virtual machine.
- The hostname of the physical server where the virtual machine is hosted.
- The CPU consumption.
- The time the computer has been left unattended without crashes and need to reboot it.

- The guest tools being installed or not in the virtual machine.

General Settings

The section provides you with the virtual machine identification information: its name, UUID, location, IP addresses if available, type of the guest operating system and the original operating system template the virtual machine is based on.

Hardware Settings

The section provides you with the virtual machine configuration information. The section shows the number and type of CPUs and the memory amount used by the virtual machine. You can also see the emulated devices the virtual machine possess and their characteristics.

You can change any of these settings on the **Virtual Machine Hardware Settings** page (see *Defining Virtual Machine Hardware Settings* on page 125).

Screenshot

The section enables you to view inside the virtual machine by means of remote display. You can update the screenshot by clicking **Refresh Screenshot**.

Resource Alerts

The section provides information on the virtual machine resource consumption:

- green circle: the virtual machine operates normally,
- yellow circle: some virtual machine resource is approaching its soft limit,
- red circle: some virtual machine resource has exceeded its soft limit.

For details on resource alerts, refer to *Viewing Infrastructure Alert Logs* on page 30.

Resources

The section provides you with the detailed information on the CPU, disk, and memory resources (total and currently in use).

7.8.3 Creating Virtual Machines

Having chosen to create a virtual machine as described in *Starting to Create Virtual Environments* on page 51, you can proceed to define general and hardware settings, and review the resulting configuration. This section describes these operations in detail.

7.8.3.1 Defining New Virtual Machine General Settings

The second step of the **New Virtual Environment** wizard allows you to define the virtual machine general settings. These settings can be divided into several groups for your convenience.

In the **General Configuration** group of settings, you can set the following parameters:

- Specify an arbitrary name for the virtual machine in the **Name** field and provide its description in the **Description** field. The latter is not available if you are creating more than one virtual machine. If you wish, you can set descriptions of your virtual machines after they are created (see *Adjusting Container Configuration and Advanced Settings* on page 104).
- Specify the destination folder for the virtual machine files in the **Location** field. Use the **Select** link to browse the host server system.
- Select an operating system to be installed in the virtual machine and choose its version in the **Guest Operating System** box.
- Decide on whether the virtual machine is to be started after its creation (the **Start the Virtual Machine After Creation** check box is selected) or left in the stopped state (the check box is cleared).

The **Multiple Virtual Machine Configuration** section is displayed only if you are creating more than one virtual machine at a time. This group of settings allows you to choose the way of assigning names to your virtual machines:

- **Assign names based on a specified template.** If you choose this option, you will need to specify a pattern for assigning names to your virtual machines in the **Virtual Machine Name Template** field. This pattern must contain the @index@ placeholder that will be replaced with the corresponding index number. For example, if you are creating two virtual machines and specify `virtual environment @index@` in this field, your virtual machines will be named `virtual environment 1` and `virtual environment 2`.
- **Set names manually for every virtual machine.** If you choose this option, you will need to manually type the names for each virtual machine you are planning to create in the fields below this option.

For more information on the **Host System Integration, Remote Display, and Offline Management** settings, see *Defining Virtual Machine General Settings* on page 121.

The **Permissions** group of settings lets you create one or more permissions for the virtual machine. A permission is a combination of a user or a group of users and a role in respect of a certain Virtuozzo Automator object, you can indicate the corresponding user/group and role in the provided fields, thus creating a permission with respect to the virtual machine being created. To add more permissions, click the

Add button.

Click **Next** to move on to the next step of the **New Virtual Environment** wizard.

Or click **Create**, to start the virtual machine creation process. The virtual machine will be created with the default system configuration. After it's created, you can view and change its configuration (see *Changing Virtual Machine Configuration* on page 121).

7.8.3.2 Defining New Virtual Machine Hardware Settings

The **New Virtual Machine: Hardware Settings** page allows you to configure the main hardware settings of the virtual machine being created. For more information, see *Defining Virtual Machine Hardware Settings* on page 125.

7.8.3.3 Reviewing Virtual Machine Configuration

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

7.8.4 Registering Virtual Machines

The **Register Virtual Machine** page allows you to add a virtual machine to the virtual machine list of the physical server.

If you have a virtual machine on the physical server, you cannot use it or otherwise manage it until it is registered. Only after that, the virtual machine becomes available for all sorts of manipulations provided by the Virtuozzo Automator functionality. For example, if you decide to move a virtual machine from one physical server to another, you will need to unregister it on the initial physical server, manually move it and register it on the target physical server. Otherwise, the final physical server will serve as a data storage for the virtual machine files.

To register a virtual machine, you should specify the path to it on the physical server. The **Path to Server** field allows you to type the path or to locate the virtual machine using the **Select** link.

To confirm your choice, click **Register**. When the operation is complete, the virtual machine will appear in the list of registered virtual machine.

7.8.5 Unregistering Virtual Machines

The **Unregister Virtual Machine** page allows you to delete the virtual machine from the physical server list of virtual machine without deleting its files from the physical server. You may need to unregister a virtual machine if you want to use it as a data storage on the physical server and do not need it in the list. If you want to move the virtual machine from one physical server to another, you should also unregister it first and register it on the target physical server.

Before you click the **Unregister** button, confirm your wish to unregister the virtual machine and enable the **Yes, I want to unregister the Virtual Machine(s)** check box.

7.8.6 Installing Virtuozzo Guest Tools in Virtual Machines

Virtuozzo Guest Tools are a suite of special utilities that help you use your virtual machines in the most comfortable and efficient way.

To install Virtuozzo guest tools in a Linux or Windows virtual machine, do the following:

1. Click **Configure** > **Install Guest Tools** on the virtual machine toolbar. The guest tools image shipped with Virtuozzo will be mounted to the virtual machine's optical drive.
2. Log in to the virtual machine on the **Console** tab (see [Connecting to Virtual Environments via VNC](#) on page 55):
 - Inside a Linux VM, create a mount point for the optical drive with the guest tools image and run the installer:

```
# mount /dev/cdrom /mnt/cdrom
# bash /mnt/cdrom/install
```
 - Inside a Windows VM, if autorun is enabled, the installer will run automatically. Otherwise, navigate to the optical drive and launch the installer manually.

Note: Virtuozzo guest tools rely on QEMU guest agent which is installed alongside the tools. The agent daemon/service (`qemu-ga`) must be running for the tools to work.

7.8.7 Monitoring Virtual Machine Resources Consumption

The **VM Monitor** subtab shows the graphical statistics on CPU, Memory and Disk resource consumption, i.e. how much of the physical server resources this virtual machine consumes. The data are shown in percentage.

Each of the three resources has its own colour on the chart. If you need to monitor the changes only for one resource, whatever it is, you can disable the others. Use the **Select Graph** subsection.

The chart shows the changes for the defined period. In the **Graph Period** subsection, you can select whether to show the data for a particular date, month, year or for any other period of time. To implement the changes, click **Apply**. The chart will change its appearance.

Some of the information on resource consumption is available on the virtual machine's **Summary** page (see [Virtual Machine Dashboard Overview](#) on page 115).

The **Export Data** link allows you save the graphical data in the format of a plain text (.csv file) on your computer.

7.8.8 Monitoring Virtual Machine Traffic Usage

The **Traffics Usage** subtab of the virtual machine **Network** pane shows the traffic statistics for the selected period or class.

To display traffic statistics, you should perform the following operations:

1. In the **Show traffic for** field, specify the time span for which you wish to see your traffic by selecting the corresponding duration unit on the drop-down menu. Depending on the selected unit, the field to the right of the drop-down menu changes and offers you a list of appropriate values to choose from. The duration units are listed below:
 - Day: Click the calendar and specify the exact date (i.e. day, month, and year) for which you wish to view your network traffic statistics.
 - Month: Specify the month and year to display your traffic statistics for.
 - Year: Specify the year to display your traffic statistics for.
 - Period: Specify the period for which you wish to view your traffic statistics by selecting the start and end dates on the calendar.
2. In the **Traffic class** field, specify the traffic accounting classes that will be displayed in the table.

- All. This option includes all specifically created accounting classes and those traffics that were not included into any class.
 - Other. This option includes only those traffics that do not belong to any specific accounting class.
 - Specific accounting classes. Apart from the All and Other classes, the list shows the classes created by you for specific needs. You can choose one concrete class to be displayed in the table. You can create new and view the detailed on the already existing ones by going to the host server and clicking the **Network** tab > **Traffic** subtab (see *Managing Network Accounting and Shaping* on page 249).
3. In the **Traffic unit** field, specify the unit of measurement your traffic statistics will be displayed in.
 4. Click on the **Update** button to display your traffic statistics for the specified period.

The results will be presented in the following table:

Column	Description
<Period>	Denotes the specified period. The name of this column depends on the duration unit selected in the Period field.
Incoming	The input traffic statistics (in the selected unit of measurement) during the specified period. This is the traffic that comes to the virtual environment from the Internet.
Outgoing	The amount of output traffic (in the selected unit of measurement) during the specified period. This is the traffic that goes out of the virtual environment to the Internet.

The **Total** row at the bottom of the table summarizes all the incoming and outgoing network traffic for the specified time span.

7.8.9 Changing Virtual Machine Configuration

7.8.9.1 Defining Virtual Machine General Settings

The **Configure General Settings** page allows you to adjust the main settings for your virtual machines. If the virtual machine was created singularly, you might have provided it with a name and a description. If the virtual machine was one of virtual machines created as a group, providing names and descriptions were not available.

In the **Preferences** group, you can change the name or description of a virtual machine created singularly, or assign a name and a description to a mass-produced virtual machine. You can also view where the virtual machine configuration file is stored. Additionally, the group includes the following settings:

- **Hostname.** Assign and change the virtual machine hostname. A hostname is a unique name under which the virtual machine is visible on the global network, meanwhile the virtual machine name is used within the VA system only. The virtual machine hostname cannot be longer than 32 valid symbols.
- **Guest Tools Autoupdate.** Ticking off the check-box ensures, that Virtuozzo Guest Tools are kept updated, and a new update is offered to install every time it is available.

The **Host System Integration** section allows you to configure the parameters responsible for integration between the virtual machine being created and the physical server. This group of settings includes the following subgroups:

- **Run VM Under Host User Account.** This subgroup enables you to define the user account under which the created virtual machine will be started. You can choose one of the following options:
 - **Administrative Account.** Select this option if you wish to run the virtual machine with the VA Administrator's rights.
 - **Other User.** Select this option if wish to run the virtual machine as a non-administrator VA user. In this case, you will need to specify the corresponding user credentials in the fields below this option.
 - **Service Default Account.** Select this option if you wish to run the virtual machine under the same VA user account under which you are launching Virtuozzo Management Console.
- **Host Startup and Shutdown.** This subgroup allows you to define a number of parameters related to the procedures of starting and shutting down the physical server. The parameters that can be specified in this subgroup are described in the table below:

On Host Startup

Option	Description
Do nothing	Select this option if you do not want your virtual machine to start automatically when you turn on the physical server hosting this virtual machine.
Start Virtual Machine	Select this option if you want the virtual machine to start automatically when you turn on the physical server hosting this virtual machine.

Continued on next page

Table 7.8.9.1.1 -- continued from previous page

Option	Description
Restore Previous State	Select this option if you want the virtual machine to start in the same mode that was applied to it at the time the physical server was turned off.

On Host Shutdown

Option	Description
Stop Virtual Machine	Select this option if you want the virtual machine to be stopped when you turn off the physical server hosting it.
Shut down Virtual Machine	Select this option if you want the virtual machine to shut down when you turn off the physical computer hosting it.
Suspend Virtual Machine	Select this option if you want the virtual machine to be suspended when you turn off the physical server hosting it.

- **Optimization Settings.** This subgroup allows you to define the priority of distributing the bare metal physical server resources

Optimize for. Define whether the virtual machine or the hosting server processes should have priority for host resource consumption.

- **Virtual machine.** Select this option to allocate more resources to the virtual machine and its applications. Selecting this option may significantly increase the virtual machine performance; however, it may slow down the work of the bare metal computer.
- **Host Computer.** Select this option to allocate more resources to the Server Bare Metal physical server and its applications. In this case, the resources usage will be optimized to provide better performance of bare metal physical server.

Disk I/O Priority. Priority level of the virtual machine disk I/O operations in comparison to those of other virtual environments allocated on this physical server. The allowed range is 0-7. The greater the priority, the more time the virtual environment has for writing to and reading from the disk. The default priority is 4.

Disk I/O Limit, Bps. Disk I/O bandwidth limit in bytes per second. The default value is 0 which stands for unlimited bandwidth.

Disk I/O Limit, Nps. Disk IOPS limit in operations per second. The default value is 0 which stands for unlimited IOPS.

The **Remote Display** group allows you to configure the settings to be used to remotely control your virtual machine via the VNC protocol.

- **Enabled with default settings.** Use the network settings of the host physical server to connect to the virtual machine via the VNC protocol. To learn the physical server settings, go to **Network** pane of the physical server itself. You can also set the password to secure your VNC connection.
- **Enabled with custom settings.** This option, if selected, allows you to specify your own connection parameters when connecting to the virtual machine via the VNC protocol. In this case you should specify the following parameters:

Option	Description
IP Address	The IP address of the server where the virtual machine is hosted.
Port	A unique port number to be used by the virtual machine. It must be a numeric value in the 5700-6900 range.

You can also set the password to secure your VNC connection.

- **Disabled.** Forbid using the VNC protocol for connecting to the virtual machine.

(For Virtuozzo 6 servers) The **Offline Services Management** group of settings lets you enable the virtual machine management through Virtuozzo Power Panel and/or Virtuozzo Plesk Control Panel irrespective of the virtual machine state, running or stopped. Offline services of the corresponding virtual machine ensure the virtual machine manageability by means of one or more offline services from any browser at its own IP address. After offline service is enabled for the virtual machine, one port of its IP addresses becomes permanently active irrespective of the virtual machine state.

Note: The virtual machine should have either the **Bridged** or the **Host-Only** network adapter to support the offline service management.

- **Disabled.** The offline management is turned off. The virtual machine can be accessed through the offline services only if it is in the running state.
- **Enabled With Default Settings.** The offline management is turned on with the physical server settings being used as default ones. Both control panels have ports and enabled.
- **Enabled With Custom Settings.** The offline management is turned on. Choose those control panels that you will use to manage the virtual machine.

The **Restart** group is available if you configure a running virtual machine. It allows you to decide when to apply the changes.

- The **Restart the Virtual Machine to apply the changes immediately** check box is selected. The changes will be applied immediately after you click the **Submit** button. The virtual machine will be stopped and then started again.
- The **Restart the Virtual Machine to apply the changes immediately** check box is cleared. The changes will be saved when you click the **Submit** button but will not be applied to the virtual machine. The changes will be applied on the first time the virtual machine is stopped or restarted.

7.8.9.2 Defining Virtual Machine Hardware Settings

The **Configure Hardware Settings** page allows you to view and change the configuration of a virtual machine. Also, you can add new devices and remove no more used ones.

To be able to change the virtual machine configuration, you should have sufficient rights.

Note: If you change the configuration of a running virtual machine, you can choose when to apply the changes - immediately after saving the changes or later when you stop/restart the virtual machine. Use the **Restart** group settings.

CPU Settings

This group of settings allows you to set the following CPU parameters:

- Define the number of CPUs to be available to the virtual machine in the **Number of CPUs** field. Keep in mind that the number of CPUs cannot exceed the number of physical CPUs installed on the physical server where the virtual machine resides.
- Define the CPU units and in the **CPU Units** field. CPU unit is a positive integer number that determines the minimal guaranteed share of the hosting server CPU time your virtual environment will receive.
- Define the CPU limit in the **CPU Limits** field. CPU limit can be set in percentage or in megahertz (MHz).
 - CPU limit set in percentage is a positive number indicating the hosting server CPU time in percent that cannot be exceeded by the corresponding virtual machine. To calculate the CPU limit for a virtual machine, you should first count the hosting server maximum CPU value in percent. To do this, multiply the number of server CPUs by 100%. For example, the maximum CPU value of a

server with 4 CPUs will be 400%. Now, you can decide what portion of the whole CPU power of this server you want to allocate to this virtual machine.

Since, the limitation is set in percent, it will be recounted automatically each time the CPU power of the hosting server changes.

- CPU limit in megahertz is a positive number indicating the hosting server CPU value in MHz that cannot be exceeded by the corresponding virtual machine.

The CPU limitation is strict and does not change in case of the virtual machine migration to a different physical server or if the hosting server CPU power changes.

- View the processor virtualization type supported for this virtual machine in the **Hardware Virtualization** field.
- Indicate one or more flags in the **System Flags** field. When specified, these flags define additional properties of the virtual machine and may change its system behavior. This field serves for the technical support needs. You will be instructed what flags to specify if such cases arise.

Operating Memory Settings

This pane allows you to specify the amount of operating memory (RAM) available for this virtual machine. You can specify any value from 4 to 8192 MB, but it is recommended to set the value indicated in the tip message that is displayed when you move the mouse cursor over the value set in the **Operating Memory** field. Note that this value can be different for different kinds of guest operating systems.

Video Memory Settings

This pane allows you to specify the amount of the memory allocated for the emulated video card inside the virtual machine. The more you allocate, the more powerful the video card will be. You can specify any value from 2 to 256 MB.

Boot settings

This group of settings allows you to configure the virtual machine boot sequence and EFI boot capability.

To enable EFI boot, check the **Use EFI** box.

The current boot sequence is displayed in the **In Use** table. To change the boot order, select a bootable device in the table and use the **Up** and **Down** buttons to move it up or down in the list. To remove a boot device from the boot sequence, select it and click the **«** button to move it to the **Not Used** table. To include the device in the boot sequence, select it in the **Not Used** table and click the **»** button.

The currently supported devices are as follows:

Device	Description
Hard disk	The virtual machine will use its hard disk to boot.
Floppy Disk	The virtual Machine will boot from the floppy disk.
CD/DVD-ROM	The virtual machine will boot from the media connected to the CD/DVD-ROM.
Network Adapter	The virtual machine will be connected to the PXE Server and will boot from the ISO image stored on it.

Note: Make sure that the devices in the boot sequence are present in the virtual machine configuration

Hard Disk Settings

Using this group of parameters, you can configure the following emulated hard disk drive settings:

Enabled. Select this option to enable hard disk operations. If you want to temporary disable this device, but do not want to remove it completely, disable this option.

Image File. In this field, you can view and change the location of the hard disk image file. By default, the hard disk image file is located in the virtual machine home folder

Disk Size and Image Type. In this section, you can change the hard disk size and format.

Note: For minimizing the disk size, enable the Resize filesystem option. Enlarging the disk size can be performed without this option enabled.

When changing the image type, you can choose one of these disk formats:

- **Expanding.** Such disks grow in size (i.e. more space is allocated for them) as more data is added.
- **Plain.** Such disks have all the required space allocated for them at creation.

If you want the virtual disk to be split into 2GB pieces, select the **Splitted** option.

Enable the **Recreate** option, if you want to replace the existing hard disk with a new blank one.

Note: Recreating the hard disk removes all data stored on it.

Interface Type and Location. In this section, you can select the interface for connecting devices and set device position:

- For Virtuozzo Hybrid Server 7:
 - **SCSI Interface:** Up to 15 virtual devices (hard disks or CD/DVD-ROM drives) per virtual machine.
 - **IDE Interface.** Up to 4 virtual devices (hard disks or CD/DVD-ROM drives) per virtual machine.
 - **VirtIO Interface.** Up to 15 virtual hard disks per virtual machine.
-

Note: Virtuozzo Hybrid Server 7 supports hotplugging of SCSI and VirtIO hard disks to virtual machines.

- For Virtuozzo 6 servers:
 - **SATA Interface.** Up to 6 virtual devices (hard disks or CD/DVD-ROM drives) per virtual machine.
 - **SCSI Interface.** Up to 15 virtual devices (hard disks or CD/DVD-ROM drives) per virtual machine.
 - **IDE Interface.** Up to 4 virtual devices (hard disks or CD/DVD-ROM drives) per virtual machine.
-

Note: Virtuozzo 6 supports hotplugging of SATA hard disks to virtual machines.

Virtual Network Settings

This group of settings allows you to manage the virtual machine's network settings:

- **Enabled.** Select this option if you want to enable the given network adapter in the virtual machine. If you want to temporarily disable the network adapter without deleting it from the virtual machine configuration, clear the **Enabled** check box.
- **Connected.** Select this option if you want the virtual machine to start up with this network adapter connected.
- **Configure network settings from guest OS.** When selected, hides the **Network Settings** section of the screen and enables you to configure the network settings from inside the virtual machine. When deselected, reveals the **Network Settings** section of the screen and allows you to configure the network settings from Virtuozzo Automator.
- **Connect to Virtual Network.** The virtual machine will connect to one of the virtual networks available

on the Virtuozzo server. By default, you can choose from these networks:

- **Bridged.** The virtual machine will access the local network and Internet through one of the network adapters installed on the physical computer. In this case, the virtual machine will be treated as a standalone computer on the network and you will need to configure it accordingly.
- **Host-Only.** The virtual machine will only connect to the physical computer and virtual machines within the same host-only network.

Additionally, you can populate the list with more virtual networks that you have already created in Virtuozzo Automator (on either the **Resource Library > Networks** screen or physical server's **Networks** screen). To be added to this list, the virtual network needs to be configured for use on this server only (**Host-Only** mode) or bound to a physical server network adapter or VLAN (**Bridged** mode). If a virtual network adapter is indicated in brackets, for example, (eth0), the network works in the **Bridged** mode. Virtual networks marked with (n/a) work in the **Host-Only** mode.

- **Routed.** The virtual machine will appear as a full member on the network, and its traffic will be routed via one of the virtual adapters on the Virtuozzo server.
- **Mac Address.** During virtual machine creation, a MAC address for the virtual network adapter is generated automatically. You can view and edit it on virtual machine's **Hardware Configuration** screen (see *Defining Virtual Machine Hardware Settings* on page 125). When you clone a virtual machine, leave the field empty so the system will automatically generate a new MAC address for it.
- **Get IP Address by.** Select the **DHCPv4** or **DHCPv6** checkbox to automatically receive TCP/IP configuration properties from the local server (the DHCP server inside the virtual machine), and the information on the default gateway through the Dynamic Host Configuration Protocol for the IP address of version 4 or version 6, correspondingly. The virtual machine adapter can have up to two IP addresses either set manually or assigned by the DHCP server automatically.

Note: The IP addresses should be of different versions. This way, a network adapter will have one IPv4 and one IPv6 address no matter how they were assigned: manually by you or automatically by DHCP.

- **IP address/Subnet mask** and **Default Gateway.** Fill out these fields to use a static IP address instead of a dynamic one automatically assigned by the DHCP server. If you leave the value at <auto>, Virtuozzo Automator will assign the IP address and subnet mask automatically.
- **DNS Server IP Address.** DNS server IP address for Internet connection.

- **Search Domain.** Search domain name. A search domain is a list for hostname lookup. The search list is normally determined by the local domain name and contains only that by default. You can add other hostnames for a particular Container. A search query is performed by attempting to use each item in the list until a match is found. Note that this process might be slow and generate a lot of network traffic if the servers for the listed domains are not local. Besides, the query might timeout if no server is available for one of the domains.
- **Filter by MAC Address.** Determines if the specified network adapter is configured to filter network packages by MAC address. If set to “yes”, the adapter is allowed to send packages only from its own MAC address.
- **Filter by IP Address.** Determines if the specified network adapter is configured to filter network packages by IP address. If set to “yes”, the adapter is allowed to send packages only from IPs in the network adapter IP addresses list.
- **Promiscuous Mode.** Determines if the specified network adapter should reject packages not addressed to its virtual machine. If set to “yes”, the adapter will drop such packages.

CD/DVD-ROM Settings

This group of settings provides you with the possibility to configure the following virtual machine’s CD/DVD-ROM drive settings:

- Leave the **Enabled** option selected if you want the virtual machine to use the given CD/DVD-ROM drive. To temporarily disable operations with this drive without removing it from the virtual machine configuration, clear the **Enabled** check box.
- Select the **Connected** option if you want the virtual machine to start up with this CD/DVD-ROM drive connected.
- In the **Image Type** section, specify whether you wish to use a real CD/DVD-ROM drive on your physical server or a CD/DVD-ROM image file to emulate the virtual machine CD/DVD-ROM drive. First of all, the CD/DVD-ROM is needed to install an operating system inside the virtual machine. If you have a real CD with an operating system, the Physical Drive option is to be selected.
 - The **Physical Drive** option is grayed out as connecting a real CD/DVD-ROM drive of the host server is not supported by hypervisor.
 - If you wish to use a CD/DVD-ROM image file, select the **Existing Image File** radio button. In this case, you will need to specify the file location (use the **Image File Location** field), the name or path to the file, and the login/password information in case of the remote storage. An image file is very

useful as it should not necessarily be stored on the same physical server where the virtual machine is located. It can be stored locally on the same host (choose the **Local CD/DVD Image** option), can be stored on any physical computer accessible via network (choose the **Network CD/DVD Image** option), or it can be stored on a file storage shared with Virtuozzo Automator (choose the **Library CD/DVD image** option).

Note: If you have a Microsoft Windows 2008 installation disk image, we advise you to store this image locally on the host server. Otherwise, check that the network connection is fast enough to successfully boot from a remote image.

- Select the interface type for connecting the CD/DVD-ROM drive in the **Interface Type** field:
 - **IDE**. Up to 4 virtual devices (hard disks or CD/DVD-ROM drives) per virtual machine.
 - **SCSI**. Up to 15 virtual devices (hard disks or CD/DVD-ROM drives) per virtual machine.
- Select the device location in the **Location** list.
- Select the **Passthrough** checkbox to connect the physical server real CD/DVD-ROM drive to the virtual machine in the passthrough mode. In this mode, the CD/DVD-ROM drive is directly assigned to the virtual machine. If you connect a recordable optical drive to a virtual machine in the passthrough mode, you will be able to use it to burn CD or DVD discs in the virtual machine. To use this option, you should have a write access to the physical server CD/DVD-ROM.

Note: If you select the **Passthrough** option, the physical server will have no access to this CD/DVD-ROM drive.

Floppy Disk Settings

This group of settings allows you to configure the virtual machine's floppy disk drive settings:

- Leave the **Enabled** option selected if you want the virtual machine to use the given floppy disk drive. To temporarily disable operations with this drive without removing it from the virtual machine configuration, clear the **Enabled** check box.
- Select the **Connected** option if you want the virtual machine to start up with this floppy disk drive connected.
- In the **Image Type** section, you can choose the device that will be used to emulate the virtual machine's

floppy disk drive:

- **Physical Drive.** Select this option to use a real floppy disk drive installed on your physical server.
- **Local Disk Image.** Select this option to use an existing image file to emulate the virtual machine's floppy disk drive. Not available when creating a virtual machine template.

Parallel Port Settings

This group of settings allows you to configure the virtual machine's parallel port settings:

Enabled. Select this option to enable the parallel port operations. If you want to temporarily disable this device, but do not want to remove it completely, disable this option.

Connected. The parallel port will be automatically connected on the virtual machine startup if you select this option.

In the **Image Type** section, you can choose the device that will be used to emulate the virtual machine's parallel port:

- **Real Device.** Select this option to connect one of the parallel ports of the physical server to the virtual machine's parallel port. In this case you will need to choose the appropriate physical port in the **Parallel Port** list.
- **Printer.** Select this option to connect a printer using the virtual machine's parallel port. In this case, you will need to choose the appropriate printer in the **Printer** list.
- **Output File.** Select this option to emulate the parallel port by using an output file. In this case, a new output file will be created in the virtual machine's folder. The name that will be assigned to the file is displayed in the **Output File** field; you can change it, if necessary. The output file (in .txt format) records the information on the parallel port activity.

Serial Port Settings

This group of settings allows you to configure the virtual machine's serial port settings:

Enabled. Select this option to enable the serial port operations. If you want to temporarily disable this device, but do not want to remove it completely, disable this option.

Connected. The serial port disk will be automatically connected on the virtual machine startup if you select this option.

In the **Image Type** section, you can choose the device that will be used to emulate the virtual machine's serial port:

- **Real Device.** Select this option to connect the virtual machine's serial port to one of the existing serial ports on the physical computer. In this case, you will need to choose the appropriate port on the physical server in the **Serial Port** list.
- **Socket.** Select this option to connect two virtual machines through the sockets. When connecting the virtual machine to a socket, you can use the default path to the socket or type a new one in the **Socket** field. You can also configure the role the virtual machine will play in the connection by selecting the necessary role in the **Mode** list. Selecting **Server** enables you to use this virtual machine to direct the other one. Selecting **Client** enables you to direct this virtual machine from the other one.
- **Output File.** Select this option to connect the virtual machine's serial port to an output file. You can accept the default file name or type your own one in the **Output File** field. The output file (in .txt format) records the information on the serial port activity.

You can use the **Add** and **Remove** buttons to add new devices to the virtual machine or remove unnecessary ones from it.

The **Restart** group is available if you configure a running virtual machine. The check box **Restart the Virtual Machine to immediately apply the changes** allows you to decide when to apply the changes:

- If the check box is selected, the changes will be applied immediately after you click the **Submit** button. The virtual machine will be restarted.
- If the check box is cleared, the changes will be saved when you click the **Submit** button but will not be applied to the virtual machine. The changes will be applied on the next virtual machine stop or restart.

Note: Virtuozzo Hybrid Server 7 supports hotplugging of SCSI and VirtIO hard disks to virtual machines. Virtuozzo 6 supports hotplugging of SATA hard disks to virtual machines.

7.8.10 Reinstalling Virtual Machines

Virtual machine reinstallation means recovering the original state of a virtual machine 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 virtual machine reinstallation process restores these files as they were at the time when the virtual machine was created or when other applications were added to the virtual machine afterwards, if so.

Reinstallation is likely to bring about some irrevocable changes to your virtual machine, therefore, to be on

the safe side, it is recommended to back up your virtual machine before reinstallation.

Click **Reinstall** on the **Reinstall: Introduction** page to start reinstallation.

Note: In order to be reinstalled, each virtual machine has to be stopped first.

7.8.11 Cloning Virtual Machines

This section describes how to define general and hardware settings of cloned virtual machines and how to clone multiple virtual machines.

7.8.11.1 Defining General Settings of Cloned Virtual Machines

The **Clone Virtual Machine: General Settings** page allows you to preset the main settings for the clone of the virtual machine before you start the process of cloning. The settings on this page are almost the same ones as when you create a new virtual machine.

Preferences

In the section, you can change the name or description of a virtual machine created singularly, or assign a name and a description to a mass-produced virtual machine. You can also view where the virtual machine configuration file is stored. The **Start the Virtual Machine after its creation** option, being enabled, launches the virtual machine upon its creation on the basis of this template.

For more information on the **Host System Integration**, **Remote Display**, and **Offline Management** settings, see *Defining Virtual Machine General Settings* on page 121.

To configure the hardware settings of the virtual machine clone, click the **Customize** button.

7.8.11.2 Defining Hardware Settings of Cloned Virtual Machines

The **Clone Virtual Machine: Hardware Settings** page allows you to preset the hardware settings for the clone of the virtual machine before you start the process of cloning. If you want to reconfigure these settings, you can easily do it later on the **Configure Hardware Settings** page. To open this page, choose the clone and go to **Configure > Hardware Settings**.

You can:

- View and edit the general settings in the **General** subsection.
- View and edit the parameters of the virtual machine devices in the **Devices** subsection.
- Add and remove various hardware devices.

For more information, see *Defining Virtual Machine Hardware Settings* on page 125.

Note: Not all hardware settings may be available for cloned virtual machines.

7.8.11.3 Cloning Multiple Virtual Machines

The **Clone Virtual Machines** page allows you to create exact copies of several virtual machines at once. The multiple creation of clones is possible only for the virtual machines that are located on the same physical server.

The page comprises as many subsections as many virtual machines you are going to clone. In each subsection, you can specify the future clone name. The default name of the clone is made by adding the `Clone_` prefix to the virtual machine initial name.

Note: The running virtual machines will be stopped prior to the process of cloning and restarted again after the process is complete.

If you want to start the virtual machines after cloning, just enable the corresponding check box below the subsections.

The resulting clones of the virtual machines will be located on the same physical server and will be listed together with the initial virtual machines as soon as the process of cloning is complete.

7.8.12 Migrating Virtual Machines

The cases when you need to move your virtual machines from one physical server to another can be quite numerous. Use the migration to distribute the workload between physical servers, or in case of the physical server malfunction. On the **Migrate Virtual Machine(s)** screen, you need to select the physical server you are going to move the virtual machines to and select some additional options.

Note the following:

1. The physical server must be registered in the infrastructure. If you need to migrate virtual machines to a physical server that has not been registered yet, this has to be done first.
2. You can migrate only running Virtuozzo 6 virtual machines to Virtuozzo Hybrid Server 7.
3. Migration of Virtuozzo Hybrid Server 7 virtual environments to Virtuozzo 6 servers is not supported.
4. If remote display is configured in the VM to be migrated live, it is recommended to either disable this feature until live migration is finished or revert its configuration to the default by selecting **Configure General Settings > Remote Display Service > Enabled with Default Settings**.

The screen can be accessed by clicking **Maintenance > Migrate** on the virtual machine toolbar.

When selecting the destination physical server for your virtual machines, remember that you will only be able to migrate virtual machines between physical servers registered in Virtuozzo Automator. If you need to migrate the virtual machines to a physical server that has not been registered yet, this has to be done first.

To initiate the migration process, you should specify what physical server will host the virtual machine.

The **Running VM Migration** section is available only if you are attempting to migrate a running virtual machine. Before you start the migration, you should specify its type. In fact, you specify for what period a virtual machine will be paused/stopped.

Before Migration

- **Pause VM for a short time during migration (Hot Migration)**. The virtual machine is automatically paused for a short time during migration and resumed when migration is over. For such migration to be successful, both source and destination physical servers must have the same CPU architecture.
- **Pause VM (Warm Migration)**. The virtual machine is automatically paused for entire migration and resumed when migration is over. For such migration to be successful, both source and destination physical servers must have the same CPU architecture.
- **Stop VM (Cold Migration)**. The virtual machine is stopped before migration and not restarted automatically when migration is over.

After Migration

If you want the virtual machine to be started automatically after migration, enable the **Resume VM** option.

7.8.13 Migrating Physical Servers to Virtual Machines

Note: This feature is only supported for Virtuozzo 6 servers.

Migration of physical servers to virtual machines is performed with the help of Virtuozzo Transporter invoked by clicking **Operate > Migrate Server to Virtual Machine** on the physical server toolbar. Fill out the required fields as described in *Migrating Physical Servers to Containers* on page 96 and click **Submit** to initiate migration and schedule the corresponding task.

Note: If a physical server has multiple partitions, all of them will be migrated to the virtual machine.

After the physical server is migrated to a virtual machine, you can adjust its configuration (see *Changing Virtual Machine Configuration* on page 121).

7.8.14 Managing Virtual Machine Templates

7.8.14.1 Creating Virtual Machine Templates

A template of a virtual machine is an exact copy of the virtual machine, with the same hardware and software configuration, but with the only difference that it cannot be started like an ordinary virtual machine though it may have an OS preinstalled and a set of various software programs.

At any time, a template can be easily converted to an ordinary virtual machine.

The created virtual machines will have the same hardware configuration, the operating system and the software that the template has.

You can convert an existing virtual machine into a template or make a clone of the virtual machine that will be used as a template and continue using the initial virtual machine.

Defining Template General Settings When Creating Virtual Machine Templates

The **New Template: General Settings** page, available on clicking **New Template** on the **Templates** screen from the left menu, allows you to preset the main settings for the virtual machine template. The settings on this page are almost the same ones as when you create a new virtual machine. For more information, see

Defining Virtual Machine General Settings on page 121.

To configure the hardware settings of the virtual machine template, click the **Next** button.

To create a template, click **Create**.

Defining Template Hardware Settings When Creating Virtual Machine Templates

The **New Template: Hardware Settings** page allows you to configure the main hardware settings of the virtual machine template that is being created. For more information, see *Defining Virtual Machine Hardware Settings* on page 125.

Note: Not all hardware settings may be available for virtual machine templates.

Reviewing Template Parameters

The **New Template: Review** page enables you to make sure that the newly created template will fit all your needs. On this page, you can review all the configuration parameters.

- **General Configuration** contains the information on the template name.
- **Hardware Settings** contains the information on the CPU, operating memory and the devices configuration.

If after the review, you decided to change the type of the network adapter, the size of the hard disk, or any other parameter, just click the **Back** button. You will be able to come back the **Hardware Settings** and **General Settings** pages.

To complete the creation of the template, click the **Create** button and wait while the process finishes.

7.8.14.2 Cloning a Virtual Machine to Template

The **Clone to Template** page allows you to create a template of the chosen virtual machine.

With this option, you can have a functioning virtual machine and its clone with the template characteristics at the same time.

Before you create a template, you should decide where to store it:

- **Clone VM to Library Template.** In this case, the template will be placed to the Resource library folder accessible to all users who have enough rights. In future, these users will be able to create a virtual machine using this template and to place it on any physical server.

- **Clone VM to Local Template.** In this case, the template will be created locally on the same physical server the virtual machine belongs to. Such a template is visible from the host server only. To find the list of such templates, go to the **Summary** page of the physical server and click **VM Templates**. In the future, the virtual machine created from this template will be placed on this physical server.

When you click **Clone**, the process of cloning starts. Wait till the virtual machine is cloned to the template. If you have chosen to create a library template, you will find it in the **Resource Library > Templates** folder. If you have chosen to create a local template of the virtual machine, you will find it in the local library on the physical server the virtual machine initially belonged to.

7.8.14.3 Converting a Virtual Machine to Template

The **Convert to Template** page allows you to create a template of the chosen virtual machine.

With this option, your virtual machine no longer exists but is converted to a template.

Before you create a template, you should decide where to store it.

- **Convert VM to Library Template.** In this case, the template will be placed to the **Resource library** folder accessible to all users who have enough rights. In future, these users will be able to create a virtual machine using this template and to place it on any registered physical server.
- **Convert VM to Local Template.** In this case, the template will be created locally on the same physical server the virtual machine belongs to. Such a template is visible from the host server only. To find the list of such templates, go to the **Summary** page of the physical server and click **VM Templates**. In the future, the virtual machine created from this template will be placed on this physical server.

When you click **Convert**, the process of converting starts. Wait till the virtual machine is converted to the template. If you have chosen to create a library template, you will find it in the **Resource Library > Templates** folder. If you have chosen to create a local template of the virtual machine, you will find it in the local library on the physical server the virtual machine initially belonged to.

7.8.14.4 Operations on Local Virtual Machine Templates

Click **Manage > Virtual Machine Templates** on the physical server toolbar to monitor and manage the state of all virtual machine templates stored on this server. The templates are listed in the table that can have up to three columns: Name, OS, and Description. To add or remove any of the columns, use the **Select Columns** button above the table.

The **Search** section also comprises three fields: Name, OS, and Description. This allows you to search for templates according to any of these parameters. If you only need some of these fields, you can add or remove them according to your needs with the help of the **Customize** button. If you do not need the search section at all, hide it with the **Hide Search** button below the table. To restore the **Search** section, click the **Show Search** button that appears on the place of the **Hide Search** one.

On the **VM Templates** page, you can perform any of the following actions:

- Create a clone of the template and store it in the Library (the **Clone to Library** button);
- Convert the template into a virtual machine (the **Convert to VM** button);
- Create a clone of the template and store it on the same physical server (the **Clone** button);
- Delete a template (the **Delete** button).

To perform an action, select one or more templates and click the respective action button.

If you click a template name, the template properties page will open.

7.8.14.5 Editing Virtual Machine Template

Having created a virtual machine template, you may need to change its general or hardware settings before converting it into a new virtual machine. Virtuozzo Automator allows you to do it.

Defining Template General Settings When Editing Virtual Machine Templates

The **Configure General Settings** page allows you to edit the main settings for the virtual machine template. The settings on this page are almost the same ones as when you create a new virtual machine. For more information, see *Defining Virtual Machine General Settings* on page 121.

To configure the hardware settings of the virtual machine template, click the **Next** button.

To save the changes, click **Create**, otherwise click **Cancel**.

Defining Template Hardware Settings When Editing Virtual Machine Templates

The **Configure Hardware Settings** page allows you to configure the main hardware settings of the virtual machine template. For more information, see *Defining Virtual Machine Hardware Settings* on page 125.

Note: Not all hardware settings may be available for virtual machine templates.

7.8.15 Viewing Virtual Machine Logs

7.8.15.1 Viewing Virtual Machine Task Logs

The **Tasks** subtab lists recent operations on the selected virtual machine. For more details on information shown, see *Viewing Infrastructure Task Logs* on page 30.

7.8.15.2 Viewing Virtual Machine Alert Logs

The **Alerts** subtab lists resource consumption alerts for the selected virtual machine. For more details on information shown, see *Viewing Infrastructure Alert Logs* on page 30.

7.8.15.3 Viewing Virtual Machine Event Logs

The **Events** subtab lists status changes of the selected virtual machine. For more details on information shown, see *Viewing Infrastructure Event Logs* on page 34.

7.9 Deleting Virtual Environments

The **Delete** screen allows you to remove those virtual environments from your physical servers that you do not need anymore. This screen is opened:

- after you click **Manage** > **Delete** on the corresponding virtual environment toolbar;
- after you select the check boxes of the virtual environments you wish to delete on the **Virtual Environments** tab of the **Infrastructure** window and click the **Delete** icon above the **Virtual Environments** table on this tab.

All the virtual environments scheduled for removing are listed in the **Delete Virtual Environments** section of the **Delete** screen. To delete the listed virtual environments, select the **Yes, I want to delete the Virtual Environments** check box and click the **Delete** button; otherwise, click **Cancel**.

When removing virtual environments, please, keep in mind the following:

- Removing a virtual environment means that the private area of the virtual environment is completely deleted from the Host OS and all the virtual environment private files are irrevocably erased from the physical server.

- Deleting a considerable number of virtual environments may take a rather long run.

CHAPTER 8

Managing Virtual Environment Backups

The virtual environment backups are listed and can be created/restored/removed on various levels:

- Global level. Here, you can configure default backup settings that will be applied to all physical servers registered in Virtuozzo Automator. Go to the **Configure Backups** page, in the **Setup** section of the left menu.
- Infrastructure level. Here, you will find all backups residing on all physical servers in Virtuozzo Automator. Go to the **Backups** subtab of the **Infrastructure** dashboard.
- Physical server level. Here, you will find all backups residing only on particular physical server, i.e. made from those virtual environments that belong to this physical server. Go to the **Backups** subtab of the physical server dashboard.
- Virtual environment level. Here, you will find the backups belonging to the particular virtual environment. Go to the **Backups** subtab of the virtual environment dashboard.

There are two ways to back up one or more virtual environments:

- Manually. This can be done by selecting the relevant virtual environments in the virtual environment list on either the Infrastructure level or physical server level and clicking **New Backups**.
- As a scheduled job. This can be done by going to the scheduler page in the **Management** group and creating a new task. For the detailed information, see *Scheduling Backup Tasks* on page 211.

When creating a backup of one or a multitude of containers, a number of backup settings can be specified during the backup operation. If they are not specified for the given backup operation, the default backup settings of the physical server where each corresponding container is located are used. The default backup

settings of a physical server can in their turn use the default container backup settings defined for the whole datacenter. This means that you can define the backup settings on different levels:

- Globally for your datacenter. Select **Setup > Configure Backups** in the left Virtuozzo Automator menu to define these settings.
- Individually for each physical server. Select the physical server, then click **Configure > Backup Settings** on the VA toolbar to define these settings.
- During an individual backup operation.

If all the levels are defined for a specific operation, the settings of the lowest level will be of the highest priority.

Note: For the VA backup functionality to work on containers, forward and reverse DNS lookups must be correctly configured for both the source and backup servers

8.1 Defining Global Backup Settings

If you have the necessary permissions, you can define the default virtual environment backup settings for the whole Virtuozzo infrastructure on the **Configure Backups** screen (in the **Setup** group on the left Virtuozzo Automator 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. Note, the physical server where you choose to store a full backup may have limitation on the allowed number of full backups. If it is so, the Wizard will delete the oldest backup with all its incremental backups on the physical server in order to create a new one. For more details, see *Defining per-Physical Server Backup Settings* on page 146.
 - **Incremental** backup affects only those files and data which have changed since the last backup and takes less storage space and creation time.
- Choose the **Backup Node** for storing virtual environment backups regardless of their source physical servers.
- In the **Number of full backups to keep** field, specify the maximum number of the full backups that will

be stored on the physical server.

Important: In case, the specified number is exceeded, the oldest backup and all its incremental backups will be deleted from the physical server to free up the space for a new full backup.

- Enable backup 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 Virtuozzo Automator should create a new full backup, thus annulling the previous incremental backups.

Note: All of these settings can also be set individually for each physical server or virtual environment.

Click **Submit** to save the changes.

8.2 Managing Backups on Infrastructure Level

The **Backups** tab on the infrastructure level lists the virtual environment backups created on all physical servers that are registered in Virtuozzo Automator. To access this page, go to the **Infrastructure** level and click the **Backups** pane. If you already have some virtual environment backups, the **Backups** tab displays a table summarizing these backups:

Column	Description
Virtual Environment Name	The name of the virtual environment that was backed up.
Last Backup	The date and time when the last backing up was performed.
Total Size	The overall size of the backup.
Backup Node	The physical server where the last backup of the given virtual environment is stored.
Total Backups	The number of backups of the virtual environment.

You can manage your backups on this page in the following ways:

- The **Restore Virtual Environment** button allows you to restore selected virtual environments from backup. If a virtual environment has multiple backups, the latest is restored by default.

- The **Remove Backups** button removes the virtual environment backup(s) currently selected in the table. Usually this is done to provide extra space for making new virtual environment backups. Use the checkbox at the upper left corner of the table to select/deselect all the backups at once.
- Clicking a virtual environment name in the table opens the **Backups of Virtual Environment** page, which allows you to manage the selected virtual environment backup(s). You can further open the **Backup Details** page where you get more information on the current virtual environment backup(s) and restore, remove, or browse the virtual environment backup(s).
- The **New Backups** button allows you to back up one or more virtual environments right from this page.
- The **Refresh Backups** button refreshes the list of available backups in the current folder.

8.3 Managing Backups on Physical Server Level

The **Backups** tab of a physical server lists the virtual environment backups created on the selected physical server only. For more information, see *Managing Backups on Infrastructure Level* on page 145.

8.3.1 Defining per-Physical Server Backup Settings

This screen is available on choosing the physical server and clicking **Configure > Backup Settings** option from the upper toolbar.

On the **Configure Backup Settings** screen displayed individually for each physical server registered in Virtuozzo Automator, you can configure:

1. The backup settings that will be used by default during the backing up of the virtual environments belonging to the current physical server. These settings are defined in the **Default Backup Options** and **Incremental Backup Settings** groups.
2. The location for virtual environment backups that will be used during the backing up of the virtual environments from any physical server (including this one) provided the current physical server is set as the Backup physical server for the corresponding backup operation. This setting is defined in the **Local Backups Location Settings** group.

First, decide whether you want to have the physical server inherit the global **Backup Settings** or define custom settings. In the latter case, select the **Use local settings for backing up Virtual Environment of this Node** radiobutton in the **Backup Settings** section.

After that you can:

In the **Default 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. Note, the physical server where you choose to store a full backup may have limitation on the allowed number of full backups. If it is so, the Wizard will delete the oldest backup with all its incremental backups on the physical server in order to create a new one. For more details, see *Defining per-Physical Server Backup Settings* on page 146.
 - **Incremental** backup affects only those files and data which have changed since the last backup and takes less storage space and creation time.
 - (Virtuozzo 6 containers only) **Differential** backup includes only the data modified since the last full backup (as opposed to incremental backups which save the data changed after any last backup, be it full, incremental, or differential).
- (Virtuozzo 6 containers only) On the **Compression Level** drop-down menu, choose one of the possible levels:
 - **None**, no compression at all, recommended if you need to perform a fast backup and do not need to save disk space.
 - **Normal**, the compression takes a longer time and saves some disk space.
 - **High**, takes an even longer time and saves even more disk space.
 - **Maximum**, takes the longest time and saves the most disk space.

Note: It is recommended to choose the backup compression level according to the type of the data the virtual environment stores. The Virtuozzo virtual environment 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 databases) and some, such as already compressed archives are not. Therefore, select the **None** checkbox when the virtual environment you are backing up stores no data that suggest or need compressing.

- Select the **Backup Node** for storing the backups of the virtual environments of this physical server. If you choose to store the backups on this very physical server, their exact location will be determined by

the local backup location settings below. If you select another physical server, the exact location of the virtual environments will be determined by the local backups location settings of the corresponding physical server.

Note: When choosing the backup node, keep in mind the following:

1. Virtuozzo Hybrid Server 7 virtual environments can be backed up only to Virtuozzo Hybrid Server 7.
 2. Virtuozzo 6 containers can be backed up only to Virtuozzo 6 servers.
 3. Virtuozzo 6 virtual machines can be backed up to both Virtuozzo 6 and 7 servers.
-

- Use the **Number of full backups to keep** field to specify the maximum number of the full container backups that will be stored on the physical server.

Important: In case, the specified number is exceeded, the oldest backup and all its incremental backups will be deleted from the physical server, thus freeing the space for a new full backup.

Enable backup 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 Virtuozzo Automator should create a new full backup, thus annulling the previous incremental backups.

The **Local Backups Location Settings** group defines the backup location of those virtual environments that are backed up to the current physical server, irrespective of their source physical server. The virtual environment backups made from different source physical servers will be always stored in one and the same specified path. That is, the path cannot be diversified into several paths according to the source physical server name. You may select either a local drive with a local path or a network share path with the corresponding network credentials.

8.3.2 Creating Virtual Environment Backups

The **New Virtual Environment Backups** screen is accessible by clicking **New Backups** on the physical server **Backups** page or on the infrastructure **Backups** page.

Click the **Add Virtual Environments** button to choose the virtual environments that you plan to back up.

Note: If you compose a longish backup list of virtual environments, you may need to revise the backup parameter limitations. To check or enlarge the timeout period, go to the VA configuration file:

- Management server: `/var/opt/pva/mn/etc/vzagent.conf`;
- Slave server: `/var/opt/pva/agent/etc/vzagent.conf`.

The virtual environments to be backed up on this screen can be selected by clicking **Add Virtual Environment** in the **Virtual Environment** section.

In the **Backup Description** section, enter any commentary you think can be practical for further backup operations.

In the **Backup Options** section, set the **Backup Type**, **Backup Node**, and **Number of full backups to keep** parameters. For details, see *Defining per-Physical Server Backup Settings* on page 146. You can also leave the default **Use Hardware Node Settings** value. In this case, every virtual environment will be backed up with the default backup parameters of the physical server.

You can also delay the backup operation until the time specified in the **Backup Start** group of options.

To start performing the backup, click **Backup**, otherwise, click **Cancel**.

8.4 Managing Backups on Virtual Environment Level

A regular backing up of the existing virtual environments is essential for any virtual environment reliability. Any virtual environment is defined by its operating system files, applications installed, configuration files, and personal information. Virtuozzo Automator allows you to back up all these components.

For a virtual environment that has been backed up, a table describing its backups is displayed:

Column	Description
Backed Up	The date and time when the backing up was performed.
Backup Node	The physical server where the backup is stored.
Size	The size of the backup.
Description	The description of the backup.

Continued on next page

Table 8.4.1 -- continued from previous page

Column	Description
Backup Type	<p>Denotes if it is a full, incremental, or differential backup. An incremental backup stores not all the files and settings of the virtual environment at the given period of time, but only the changes the virtual environment has undergone since the last backup. A differential backup saves the data changed after the last full backup.</p> <hr/> <p>Note: You can create differential backups only for Virtuozzo 6 containers.</p> <hr/>

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**.

To show or hide columns, click **Select Columns** and set or clear the respective checkboxes.

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 begins the process of backing up the current state of the virtual environment, be it running or not. Virtuozzo Automator places the backup of the virtual environment onto one of the physical servers registered in Virtuozzo Automator that was set as the default backup storage space.
- The **Renew Backup** link allows you to replace a full backup of a virtual environment and all its dependent incremental backups with a new full backup. You renew a full backup by selecting the check box opposite the corresponding date and clicking the **Renew Backup** button. Only full backups can be renewed and only one at a time.
- The **Restore Virtual Environment** link allows you to restore a single virtual environment backup selected in the table.
- The **Remove Backups** button removes the virtual environment backups currently selected in the table. Usually this is done to provide extra space for making new virtual environment backups. Use the check box 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 virtual environment backup.

8.4.1 Creating Backups

On the **New Backup** screen that can be accessed by clicking the **Maintenance > Back Up** link on the VA toolbar, 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, set the **Backup Type**, **Backup Node**, **Number of full backups to keep** (containers only), and **Compression Level** (Virtuozzo 6 containers only) parameters. For details, see *Defining per-Physical Server Backup Settings* on page 146. You can also leave the default **Use Hardware Node Settings** value. In this case, every virtual environment will be backed up with the default backup parameters of the physical server.
- (Virtuozzo 6 containers only) The **Exclude** section allows you to exclude specific files and directories from backup. If you do not want to back up a whole directory, type it into the corresponding field; to exclude more directories from backup, enter their paths by means of the plus icon.
- (Virtuozzo 6 containers only) The **Include** section allows you to include only specific files or directories inside the virtual environment in the backup. In the field provided, type the absolute path to the file or directory to back up. To include more files or directories, enter their paths by means of the plus icon.

Note: The backup will contain only those files and directories that you have indicated in the **Include** section. To back up the whole virtual environment, leave the **Include** section empty.

- You can also delay the backup operation until the time specified in the **Backup Start** group of options.

To start performing the backup, click **Backup**, otherwise, click **Cancel**.

You can view the created backups listed on the **Backups** subfolder of the target physical server. You can use the **Backups** list to choose virtual environment backups for being deleted permanently or for being restored.

Note the following:

- You can back up both running and stopped virtual machines and containers.
- Creating a consistent backup of a running virtual machine requires the Virtuozzo guest tools to be installed in that virtual machine.
- You cannot back up virtual machines with attached physical HDDs, mounted ISO or floppy disk images,

etc.

- If you restore a VM or container from backup and back it up again, a full backup will be created. The following backups will be incremental.
- Incremental backups will not be created if you manage backups with more than one solution that uses the Virtuozzo API, e.g., `pr1ct1` backup and some other.
- Container images are compacted at 02:00 every night by `pcompact` launched by a cron job. This process locks container images and prevents any other processes from opening them for writing. As a result, backup processes on locked images may fail. To avoid this, you can either reschedule backups or the `pcompact` job.

8.4.2 Viewing Backup Details

The **Backup Details** page provides general information on the virtual environment backup in the following table:

Column	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 virtual environment at the given period of time, but only the changes the virtual environment has undergone since the last backup. A differential backup saves the data changed after the last full backup. Note: You can create differential backups only for Virtuozzo 6 containers.
Virtual Environment	The name of the backed up virtual environment.
IP Address(es)	The IP address of the backed up virtual environment.
Backup Node	The hostname of hardware node where the virtual environment was backed up.

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 Virtuozzo Automator toolbar:

- The **Restore** button restores the selected virtual environment backup.
- (Virtuozzo 6 containers only) The **Browse** button allows you to browse the contents of an archived container backup and restore only the necessary files and directories.
- The **Remove** button removes the current virtual environment backup. Usually this is done to provide extra space for making new virtual environment backups.

8.4.3 Browsing Backup Contents

Note: This feature is only supported for Virtuozzo 6 containers.

Virtuozzo Automator 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** button on the **Backup Details** page.

The content 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 table on the whole provides the following information:

Column	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.

If you are browsing an incremental container 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 check boxes in the rightmost column and click the **Restore** button.

8.4.4 Renewing Virtual Environment Backups

Note: Only full backups can be renewed.

On the **Renew Backup** screen, you can renew the selected full backup of a virtual environment by replacing it with a new full backup. The selected full backup and all its dependent incremental backups will be deleted and a new full backup will be created regardless of the selected backup type.

Set the parameters of the new backup (you can omit **Backup Type**) and click **Backup** to start the operation. For information on parameters, see *Creating Backups* on page 151.

8.4.5 Restoring Virtual Environments from Backup

Click **Restore Virtual Environment** on the infrastructure, physical server, or virtual environment level. The **Restore Confirmation** screen will open on which you will be able to choose how and where to restore the backup.

You can select the destination hardware node from the **Restore on Hardware Node** list and, if available, specify a new virtual environment name in the **Restore to a new VE with the name** field.

Restoration scenarios differ depending on the versions of the source and destination servers. All scenarios comply with the following rules:

1. The destination server must be registered with Virtuozzo Automator.
2. Existing virtual environments can only be restored with new names to other servers.
3. Virtual environments can only be restored with old names to Virtuozzo 6 servers.
4. VZFS-based containers must be converted to ploop format and backed up again before they can be restored to Virtuozzo Hybrid Server 7.

The sections below describe available restoration scenarios in detail.

8.4.5.1 Restoring from Backup on Virtuozzo 6 Servers

You can restore virtual environments from backups stored on a Virtuozzo 6 physical server:

- To the same server, with the old name. The original virtual environment, if it exists, will be replaced by the one restored from backup. All changes made to the virtual environment after backup creation will be lost (e.g., the hostname, IP address, and applications). If the original virtual environment is running, the restored one will be started after restoration as well.
- To another Virtuozzo 6 server, with the old name, if the original virtual environment has been removed from the source server. A new virtual environment with the old name will be created on the destination server.
- To another Virtuozzo Hybrid Server 7, with the old name, if the original virtual environment has been removed from the source server. A new virtual environment with the old name will be created on the destination server with conversion to Virtuozzo Hybrid Server 7 format.
- To another Virtuozzo Hybrid Server 7, with a new name. The original virtual environment, if it exists, will remain, and a new one—with the new name—will be created on the destination server with conversion to Virtuozzo Hybrid Server 7 format.

Note: If the configuration of a restored virtual environment conflicts with that of another one (e.g., IP addresses are the same), you will not be able to have both of them running at the same time.

8.4.5.2 Restoring from Backup on Virtuozzo Hybrid Server 7

You can restore virtual environments from backups stored on Virtuozzo Hybrid Server 7:

- To the same server, with the old name. The original virtual environment, if it exists, will be replaced by the one restored from backup. All changes made to the virtual environment after backup creation will be lost (e.g., the hostname, IP address, and applications). If the original virtual environment is running, the restored one will be started after restoration as well.
- To the same server, with a new name. The original virtual environment, if it exists, will remain, and a new one—with the new name—will be created.
- To another Virtuozzo Hybrid Server 7, with the old name, if the original virtual environment has been removed from the source server. A new virtual environment with the old name will be created on the

destination server.

- To another Virtuozzo Hybrid Server 7, with a new name. The original virtual environment, if it exists, will remain, and a new one—with the new name—will be created on the destination server.
- To a Virtuozzo 6 server, with the old name, if the original virtual environment has been removed from the source server. A new virtual environment with the old name will be created on the destination server.

Legacy backups created in previous versions of Virtuozzo Automator can be moved to Virtuozzo Hybrid Server 7 manually using Linux command-line utilities (e.g., `scp`) and restored to virtual environments with conversion to Virtuozzo Hybrid Server 7 format. Containers can also be restored from legacy backups with the `vzarestore` utility. For details, see [vzarestore](#) on page 284.

Note: If the configuration of a restored virtual environment conflicts with that of another virtual environment (e.g., IP addresses are the same), you will not be able to have both of them running at the same time.

CHAPTER 9

Managing Resource Library Tools

This chapter provides information on the resource library tools such as templates, IP tools or virtual networks.

9.1 Viewing the Resource Library Dashboard

The **Resource Library** page enables you to view the summary information on the Resource Library tools.

Templates

The subsection shows the overall number of templates registered in Virtuozzo Automator Resource Library. You can monitor how many templates belong to Virtuozzo virtual technology and how many templates have a particular type of guest operating system.

To receive more detailed information on the virtual environment templates, click the **Templates** link from the Virtuozzo Automator left menu.

If you need to create a new template, click the **New Template** link in the bottom of the table. You can initiate the same operation from the **Templates** page (see *Managing Templates Storage* on page 160).

Software

This subsection displays the information on the registered in Virtuozzo Automator file shares and the content of these shares. These can be CD/DVD images (see *Managing Disk Images* on page 37), application templates (see *Managing Application Templates in Group Context* on page 262), or operating system templates (see *Managing OS Templates in Group Context* on page 260). To receive more detailed information on any of these

files, click the corresponding link in the table.

If you want to create a new file share, you can either click the **New File Share** link on this screen or pass on to the **Software** page, **File Shares** tab (see *Managing File Shares* on page 158), and click the same link there. To synchronize the shares, click the **Synchronize all Shares** link.

IP Pools

The subsection shows the summary information on the registered IP pools and the statistics of leased and free IP addresses. From this subsection, you can create a new IP pool by clicking the **New IP pool** link. To receive more detailed information on IP pools and addresses, pass on to the **IP Pools** section, in the **Resource Library** folder.

Virtual Networks

This subsection displays the number of virtual networks registered in Virtuozzo Automator. To add a new virtual network, click the **New Virtual Network** link. The deleting option is available only from the **Virtual Networks** page (see *Listing Virtual Networks in Server Group* on page 231).

9.2 Managing File Shares

If you have any file shares registered in Virtuozzo Automator, they will be displayed on **Resource Library > Software > File Shares** tab.

The **File Shares** table displays the file shares details as follows:

Column	Description
Name	The name of the file share.
Description	The description of the file share.
Path	The network path to the physical server that will serve as a file share.
Size	The size of the corresponding file share.
Status	The current status of the file share.

To show or hide columns, click **Select Columns** and set or clear the respective checkboxes

To facilitate working with file shares registered in Virtuozzo Automator, you can also filter the file shares shown in the **File Shares** table. To do that, click **Show Search**, enter search patterns in the search fields, and click **Search**. To change what search fields are displayed, click **Customize**. To view all the file shares registered in Virtuozzo Automator, click **Reset Results**.

To manage several file shares at once, make use of the Virtuozzo Automator toolbar right above the table. You are able to execute the following operations on file shares groups:

- Registering a new file share (the **New File Share** button).
- Synchronizing any number of file shares (the **Synchronize** button). You should synchronize the newly registered file shares to view the disk images stored on these shares on the **CD/DVD Images** tab.
- Deleting any number of file shares (the **Delete** button).

9.2.1 Registering File Share

Note: Before registering a Linux SMB share, make sure the option `read only = no` is set for it (e.g., in `/etc/samba/smb.conf`). Otherwise, VMs this share is mounted to may not start.

To register a new file share in Virtuozzo Automator, expand **Resource Library** in the left Virtuozzo Automator pane, click **Software**, then **New File Share** on the toolbar of the **File Shares** tab, and fill out the following fields:

- **Name** (mandatory): specify the name for the file share which you are going to register in Virtuozzo Automator.
- **Description:** enter any commentary on this file share.
- **Path** (mandatory): enter the network path to the physical server that will serve as a the file share. The format of the path should look as follows: `\\server\path`. In stead of a `<server>`, you can type in either a hostname or an IPv4 address. If your server has an IPv6 address, use its hostname to provide the valid path.
- **User Name** and **Password:** provide the administrator's credentials to log in to the file share.

After specifying the necessary parameters, click the **Save** button to start registering the file share. The newly registered file share will be displayed in the **File Shares** table on the **File Shares** tab of the **Software** screen.

9.2.2 Viewing File Share Details

The file share window is divided into three sections, each reflecting the following file share details:

- The **General Settings** section of the screen displays the information about the file share:
 - the file share name;
 - the path to the file share;
 - the file share description if written;
 - the file share size;
 - the file share status.
- The **Tasks** section provides quick access to performing the following operations:
 - Configuring the file share (the **Configure** link).
 - Synchronizing the file share (the **Synchronize** link). You should synchronize the file share to view the disk images stored on this share in the **File Share Content** section and on the **CD/DVD Images** tab.
 - Deleting the file share (the **Delete** link).
- The **File Share Content** section displays the disk images stored on the file share. The information on the disk images is organized the same way as on the **CD/DVD Images** tab.

9.2.3 Configuring File Share Parameters

The **Configure** page allows you to adjust the settings for the file share. In the **General Settings** group, you can change the file share name and description, the path to the file share. In the **Administrative Login to File Share** group, you can change the administrator's credentials to log in to the file share.

Press the **Save** button to save the changes, otherwise, click **Cancel**.

9.3 Managing Templates Storage

You may want to list the virtual environment templates that are currently available on any of the physical servers registered in Virtuozzo Automator. The whole list of the virtual environment templates present on

your physical servers is given in the **Templates** table on the **Templates** page:

Column	Description
Name	The name of the virtual environment template. It can be a container or a virtual machine template.
VT	The physical server virtualization technology.
OS	The operating system icon the template is based on.
VT Arch	Virtualization Architecture. The microprocessor architecture of the physical server where the template is stored.
Description	The explanatory text intended to help users understand the virtual environment template purpose or to provide additional information on it.
Operating System	The detailed description of the operating system type and version the template is based on.
Size	The size of the template.
Status	The availability of the status, i.e. whether it is online or offline.

To add or remove any of the columns, use the **Select Columns** button above the table.

The **Search** section comprises four fields: VT, Name, OS, and Description. This allows you to search the templates according to any of these parameters. If you use only some of these fields, you can add or remove them according to your needs with the help of the **Customize** button. If you do not need the search section at all, just hide it with the **Hide Search** button above the table. To restore the Search section, click the **Show Search** button that appears on the place of the **Hide Search** one.

To edit a template, click its name in the **Name** column.

The toolbar buttons on this screen let you quickly perform the following operations:

- To create a new template, click **New** and select template.
- To create a new template by dividing the physical server resources by a specified number of virtual environments, click the **Split Hardware Node** link.
- To delete those templates that are not needed any more, select the check boxes next to the corresponding templates and click **Delete**.

Setting Up a Virtual Machine Storage

To create a global template of a virtual machine, you should first register a **VM Templates Storage**. Thus the system will know where to place the hard disk image file and other files of the resulting virtual machine

templates. If you use Virtuozzo Automator console to place a VM template to the Templates Storage, it is added to the Templates List on this page. If you add a VM template manually, you will need to synchronize the Storage contents and the Templates list.

The container template, being a configuration file, does not necessarily need a registered Template Storage.

The **VM Templates Storage** table enables you to perform the following actions:

Operation Name	Description
Configure	Click this link to register an external VM template storage in Virtuozzo Automator.
Check Status	Click this link to check whether the storage is online or not.
Synchronize	Click this link to refresh the storage content in Virtuozzo Automator.
Unregister	Click this link to unregister the external storage from Virtuozzo Automator.

9.3.1 Setting Up an External Templates Storage

The **Setup** page enables you to register a physical server a new template storage where you can store the template-related files.

You should fill in the following information to register a storage:

- **Network Path.** Specify the path to the Samba share storage.
- **Login Name.** Specify the valid login name to the Samba share storage.
- **Login Password.** Specify the correct password to the Samba share storage.

When finished, click **Save** to complete registration.

9.3.2 Creating Template Initial Configuration

If you are not satisfied with the container templates shipped with the Virtuozzo software or want to have virtual machine templates storage, you can create your own templates. Virtuozzo Automator provides a special wizard for creating virtual environment templates. The **New Template** wizard will guide you through the process and gather all the necessary information. To launch the wizard, click the **Template** link on the Virtuozzo Automator left menu, then click the **New template** link on the **Template** screen.

The first page of the **New template** wizard enables you to define the main parameters for the virtual environment template being created.

- **Use an existing Template for initial configuration.** Choose one of the virtual environment templates currently existing in the Templates library to create a new template on its basis. In this case, the new virtual environment template will inherit all the properties of the template selected on the drop-down menu.
- **Create a new Template from scratch.** From the drop-down list, choose what technology your template will belong to: containers or virtual machines.

Note: New virtual machine template, created from scratch, consists of resource preferences and does not have operating system in it.

- **Use an existing Virtual Environment for initial configuration.** Choose among the existing virtual environments the one to copy its resources configuration settings to the template being created. Click the small folder icon next to the **Virtual Environment** field and select a virtual environment from a new window. The resource parameters configuration page presented next for adjustment will feature the resource parameters values from the chosen virtual environment.

To proceed with the template creation, click **Next**.

If you have chosen to create a Virtuozzo container template, you will see the **Create New template** wizard for a container template (see *Defining Container Template General Settings* in *Creating Container Templates* on page 106). If you have chosen to create a virtual machine template, you will pass on to the **New Template: General Settings** wizard for virtual machines (see *Defining Template General Settings When Creating Virtual Machine Templates* in *Creating Virtual Machine Templates* on page 137).

CHAPTER 10

Managing Product Licenses

The **Licensing** screen contains all the necessary information on the Virtuozzo product keys installed on physical servers registered in Virtuozzo Automator.

The **Licenses** table shows the information on all your installed licenses:

Column	Description
Serial Number	The string of symbols that serves for both activating the license and as an identifier of the license on the physical server.
Key Number	The key number of the license, which identifies the license on the Virtuozzo Key Authentication (KA) server.
Hardware Node	The physical server on which the license is installed.
Status	The status of the license.
Expiration	The expiration date and time of the license.

To see all parameters of a license (e.g., the allowed number of CPUs, virtual environments, or users per physical server), click the desired license key.

You may need to update the license if the information in the **Status** or **Expiration** columns suggests that you do. For example, if the **Status** column shows that the license is invalid or expired, or the expiration date displayed in the **Expiration** column is close. You can also update your trial license. To update your license, select its check box on the list and click **Refresh** on top of the table.

To update a license, install it either as a key or text file by clicking **Install License Key** or **Install License File**, correspondingly.

10.1 Installing License Key

Depending on the context you operate the Virtuozzo virtual environment software in, a Virtuozzo license key is a string of symbols used as:

- a product key that can be installed on the physical server;
- a password that can be sent to the Virtuozzo licensing server to obtain a license file.

To install a license key, do the following:

1. Click **Install License Key** on the **Licensing** screen.
2. On the **Install License: Enter Product Key** screen, select the physical server on which you want to install the license. To do this, click the icon next to the **Hardware Node** field in the **Install License to** section. The list will display only those physical servers on which the current license key can be installed.
3. Enter your Virtuozzo product key in the **Product Key** field.
4. Click **Next**.
5. Review the license details. For more information about license details, see *Reviewing Installed Licenses* on page 166.
6. Click **Install** to either install the product key directly on the physical server or send it to the Virtuozzo licensing server, which, in turn, will generate a license file, send it back to the physical server the product key has been sent from, and install it on this physical server.

If, for some reasons, the physical server is not connected to the Internet at the moment of sending the product key, Virtuozzo Automator displays a message informing you of the fact and provides you with 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 Virtuozzo host. 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 physical server, save it on its hard disk (or make it available from there, whatever way you think to be expedient) and upload it on the physical server.

10.2 Installing License File

To install a license file on a physical server, do the following:

1. Click **Install License File** on the **Licensing** screen.

2. On the **Install License: Upload File** screen, select the physical server on which you want to install the license. To do this, click the icon next to the **Hardware Node** field in the **Install License to** section. The list will display only those physical servers on which the current license key can be installed.
3. 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; then place the cursor to the text area and paste the copied license text.
4. Click **Next**.
5. Review the license details. For more information about license details, see *Reviewing Installed Licenses* on page 166.
6. Click **Install** to install the license on the chosen physical server.

10.3 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	Description
Key Number	The license key number. This is a unique identifier of the license on the Virtuozzo KA server.
Hardware Node	The physical server on which the license is installed.
Target	The physical servers 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	Description
Architectures	Microprocessor architecture(s) suggested by the license.
Grace period	The period during which the Virtuozzo software continues functioning after your license has expired, in seconds.

Continued on next page

Table 10.3.2 -- continued from previous page

Column	Description
Hardware ID	Hardware node's unique identifier.
License version	The version of the license (the same as the version of the virtual environment software).
Number of CPUs	The total number of central processor units installed on the physical server. A dual core CPU or a CPU with Hyper Threading technology is a single CPU; only CPU sockets are regarded as CPUs.
Platform	The operating system installed on the physical server.
Product key	The string of symbols that serves for both activating the license and as an identifier of the license on the physical server.
Products	Indicates the type of technology: Virtuozzo.
Number of running virtual environments	The total number of virtual environments you can simultaneously run on the physical server.
Start date	indicates the date when the license comes into effect.
subscription	Virtuozzo feature subscription key.

10.4 License Statuses

When viewing information on a license, pay attention to the license status that can be one of the following:

Status	Description
ACTIVE	The license file is valid and has been successfully loaded.
VALID	The license file contains a valid license for this physical server; however, no license is loaded.
INVALID	The license file is invalid (for example, because of the physical server ID mismatch) or corrupted.
EXPIRED	The license file matches the physical server 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).

CHAPTER 11

Managing Virtuozzo Automator Security

This chapter contains information on how to organize and control the process of granting the users access to physical servers and their virtual environments through Virtuozzo Automator.

11.1 Understanding Role-Based Access Administration in Virtuozzo Automator

As the Virtuozzo datacenter administrator, you can use the credentials of the `root` user having a full administrative access to the physical servers to manage these physical servers and all their virtual environments by means of Virtuozzo Automator. However, you may want to grant the rights to other users to perform certain operations on a physical server and/or its virtual environments. For example, you can allow some user to manage certain virtual environments without having access to the remaining virtual environments on the physical server and/or to the physical server itself or to complete only a restricted set of tasks in the virtual environment context (e.g. start, stop, and restart a virtual environment without having the right to back up this virtual environment or configure its resources).

To achieve this goal, a well-balanced user authentication and authorization strategy has been implemented. This strategy is based on the following main components:

- users;
- groups;
- permissions;

- roles;
- authentication databases.

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 physical server 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:

- virtual environments;
- physical servers;
- logical units;
- server group.

The latter two scopes are only available if you have the Server Group Operations license installed on your physical server.

Virtuozzo Automator allows you to manage any of the aforementioned components in the following way:

- View the users currently existing on the physical server, create a new user, edit its properties (e.g. add users to groups), and remove an existing user from the physical server.
- View the groups currently existing on the physical server, create a new group, edit its properties, and remove an existing group from the physical server.
- View the roles currently existing on the physical server, create a new role, edit its properties, and remove an existing role from the physical server.
- View the authentication databases currently existing on the physical server, create a new realm, set the default realm, and remove an existing realm from the physical server.
- Grant users permissions, i.e. define what rights the users will have within a physical server of virtual environment(s).

Detailed information on how to perform these operations is given in the subsections below.

11.2 Typical Scenario of Virtuozzo Automator Security Usage

A typical course of actions to make use of the Virtuozzo virtual environments 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 (physical or virtual environments) 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 Virtuozzo Automator 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 physical server to users from external authentication databases, you should additionally register one or more authentication databases on the physical server.
5. Assign a role to a user/group, thus, granting this user/group the right to manage the physical server and/or its virtual environments in accordance with the privileges deduced from the assigned role.

Let us see how it all works with a common 'Virtual Environment Administrator' role.

1. The 'Virtual Environment Administrator' role should be common for virtually every datacenter, so no wonder it is one of the built-in roles in Virtuozzo Automator. This role defines a set of privileges the user will be able to perform in the virtual environment context. However, there is no information in this role about the particular virtual environments 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 Virtuozzo Automator menu.
 - Click the **Roles** tab.
 - Click the **Virtual Environment Administrator** role to view its properties.
 - Overview the privileges included in this role in the **Privileges** group. You are free to modify these privileges at your discretion.
 - Click **Submit** to save the changes.

So we have made sure that the role we need exists in Virtuozzo Automator 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 Virtual Environment Administrator role suggests that a particular virtual environment will be managed by a particular user and another virtual environment will be managed by another user. So it would be logical to create a user group only if we are going to grant two or more users to administer the same virtual environment, otherwise, groups will be of no use.
3. The users to whom you will later assign the Virtual Environment 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: *Virtuozzo Internal* and *System*. The users in the Virtuozzo Internal database are those that you create in Virtuozzo Automator specifically for Virtuozzo virtual environment management. On a fresh Virtuozzo Automator installation, this database is empty. The users in the System database are the regular system users of the Master Server of the Server Group.

So, you can either create the necessary number of Virtuozzo virtual environment users or just have the users from external databases (listed on the respective tabs).

Note: To be able to use Virtuozzo Automator for the virtual environment administration, the users should also have the privilege to log in to Virtuozzo Automator. Do not forget to enable this right when creating the role or, you can include the users in the precreated **Virtuozzo Automator Users** group.

4. To have more users available without the need to create them, you can connect Virtuozzo Automator to other authentication databases, 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 virtual environment. To this effect, a new permission should be created. Before creating a permission, we should think to what level the permission refers. As we want to give the user rights to administer the virtual environment, the virtual environment should be chosen. Thus, you should:
 - 5.1. Display a list of virtual environments you have in the datacenter/logical unit/ on a physical server and click the needed virtual environment to display its control panel.
 - 5.2. Click the **Security** tab on the virtual environment dashboard and follow the **New Permission** link.
 - 5.3. On the **Add Permission** screen, fill the **Users and Groups** area with the users and groups allowed to manage this virtual environment. Normally, it will be just one user.

- 5.4. Move the virtual environment 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 virtual environment.

It can be seen from the scenario above that essentially the first four steps (defining the Virtuozzo Automator roles, users, groups, and authentication databases) serve to prepare you as the Virtuozzo Automator administrator for working with particular permissions in Virtuozzo Automator. These four steps are likely to be performed in a detailed manner only once, namely, when you are setting up the Virtuozzo Automator 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.

11.3 Managing 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 physical server and/or virtual environment(s). Virtuozzo Automator allows you to manage users in one of the following ways:

- view the information on the users currently existing in Virtuozzo Automator;
- remove an existing user from the particular physical/virtual environment or from VA;
- create a new user in VA or on a particular physical/virtual environment;
- configure the user's parameters.

11.3.1 Viewing Users

The users currently registered in Virtuozzo Automator can be viewed on the **Users** tab of the **Security** screen displayed by following the **Security** link on the Virtuozzo Automator menu. There are two default subtabs on this screen allowing you to list the users from two databases (these databases are automatically created):

- The **Virtuozzo Internal** subtab: this database contains VA-specific users.
- The **System** subtab: this database is fully identical to the system database of the Master Server Host OS. 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 content of the database can be changed within the Host OS.

The information on users is presented in the table having the following columns:

Name	Description
Icon	The icon that serves as a signal that this object is a single user or a whole group: one figure stands for a user, two stand for a group of users.
Login	The name used to log in to Virtuozzo Automator.
Full Name	The full name of the user.
E-Mail	The user's valid e-mail 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 Virtuozzo Automator.

By default, 20 users are displayed on a page. To change the number of users shown per page, click the appropriate link below the table. You can also filter the users shown in the **Users** table. To do that, click **Show Search**, enter search patterns in the search fields, and click **Search**. To change what search fields are displayed, click **Customize**. To have the full list of users back, click **Reset Results**. To change the users order in the table, click the corresponding column name.

On the **Users** tab you can:

- 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 by following the **New User** link at the top of the **Users** table.

11.3.2 Creating New User

The **New User** screen allowing you to create new users in Virtuozzo Automator opens on following the **Security** link on the Virtuozzo Automator menu, clicking the **Users** tab on the **Security** screen, and then clicking **New User** on the 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 Virtuozzo Automator.
- **Full name**: indicate the full name of the user.

- **Description:** enter any commentary on the user.
- **Email:** enter the user's valid email.
- **Type Password** (mandatory): provide the password to be used by the user to log in to Virtuozzo Automator.
- **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 registered in VA. 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 Virtuozzo Automator for the virtual environment administration, the users should also have the privilege to log in to Virtuozzo Automator. Do not forget to enable this right when creating the role for the user or, you can include the users in the precreated **Virtuozzo Automator Users** group, which is done by default during the user's creation by means of Virtuozzo Automator. If you do not want the created user to have this privilege (e.g. you want the user to be able to use Virtuozzo 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.

11.3.3 Viewing User's Details

The **User** screen allows you to view detailed information on a VA user. To display this page, follow the **Security** link on the Virtuozzo Automator menu, click 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 Virtuozzo Automator.
- 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 **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.

11.3.4 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 Virtuozzo Automator menu, click 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 Virtuozzo Automator;
- 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 Virtuozzo Automator;
- 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**.

11.4 Managing 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 physical and virtual environments 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.

Virtuozzo Automator allows you to manage groups in one of the following ways:

- view the groups currently registered in VA;
- create a new group;
- view group details;
- edit the parameters of an existing group.

11.4.1 Viewing Groups

The groups currently registered in Virtuozzo Automator can be viewed on the **Groups** tab of the **Security** screen displayed by following the **Security** link on the Virtuozzo Automator menu. There are two subtabs on this screen allowing you to list the groups from two Virtuozzo databases (these databases are automatically created during the Virtuozzo Containers installation):

- The **Virtuozzo Internal** subtab: this database contains VA-specific groups.
- The **System** subtab: this database is fully identical to the system database of the Master Server Host OS. 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 content of the database can be changed within the Host OS.

The information on groups is presented in the table having the following columns:

Name	Description
Icon	The icon that serves as a signal that this object is a single user or a whole group: one figure stands for a user, two - stand for a group of users.
Name	The name assigned to the group.
Description	The group description.

By default, 20 groups are displayed on a page. To change the number of groups shown per page, click the appropriate link below the table. You can also filter the groups shown in the **Groups** table. To do that, click **Show Search**, enter search patterns in the search fields, and click **Search**. To change what search fields are displayed, click **Customize**. To have the full list of groups back, click **Reset Results**. To change the groups order in the table, click the corresponding column name.

On the **Group** tab you can:

- 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 by following the **New Group** link at the top of the **Groups** table.

11.4.2 Creating New Group

You can create a new group in Virtuozzo Automator on the **New Group** screen which can be accessed by following the **Security** link on the Virtuozzo Automator 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.

The **Remove Selected** button serves to delete selected users and groups from the list of included ones.

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 physical servers or any of their virtual environments.

11.4.3 Viewing Group Details

The **Group** screen allows you to view detailed information on a VA Group. To display this page, follow the **Security** link on the Virtuozzo Automator 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
Icon	The icon that serves as a signal that this object is a single user or a whole group: one figure stands for a user, two - stand for a group of users.
Login	The name of the user or group.
Full Name	The full name of the user.
E-Mail	The user's valid email address.

Continued on next page

Table 11.4.3.1 -- continued from previous page

Name	Description
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.

By default, 20 users and groups are displayed on a page. To change their number shown per page, click the appropriate link below the table. You can also filter the users and groups shown in the **Users and Groups** table. To do that, click **Show Search**, enter search patterns in the search fields, and click **Search**. To change what search fields are displayed, click **Customize**. To have the full list of users and groups back, click **Reset Results**. To change the users and groups order in the table, click the corresponding column name.

If you want to change the name and description of the group, click the **Configure** icon on the toolbar (available only for modifiable databases, like the Virtuozzo internal one).

11.4.4 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 Virtuozzo Automator 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 upper 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.

11.5 Managing Roles

Roles 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 a physical server, a virtual environment, or Logical Unit. Virtuozzo Automator allows you to manage roles in one of the following ways:

- view the roles currently existing in VA;
- create a new role;
- configuring the parameters of an existing role;
- remove an existing role.

11.5.1 Viewing Roles

Roles 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 physical server or virtual environment 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 physical server, follow the **Security** link on the Virtuozzo Automator 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').

By default, 20 roles are displayed on a page. To change the number of roles shown per page, click the appropriate link below the table. You can also filter the roles shown in the **Roles** table. To do that, click **Show Search**, enter search patterns in the search fields, and click **Search**. To change what search fields are displayed, click **Customize**. To have the full list of roles back, click **Reset Results**. To change the roles order in the table, click the corresponding column name.

On the **Roles** tab you can complete the following tasks:

- Create a new role 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.

If you have already developed a well-designed taxonomy of roles and are going to further maintain it using the built-in roles remember that you cannot modify or rename the built-in roles to fit them in. If you want to have a modified built-in role to be assigned to a user, clone this role first, and then change the cloned role.

11.5.2 Creating New Roles

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 Virtuozzo Automator menu, clicking the **Roles** tab on the **Security** screen, and then clicking the **New Role** button over the **Roles** table.

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 triangle 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 through 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 **Virtual Environment Management** privilege to include the right of performing any operations in the virtual environment context (e.g. to create or destroy a virtual environment) in the role. Please keep in mind that selecting a

check box which stands for a higher level set of privileges will automatically add the privileges from all lower level sets to the role. So, the Virtual Environment Management privilege includes all the lower level privileges (Configure Virtual Environment, Delete Virtual Environment, etc.).

When setting up VA 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 Virtuozzo Automator privilege in the role intended for virtual environment administrators and, therefore, used in the virtual environment scope only.

The table below describes all the available privileges and indicates the scopes where they can be used:

Privilege	G	U	PS	VE	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 VA Control Panel	+	-	-	-	Allow the user to log in to Virtuozzo Automator.
Log in to Virtuozzo Power Panel	+	+	+	+	Allow the user to log in to Virtuozzo Power Panel of any virtual environment included in the given scope.
Log in to virtual environment terminal	+	+	+	+	Allow browser-based connections to any virtual environment included in the given scope.
Log in to Plesk	+	+	+	+	Allow the user to log in to the Plesk control panel of any container included in the given scope.
Log in via SOAP	+	+	+	+	Allow the user to log in to the physical server using the SOAP API (Application Programming Interface).
Virtual Environment Management	+	+	+	+	Provide the user with all the various virtual environment management permissions enumerated below.
New virtual environment	+	+	+	+	Allow the user to create a new virtual environment using the various methods enumerated below. In a non-global scope, this privilege only allows to clone an existing virtual environment.

Continued on next page

Table 11.5.2.1 -- continued from previous page

Privilege	G	U	PS	VE	Description
Create virtual environment	+	-	-	-	Allow the user to create a new virtual environment.
Clone virtual environment	+	+	+	+	Allow the user to clone any virtual environment included in the given scope.
Migrate physical server to virtual environment	+	-	-	-	Allow the user to create a new virtual environment on the basis of an existing physical server.
View virtual environment properties	+	+	+	+	Allow the user to view the properties of any virtual environment included in the given scope and to have the corresponding virtual environment displayed in the lists of virtual environments. Note: This privilege is necessary for all the other Virtual Environment Management privileges to work.
View extended resources	+	+	+	+	Allow the user to view the resources consumption and configuration on any virtual environment included in the given scope.
Operate virtual environment	+	+	+	+	Allow the user to start, stop, suspend, resume, and migrate any virtual environment included in the given scope.
Start and stop virtual environment	+	+	+	+	Allow the user to start and stop any virtual environment included in the given scope.
Migrate virtual environment	+	+	+	+	Allow the user to migrate any virtual environment included in the given scope to another physical server registered in Virtuozzo Automator, provided the user has the privilege to access the Destination physical server.
Configure virtual environment	+	+	+	+	Allow the user to set up the various virtual environment settings enumerated below.

Continued on next page

Table 11.5.2.1 -- continued from previous page

Privilege	G	U	PS	VE	Description
Configure virtual environment general settings	+	+	+	+	Allow the user to configure the general settings of any virtual environment in the given scope: name and description, networking, resources, etc.
Manage applications	+	+	+	+	Allow the user to manage the software packages inside any virtual environment in the given scope.
Manage devices	+	+	+	+	Allow the user to mount and unmount disk volumes in any virtual environment in the given scope.
Maintenance	+	+	+	+	Allow the user to enter the repair mode for any virtual environment included in the given scope.
Repair virtual environment	+	+	+	+	Allow the user to enter the repair mode for any virtual environment included in the given scope.
Backups Management	+	+	+	+	Allow the user to manage the backups of any included in the given scope.
List virtual environment backups	+	+	+	+	Allow the user to view the backups of any virtual environment included in the given scope.
Back up virtual environment	+	+	+	+	Allow the user to back up any virtual environment included in the given scope.
Restore virtual environment	+	+	+	+	Allow the user to restore the backup of any virtual environment included in the given scope.
Remove virtual environment backups	+	+	+	+	Allow the user to delete the backups of any virtual environment included in the given scope.
Manage services	+	+	+	+	Allow the user to manage the services in any virtual environment included in the given scope.
Manage files and services	+	+	+	+	Allow the user to manage the files and services in any virtual environment included in the given scope.
Delete virtual environment	+	+	+	+	Allow the user to delete any virtual environment included in the given scope.
Manage scheduled operations	+	+	+	+	Allow the user to automate container routine operations in the given scope.

Continued on next page

Table 11.5.2.1 -- continued from previous page

Privilege	G	U	PS	VE	Description
Node Management	+	+	+	-	Provide the user with all the various physical server management permissions enumerated below.
View Node properties	+	+	+	-	<p>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.</p> <hr/> <p>Note: This privilege is necessary for all the other Node Management privileges to work.</p> <hr/>
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 Node general settings	+	+	+	-	Allow the user to configure the general settings of any physical server: name and description, networking, resources, etc.
Configure email and notifications	+	+	+	-	Allow the user to configure the email gateway for any physical server included in the given scope.
Configure network	+	+	+	-	<p>Allow the user to configure the network settings for any physical server included in the given scope: traffic accounting and shaping, proxy settings, network interfaces.</p> <hr/> <p>Note: To allow the user to configure the proxy server settings, you should additionally enable the Configure email and notifications privilege.</p> <hr/>
Manage OS and application templates	+	+	+	-	Allow the user to perform all the available operations on the application templates for any physical server included in the given scope.

Continued on next page

Table 11.5.2.1 -- continued from previous page

Privilege	G	U	PS	VE	Description
Backups Administration	+	+	+	-	Allow the user to administer any physical server included in the given scope as a Backup physical server.
Configure backups	+	+	+	-	Allow the user to configure the way of storing backups for any physical server included in the given scope.
List backups	+	+	+	-	Allow the user to view the backups stored on any physical server included in the given scope.
Store backups	+	+	+	-	Allow the user to place virtual environment backups on any physical server included in the given scope.
Remove backups	+	+	+	-	Allow the user to delete the virtual environment backups from any physical server included in the given scope.
Update System	+	+	+	-	Allow the user to configure the update repository settings for any physical server included in the given scope.
Reboot	+	+	+	-	Allow the user to reboot any physical server included in the given scope.
Policy Management	+	+	+	+	Allow the user to view, assign, and configure the policies.
Configure global policies	+	+	+	+	Allow the user to configure the global policies.
Assign policies to an object	+	+	+	+	Allow the user to assign policies.
Logical Structure	+	+	-	-	Provide the user with all the possible privileges to build up the logical structure of the VA datacenter.

Continued on next page

Table 11.5.2.1 -- continued from previous page

Privilege	G	U	PS	VE	Description
List units	+	+	-	-	<ul style="list-style-type: none"> • In the unit scope, allows the user to view the corresponding logical unit on the left Virtuozzo Automator menu and view its contents. • In the global scope, allows the user to view all logical units and their contents.
Manage virtual environments and Nodes in unit	+	+	-	-	Allow the user to manage the physical servers and virtual environments 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 physical servers and virtual environments 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 VA datacenter infrastructure.
Manage disk images	+	-	-	-	Allow the user to set up and work with disk images.
Manage Server Group	+	-	-	-	<p>Allow the user to exercise the overall management on Master Server and all its slave physical servers: view them, register and unregister Hardware Nodes, etc.</p> <hr/> <p>Important: This privilege should be included in the role intended for VA administrators only.</p> <hr/>

Continued on next page

Table 11.5.2.1 -- continued from previous page

Privilege	G	U	PS	VE	Description
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 virtual networks, as well as set up bridged networking on physical servers. 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 virtual environment templates	+	-	-	-	Allow the user to perform all the available operations on virtual environment configuration templates. The user will be able to manage the VM Templates Storage: changing VM Templates Storage configuration, adding or removing VM templates in the Storage.
Set up messaging	+	-	-	-	Allow the user to configure the email messaging system.
Workflow	+	+	+	+	Provide the user with a set of privileges related to virtual environment troubleshooting.

Continued on next page

Table 11.5.2.1 -- continued from previous page

Privilege	G	U	PS	VE	Description
Troubleshooting	+	+	+	+	<ul style="list-style-type: none"> • In the virtual environment scope, allow the user to reinstall the virtual environment. • In the global scope, additionally allow the user to see the descriptions of Virtuozzo Automator error codes.
Security	+	+	+	+	<p>Allow the user to manage the Virtuozzo Automator security policy.</p> <hr/> <p>Important: This privilege should be included in the role intended for VA administrators only.</p> <hr/>
Manage users and groups	+	+	+	+	<p>Allow the user to change the administrative password of any virtual environment included in the given scope or set the administrative password during its reinstallation.</p>
List users and groups	+	+	+	+	<p>Allow the user to list and view users and groups of any virtual environment included in the given scope.</p>
Edit users and groups	+	+	+	+	<p>Allow the user to create, edit and delete users and groups of any virtual environment included in the given scope.</p>
Manage roles	+	-	-	-	<p>Allow the user to create, modify, and delete roles and create permissions on their basis in any scope.</p> <hr/> <p>Important: This privilege should be included in the role intended for VA administrators only.</p> <hr/>

Continued on next page

Table 11.5.2.1 -- continued from previous page

Privilege	G	U	PS	VE	Description
Manage authentication databases	+	-	-	-	Allow the user to register, configure, and unregister authentication databases in Virtuozzo Automator.
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 virtual environment 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;
- **PS** - the scope of a single physical server;
- **VE** - the scope of a single virtual environment.

When you are ready, click the **Submit** button to start creating the role with the specified parameters.

Note: If you have already developed a well-designed taxonomy of roles and are going to further maintain it using the built-in roles remember that you cannot modify or rename the built-in roles to fit them in. If you want to have a modified built-in role to be assigned to a user, clone this role first, and then change the cloned role.

11.5.3 Configuring Role Parameters

The **Manage Role** page allows you to configure the parameters of any roles existing in Virtuozzo Automator. To display this page, follow the **Security** link on the Virtuozzo Automator 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.

Note:

1. To edit a role, you need to have your own permission to perform this action.

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 through 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 VA 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 Virtuozzo Automator` privilege in the role intended for virtual environment administrators and, therefore, used in the virtual environment scope only.

The list of settings, you can reconfigure in the **Privileges** section is the same one that you set up when create a new role.

After you have configured the role parameters, click the **Submit** button for the changed to take effect.

11.6 Managing Authentication Databases

The Virtuozzo Automator security authentication mechanism allows you to grant access to physical servers and their virtual environments 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 physical server, the Virtuozzo Automator 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 **Virtuozzo internal** database: this database contains VA-specific users and groups.

Along with the user databases created by the Virtuozzo Automator 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 physical servers and their virtual environments. So, you do not need to manually create these users and add them to the **Virtuozzo internal** database. The only requirement that should be met by a database to be registered in Virtuozzo Automator 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 Virtuozzo Automator and allow the users registered in the AD directory to be authenticated through the controller itself rather than go through the authentication process on the physical server. The user authorization, however, will take place on the physical server and the user will get the rights and privileges in accordance with the role(s) assigned to them on this physical server.

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.

Virtuozzo Automator allows you to manage authentication databases as follows:

- view detailed information on the authentication database currently registered on the physical server;
- remove a registered authentication database from the physical server;

- register a new authentication database on the physical server.

11.6.1 Viewing Authentication Databases

The **Authentication Databases** tab (displayed on following the **Security** link on the Virtuozzo Automator main menu) allows you to view a list of user databases currently registered on the physical server and used to authenticate the users trying to log in to the physical server (or Server Group, or virtual environments) through Virtuozzo Automator.

The general information on Virtuozzo Automator authentication databases is given in *Managing Authentication Databases* on page 190.

The information on databases is presented in the table having the following columns:

Column	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.

By default, 20 databases are displayed on a page. To change the number of databases shown per page, click the appropriate link below the table. You can also filter the databases shown in the **Authentication Databases** table. To do that, click **Show Search**, enter search patterns in the search fields, and click **Search**. To change what search fields are displayed, click **Customize**. To have the full list of users back, click **Reset Results**. To have the full list of databases back, click **Reset Results**.

On the **Authentication Databases** tab you can:

- Remove an existing database by selecting the check box near the corresponding realm and clicking the **Delete** button.
- Register a new database by following the **Register Database** link at the top of the **Authentication Databases** table.

11.6.2 Registering New Database

Along with the databases registered by VA 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* on page 190 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 Virtuozzo Automator 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 Virtuozzo Automator.
- **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 Virtuozzo Automator Master Server 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 Virtuozzo Automator.

- **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 Virtuozzo Automator, users should have the privilege to log in to Virtuozzo Automator, which can be defined in the global (Server Group) scope only. The easiest way to do this is to include the corresponding users from the external database in the precreated **Virtuozzo Automator Users** group.

11.6.3 Viewing Database Details

On this screen, you may review the detailed information on any authentication database currently registered on the physical server. To display this page, follow the **Security** link on the Virtuozzo Automator 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 Virtuozzo Automator toolbar (not available for the Virtuozzo internal authentication database).

11.6.4 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 Virtuozzo Automator 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 upper

toolbar.

Note: You cannot modify the details of the Virtuozzo internal and the System databases. These databases are automatically created on the physical server.

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**.

11.7 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 physical server or its virtual environments, thus, allowing them to log in to this physical server/virtual environment(s) by means of Virtuozzo Automator 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 VA 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 physical server/virtual environment context.

11.7.1 Creating Permissions

To let a user perform tasks in Virtuozzo Automator, assign one or more roles to that user, either directly or by placing the user in a group with the role. Roles can be assigned by creating permissions for users or groups.

In terms of scope, permissions can be global (affecting the entire infrastructure) or limited to one or more physical servers, a logical folder, or a virtual environment.

Typically, you need to create a global permission to let the user log in to Virtuozzo Automator and then create a scoped permission to let the user perform needed tasks in the chosen context.

To create a global permission allowing selected users to log in to Virtuozzo Automator, do the following:

1. Open **Setup > Security > Global Permissions** and click **New Permission**.
2. On the **New Permission** screen, click **Add User**.
3. In the **Specify Users** pop-up window, click **Search** to update the user list, select one or more entries, and click **Add Selected**.
4. Back on the **New Permission** screen, select the role **VA User** and click **»** to move it to the **Selected** list.
5. Click **Save**.

Now the selected users can log in to Virtuozzo Automator.

You can also create a similar permission for one or more groups and add users to them either while creating users or by configuring them on the **Setup > Security > Users** screen.

The procedure to grant a scoped permission to users is similar to the one described above:

1. Open the **Security** screen, depending on the scope:
 - **Infrastructure > Security**, for operations on the entire infrastructure
 - **<node> > Security**, for operations on a node,
 - **<VE> > > Security**, for operations on a virtual environment,
 - **Logical View > Security**, for operations
 - **<subfolder> > Security**, for operations on the entities in a subfolder
2. Click **New Permission**.
3. On the **New Permission** screen, click **Add User**.

4. In the **Specify Users** pop-up window, click **Search** to update the user list, select one or more entries, and click **Add Selected**.
5. Back on the **New Permission** screen, select one or more roles and click » to move them to the **Selected** list.
6. Click **Save**.

You can also create a similar permission for one or more groups and add users to them either while creating users or by configuring them on the **Setup > Security > Users** screen.

Now the selected users can perform tasks according to the assigned roles in the chosen context.

11.7.1.1 Managing Physical Server Permissions

11.7.2 Viewing Physical Server Permissions

You can view the permissions of a user (group) to perform certain operations in the physical server context on the **Security** tab of the physical server. The **Permissions** table on this tab displays all the permissions currently existing in respect of the physical server. The information on permissions is presented in the following columns:

Column	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.

By default, 20 permissions are displayed on a page. To change the number of permissions shown per page, click the appropriate link below the table. You can also filter the permissions shown in the **Permissions** table. To do that, click **Show Search**, enter search patterns in the search fields, and click **Search**. To change what search fields are displayed, click **Customize**. To have the full list of permissions back, click **Reset Results**. To change the permissions order in the table, click the corresponding column name.

On the **Permissions** tab you can:

- 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.

11.7.3 Creating Physical Server Permissions

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 physical server. This screen can be accessed by clicking **New Permission** on the **Security** tab of the physical server. For more information, see *Creating Permissions* on page 196.

11.7.3.1 Managing Container Permissions

11.7.4 Viewing Container Permissions

You can view the permissions of a user (group) to perform certain operations in the container context on the **Security** tab of the container. The **Permissions** table on this tab displays all the permissions currently existing in respect of the given container. For more information, see *Viewing Physical Server Permissions* on page 197.

11.7.5 Creating Container Permissions

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 clicking **New Permission** on the **Security** tab of the container. For more information, see *Creating Permissions* on page 196.

11.7.5.1 Managing Virtual Machine Permissions

11.7.6 Viewing Virtual Machine Permissions

You can view the permissions of a user (group) to perform certain operations in the virtual machine context on the **Security** tab of the virtual machine. The **Permissions** table on this tab displays all the permissions currently existing in respect of the given virtual machine. For more information, see *Viewing Physical Server Permissions* on page 197.

11.7.7 Creating Virtual Machine Permissions

The **Add Permission** screen allows you to assign roles to users or groups, thus, endowing these users or groups with certain rights in respect of the virtual machine. This screen can be accessed by clicking **New Permission** on the **Security** tab of the virtual machine. For more information, see *Creating Permissions* on page 196.

11.7.7.1 Managing Server Group Permissions

11.7.8 Viewing Server Group Permissions

You can view the permissions of a user (group), allowing her/him to perform certain operations on all physical servers included in the Server Group, on the **Global Permissions** tab of the **Security** window which can be accessed by following the **Security** link on the Virtuozzo Automator main menu. The **Permissions** table on this tab displays all the permissions currently existing in respect of the Server Group. For more information, see *Viewing Physical Server Permissions* on page 197.

Note: If you have one physical server registered in Virtuozzo Automator, the **Permissions** table will display the permissions for this physical server only.

11.7.9 Creating Server Group Permissions

The **New Permission** screen allows you to assign roles to users/groups, thus, endowing these users/groups with certain rights to manage all the physical servers included in the Server Group and all their virtual environments. This screen can be accessed by following the **Security** link on the Virtuozzo Automator main menu, clicking the **Global Permissions** tab on the **Security** screen, and clicking **New Permission** on this tab. For more information, see *Creating Permissions* on page 196.

11.7.9.1 Managing Logical Unit Permissions

11.7.10 Viewing Logical Unit Permissions

You can view the permissions of a user (group), allowing her/him to perform certain operations on all physical servers and virtual environments 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 Virtuozzo Automator main menu. The **Permissions** table on this tab displays all the permissions currently existing in respect of this logical unit. For more information, see *Viewing Physical Server Permissions* on page 197.

11.7.11 Creating Logical Unit Permissions

The **New Permission** screen allows you to assign roles to users/groups, thus, endowing these users/groups with certain rights to manage all the physical servers and virtual environments included in the given logical unit. This screen can be accessed by following the **Logical View** link on the Virtuozzo Automator main menu, clicking the **Permissions** tab on the **Logical View** screen, and clicking **New Permission** on this tab. For more information, see *Creating Permissions* on page 196.

11.8 Managing Power Panel Policies

Note: This feature is only supported for Virtuozzo 6 servers.

Virtuozzo Power Panel is a tool allowing individual users to manage their virtual environments through a common web browser. As virtual environment administrators, they have full control over their virtual environments. For example, they can:

- start, stop, or restart the virtual environment;
- back up and restore the virtual environment;
- start, stop, or restart certain services inside the virtual environment;
- view the processes currently running in the virtual environment and send signals to them;
- view the current resources consumption and resources overusage alerts.

In Virtuozzo Automator, you can configure the rights users will have in respect of their virtual environments by creating *policies*. A policy is a set of rules that prohibits users from accessing certain functionality in Virtuozzo Power Panel or sets limitations on performing certain operations in the virtual environment context. For example, you can create a policy that will enable the user to create no more than two backups of their virtual environment or completely hide the backup functionality from the user in Power Panel.

Policies can be set on three levels:

- **Global level.** The policies applied on this level have effect on all virtual environments that reside on all physical servers registered in Virtuozzo Automator. You can manage policies on the global level by following the **Manage Infrastructure > Global Policies** link on the Infrastructure toolbar.
- **Physical server level.** The policies applied on this level have effect on all virtual environments residing on a particular physical server. You can manage policies on the physical server level by following the **Manage > Power Panel Policies** link on the physical server toolbar.
- **Virtual environment level.** The policies applied on this level have effect on particular virtual environments. You can manage policies on the virtual environment level by following the **Manage > Power Panel Policies** link on the virtual environment toolbar.

11.8.1 Managing Policies

On the **Policies** screen, you can manage the policies currently existing in Virtuozzo Automator on three levels: the global level, the physical server level, and the virtual environment level. You can perform the following operations on each level:

Operation	Global Level	Physical Server Level	Virtual Environment Level
Viewing policies	View the policies in the Assigned Policies table that are currently applied to all virtual environments residing on all physical servers registered in VA Control Center.	View the policies in the Assigned Policies table that are currently applied to all virtual environments residing on the given physical server.	View the policies in the Assigned Policies table that are currently applied to the given virtual environment.

Continued on next page

Table 11.8.1.1 -- continued from previous page

Operation	Global Level	Physical Server Level	Virtual Environment Level
Viewing rules	View the restriction rules included in the policies listed in the Assigned Policies table. These rules have effect on all virtual environments in Virtuozzo Automator. All the restriction rules are displayed in the Effective Policy Rules table.	View the restriction rules included in the policies listed in the Assigned Policies table. These rules have effect on all virtual environments of the given physical server. All the restriction rules are displayed in the Effective Policy Rules table.	View the restriction rules included in the policies listed in the Assigned Policies table. These rules have effect on all virtual environments of the given physical server only. All the restriction rules are displayed in the Effective Policy Rules table.
Adding and removing policies	Add new polices that will be applied to all virtual environments in Virtuozzo Automator and remove existing ones. To this effect, follow the Manage Assignment link and perform the necessary operation.	Add new polices that will be applied to all virtual environments of the given physical server and remove existing ones. To this effect, follow the Manage Assignment link and perform the necessary operation.	Add new polices that will be applied to the given virtual environment and remove existing ones. To this effect, follow the Manage Assignment link and perform the necessary operation.

11.8.2 Performing Main Operation on Policies

The **Power Panel Policies** screen accessible by clicking **Setup > Power Panel Policies** on the VA menu allows you to manage your policies in the following way:

- view all Power Panel policies currently existing in Virtuozzo Automator in the table,
- create a new policy by following the **New Policy** link above the table,
- configure the policy parameters by clicking the name of the corresponding policy in the table,

- remove the policies that you do not need any more by selecting the check boxes next to the corresponding policies in the table and clicking the **Delete** button.

11.8.3 Creating New Policy

A policy restricts user access to certain Power Panel functionality and/or set limitations on performing certain operations on the corresponding virtual environment(s) or physical server(s). The **New Policy** screen can be accessed by clicking **New Policy** on the **Power Panel Policies** screen.

To make a new policy, you should perform the following operations:

1. In the **General Settings** section, specify a policy name in the **Name** field. You can also provide brief description for the policy in the **Description** field.
2. In the **Power Panel Policy Rules** section, choose the restriction rules that will comprise the policy. The following rules can be selected:

Rule Name	Description
Backups Management	Deny access to the backup management functionality in Virtuozzo Power Panel. In this case, the user will not be able to create and restore virtual environment backups.
Backup Total Count	Having enabled the Backups Management functionality, you can set a limit on the number of backups the user is allowed to create for their virtual environment. <ul style="list-style-type: none"> • With the Unlimited option, there is no limitation for backup creation. • With the Limited option, specify the maximum number of allowed backups in the Total field. <hr/> <p>Note: At least one backup should be allowed.</p> <hr/>
Backup Total Size	Set a limit on the maximal size of all created backups for a particular virtual environment. If you select this rule, you will need to specify the desired size in the Total field.
Packages Management	Prohibit the user from managing rpm and deb packages in the virtual environment context using Virtuozzo Power Panel.

Continued on next page

Table 11.8.3.1 -- continued from previous page

Rule Name	Description
Files Management	Prohibit the user from managing the virtual environment files using Virtuozzo Power Panel.
Applications Management	Prohibit the user from managing applications in the virtual environment context using Virtuozzo Power Panel.
Control Panel Management	Prohibit the user from managing the Plesk control panel from Virtuozzo Power Panel. With this restriction turned on, the Control Panels menu item is removed from the Virtuozzo Power Panel. <hr/> Note: This rule can be applied to containers only <hr/>

3. Click the **Save** button.

After a while, the newly created policy will be displayed in the table on the **Power Panel Policies** screen.

To apply any of the policies to a certain virtual environment or physical server, go to the corresponding object and click **Manage > Power Panel Policies** on its toolbar. You can manage policies on the global level by following the **Manage Infrastructure > Global Policies** link on the Infrastructure toolbar. On the **Policies** screen, you will see if any policies have already been applied to this objects and you will be able to apply new policies.

11.8.4 Configuring Policy Parameters

The **Configure Policy** screen allows you to configure the parameters of any policies existing in Virtuozzo Automator. To display this screen, click the name of the policy you wish to edit in the table on the **Power Panel Policies** screen.

You can configure the policy parameters as follows:

- In the **General Settings** section, you can
 - modify the name currently assigned to the policy in the **Name** field;
 - change the policy description in the **Description** field.
- In the **Power Panel Policy Rules** section, you can

- add new restrictions rules to the policy by selecting the check boxes next to the corresponding rules;
- remove any of the restriction rules currently included in the policy by clearing the check box next to the corresponding rules.

When you are ready, click the **Save** button to save the changes made.

11.8.5 Managing Policy Assignments

The **Manage Assignment** screen allows you to assign new policies to your virtual environments and remove those policies that you do not need any more. This screen is displayed on clicking the **Manage Assignment** link on the **Policies** screen.

The **Available Policies** table displays all the policies that currently exist in Virtuozzo Automator and are not yet assigned to your virtual environments. Depending on the level where a policy will be applied, it will have effect on:

- all virtual environments that reside on physical servers registered in Virtuozzo Automator (the global level);
- all virtual environments that reside on a particular physical server (the physical server level);
- a particular virtual environment (the virtual environment level).

To assign a new policy:

1. Select the check box next to its name and click the » button. The policy will appear in the **Assigned Policies** table.
2. In the drop-down list box under the policy name, select:
 - **Allow to override on sublevels** if you wish to allow policies set on lower levels redefine those assigned on higher levels. If this option is enabled (the default behavior):
 - the policies set on the physical server and virtual environment levels will be able to redefine those assigned on the global level,
 - the policies set on the virtual environment level will be able to redefine those assigned on the physical server level.
 - **Force on all sublevels** if you wish to forbid redefining policies set on higher levels by those assigned on lower levels.

3. Click the **Save** button.

After a while, the policy name will appear in the **Assigned Policies** table on the **Policies** screen.

The **Assigned Policies** table on the **Manage Assignment** screen lists those policies that are currently assigned to your virtual environments. To remove a policy:

1. Select the check box next to its name and click the « button. The policy will be moved to the **Assigned Policies** table.
2. Click the **Save** button.

CHAPTER 12

Maintaining Virtuozzo Automator Management Tools

The **Management** dashboard is divided into the following sections:

Scheduler. The **Manage scheduled operations** link opens the screen where you can set certain virtual environments to be backed up or restarted according to your timetable.

Tasks. The **View tasks log** link opens the screen listing operations that both have already been and are still to be completed.

Support. The **Look up Virtuozzo Automator error descriptions** link opens the one displaying the details of a certain error that occurred during a Virtuozzo Automator session and a standard way to fix it.

Updates. The **Update Virtuozzo software** link displays the Virtuozzo Automator screen where you can select the physical server and update its Virtuozzo installation.

Alerts and Events. Follow these links to see the virtual environment resources consumption dynamic reflected in alerts signs (**View alerts log**) and changes in virtual environment statuses (**View events log**).

Audit. The links here enable you to view the current live sessions on physical servers and virtual environments on them (the **Live User Sessions** link) and to view the audit logs of these user sessions (the **Audit Logs** link).

12.1 Monitoring Operations and Viewing Logs

12.1.1 Viewing Tasks Log

The **Tasks** screen lists all recent operations performed in Virtuozzo Automator. For more details on information shown, see *Viewing Infrastructure Task Logs* on page 30.

12.1.2 Viewing Alerts Log

The **Alerts** tab lists all resource consumption alerts logged by Virtuozzo Automator. For more details on information shown, see *Viewing Infrastructure Alert Logs* on page 30.

12.1.3 Viewing Event logs

The **Events** subtab lists all status changes logged by Virtuozzo Automator. For more details on information shown, see *Viewing Infrastructure Event Logs* on page 34.

12.1.4 Viewing Active Tasks

Almost all Virtuozzo Automator pages, except for those containing an error report, allow you to check for any virtual environment operations currently under way. The **Active Tasks** window can be accessed by clicking the **Tasks** button at the top of a Virtuozzo Automator page. If you are planning to perform any operation on a virtual environment, 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.

The information on the active tasks is presented as a table with the following columns:

Column	Description
Status	Indicates the operation status. At present the only one possible is "In Progress", which means that the operation is under way.
Started	The date and time when the operation was started.
Hardware Node	The physical server where the task object is located.
Object	The name of the virtual environment to which the task is applied.

Continued on next page

Table 12.1.4.1 -- continued from previous page

Column	Description
Task	The name of the operation.

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 running tasks at the moment. message appears.

12.1.5 Viewing Task Details

The **Task Details** window is available by clicking the **Details** link beside any task, be it **In progress**, **Completed**, or **Failed**.

The **Task Details** window serves for providing brief and most informative reference on the operation. The upper table of the window provides you with the task's type, the name of the virtual environment to which this task is applied, the physical server where the virtual environment resides, the user who initiated the task, and finally, the task's status.

The lower table consists of the following columns:

Column	Description
Time	The time when a certain operation stage began.
Operation	The corresponding utility message.
Status	The status of each of the steps the operation the operation consists of: In progress , Completed , or Failed .

Click **Detach** to have the message appear in a separated web-browser window.

Click **Close** to quit the window.

12.1.6 Viewing Error Details

The **Error Details** page provides specific information in case of an operation failure. When you are trying to perform an operation and it fails, the corresponding 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.

12.2 Scheduling Tasks

On this screen, you can automate such a routine maintenance operation as backing up or restarting your virtual environments.

Note: Configure notifications as described in *Managing Email Notification Settings* on page 257 to receive emails about scheduled tasks that have failed.

On the **Scheduler** screen, you can create a new task or review the tasks you have already assigned Virtuozzo Automator 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	Description
Title	The name of the task.
Description	The description of the task.
Action	The action Virtuozzo Automator will perform in the framework of this task.
Object(s)	The virtual environments to be backed up or restarted. If you see the inscription Deleted , the virtual environments that this task is applied to were deleted from the physical server 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.

By default, 20 tasks are displayed on a page. To change the number of users shown per page, click the appropriate link below the table. You can also filter the tasks shown in the **Scheduled Tasks** table. To do that, click **Show Search**, enter search patterns in the search fields, and click **Search**. To change what search

fields are displayed, click **Customize**. To have the full list of tasks back, click **Reset Results**. To show or hide columns, click **Select Columns** and set or clear the respective checkboxes.

On the **Scheduler** screen, you can:

- To schedule an operation, click the **New Task** link.
- To run a task immediately, select its check box (or the uppermost check box to run all the tasks at once) and click **Run Now**.
- To enable or disable a task, select its check box (or the uppermost check box to enable or disable all the tasks) and click **Enable** or **Disable**.
- To delete a task, select its check box (or the uppermost check box to delete all the tasks) and click **Delete**.

You can change the timetable of a task and the virtual environments list it performs on by clicking its name.

12.2.1 Choosing Tasks

The **New Task: Select Action** page enables you to schedule a task for one or several registered virtual environments.

Back Up Virtual Environment. You can create a task for one or several virtual environments to be backed up periodically or once. Having chosen this option, you will be able to specify the virtual environments list, the time and period for the scheduled backups. Virtual Environments can belong to different physical servers.

Restart Virtual Environments. You can create a task for one or several virtual environments to be restarted. Having chosen this option, you will be able to specify the virtual environments list, the time and period for the scheduled restarts. The virtual environments can belong to different physical servers.

Choose the task and click the **Next** button to set the details of the operation.

12.2.1.1 Scheduling Backup Tasks

To back up certain virtual environments at a certain time, you can schedule a backup with the parameters to be entered on the **New Task: Back Up Virtual Environments** screen.

In the **Task Configuration** section, enter task name and the description and enable the task if necessary.

In the **First Run** (or **Next Run**) section, specify:

- first launch time;
- first launch date selected from the **Select date** window.

In the **Recurrence Pattern** section, you can set the task to be performed once, daily or weekly:

- if you select the **Run once** radio button, the task will be performed at the time and on the date set in the **First Run** section;
- if you select the **Daily** radio button, the **Repeat Daily** section will open below, allowing you to set the following periodicity:
 - every specified number of days (**Every N day(s)**),
 - only on weekdays (**Every weekday**),
 - only on weekends (**Every weekend day**);
- if you select the **Weekly** radio button, the **Repeat Weekly** section will open, allowing you to set weekly periodicity (**Recur every N week(s)**) and specific days of week to run the task on.

The **End Date** section is displayed only if the task is to be launched more than once. In this section, you can set the task to be:

- performed repeatedly until manually disabled, removed or edited (the **No end date** radio button);
- launched for the first time on the date set in the **Task Details** section, and for the last time, on the date selected in the **Select date** window next to the **End Date** radio button.

In the **Virtual Environments to back up** section, you can choose:

- individual virtual environments,
- entire Hardware Nodes. In this case, all virtual environments on the Node(s) will be added to the back up task.

Having selected virtual environments to back up, click the **Add Virtual Environments** or **Add** button and select virtual environments from the pop-up window. To remove a virtual environment from the list, select it and click the **Remove Selected** button.

For information on backup options, see *Creating Virtual Environment Backups* on page 148.

To save the task configuration, click **Save**, otherwise click **Cancel**.

12.2.1.2 Scheduling Restart Tasks

In the **New Task: Restart Virtual Environment** page, specify all the necessary details for the automatic restart of one or several virtual environments.

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** check box.

In the **First 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, click **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 weekday 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 virtual environments the task is addressed to can be selected in the **Restart Virtual Environment** section. Click the **Add Virtual Environments** button and select the virtual environments you want to

perform the task on from the pop-up window. To take a virtual environment out of the list, select it and click the **Remove Selected** button.

To save the task configuration, click **Save**, otherwise click **Cancel**.

12.3 Managing Maintenance Tasks

The screen can be accessed if you click any of the tasks in the **Scheduled Tasks** table.

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 Virtuozzo Automator will perform in the framework of this task.
Virtual Environments to process	The virtual environment(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.

12.3.1 Changing Maintenance Tasks

On the **Configure Task** screen you can do the following.

In the **Task Configuration** section, enter task name and the description and enable the task if necessary.

In the **First Run** (or **Next Run**) section, specify:

- first launch time;
- first launch date selected from the **Select date** window.

In the **Recurrence Pattern** section, you can set the task to be performed once, daily or weekly:

- if you select the **Run once** radio button, the task will be performed at the time and on the date set in the **First Run** section;

- if you select the **Daily** radio button, the **Repeat Daily** section will open below, allowing you to set the following periodicity:
 - every specified number of days (**Every N day(s)**),
 - only on weekdays (**Every weekday**),
 - only on weekends (**Every weekend day**);
- if you select the **Weekly** radio button, the **Repeat Weekly** section will open, allowing you to set weekly periodicity (**Recur every N week(s)**) and specific days of week to run the task on.

The **End Date** section is displayed only if the task is to be launched more than once. In this section, you can set the task to be:

- performed repeatedly until manually disabled, removed or edited (the **No end date** radio button);
- launched for the first time on the date set in the **Task Details** section, and for the last time, on the date selected in the **Select date** window next to the **End Date** radio button.

In the **Virtual Environments to back up** section, you can choose:

- individual virtual environments,
- entire Hardware Nodes. In this case, all virtual environments on the Node(s) will be added to the back up task.

Having selected virtual environments to back up, click the **Add Virtual Environments** or **Add** button and select virtual environments from the pop-up window. To remove a virtual environment from the list, select it and click the **Remove Selected** button.

For information on backup options, see [Creating Virtual Environment Backups](#) on page 148.

To save the task configuration, click **Save**, otherwise click **Cancel**.

12.4 Viewing Virtuozzo Automator User Sessions

12.4.1 Viewing Management Server Live User Sessions

On the **Management Node** pane, you can view the detailed information on all the current user sessions on the Virtuozzo Automator Management Servers. The user session is a set of parameters that is created when a user logs in to Virtuozzo Automator and is closed when a user logs off.

The **Live User Sessions** table displays the information on the current user sessions as follows:

Column	Description
Login	The name of the user session. Click the name to switch to the user session properties page.
Authentication Database	The source where the user information is taken from. It may be an external or local database. These databases are used to authenticate the users trying to log in to their physical servers through Virtuozzo Automator. The number of available authentication databases may vary, but two databases are always present: <i>Virtuozzo Internal</i> and <i>System</i> . The users in the Virtuozzo Internal database are those that you create in Virtuozzo Automator specifically for Virtuozzo virtual environment management. On a fresh Virtuozzo virtual environment installation, this database is empty. The users in the System database are the regular system users of the Master Server of the Server Group.
Email	The email the user specified for feedback connection.
IP address	The IP address of the computer the user started the live session.
Logon Time	The date and time when the user started the live session.
Expiration time	The date and time when the session will be terminated if the user keeps idle.

To show or hide columns, click **Select Columns** and set or clear the respective checkboxes.

You can also filter the user sessions shown in the **Live User Sessions** table. To do that, click **Show Search**, enter search patterns in the search fields, and click **Search**. To change what search fields are displayed, click **Customize**. Click **Reset Results** to view all the current user sessions.

If you need to terminate a session or several sessions, choose them and click the **Close Sessions** button

abode the table.

12.4.2 Viewing Power Panel Live User Sessions

Note: Virtuozzo Power Panel is only supported for Virtuozzo 6 servers.

On the **Power Panel** pane, you can view the detailed information on all user sessions currently running in Virtuozzo Power Panel. The user session is a set of parameters that is created when a user logs in to Virtuozzo Power Panel and is closed when a user logs off.

The **Live User Sessions** table displays the information on the current user sessions as follows:

Column	Description
User	The name of the user session. Click the name to switch to the user session properties page.
User IP Address	The IP address of the computer from which the user started the live session.
Hardware Node	The name of the physical server the virtual environment belongs to.
Virtual Environment	The name of the virtual environment the user is working with.
Logon Time	The date and time when the user started the live session.
Expiration time	The date and time when the session will be terminated if the user does not perform any actions on the virtual environment.

To show or hide columns, click **Select Columns** and set or clear the respective checkboxes.

You can also filter the user sessions shown in the **Live User Sessions** table. To do that, click **Show Search**, enter search patterns in the search fields, and click **Search**. To change what search fields are displayed, click **Customize**. Click **Reset Results** to view all the current user sessions.

If you need to terminate a session or several sessions, select them and click the **Close Sessions** button above the table.

12.4.3 Viewing Audit Logs

On the **Audit Log** pane, you can view the detailed information on the Management Server user sessions.

The table displays the information on user sessions as follows:

Column	Description
Time	The number and kind of user sessions at the present time.
User	The name of the user who started this session.
IP address	The IP address of the computer on which the user started the live session, i.e. the computer where the user opened the Virtuozzo Automator client.
Event	The user activity status.

To show or hide columns, click **Select Columns** and set or clear the respective checkboxes.

You can also filter the user sessions shown in the table. To do that, click **Show Search**, enter search patterns in the search fields, and click **Search**. To change what search fields are displayed, click **Customize**. Click **Reset Results** to view all the current user sessions.

The **Event** column reflects the change of the user session status and can show one of five states:

State Name	Description
Login Successful	The user has logged in successfully.
Failed Login	The login operation failed.
Logoff	The user has logged off successfully.
Session Expired	The user session has been stopped because the user kept idle for a certain period of time.
Session Terminated	The user session has been stopped by the administrator or because of the agent restart.

12.4.4 Viewing User Session Properties

The **User Session** page allows you to see the detailed information on the chosen live user session.

The table provides the following information:

Column	Description
Login	The name of the user session. Click the name to switch to the user properties page where you can manage the details of this user.
Authentication Database	The source where the user information is taken from. It may be an external or local database. These databases are used to authenticate the users trying to log in to their physical servers through Virtuozzo Automator.
E-mail	The e-mail the user specified for the feedback connection.
IP address	The IP address of the computer the user started the live session.
Logon Time	The date and time when the user started the live session.
Expiration time	The date and time when the session will be terminated if the user keeps idle.
Status	The user status.

The **Tasks** field comprises the **Close Session** link. By clicking this link you will terminate the current session.

The **Session Tasks Log** subsection comprises the list of all tasks prescribed to this user.

CHAPTER 13

Managing Virtuozzo Network

13.1 Managing Network Adapters on Physical Server

13.1.1 Listing Adapters

The **Network Adapters** screen displays a list of network interface cards (NICs) and VLAN adapters currently available on the physical server.

To access the screen, go to **Infrastructure** > physical server > **Network** tab. The information on the network adapters is presented in the table having the following columns:

Column	Description
Interface	The name assigned to the network adapter (e.g. physical adapter <code>eth0</code> , VLAN <code>eth0.1</code>).
Type	Indicates whether it is a real physical adapter (<code>Physical</code>) or a VLAN adapter created on the basis of a physical adapter (<code>VLAN</code>).
VLAN ID	The ID assigned to the VLAN adapter. Relevant for VLAN adapters only.
Virtual Network	The name of the virtual network, if any, that is associated with this network adapter.
IP Addresses	The IP addresses assigned to the network adapter. <hr/> Note: To assign IP addresses and other network parameters to the adapter, you can use standard Linux utilities (for example, <code>ip</code>). <hr/>

Continued on next page

Table 13.1.1.1 -- continued from previous page

Column	Description
MAC Address	The MAC address of the network adapter.

Note: To learn more about the notion of virtual networks and their relation to physical adapters, VLAN adapters, and virtual environments, please refer to the *Managing Virtual Networks* on page 224 section.

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.

Available Operations

- Remove an existing VLAN adapter. To do this, tick the check box near the corresponding adapter and click **Delete**.
- Create a new VLAN adapter. To do this, click **New VLAN Interface** at the top of the **Network Adapters** table.

13.1.2 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 physical server dashboard:

Column	Description
Interface	The name assigned to the network adapter (e.g. eth0).
Type	Indicates that it is a physical adapter (Physical).

Continued on next page

Table 13.1.2.1 -- continued from previous page

Column	Description
Virtual Network	<p>The name of the virtual network, if any, associated with the network adapter.</p> <hr/> <p>Note: To learn more about virtual networks and their relation to physical adapters, VLAN adapters, and virtual environments, please refer to <i>Managing Virtual Networks</i> on page 224.</p> <hr/>
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 virtual networks. To assign IP addresses and other network parameters to the adapter, you can use standard Linux utilities (for example, `ip`).

13.1.3 Connecting Physical Adapter to Virtual Network

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

On this screen, you can connect the physical network adapter to a virtual network (and, consequently, to the virtual environments 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 want to connect the adapter to a 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, you can use standard Linux utilities (for example, `ip`).

13.1.4 Creating VLAN Adapters on Physical Servers

The **New VLAN Interface** screen allows creating new virtual local area network (VLAN) adapters on the basis of physical servers. You can use these adapters later to connect your virtual environments to the corresponding virtual local area networks. To access this screen, click **New VLAN Interface**.

To create a new VLAN adapter, fill out these fields:

- **VLAN Tag** (mandatory). The ID that will be assigned to the new VLAN. Any integer value from 1 to 4094. The VLAN ID will be displayed in its name. If you choose the IDs “1” and “2” for the VLAN with the base interface “enp0s5”, their IDs will be “enp0s5.1” and “enp0s5.2” respectively.
- **Base Interface**. The physical network adapter on the physical server to bind the VLAN to.
- **Assign Virtual Network** (optional). The virtual network on the physical server to connect the VLAN adapter to. Virtual networks need to be created separately on the **Infrastructure** > <physical server> > **Network** tab > **Virtual Networks** subtab.

After entering the necessary information, click **Submit** to create the VLAN adapter. The newly created VLAN will be displayed on the **Network Adapters** screen.

13.1.5 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 physical server dashboard:

Column	Description
Interface	The name assigned to the network adapter (e.g. eth0.1).
Type	Indicates that it is a VLAN adapter created on the basis of a physical adapter (VLAN).
VLAN ID	The ID assigned to the VLAN adapter.
Virtual Network	The name of the virtual network, if any, associated with the network adapter. Note: To learn more about the notion of virtual networks and their relation to physical adapters, VLAN adapters, and virtual environments, please refer to Managing Virtual Networks on page 224.

Continued on next page

Table 13.1.5.1 -- continued from previous page

Column	Description
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 adapter to any of the available virtual networks. To assign IP addresses and other network parameters to the adapter, you can use standard Linux utilities (for example, `ip`).

13.1.6 Connecting VLAN Adapter to Virtual Network

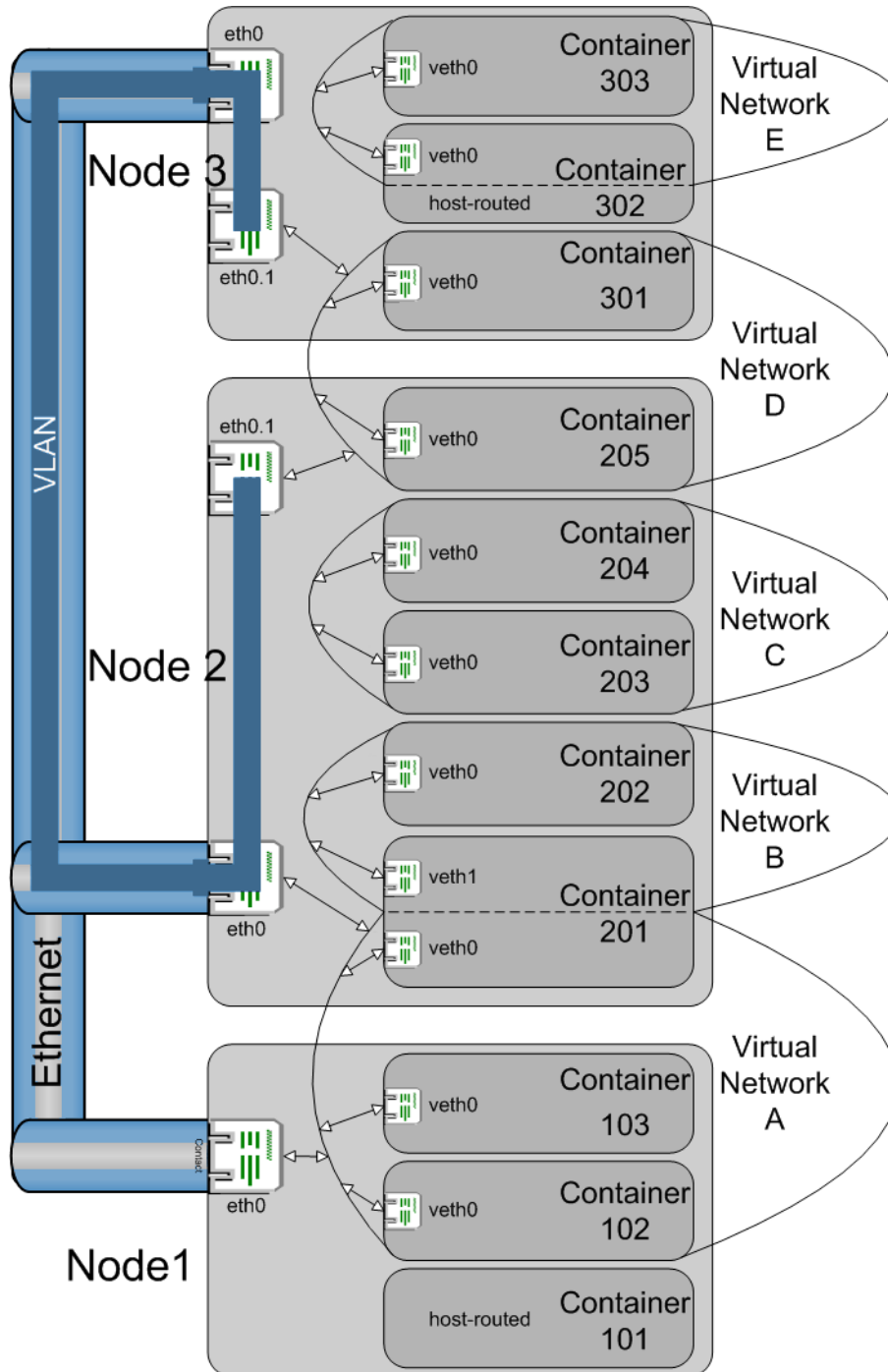
The **Configure** screen allows you to connect the VLAN adapter existing on the physical server to any of the available virtual networks (and, consequently, to the virtual environments joined to this virtual network) by selecting the name of the corresponding virtual network on the drop-down menu in 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 **Submit**.

Note: To assign IP addresses and other network parameters to the adapter, you can use standard Linux utilities (for example, `ip`).

13.2 Managing Virtual Networks

A Virtual Network is a grouped number of virtual environments with bridged network interfaces into a single subnet. Using virtual networks you can make groups of virtual environments on a physical server which belong to different subnets invisible to each other. General information on the two network modes in which virtual environments can operate (host-routed and bridged) is provided in Virtuozzo documentation. Only virtual environments operating in the bridged mode can be organized into virtual networks. The chart below illustrates different scenarios of virtual network usage and their respective results.



The scheme above illustrates three Virtuozzo physical servers 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.

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 Virtuozzo Automator screen for the whole Server

Group of physical servers or on the screen related to a particular physical server. Whatever the screen, the created Virtual Network will be available for all the registered physical servers. If you use a particular physical server for the Virtual Network creation, you can also specify to what network interface card (NIC) of the current physical server the Virtual Network will be assigned, if at all.

2. Containers from one or more physical servers 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 physical server that hosts the containers included in the Virtual Network, the Virtual Network should either be assigned to one of the physical server's physical/VLAN adapters or defined locally for the physical server (the latter variant is possible if the containers of only one physical server 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 physical servers - 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 physical server or bridged to some adapter - the latter case is illustrated with double-headed arrows connecting the Virtual Network border with the physical servers' 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 Physical Server 1.
- Containers 102, 103, and 201 are united into Virtual Network A. They can communicate with each other and other hosts because on each physical server, 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 physical server, 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 physical server 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 physical server, 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 physical server.

- Containers 205 and 301 are united into Virtual Network D through the respective adapters of their physical servers much like the containers of Virtual Network A. However, Virtual Network D is bridged not to the physical interface on both of the physical servers, 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 physical server's interfaces, so it remains local for the physical server. 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 physical server'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 physical server'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 physical server, 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, Virtuozzo Automator provides easier ways of setting up your network, as was illustrated above.

Note: Any interface on the physical server can be assigned to only one Virtual Network. If you need to create more Virtual Networks on one physical server, use more physical adapters.

13.2.1 Listing Virtual Networks on Physical Server

To access the screen, go to **Infrastructure** > physical server > **Network** tab > **Virtual Networks** subtab.

The **Virtual Networks** screen displays a general list of virtual networks available in Virtuozzo Automator.

The information on virtual networks is presented in the table having the following columns:

Column	Description
Virtual Network	The name assigned to the virtual network during its creation.

Continued on next page

Table 13.2.1.1 -- continued from previous page

Column	Description
Connection Status	Indicates the virtual network status: <ul style="list-style-type: none"> • <i>Not Configured</i>. The virtual network is not connected to any of this physical server network adapters. • <i>Local</i>. The virtual network is set for the usage on the physical server only cannot be connected to external networks. • <i>Connected</i>. The virtual network is connected to this physical server network adapter. The Assigned Interface column indicates the name of the chosen network adapter.
Network Description	The description of the virtual network, if set.
Assigned Interface	If the virtual network is connected to some network adapter on this physical server, the name of this adapter is displayed.

Note: To learn more about the notion of virtual networks and their relation to physical adapters, VLAN adapters, and virtual environments, please refer to [Managing Virtual Networks](#) on page 224.

By default, 20 virtual networks are displayed on a page. To change the number of virtual networks shown per page, click the appropriate link below the table. You can also filter the virtual networks shown in the **Connections** table. To do that, click **Show Search**, enter search patterns in the search fields, and click **Search**. To change what search fields are displayed, click **Customize**. To have the full list of virtual networks back, click **Reset Results**. To change the virtual networks order in the table, click the corresponding column name. To show or hide columns, click **Select Columns** and set or clear the respective checkboxes.

Operations Available

- Create a new virtual network. Click the **New Virtual Network** link.
- View and edit the virtual networks details. Click its name in the table.

Note: To delete a virtual network, go to **Resource Library > Virtual Networks**.

13.2.2 Creating Virtual Network on Physical Server

The aim of the virtual network is to group virtual environments within one physical server or between several physical servers and to provide all virtual environments with common network configuration.

To access the **New Virtual Network** screen, go to **Infrastructure** > physical server > **Network** tab > **Virtual Networks** subtab and click the **New Virtual Network** link.

On the **New Virtual Network** screen, 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.

The **Assign Interface** section enables you to configure the following Virtual Network parameters:

- Select the **Not Configured** option if you do not wish to connect the virtual network to any network adapter on this physical server. After the creation, the virtual network's status will be *Not Configured*.
- Select the **Connect via** option and specify the network adapter you wish to connect the virtual network. The drop-down menu lists all physical and VLAN adapters available on the physical server. After the creation, the virtual network's status will be *Connected*.
- Select the **Use on the Node only** option if you do not plan to connect the virtual network to external networks, however, wish to unite some of your virtual environments inside this virtual network to allow these virtual environments to communicate with each other.

Note: To learn more about the notion of virtual networks and their relation to physical adapters, VLAN adapters, and virtual environments, please refer to [Managing Virtual Networks](#) on page 224.

After you have entered the necessary information, click the **Submit** button to create the virtual network. After a while, the newly created virtual network will be displayed on the **Virtual Networks** screen.

13.2.3 Viewing Virtual Network Details

To access the **Virtual Network** screen, go to **Infrastructure** > physical server > **Network** tab > **Virtual Networks** subtab and click the virtual network name in the table.

The **Virtual Network** screen allows viewing the following information:

- The **General Settings** group displays the name and description of the virtual network and indicates whether the virtual network is connected to some network adapter on this physical server (*connected* status), set for usage on this physical server only (*local*), or not configured. To change network interface settings, click the **Configure** button.
- Under **Connected Containers**, you can view the containers that were added to this virtual network. The list provides extended info on the containers just like it is presented in the physical server's **Virtual Environment** list.

Note: To learn more about the notion of virtual networks and their relation to physical adapters, VLAN adapters, and virtual environments, please refer to [Managing Virtual Networks](#) on page 224.

13.2.4 Configuring Virtual Network Parameters on Physical Server

The **Configure** screen for the selected 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 virtual networks and their relation to physical adapters, VLAN adapters, and virtual environments, please refer to [Managing Virtual Networks](#) on page 224.

The **Assign Interface** section enables you to configure the following Virtual Network parameters:

- Select the **Not Configured** option if you do not wish to connect the virtual network to any network adapter on this physical server. After the creation, the virtual network's status will be *Not Configured*.
- Select the **Connect via** option and specify the network adapter you wish to connect the virtual network. The drop-down menu lists all physical and VLAN adapters available on the physical server. After the creation, the virtual network's status will be *Connected*.
- Select the **Use on the Node only** option if you do not plan to connect the virtual network to external networks, however, wish to unite some of your virtual environments inside this virtual network to allow these virtual environments to communicate with each other.

13.2.5 Listing Virtual Networks in Server Group

To access the **Virtual Networks** screen, go to **Resource Library > Virtual Networks**.

The **Virtual Networks** screen displays all the virtual networks that were created in the VA infrastructure. The virtual networks may have been created either locally on a particular Slave physical server, or from the Resource Library. However, the **Virtual Networks** screen does not provide information on the virtual networks connection statuses. The information on this screen is for the management purposes only.

When you create a new virtual network in the Resource Library, it also appears on the **Virtual Networks** list of every VA physical server. To view this list, go to **Infrastructure > physical server > Network tab > Virtual Networks** subtab. For the physical servers, the newly created virtual network exists in the *Not Configured* status and cannot be used for grouping virtual environments until you configure its properties and bind it to the physical server network adapter (see [Configuring Virtual Network Parameters on Physical Server](#) on page 230).

Note: To learn more about the notion of virtual networks and their relation to physical adapters, VLAN adapters, and virtual environments, please refer to [Managing Virtual Networks](#) on page 224.

The information on **Virtual Networks** is presented in the table having the following columns:

Column	Description
Name	The name assigned to the virtual network.
Description	The description of the virtual network, if set.

By default, 20 virtual networks are displayed on a page. To change the number of virtual networks shown per page, click the appropriate link below the table. You can also filter the virtual networks shown in the **Virtual Networks** table. To do that, click **Show Search**, enter search patterns in the search fields, and click **Search**. To change what search fields are displayed, click **Customize**. To have the full list of virtual networks back, click **Reset Results**. To change the virtual networks order in the table, click the corresponding column name. To show or hide columns, click **Select Columns** and set or clear the respective checkboxes.

Operations Available

- **New Virtual Network** link. Create a new virtual network.
- **Delete** link. Delete any of the existing virtual networks. If the virtual network was bound to a physical

server network adapter, the adapter will be released and available for connecting to other virtual networks.

- Change the virtual network description by clicking its name in the table.

13.2.6 Creating New Virtual Network

The aim of the virtual network is to group virtual environments within one physical server or between several physical servers and to provide all virtual environments with common network configuration.

To access the **New Virtual Network** screen, go to **Resource library > Virtual Networks** and click the **New Virtual Network** link.

On the **New Virtual Network** screen, you can create a new virtual network. Provide the information in the following fields:

- **Virtual Network Name** (mandatory). Specify an arbitrary name to be assigned to the virtual network. This can be any name to your like.
- **Description** (optional). Provide the virtual network description, if necessary.

After you have entered the necessary information, click the **Submit** button to create the virtual network. After a while, the newly created virtual network will be displayed on the **Virtual Networks** screen.

Note: To learn more about the notion of virtual networks and their relation to physical adapters, VLAN adapters, and virtual environments, please refer to *Managing Virtual Networks* on page 224.

13.2.7 Configuring Virtual Network Parameters

The **Manage Virtual Network** screen allows you to change the description of a virtual network.

To access the screen, go to **Resource Library > Virtual Networks** and click 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.

13.3 Managing Container Network Parameters

This section describes how to view and configure container network parameters.

13.3.1 Viewing Container Network Parameters

The **Summary** subtab (displayed on clicking the **Network** tab on the container dashboard) shows the current container network parameters. The **Global Network Configuration** parameters are relevant for both host-routed and bridged container adapters, while the **Routed Network** and **Bridged Network** sections refer to respective adapters only.

Field	Description
Global Network Configuration	
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).
Netfilter Mode	The netfilter mode set for the container.
Routed Network	
IP Addresses/Subnet Masks	The IP addresses and subnet masks assigned to container's host-routed adapter.
Bridged Network	
Virtual Network	<p>The virtual network where the virtual network adapter is connected.</p> <hr/> <p>Note: To learn more about the notion of virtual networks and their relation to physical adapters, VLAN adapters, and virtual environments, please refer to Managing Virtual Networks on page 224.</p> <hr/>
MAC Address	The Mac address assigned to the virtual network adapter.

Continued on next page

Table 13.3.1.1 -- continued from previous page

Field	Description
IP Addresses	The IPv4 or IPv6 address(es) assigned to the virtual interface. One virtual interface can have up to two IP addresses, however the IP addresses should be of different versions: one IPv4 and one IPv6 address.
Default Gateway	The default gateway set for the virtual interface.

To configure these parameters, click **Configure**.

13.3.2 Configuring Container Network Parameters

The **Configure Network** screen displayed after clicking the **Network** tab on the container dashboard and then clicking **Configure** on the Virtuozzo Automator 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. 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 server IP addresses that this container is supposed to use in the **DNS Server IP Address** field or leave it blank. Use the add and remove icons. 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. 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.
 - Select the netfilter mode in the **Netfilter Mode** drop-down list.

The parameters defined under **Global Network** will apply to the virtual environment regardless of whether it is on a bridged network or depends on the physical server 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 physical server 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 to be assigned to the container in the **IP Address / Subnet Mask** fields. The field for the subnet mask is slash-separated from the IP address field. You can assign several IP addresses to the container by clicking the add icon to the right of the field containing the information on container IP addresses. Clicking the remove icon near the field with the information on container IP addresses will remove the corresponding IP address assigned to the container.

Note: If you have previously consolidated the IP addresses available on your physical server into a range, it is recommended to check those of them that were assigned to virtual environment - when creating or configuring - on the **Allocated IPs** screen 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 physical server and joined through 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 physical server by choosing the corresponding virtual network name on the drop-down menu in the **Connect to** field.
 - Allow the network adapter automatically receive a MAC address or assign it manually by selecting the appropriate option in the **MAC Address** field.
 - Select the **DHCPv4** or **DHCPv6** check boxes to automatically assign IP addresses to the container adapter using the DHCP protocol. You can choose to automatically assign IP addresses of both versions to one network interface. Or you can manually specify IPv4 or IPv6 addresses with the subnet mask and default gateway.

Important: If a network interface has two IP addresses, they must be of different versions: one IPv4 and one IPv6 address.

After configuring the necessary container network parameters, click the **Submit** button for the changes to take effect.

13.4 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. The Virtuozzo software has a built-in firewall that can be managed through Virtuozzo Automator. Along with - and apart from - the Virtuozzo Automator 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.

You can set one of the three policies when creating or editing an access rule in the advanced mode (see [Adding Rules in Advanced Mode](#) on page 243 or [Editing Rules in Advanced Mode](#) on page 243).

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 **Configure > Firewall** on the container toolbar.

13.4.1 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 in [Adding Access Rule in Normal Mode](#) on page 238.

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* on page 238 subsection.

13.4.1.1 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**.

13.4.2 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.

13.4.3 Selecting Mode

If you have only just started using the firewall by clicking **Configure > Firewall** on the container toolbar, 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 8 built-in access rules (see [Configuring Firewall in Normal Mode](#) on page 237) 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 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.

13.4.4 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 [Selecting Mode](#) on page 238, 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.

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 (see <i>Managing Container Firewall</i> on page 236).
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.
Enabled	The current status of the rule (Enabled/Disabled). The green circle with a tick stands for "enabled", the red circle with a cross stands for "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**. 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, click the up arrow icon. To move a rule a level down, click the down arrow icon. You can also filter the rules shown in the table. To do that, click **Show Search**, enter search patterns in the search fields, and

click **Search**. To change what search fields are displayed, click **Customize**. To have the full list of rules back, click **Reset Results**. To show or hide columns, click **Select Columns** and set or clear the respective checkboxes.

You can also switch to the normal mode by clicking **Firewall setup** and selecting normal mode there.

13.4.5 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 *Building Input Chain* on page 239, 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 in *Building Input Chain* on page 239.

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, click the up arrow icon. To move a rule a level down, click the down arrow icon. You can also filter the rules shown in the table. To do that, click **Show Search**, enter search patterns in the search fields, and click **Search**. To change what search fields are displayed, click **Customize**. To have the full list of rules back, click **Reset Results**. To show or hide columns, click **Select Columns** and set or clear the respective checkboxes..

You can also switch to the normal mode by clicking **Firewall Setup** and selecting normal mode there.

13.4.6 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 **Show Search**, enter search patterns in the search fields, and click **Search**. To change what search fields are displayed, click **Customize**. To have the full list of rules back, click **Reset Results**. To show or hide columns, click **Select Columns** and set or clear the respective checkboxes. Click the up arrow icon to take a rule a level up its current position in the chain, or the down arrow icon 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 in *Building Input Chain* on page 239.

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** menu (see *Selecting Mode* on page 238).

13.4.7 Adding Rules in Advanced Mode

To get to this page, click the **Add Rule** icon on the **Input Chain**, **Output Chain**, or **Forward Chain** 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**.

13.4.8 Editing Rules in Advanced Mode

The main difference here from the operations described in *Adding Rules in Advanced Mode* on page 243 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.

13.5 Managing IP Pools

On the **IP Pools** screen (accessible by clicking **Resource Library** > **IP Pools** on the menu), you can review and manage IP address pools for virtual environments. An IP pool is a range of configured IP addresses, either IPv4 or IPv6, that can be automatically allocated to virtual environments hosted on one or several physical servers registered in Virtuozzo Automator.

13.5.1 Reviewing IP Pools

The **Summary** tab provides you with general statistics about the IP pools created for virtual environments:

- the total number of IP pools created for virtual environments;
- the number of enabled and disabled IP pools;
- the total number of IP addresses belonging to the IP pools;
- the number of leased and free IP addresses.

The table on the **IP Pools** tab presents detailed information on the IP pools currently created in Virtuozzo Automator:

Column	Description
Name	The name of the IP pool.
Description	The description of the IP pool.
IP Address Ranges	The range of IP addresses, IPv4 or IPv6, belonging to the IP pool.
Assigned Hardware Nodes	The physical servers assigned to the IP pool.
Enabled	This column shows whether the IP pool is enabled or not.

You can filter the IP pools shown in the **IP Pools** table. To do that, click **Show Search**, enter search patterns in the search fields, and click **Search**. To change what search fields are displayed, click **Customize**. To have the full list of IP address ranges back, click **Reset Results**. To show or hide columns, click **Select Columns** and set or clear the respective checkboxes.

To disable an IP pool, click the IP pool name displayed in the **Name** column. When the IP pool configuration screen appears, click the **Configure** icon in the **Tasks** section, clear the **Enabled** check box, and click **Save**.

To create a new IP pool, click the **New IP Pool** icon.

13.5.2 Creating New IP Pool

The **New IP Pool** page enables you to create a new IP address pool.

Determine the name of the new IP pool and provide a description if needed.

IP Address Ranges

Determine the range of the IP addresses, IPv4 or IPv6, for the IP pool. You can create several ranges. To do that, click the icon with the green plus, that is located on the right from the **Range Mask** field. If you changed your mind and decided to delete one of the pools, just click the icon with the red cross opposite the pool you no longer need. In the **Range Mask** field, specify the mask that would define the IP address.

In the **First IP Address** field, type the address from which the IP range will start.

In the **Last IP Address** field, type the final address that will end up the range of all available IP addresses.

Network Interface Settings

To set up the connection between the virtual environment and the network, specify the network interface settings. Specify the network, gateway parameters and DNS Server IP addresses of the appropriate network interface which IP addresses will be used.

Assigning Hardware Nodes

In this subsection, you can specify the physical servers that will use the IP addresses from this pool. You can add or remove the physical servers by using the corresponding buttons below the table.

Having specified all the parameters, click **Save**.

13.5.3 Viewing Leased IP Addresses

13.5.3.1 IP Addresses from All IP Pools

The **Leased IP Addresses** screen list the IP addresses from all IP pools that have been already assigned to the virtual environments (either during the virtual environment creation or while configuring these virtual environments afterwards). You can access the screen by clicking the **IP Pools** menu from the Left menu tree and then switching to the **Leased IP Addresses** tab.

The information on the leased IP addresses is presented in the table having the following columns:

Column	Description
Hardware Node	The physical server hosting the virtual environment with the specific IP address.
Virtual Environment	The virtual environment to which the IP address is assigned.
IP Address	The leased IP address.
IP Pool	The IP pool to which the IP address belongs.

You can filter the leased IP addresses shown in the **Allocated Ranges** table. To do that, click **Show Search**, enter search patterns in the search fields, and click **Search**. To change what search fields are displayed, click **Customize**. To have the full list of leased IP addresses back, click **Reset Results**. To show or hide columns, click **Select Columns** and set or clear the respective checkboxes.

13.5.3.2 IP Addresses from Specific Pool

The **Leased IP Addresses** screen list the IP addresses from a specific IP pool that have been already assigned to the virtual environments (either during the virtual environment creation or while configuring these virtual environments afterwards). To access the screen, choose the **IP Pools** menu from the left menu tree, switch to the **IP Pools** tab and choose the IP pool which IP addresses you need to view. Switch to the **Leased IP Addresses** tab.

The information on the leased IP addresses is presented in the table having the following columns:

Column	Description
Hardware Node	The physical server hosting the virtual environment with the specific IP address.
Virtual Environment	The virtual environment to which the IP address is assigned.
IP Address	The leased IP address.

You can filter the leased IP addresses shown in the **Allocated Ranges** table. To do that, click **Show Search**, enter search patterns in the search fields, and click **Search**. To change what search fields are displayed, click **Customize**. To have the full list of leased IP addresses back, click **Reset Results**. To show or hide columns, click **Select Columns** and set or clear the respective checkboxes.

13.5.4 Viewing IP Pool Summary Information

The **Summary** tab of the **IP Pool Configuration** screen provides you with the summary information on the selected IP pool and allows you to perform some main operations. To access this screen, choose **IP Pools** from the left menu tree, switch to the **IP Pools** tab and click the IP pool name in the list.

General Settings

The subsection shows the IP pool name, description (if any) and the status (enabled or not). The *enabled* status of the IP pool indicates that the pool can be used for the IP addresses allocation.

The IP pool status can be changed on its configuration screen. To this effect, click **Configure** in the **Tasks** subsection.

IP Addresses Ranges

The subsection shows the IP address ranges assigned to this IP pool. The number of ranges and the number of IP addresses they include can be changed on the IP pool configuration screen. To this effect, click **Configure** in the **Tasks** subsection.

Network interface Settings

The subsections shows the IP pool network settings. The settings can be changed on its configuration screen. To this effect, click **Configure** in the **Tasks** subsection.

Assigned To

The subsection shows the hardware nodes the IP pool is assigned to (if assigned).

Tasks

The subsections lists the actions available for this IP pool:

- **Configure**. Click this link to open the IP pool configuration screen and to change any of the IP pool settings.
- **Delete**. Click this link to delete the IP pool from the infrastructure.

IP Addresses Summary

The subsection shows the statistics of the leased and free IP addresses of this IP pool. By clicking the leased link, you open the list of the IP addresses within this IP pool and assigned to virtual environments.

13.5.5 Changing IP Pool Configuration

The **Configure** screen allows you to change the current settings of the chosen IP pool. To access this screen, choose **IP Pools** from the left menu tree, switch to the **IP Pools** tab, click the IP pool name in the list and click the **Configure** link in the **Tasks** subsection.

General Settings

In this subsection, change the IP pool name or description using the **Name** and **Description** fields, respectively. Note, that the IP pool name should be unique and descriptive.

Tick the **Enabled** check box to make the IP pool's addresses available for the distribution to the virtual environments.

IP Address Ranges

In this subsection, change the number of IP ranges by adding new or deleting obsolete ones. To add a new range, click the green plus icon. To delete a range, click the red cross icon beside the range you want to delete. Having added a new range, you should specify the first and the last IP addresses within this range. You can also change the first and the last IP addresses of an existing range.

- Type the IP address with which the new range will start in the **First IP Address** field.
- Type the IP address that will close the range of addresses in the **Last IP Address** field.

Network Interface Settings

In this subsection, change the network interface settings. These settings are responsible for the connection between the virtual environments. Specify the network, gateway parameters and DNS Server IP addresses of the appropriate network interface which IP addresses will be used.

Assigning Hardware Settings

In this subsection, you can specify the physical servers that will use the IP addresses from this pool. You can add or remove the physical servers by using the **Add** and **Remove Selected** buttons, respectively.

Having specified the parameters, click **Save**.

13.6 Managing Network Accounting and Shaping

Virtuozzo Automator allows you to track the inbound and outbound network traffic as well as to shape (limit) the outgoing traffic for virtual environments.

Note: VM and container traffic is shaped by marking packets' `fwmark` field. If the hardware node uses custom packet filtering rules set with the `MARK` and `CONNMARK` iptables modules, the traffic shaping feature will not work. Per-container traffic statistics, however, will be correct even if the node uses custom traffic marks.

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 software counts and shapes the traffic.

Virtuozzo 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 software to match any IP address and is always present in the 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 through 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.

Continued on next page

Table 13.6.1 -- continued from previous page

Class Definition	Explanation
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.

13.6.1 Managing Network Accounting and Shaping for Physical Servers

Virtuozzo Automator displays the current status and statistics for the network traffic consumed by virtual environments on registered physical server.

Traffic accounting service is available for virtual machines and containers residing on the physical servers with Virtuozzo virtualization software.

The screen is displayed on the **Traffic** subtab of the **Network** tab of a physical server.

With traffic accounting service, you can always view the statistics on the network traffic going from and to the physical server for each of the network classes specified in the system. The statistics is garnered from the moment of the latest physical server 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 physical server to the outer world. The **Interfaces Configuration** table enumerates the network interfaces (Ethernet cards) installed on the physical server and their bandwidth limit. The most common Fast Ethernet cards have their traffic throughput limited at 100 Mbps, which would be indicated in the **Bandwidth** column as 102400 Kbps.

Virtuozzo Automator can limit the network bandwidth not for the interface, but for each network class 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 virtual environments when they need more bandwidth for communicating with hosts from the corresponding network class. It is used to limit the total available outgoing traffic virtual environments can consume. The default value for Network Class 1 on the first Ethernet adapter is 4Mbps.

As to the **Rate Guarantee** column, its value amounts to the number of kilobits per second any virtual environment 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 virtual environment is guaranteed to receive the bandwidth of at least 8 Kbps for sending data to Class 1 hosts on the first Ethernet device. This bandwidth is not the limit for a virtual environment (though it is possible to make it the limit) - the virtual environment is able to take the needed bandwidth from the bandwidth pool if it is not used by other virtual environments.

Apart from viewing the current state of affairs with the physical server traffic, the **Traffic** subtab allows you to do the following:

- Define the network classes for the physical server traffic by clicking the **Configure Accounting** button;
- Specify the bandwidth limit for the existing network interface cards by clicking the **Configure Interfaces** button;
- Set up the traffic shaping rules for each network interface card on the physical server by clicking the **Configure Rates** button;
- Enable traffic shaping for the physical server 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 physical server by clicking the **Disable Shaping** button.

13.6.1.1 Setting Up Network Classes

To set up a network class, go to **Infrastructure** > physical server > **Network** tab > **Traffic** subtab and click the **Configure Accounting** button. The screen allows configuring traffic accounting by creating traffic accounting classes on the physical server and specifying the network for each class.

Virtuozzo Automator allows combining IPv4 and IPv6 addresses within a traffic shaping class. Since a traffic class can include several networks, you just need to add the appropriate networks being constituted of IPv4 and IPv6 addresses.

- 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 for IPv4 or address or 3ffe:1900:4545:3:200:f8ff:fe21:0000/112 for IPv6.

- The plus icon 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 cross icon allows you to delete the given **Class ID/Network** line.

13.6.1.2 Configuring Network Adapters

The **Configure Interfaces** page (accessible by clicking the **Configure Interfaces** button on the **Traffic** subtab of the **Network** tab of a physical server) enables you to define which network adapters installed on the physical server will be taken into account by Virtuozzo network accounting and shaping policies.

This page lists all the network interface cards installed on the physical server together with their default (or assigned) bandwidth and IP addresses. You are able to manage these interfaces in two ways:

- Select or clear the check box beside the corresponding adapter to include it in or exclude from being part of network accounting and shaping.
- 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 network accounting and shaping. Another restriction in modifying this value consists in that you cannot make it lower than the **Total Rate** value of any class defined for the given interface.

13.6.1.3 Configuring Network Shaping

The **Configure Rates** page (accessible by clicking the **Configure Rates** button on the **Traffic** subtab of the **Network** tab of a physical server) allows you to set up all the parameters that define how much bandwidth will be accessible to the virtual machines residing on the physical server. 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 physical server and selected for being shaped on the **Configuring Interfaces** page (see *Configuring Network Adapters in Managing Network Accounting and Shaping for Physical Servers* on page 250). 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 Mbps, 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 (see *Configuring Network Adapters* in *Managing Network Accounting and Shaping for Physical Servers* on page 250). Thus, it is the second place where you can adjust the total bandwidth throughput of the given network interface.

The Virtuozzo software can limit the network bandwidth not for the interface, but for each network class 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 virtual environments when they need more bandwidth for communicating with hosts from the corresponding network class. It is used to limit the total available outgoing traffic virtual environments can consume. The default value for Network Class 1 on the first Ethernet adapter is 4096, which corresponds to the pool size of 4Mbps. 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** check box, and included in the shaping if you select the check box.

Finally, the value of the **Rate guarantee** field amounts to the number of kilobits per second any virtual environment 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 virtual environment is guaranteed to receive the bandwidth of at least 8 Kbps for sending data to Class 1 hosts on the first Ethernet device. This bandwidth is not the limit for a virtual environment (though it is possible to make it the limit) - the virtual environment is able to take the needed bandwidth from the bandwidth pool if it is not used by other virtual machines.

13.6.2 Managing Network Shaping for Containers

The network shaping (setting limit on the available bandwidth for outgoing traffic) is generally defined for each container on the given physical server on the **Configure Shaping** page in Virtuozzo Automator. The **Configure Traffic Shaping** page (which you can access by clicking **Configure > Shaping** on the container toolbar) allows you to redefine some of the shaping parameters for the given particular container.

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 (see *Configuring Network Shaping* in *Managing Network Accounting and Shaping for Physical Servers* on page 250), 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** check box is cleared. The default state of this option (selected or cleared) depends on what has been chosen on the **Configure Shaping** page (see *Configuring Network Shaping* in *Managing Network Accounting and Shaping for Physical Servers* on page 250).

13.6.2.1 Viewing Network Shaping Settings for Containers

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 configured on the physical server. If the table is not present, this means that either traffic shaping is disabled on the physical server, or no network classes are configured.

Tip: To configure network classes on a physical server, go to **Infrastructure** > physical server > **Network** tab > **Traffic** subtab.

The **Total Rate** field informs you on the bandwidth limit that is set for the corresponding class on the physical server, which means that the summary outgoing traffic of all the containers of this physical server 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. 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.

13.6.2.2 Configuring Network Shaping for Containers

The network shaping (setting limit on the available bandwidth for outgoing traffic) is generally defined for each container on the given physical server on the **Configure Shaping** page (see *Configuring Network Shaping in Managing Network Accounting and Shaping for Physical Servers* on page 250). The **Configure Traffic Shaping** page (which you can access by clicking **Configure** > **Shaping** on the container toolbar) allows you to define more precisely some of the shaping parameters for the given particular container. To do this, 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** check box (selected or cleared) depends on what has been chosen on the **Configure Shaping** page (see *Configuring Network Shaping in Managing Network Accounting and Shaping for Physical Servers* on page 250). However, you can redefine if the shaping of this class should be turned on or off for this particular container by setting this check box in the appropriate state.

The **Total Rate** field informs you of the bandwidth limit that is set for the corresponding class on the physical server, which means that the summary outgoing traffic of all the containers of this physical server 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. 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** check box, if selected, tells Virtuozzo Automator to keep the container from getting more bandwidth than is defined in its **Rate Guarantee** values, even if there is spare bandwidth on the physical server for this class. Thus, you can efficiently impose bandwidth rate limits on any container.

13.6.3 Managing Network Shaping for Virtual Machines

The network shaping (setting limit on the available bandwidth for outgoing traffic) is generally defined for each virtual machine on the given physical server on the **Configure Shaping** page (see *Configuring Network Shaping in Managing Network Accounting and Shaping for Physical Servers* on page 250) in Virtuozzo Automator. The **Configure Traffic Shaping** page (which you can access by clicking the **Configure** button on the **Shaping** subtab of the virtual machine **Network** tab) allows you to redefine some of the shaping parameters for the

given particular virtual machine.

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 virtual machines transmitting data proportionally to their **Rate Guarantee** settings. The global **Rate Guarantee** setting is defined on the **Configure Shaping** page (see *Configuring Network Shaping* in *Managing Network Accounting and Shaping for Physical Servers* on page 250), but can be redefined here in the **Virtual Machine Rate Guarantee** field for this given virtual machine. If the total value of the rate guarantees of all virtual machines transmitting data does not exceed the bandwidth pool value, each virtual machine gets the bandwidth equal or greater than its rate guarantee (unless the **Use Virtual Machine Rate Guarantee as limit** radio button is not selected on this page). If the total value of the rate guarantees of all virtual machines transmitting data exceeds the bandwidth pool, each virtual machine 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 Virtual Machine 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 virtual machine, if the **Enable shaping for this class** check box is cleared. The default state of this option (selected or cleared) depends on what has been chosen on the **Configure Shaping** page (see *Configuring Network Shaping* in *Managing Network Accounting and Shaping for Physical Servers* on page 250).

13.6.3.1 Viewing Network Shaping Settings for Virtual Machines

The **Shaping** subtab of the **Network** tab allows you to view the traffic shaping parameters for the given virtual machine. For more information, see *Viewing Network Shaping Settings for Containers* in *Managing Network Shaping for Containers* on page 253.

13.6.3.2 Configuring Network Shaping for Virtual Machines

Network shaping (limiting of outgoing traffic bandwidth) is generally defined for each virtual machine on the given physical server on the **Configure Shaping** page (see *Configuring Network Shaping* in *Managing Network Accounting and Shaping for Physical Servers* on page 250) which allows you to fine-tune shaping for the given virtual machine. For more information, see *Configuring Network Shaping for Containers* in *Managing Network Shaping for Containers* on page 253.

13.7 Managing Email Gateway and Proxy Server

As a physical server administrator, you may need to receive email notifications on critical system events. You can subscribe to such alerts using XML API (for more details, see the `alertm` interface in the [Virtuozzo Automator Agent XML API Reference](#)). To ensure the correct delivery of system email messages, you need to configure SMTP relays for your physical servers.

You can configure the way a physical server communicates with the public networks on the **Configure Proxy Settings** page. The page can be accessed either by clicking the **Configure** button on the physical server > **Network** tab > **Proxy** subtab or selecting **Configure** > **Proxy Settings** on the physical server toolbar.

On the **Configure Proxy Settings** page, you can do the following:

- In the **SMTP Relay Server IP Address** field, specify the IP address or hostname of the SMTP server the current physical server uses to send email messages.
- In the **Proxy Server** field, specify the proxy server IP address or hostname, if the current physical server uses a proxy server to establish external connections.

Click **Submit** to save your changes or **Cancel** to return to the **Proxy** subtab.

13.8 Managing Email Notification Settings

To have Virtuozzo Automator send out email notifications, you need to configure the mail server parameters. When enabled, email notifications are sent to users for [password recovery](#) and to the VA administrator to inform him about failed [scheduled tasks](#).

The **Messaging** screen (in the **Setup** group on the left menu) shows the current configuration of email notification settings in Virtuozzo Automator:

- Whether email notifications are enabled or disabled in Virtuozzo Automator.
- The email address that will be shown in the **From:** field of email messages and used to identify you as the message sender (the **System Account** field).
- The email address to which the system will send administrative notifications (the **Administrative Account** field).

To edit any of these parameters, click **Configure**.

13.8.1 Configuring Email Notifications

To configure the email settings in Virtuozzo Automator, click **Configure** on the **Messaging** screen.

On the **Configure** screen, you can do the following:

1. In the **General Settings** section, select the **Enable Email Notifications** check box to enable the 'Email Notifications' functionality in Virtuozzo Automator.
2. In the **System Email Account** section, specify an arbitrary name and email address that will be shown in the **From:** field of the message and used to identify you as the message sender in the **Email User Name** and **Email Address** fields, respectively.
3. In the the **Administrator Email Account** section, specify an arbitrary name and email address where the system will send administrative notifications in the **Email User Name** and **Email Address** fields, respectively.

CHAPTER 14

Managing Virtuozzo Containers OS and Application Templates

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

All Virtuozzo containers 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 virtual machine, because any virtual machine 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 `proftpd` and `MySQL` templates, or a template with any other application (possibly more than one application in a single template) not included into the OS template.

Note: You cannot use the Virtuozzo OS and Application templates for managing virtual machines.

You may perform the following operations with OS/application templates in Virtuozzo Automator:

- List OS/application templates installed on the physical server.
- Delete those OS/application templates that are not needed any more.
- Install new OS/application templates on the physical server.
- Install/uninstall an application template to/from the virtual environment.

- 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.

14.1 Managing OS Templates in Group Context

Virtuozzo Automator allows you to list OS templates installed on the physical servers registered in Virtuozzo Automator. They may be already used or not used by certain virtual environments. All OS templates installed on the physical servers are listed on the **OS Templates** page in the following table:

Column	Description
Name	The name of the OS template.
Type	Denotes if it is an EZ template. 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 and thus cannot be updated.
Description	The description of the OS template.
OS	The operating system the template is intended for.
Architecture	The microprocessor architecture.

To show or hide columns, click **Select Columns** and set or clear the respective checkboxes.

By default, 20 templates are displayed on a page. To change the number of templates shown per page, click the appropriate link below the table. You can also filter the templates shown in the **OS Templates** table. To do that, click **Show Search**, enter search patterns in the search fields, and click **Search**. To change what search fields are displayed, click **Customize**. To view all OS templates residing on your physical servers, click **Reset Results**.

With the help of the Virtuozzo Automator toolbar you can perform the following operations on OS templates:

- Upload a new template that you have locally and install it on a physical server registered in Virtuozzo

Automator (the **New App/OS Template** button).

- Select some templates in the table and install them on one or more Virtuozzo Automator physical servers at once (the **Install to HNs** button).
- Delete those OS templates that are not needed any more. To this effect, select the check boxes opposite the OS templates you wish to delete and click the **Uninstall from HNs** button.

Note: If any virtual environment on your physical servers 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 (see *Viewing OS Template Properties in Group Context* on page 261).

14.1.1 Viewing OS Template Properties in Group Context

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	Description
Type	Denotes if it is an EZ Virtuozzo template. 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.
Architecture	The microprocessor architecture.
Platform	Denotes the operating system the template is intended for.
Supported technologies	Lists the technologies that the physical server must support for the template to work correctly.

The **Installed on HNs** section enumerates those physical servers where the given template has been installed. You have the possibility to select any number of physical servers in the table and either cache the given template on these physical servers (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 physical server to make the template work. Second, to be used for creating virtual environments on its basis,

any OS template has to be *cached*. Caching an OS template is preparing it for creating virtual environments on its basis. When you cache an OS template, you:

1. Download the packages its meta data refer to from the download repository to your physical server.
2. Install them on the physical server.
3. 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.

14.2 Managing Application Templates in Group Context

Virtuozzo Automator allows you to list application templates available in your data center by clicking **Resource Library > Software > Virtuozzo Container Software > Application Templates**. The information on application templates is presented in the table with the following columns:

Column	Description
Name	The name of the application template.
Type	Denotes if it is an EZ Virtuozzo template. 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 application template.
OS	Denotes if this is a Linux template.
Architecture	The microprocessor architecture.
OS Name	The exact version of the operating system the template is intended for.

To show or hide columns, click **Select Columns** and set or clear the respective checkboxes.

By default, 20 templates are displayed on a page. To change the number of templates shown per page, click the appropriate link below the table. You can also filter the templates shown in the **App Templates** table. To do that, click **Show Search**, enter search patterns in the search fields, and click **Search**. To change what search fields are displayed, click **Customize**. To view all application templates residing on your physical servers, click **Reset Results**.

With the help of the Virtuozzo Automator toolbar you can perform the following operations on application templates:

- Upload a new template that you have locally and install it on a physical server registered in Virtuozzo Automator (the **New App/OS Template** button).
- Select some templates in the table and install them on one or more Virtuozzo Automator physical servers at once (the **Install to HNs** button).
- Select some templates in the table and add them to one or more virtual environments (the **Add to Containers** button).

Note: For a template to be added to a container, it first should be installed on the physical server where the container is hosted.

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

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

14.2.1 Viewing Application Template Properties in Group Context

The template properties page can be accessed by the **Software** option in the **Resource Library** section from the left menu tree, then switch to the **Virtuozzo Container Software** tab and click the application template in the **Application Template** table.

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	Description
Type	Denotes if it is an EZ template. 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.
OS Template	The OS template the given template is compatible with.
Platform	Denotes the operating system the template is intended for.

The **Installed on HNs** section enumerates those physical servers where the given template has been

installed. You have the possibility to select any number of physical servers in the table and uninstall the given template from them (the **Uninstall Template** button). The table presents the following information:

Field	Description
Status	The current status of the application template.
Hostname	The name of the hosting physical server.
Description	The application template description, if any.
Default IP Address	The IP address that will be assigned to the containers based on this template by default.
Product	The virtualization software product to which the template belongs.
VT	The technologies that the physical server must support for the template to work correctly.
OS	The type of the physical server operating system.
Operating System	The name and version of the physical server operating system.
Arch	The description of the processor model(s) installed on the server.

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

14.3 Managing OS Templates in Physical Server Context

Virtuozzo Automator allows you to list OS templates installed on a particular physical server. They may be already used or not used by certain virtual environments. All OS templates installed on the physical server are listed on the **Container Software > OS Templates** page of any physical server in the following table:

Column	Description
Name	The name of the OS template.
Type	Denotes if it is an EZ Virtuozzo template. 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.
OS	Denotes the operating system the template is intended for.

Continued on next page

Table 14.3.1 -- continued from previous page

Column	Description
Architecture	The microprocessor architecture.
Cached	If the value is "No", this means that to base virtual environments on this template you need to cache it first.

To show or hide columns, click **Select Columns** and set or clear the respective checkboxes.

By default, 20 templates are displayed on a page. To change the number of templates shown per page, click the appropriate link below the table. You can also filter the templates shown in the **Templates** table. To do that, click **Show Search**, enter search patterns in the search fields, and click **Search**. To change what search fields are displayed, click **Customize**. To view all OS templates installed on the physical server, click **Reset Results**.

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 physical servers registered in Virtuozzo Automator by clicking **New App/OS Template**;
- install an OS template present on this physical server to other physical servers registered in Virtuozzo Automator by clicking **Install to HNs**;
- prepare an OS template for creating virtual environments on its basis by selecting it and clicking **Cache**;
- delete those OS templates that are not needed any more from the physical server. To do this, select the check boxes opposite the OS templates you wish to delete and click **Uninstall**.

Note: If any virtual environment on the physical server is based on the OS template you wish to delete, the OS template deletion will fail.

- update an OS template 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.

14.3.1 Viewing OS Template Properties in Physical Server Context

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	Description
Type	Denotes if it is an EZ Virtuozzo template. 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.
Cached	If the template is cached on a particular physical server, new virtual environments can be created on its basis on this physical server.
Architecture	The microprocessor architecture.
Platform	Denotes the operating system the template is intended for.
Supported technologies	Lists the technologies that the physical server must support for the template to work correctly.

The **Added to Containers** table at the bottom of the page enumerates those virtual environments 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 physical server to make the template work. Second, to be used for creating virtual environments on its basis, any OS template has to be *cached*. Caching an OS template is preparing it for creating virtual environments on its basis. When you cache an OS template, you:

1. Download the packages its meta data refer to from the download repository to your physical server.
2. Install them on the physical server.
3. Compress them into a gzipped archive for further usage.

If the template has already been cached, clicking the **Cache** 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.

14.4 Managing Application Templates in Physical Server Context

Virtuozzo Automator allows you to list application templates installed on the physical server.

All application templates installed on the physical server are listed on the **Container Software > Applications Templates** page of any physical server in the following table:

Column	Description
Name	The name of the application template.
Type	Denotes if it is an EZ Virtuozzo template. 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 application template.
OS	Denotes if this is a Linux template.
Architecture	The microprocessor architecture.
OS Name	The exact version of the operating system the template is intended for.

To show or hide columns, click **Select Columns** and set or clear the respective checkboxes.

By default, 20 templates are displayed on a page. To change the number of templates shown per page, click the appropriate link below the table. You can also filter the templates shown in the **Templates** table. To do that, click **Show Search**, enter search patterns in the search fields, and click **Search**. To change what search fields are displayed, click **Customize**. To view all application templates installed on the physical server, click **Reset Results**.

With the help of the Virtuozzo Automator toolbar you can perform the following operations on application templates:

- Upload a new template that you have locally and install it on a physical server registered in Virtuozzo Automator (the **New App/OS Template** button).
- Install an OS template present on this physical server to other physical servers registered in Virtuozzo Automator (the **Install to HNs** button).
- Select some templates in the table and add them to one or more virtual environments of the given physical server (the **Add to Containers** button).
- Delete those application templates that are not needed any more. To this effect, select the check boxes

opposite the application templates you wish to delete and click the **Uninstall** button.

- Update the selected templates with the latest packages from the Virtuozzo update repository (the **Update** button).

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

14.4.1 Viewing Application Template Properties in Physical Server Context

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	Description
Type	Denotes if it is an EZ template. 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.
OS Template	The OS template the given template is compatible with.
Platform	Denotes the operating system the template is intended for.

The **Installed in Containers** section enumerates those virtual environments where the given template has been added. You have the possibility to select any number of virtual environments 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.

14.5 Uploading and Installing Templates on Physical Servers

Virtuozzo Automator enables you to upload and install templates on any of Virtuozzo Server Group physical servers by clicking the **New App/OS Template** button above the table listing available OS and application templates. In case you have one or more new templates that you want to install on your physical servers, you should first have these files accessible from the computer where Virtuozzo Automator 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 template to a Virtuozzo Server Group physical server, 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 Virtuozzo Automator is running).
2. Select the physical server 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 physical server from the list of physical servers.
3. Select the **Force Installation** check box if you want to install the template even in case any errors appear during the installation process.
4. Click **Submit** to upload and install the template.

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

14.6 Installing Application Templates on Physical Servers

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

14.7 Installing OS Templates on Physical Servers

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

14.8 Caching OS Templates on Physical Servers

The **Cache on HNs** screen allows you to cache the given OS template on one or more physical servers registered in Virtuozzo Automator.

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 Virtuozzo Automator to create a tarball of the packages comprising the template, which helps greatly speed up the process of creating new containers on the physical servers where this OS template is cached.
- The **Cache application packages** option tells Virtuozzo Automator to download the latest packages comprising the EZ template to the physical server(s) indicated in the **Select Hardware Nodes** section.

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

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

14.9 Uninstalling Templates From Physical Servers

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

Note: If any container on your physical servers is based on the OS template you wish to delete, the OS template deletion will fail.

14.10 Adding Application Templates to Containers

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

1. Review the templates to be installed to containers in the **Templates to Install** section.
2. 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.
3. Install the templates by clicking the **Install** button.

14.11 Updating Templates on Physical Server

The page where you can update certain templates on a particular physical server is displayed if you go to the Virtuozzo physical server and click the **Container Software** tab, then select the corresponding template(s) on the templates list and click the **Update** link above. This relates both to OS and application templates.

While the **Update** screen is being loaded, you can see the virtual environments 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 virtual environments 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 as follows. 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 physical server 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 physical server.

The latter number is reversely dependent on the former: if you do not have a certain template installed on the physical server, 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 15

Updating Virtuozzo Software

Virtuozzo Automator provides a GUI interface to update your Virtuozzo software. You can query the current state of Virtuozzo and Virtuozzo Automator itself. And you can install the following, if available:

- kernel updates;
- new Virtuozzo product releases;
- new or updated Virtuozzo command-line utilities;
- OS template updates;
- application template updates.

The **Updates** screen allows you to update Virtuozzo software on any physical server registered in Virtuozzo Automator.

On the **Updates** screen, you can perform the following operations:

- Filter physical servers by **Hostname** and **OS**: enter search criteria in the corresponding fields, and click **Search**.

Note: You may need to click **Show Search** first, if the search panel is hidden.

- Select columns to display: click **Select Columns**, check the necessary boxes, and click **Save**.
- Check for physical server updates: click a hostname in the **Hostname** column. Found updates, if any, will be listed on the **Software Updates** screen.

To update OS/application templates on a physical server, click its name in the table and switch to the **Template Updates** tab.

15.1 Updating System Software

On the **Virtuozzo Software Updates** tab of the **Software Updates** screen, you can browse and install updates for the following Virtuozzo software solutions installed on physical servers:

- Virtuozzo,
- Virtuozzo Automator.

On opening this tab, Virtuozzo Automator checks for updates if at least one of the following conditions is met:

- A check for updates has never been performed yet.
- It has been 24 hours or more since the last update check.
- Connection to the update repository has been insecure.

A check for updates can also be launched by clicking the **Check For Updates** button on the toolbar.

Virtuozzo updates can be of three types:

1. Virtuozzo releases: major updates for Virtuozzo products. For instructions on installing major updates, refer to the [Virtuozzo Hybrid Server 7 User's Guide](#).
2. Virtuozzo core updates: latest patches to Virtuozzo product kernels.
3. Virtuozzo tools updates: latest versions of Virtuozzo command-line utilities.

To install updates, select the check boxes next to them and click the **Install** button. You can also install all available updates at once by clicking the **Install Everything** button.

Before installing an update, you can learn more information about it by clicking **View Details**.

15.2 Installing New OS Templates

On loading the **OS Templates** screen of the **New Software** tab, Virtuozzo Automator checks for new OS templates that can be installed on the physical server. A check is performed if at least one of the following conditions is met:

- A check has never been performed yet.
- It has been 24 hours or more since the last check.
- Connection to the repository has been insecure.

The check results are displayed in two sections: the first provides the time of the last check and the second lists found templates, the number of which is provided in brackets after the section name.

To view information on an OS template or install additional compatible application templates, click the OS template name.

To install an OS template from the list without additional application templates, check its box and click the **Install** button on the toolbar.

15.2.1 Displaying OS Template Information

This screen provides detailed information on the selected OS template and allows you to install it with or without supported application templates:

- To install the OS template without selecting any supported application templates, click **Install OS** in the **Tasks** section.
- To install the OS template along with a list of supported application templates, click **Install OS and applications** in the **Tasks** section.

15.2.2 Choosing Application Templates for Updates

The **New OS Template: Select Applications** screen allows you to choose compatible application templates to install along with the selected OS template.

To choose an application template for installation:

1. Select the check box of the application to install in the **Available Applications** table. To choose all available applications at once, select the check box next to the **Available Applications** name at the top of the table.
2. Click the **»** button. This will add the template to the installation list in the **Selected Applications** table.
3. Click **Next** to proceed.

To return to the **OS Templates** screen of the **New Software** tab, click **Cancel**.

15.2.3 Reviewing OS and Application Templates

On the **New OS Template: Install Preview** screen, you can review the OS and application templates you selected on the previous screens. The following information on listed templates is presented:

Column	Description
Template Name	Name of the OS/application template to install.
Type	Template type: OS or application.
Description	Template description.

On this screen, you can do the following:

- Install the listed OS and application templates by clicking **Install**. After installation, you will be taken back to the **OS Templates** screen of the **New Software** tab.
- Return to the previous **New OS Template: Select Applications** screen by clicking **Back**.
- Return to the **OS Templates** screen of the **New Software** tab by clicking **Cancel**.

Note: For the installation log, click **Task Log** in the **Management** section on the Virtuozzo Automator menu on the left.

15.3 Installing New Application Templates

On loading the **Application Templates** screen of the **New Software** tab, Virtuozzo Automator checks for application templates available for OS templates installed on the physical server. A check is performed if at least one of the following conditions is met:

- A check has never been performed yet.
- It has been 24 hours or more since the last check.
- Connection to the update repository has been insecure.

The check results are displayed in two sections: the first provides the time of the last check and the second lists found templates, the number of which is provided in brackets after the section name.

To install application templates from the list, check their boxes and click **Install** on the toolbar.

CHAPTER 16

Advanced Tasks

16.1 Virtuozzo Automator Command-Line Utilities

This chapter is an additional reference on the Hardware Node command-line utilities. The chapter documents the utilities that are available after the VA Agent is installed on the Hardware Node. For every utility, all available command-line options are described.

16.1.1 vzagroup

The vzagroup utility is used to logically organize the physical servers and containers. There are two independent ways to design the structure organization. They are called **Infrastructure** and **Logical View** and presented as top-level elements in the Virtuozzo Automator left menu. You can use either one of them or, better, both at once, as their functions are different. For more information on building up a logical structure and combining containers into groups, refer to the [Organizing Logical Structure](#) on page 18 section.

The utility is also used as a part of an upgrading procedure for importing data between server.

The utility can be run either on a Master server or a Slave server with a different number of available commands.

Running on VA Slave Server

The utility has the following syntax:

```
# vzagroup <command> <options> <node>
```

The restoration options are the following:

Command	Description
addToGroup [USER[:PASSWORD]@]ADDRESS	Adds the Slave server to the VA group.
list	Lists the physical servers within the VA infrastructure. The command shows the statuses (online/offline) and roles (Master/Slave) of the listed servers.
removeFromGroup [USER[:PASSWORD]@]ADDRESS	Removes the Slave server, you are logged into, from the VA group.

Running on VA Master Server

The utility has the following syntax:

```
# vzagroup <command> <options> <node>
```

Commands:

Command	Description
addContainer /<infrastructure organizational>[/subfolder name] [USER[:PASSWORD]@]ADDRESS <ctid>	Includes a container into an Infrastructure (<infrastructure> option) or Logical View (<organizational> option) context. To indicate the container, specify its ID and the hosting physical server IP address.
addFolder /<infrastructure organizational>[/subfolder name]	Creates a new folder/subfolder in the Infrastructure or Logical View context, <infrastructure> or <organizational> option respectively.
addSlave [USER[:PASSWORD]@]ADDRESS	Registers a new Slave physical server in the VA infrastructure. Specify the physical server's IP address. In case the server is registered in another infrastructure, you can force the server re-registration with the [--force] option.
delContainer /<infrastructure organizational>[/subfolder name] [USER[:PASSWORD]@]ADDRESS <ctid>	Removes container from the Infrastructure or Logical View context. Specify the folder/subfolder name where the container belongs, the physical server IP address that host the container and the container ID.
delFolder /<infrastructure organizational>[/subfolder name]	Removes a folder/sub-folder from the Infrastructure or Logical View context.

Continued on next page

Table 16.1.1.2 -- continued from previous page

Command	Description
<code>list</code>	Lists the physical servers within the VA infrastructure. The command shows the statuses (online/offline) and roles (Master/Slave) of the listed servers.
<code>listInfrastructure /<infrastructure organizational>[/subfolder name]</code>	Lists the elements (folders, containers, etc.) that are grouped under the Infrastructure or Logical View context. To list the elements of a particular folder/sub-folder, specify its name additionally.
<code>reconfigure [/option-path-in-xml-config option-value]</code>	Changes the configuration settings for a group of containers, such as, managing permissions, scheduling backups, applying system updates, etc. For example. the log level can be changes with the following command: <code>vzgroup reconfigure /data/system/configuration/log_level 5.</code>
<code>removeSlave [USER[:PASSWORD]@]ADDRESS</code>	Unregisters a Slave physical server from the VA infrastructure. Use the <code>[--force]</code> option to unregister the server even if it's offline.
<code>[--force]</code>	Use the option with the <code>addSlave</code> and <code>removeSlave</code> commands. With the <code>addSlave</code> command, the option forces the Slave registration even if it registered in another Infrastructure. With the <code>removeSlave</code> command, the option unregisters the slave server even if it is offline.

Upgrade commands:

Command	Description
<code>--switchSlave [USER[:PASSWORD]@]ADDRESS</code>	Registers the Slave server from the PIM 4.0 infrastructure in the Virtuozzo Automator Infrastructure. The Slave server's version remains 4.0.
<code>--importSettings [USER[:PASSWORD]@]ADDRESS [options]</code>	Transfers data from the PIM 4.0 infrastructure to the Virtuozzo Automator infrastructure.

The options which can be used with the `--importSettings` command of `vzgroup`:

Option	Description
--import-security	Imports security settings from 4.0 server (roles, role assignments, users, groups).
--import-infrastructure	Imports infrastructure folders, logical view from 4.0 server.
--import-alerts	Imports alerts and events from 4.0 server.
--import-operations	Imports task log from 4.0 server.
--import-tasks	Imports scheduled tasks from 4.0 server.
--import-messaging	Imports physical server messaging settings from 4.0 server.
--import-backup-settings	Imports default backup settings from 4.0 server.
--import-ipranges	Imports IP ranges from 4.0 server.
--import-samples	Imports container templates from 4.0 server.
--import-networks	Imports virtual networks from 4.0 server.
--clear	Deletes data from a 6.1 master server before importing information from 4.0 server.
--switch-master	<p>Assigns a 4.0 Master server a Slave server role while registering by 6.1 Master server.</p> <hr/> <p>Note: You can also register the server from Virtuozzo Automator.</p> <hr/>

16.1.2 vzabackup

Note: This feature is only supported for Virtuozzo 6 servers.

The vzabackup utility is used to back up legacy containers or certain container files/folders and can be run on any Virtuozzo 6 host (including the Source and Backup Nodes) with the vzabackup package installed. It has the following syntax:

```
vzabackup [BACKUP\_OPTIONS] NODE1 ... [CT\_OPTIONS]
vzabackup [STORAGE\_OPTIONS]
```

Note: For the vzabackup functionality to work, forward and reverse DNS lookups must be correctly configured for both the Source and Backup Nodes.

General backup options:

Option	Description
-F, -I, --Tfull	Forces performing a full backup.
-i, --Tinc	Makes an incremental backup or, if no full backups are available, a full backup. If this and --Tdiff options are omitted, the full backup is created.
--Tdiff	Makes a differential backup or, if no full backups are available, a full backup. If this and -i options are omitted, the full backup is created.
-D DESCRIPTION	The description of the backup archive. The backup description should always be quoted (e.g. "backup for Container 101").
-o, --rm-old	Creates a new backup and then removes the oldest backup of the specified container.
-d, --rm-tag BACKUP_ID	Creates a backup and then removes the backup with the specified ID. You can learn what ID is assigned to this or that container backup by running the vzarestore utility with the -l or -f option.
-Cn, -C0	Creates the container backup without any compression. This will speed up the backing up time; however, it may significantly increase the size of the resulting backup archive.
-Cg, -C1	Compresses the resulting backups with the normal level of compression. This is the default level of compression used to back up all server/containers. The optimal data compression level depends on the type of files to be stored in the backup archive. For example, it is advisable to use the 'normal' and 'none' compression types if most of the files to be backed up are already compressed (e.g. the files with the .zip and .rar extensions) or can be compressed with a low degree of efficiency (e.g. all executable files with the .exe extension or image files with the .jpg, .jpeg, and .gif extensions).
-C2	Compresses the resulting backups with the high level of compression. The size of the resulting backup file is smaller than that of the backup file compressed with the -C0 and C1 options; however, it takes longer to create the backup file.

Continued on next page

Table 16.1.2.1 -- continued from previous page

Option	Description
-Cb, -C3	Compresses the resulting backups with the maximum level of compression. In this case the backup file size is the smallest; however, it may take much time to create such backups.
-J	If several servers (Hardware Nodes) are specified, this option tells <code>vzabackup</code> to back up the specified Hardware Nodes (and their containers) simultaneously. If the option is omitted, the Hardware Nodes are backed up sequentially one after another.
--force	Forces the process of backing up the server (Hardware Nodes)/containers. You are recommended to use this option when simultaneously backing up more than one Node/container.
--storage NODE	<p>The IP address or hostname and the credentials of the Backup Node where the created backup will be stored. Should be specified in the following format: <code>[USER[:PASSWD]]@IP_ADDRESS</code> where:</p> <ul style="list-style-type: none"> • <code>IP_ADDRESS</code> is the IP address or hostname of the Backup Node, and • <code>USER</code> and <code>PASSWD</code> denote the credentials of the <code>root</code> user used to log in to the Backup Node. <p>When using this option, keep in mind the following:</p> <ul style="list-style-type: none"> • If you do not indicate the user and/or password to log in to the Backup Node, you will be asked to do so during the <code>vzabackup</code> execution. • If you are backing up containers residing on the local Node and this local Node is also used as the Backup Node, you do not need to specify the Node credentials, provided that you are logged in to this Node as <code>root</code>. • If the <code>--storage</code> option is omitted, <code>vzabackup</code> puts the created container backups to the backup directory on the Source Node. By default, this directory is <code>/vz/backups</code>.

Continued on next page

Table 16.1.2.1 -- continued from previous page

Option	Description
NODE1...	<p>The IP address and the root credentials of the Source Node, i.e. of the Node hosting the containers to be backed up. Should be specified in the following form: [USER[:PASSWD]]@IP_ADDRESS where:</p> <ul style="list-style-type: none"> • IP_ADDRESS is the IP address or hostname of the Source Node and • USER and PASSWD denote the credentials of the root user used to log in to the Source Node. <p>When using this option, keep in mind the following:</p> <ul style="list-style-type: none"> • If you do not indicate the user and/or password to log in to the Source Node, you will be asked to do so during the vzabackup execution. • If you are backing up containers residing on the Source Node, you do not need to specify the Node credentials, provided that you are logged in to this Source Node as root.
-q, --no-progress	Disables logging to the screen during the vzabackup operation.

Per-Container parameters:

Option	Description
--chain-length NUMBER	An incremental backup parameter. After this number of incremental backups, a full backup will be performed.
--chain-days NUMBER	An incremental backup parameter. After this number of days, a full backup will be performed.

Container backup options:

Option	Description
-e CT1...	The containers to back up on the Source Node. If this and the -x options are omitted, all containers on the given Node will be backed up. containers can be specified using both their IDs (e.g., 101 or 102) and their names (e.g. server1 or server2).

Continued on next page

Table 16.1.2.3 -- continued from previous page

Option	Description
-x CT1...	The containers that need not to be backed up, i.e. the containers you wish to exclude from the backup process. If this and the -e options are omitted, all containers on the given Node will be backed up. Containers can be specified using both their IDs (e.g., 101 or 102) and their names (e.g., server1 or server2).
--include-files FILE_LIST	The path to the files and directories inside the container to be included in the backup.
--exclude-files FILE_LIST	The path to the files and directories inside the container to be excluded from the backup.

Backup storage options:

Option	Description
--view-folder	Displays the path to the backup storage directory on the local Node. The default directory is /vz/backups.
--set-folder PATH	Sets a new directory on the local Node where the created backups are to be stored (if the local Node is used as the Backup Node). Uses --backup-folder-* parameters.
--set-folder-creds USER[:PASSWD]	Sets backup storage login credentials. Required for Samba storage. Uses --backup-folder-* parameters.
--backup-folder-path PATH	Path to a custom backup storage location.
--backup-folder-login LOGIN	Username for a custom backup storage on a Samba share.
--backup-folder-passwd PASSWD	Password for a custom backup storage on a Samba share.

16.1.3 vzarestore

The vzarestore utility is used to restore legacy containers or certain files/folders from container backup archives, list backups existing on the Backup Node, remove backups, etc.

The utility has the following syntax:

```
vzarestore [CTID[:NEW_CTID] | -e [<CTID[:NEW_CTID]...>] [OPTIONS] [BACKUP_NODE]
vzarestore -r,--remove <BACKUP_ID...>
```

```

vzarestore -l,--list [LIST_OPTIONS] [BACKUP_NODE]
vzarestore --browse BACKUP_ID [BROWSE_OPTIONS] [BACKUP_NODE]
vzarestore --print-ct-config BACKUP_ID [BACKUP_NODE]
vzarestore --help

```

Restoration options:

Option	Description
-e CTID[:NEW_CTID]...	Comma-separated list of containers to restore. Containers can be specified using both their IDs (e.g., 101) and their names (e.g., computer1).
-x CT1...	Comma-separated list of containers to skip. Containers can be specified using both their IDs (e.g., 101) and their names (e.g., computer1).
-b BACKUP_ID	The ID assigned to the container backup. This ID can be used to restore this container or its certain files from the backup with the specified ID. If not specified, the last container backup is used. This option is incompatible with the -e option. Note: -b is used for restoring files only and can't be used to change the restored container ID.
--force	Do not stop on errors during the vzarestore execution. You are recommended to use this option when restoring more than one container at once.
--skip-ct-config	Do not restore the container configuration file. This option can be used only when restoring a single container. Note: The container configuration file is not changed when restoring separate container files.
--files PATH	The full path to the file/directory inside the container to be restored. This option is incompatible with the -e option.
--skip-locked	Do not stop on errors even if some of the files to be restored are in the 'locked' state.
-B	Handles the values after the -e option as container backup IDs.

Continued on next page

Table 16.1.3.1 -- continued from previous page

Option	Description
<code>--storage NODE</code>	The IP address and the credentials of the Backup Node where the container backups are stored. Can be specified in the following form: <code>USER[:PASSWD]@IP_ADDRESS</code> . If this option is omitted, the local Node is treated as the Backup Node.

Miscellaneous options:

Option	Description
<code>-r, --remove BACKUP_ID</code>	Removes the container backup with the specified backup ID. You can specify several backup IDs and separate them by spaces.
<code>-l, --list</code>	Do not restore any containers. Displays the information on the existing backups located either on the Backup Node or on the local Node if the former is not specified.
<code>--browse BACKUP_ID</code>	Displays the contents of the container backup with the specified backup ID.
<code>--print-ct-config BACKUP_ID</code>	Displays the configuration file contents of the container with the specified backup ID.

Listing options:

Option	Description
<code>-f, --full</code>	Displays the full information on the specified container backup. Used only with <code>--list</code> .
<code>--latest</code>	Displays the latest containers backups. Used only with <code>--list</code> .
<code>-e CT1...</code>	Displays the information on the backups for the specified containers only.
<code>-B</code>	Handles the values after the <code>-e</code> option as container backup IDs.

Browsing options:

Option	Description
-d, --dir PATH	Path to a directory inside a container backup archive contents of which you want to see. Used with --browse.
--backup-folder-path PATH	Path to a custom backup storage location.

16.2 Monitoring Virtuozzo Objects via SNMP

Note: This feature is only supported for Virtuozzo 6 servers.

You can monitor Virtuozzo 6 hardware nodes via the Simple Network Management Protocol (SNMP). The implementation conforms to the same Structure of Management Information (SMI) rules as the data in the standard SNMP context: all Virtuozzo objects are organized in a tree; each object identifier (OID) is a series of integers corresponding to tree nodes and separated by dots.

General information:

- The OID of the root subtree with all the objects you can monitor is 1.3.6.1.4.1.26171.1.1.
- Two management information base (MIB) files are required to monitor Virtuozzo objects: SWSOFT-SMI.txt and SWSOFT-VIRTUOZZO-MIB.txt. Both are installed along with VA Agent. Their default location is /usr/share/snmp/mibs.

The following subsections describe ways to enable and use SNMP to monitor Virtuozzo objects.

16.2.1 Enabling SNMP Access on Hardware Node

To enable SNMP access on a hardware node, do the following:

1. Install the net-snmp package.
2. Make sure the snmpd service is running.
3. Install VA Agent with the SNMP component.

Important: The SNMP option is disabled by default. To enable it in the TUI-based installer, choose custom installation and check the respective box in the component list. To enable it for an unattended

installation, add it to the list of components to install.

16.2.2 Accessing Virtuozzo Objects via SNMP

You can access Virtuozzo Objects with SNMP tools of your choice. Let us examine the procedure on the example of the free Net-SNMP suite.

To display the entire Virtuozzo object tree, use the `snmpwalk` command in the console. For example:

Typical output for a Linux Hardware Node may be:

```
SWSOFT-VIRTUOZZO-MIB::vzHWID.0 = STRING: "2ef600c5-17c4-f042-9efe-e13282c53e48"
SWSOFT-VIRTUOZZO-MIB::vzVersion.0 = STRING: 4.0.0
SWSOFT-VIRTUOZZO-MIB::vzLicenseStatus.0 = STRING: ACTIVE
SWSOFT-VIRTUOZZO-MIB::vzEnvID.50 = Gauge32: 50
SWSOFT-VIRTUOZZO-MIB::vzEnvID.111 = Gauge32: 111
SWSOFT-VIRTUOZZO-MIB::vzEnvEid.50 = STRING: "00123d1b-a799-7947-9f11-57e78d8332dd"
SWSOFT-VIRTUOZZO-MIB::vzEnvEid.111 = STRING: "2f211e5b-ca23-5d4f-8111-8ba31831d120"
SWSOFT-VIRTUOZZO-MIB::vzEnvType.50 = STRING: virtuozzo
SWSOFT-VIRTUOZZO-MIB::vzEnvType.111 = STRING: virtuozzo
SWSOFT-VIRTUOZZO-MIB::vzEnvName.50 = STRING: pva-mn-77.sw.ru
SWSOFT-VIRTUOZZO-MIB::vzEnvName.111 = STRING: CT111
SWSOFT-VIRTUOZZO-MIB::vzEnvDescription.50 = STRING:
SWSOFT-VIRTUOZZO-MIB::vzEnvDescription.111 = STRING: root
SWSOFT-VIRTUOZZO-MIB::vzEnvOS.50 = STRING: .centos-6-x86\_64
SWSOFT-VIRTUOZZO-MIB::vzEnvOS.111 = STRING: .centos-6-x86\_64
SWSOFT-VIRTUOZZO-MIB::vzEnvOrigSample.50 = STRING: "00000000-0000-0000-0000-000000000000"
SWSOFT-VIRTUOZZO-MIB::vzEnvOrigSample.111 = STRING: "00000000-0000-0000-0000-000000000000"
SWSOFT-VIRTUOZZO-MIB::vzEnvState.50 = INTEGER: running(6)
SWSOFT-VIRTUOZZO-MIB::vzEnvState.111 = INTEGER: running(6)
SWSOFT-VIRTUOZZO-MIB::vzEnvTransition.50 = INTEGER: none(0)
SWSOFT-VIRTUOZZO-MIB::vzEnvTransition.111 = INTEGER: none(0)
SWSOFT-VIRTUOZZO-MIB::ipAddrEntAddress.50.10.30.128.129 = IpAddress: 10.30.128.129
SWSOFT-VIRTUOZZO-MIB::ipAddrEntAddress.111.255.255.255.255 = IpAddress: 255.255.255.255
SWSOFT-VIRTUOZZO-MIB::ipAddrEntNetMask.50.10.30.128.129 = IpAddress: 255.255.255.255
SWSOFT-VIRTUOZZO-MIB::ipAddrEntNetMask.111.255.255.255.255 = IpAddress: 0.0.0.64
SWSOFT-VIRTUOZZO-MIB::envNetworkClass.50.0 = Gauge32: 0
SWSOFT-VIRTUOZZO-MIB::envNetworkClass.50.1 = Gauge32: 1
SWSOFT-VIRTUOZZO-MIB::envNetworkClass.111.0 = Gauge32: 0
SWSOFT-VIRTUOZZO-MIB::envNetworkClass.111.1 = Gauge32: 1
End of MIB
```

16.2.3 Description of Virtuozzo Objects

The table below describes Virtuozzo objects you can monitor:

Object	Description
SWSOFT-VIRTUOZZO-MIB::vzHWID	The Hardware Node unique identifier used by different management tools to identify the Hardware Node.
SWSOFT-VIRTUOZZO-MIB::vzVersion	Virtuozzo version currently installed on the Hardware Node.
SWSOFT-VIRTUOZZO-MIB::vzLicenseStatus	Virtuozzo license status.
SWSOFT-VIRTUOZZO-MIB::vzEnvID	Container ID. (The Service Container is always marked as Container 1.)
SWSOFT-VIRTUOZZO-MIB::vzEnvEid	The unique container ID used by <PVC> tools to identify the container.
SWSOFT-VIRTUOZZO-MIB::vzEnvType	Container virtualization technology.
SWSOFT-VIRTUOZZO-MIB::vzEnvName	Container hostname.
SWSOFT-VIRTUOZZO-MIB::vzEnvDescription	Container description, if set.
SWSOFT-VIRTUOZZO-MIB::vzEnvOS	OS template the container is based on.
SWSOFT-VIRTUOZZO-MIB::vzEnvOrigSample	Container original sample unique ID used by Virtuozzo tools to identify the container sample.
SWSOFT-VIRTUOZZO-MIB::vzEnvState	Current container state.
SWSOFT-VIRTUOZZO-MIB::vzEnvTransition	Transitional container state.
SWSOFT-VIRTUOZZO-MIB::ipAddrEntAddress	Container IP address.
SWSOFT-VIRTUOZZO-MIB::ipAddrEntNetMask	Container network mask.
SWSOFT-VIRTUOZZO-MIB::envQuotaDiskSpace	Disk space currently consumed by the container.
SWSOFT-VIRTUOZZO-MIB::envQuotaDiskSpaceSoft	Soft disk space limit set for the container.
SWSOFT-VIRTUOZZO-MIB::envQuotaDiskSpaceHard	Hard disk space limit set for the container.

Continued on next page

Table 16.2.3.1 -- continued from previous page

Object	Description
SWSOFT-VIRTUOZZO-MIB::envQuotaDiskInodes	Number of disk inodes (files, directories, symbolic links) currently used by the container.
SWSOFT-VIRTUOZZO-MIB::envQuotaDiskInodesSoft	Soft disk inodes limit set for the container.
SWSOFT-VIRTUOZZO-MIB::envQuotaDiskInodesHard	Hard disk inodes limit set for the container.
SWSOFT-VIRTUOZZO-MIB::envQuotaUgid SWSOFT-VIRTUOZZO-MIB::envQuotaUgidHard	Number of user/group IDs allowed for container's internal disk quota. (Disabled for the Service Container.)
SWSOFT-VIRTUOZZO-MIB::envNetworkClass	Network classes currently existing on the Hardware Node.
SWSOFT-VIRTUOZZO-MIB::envNetstatIncomingBytes	Incoming traffic, in bytes, consumed by the container.
SWSOFT-VIRTUOZZO-MIB::envNetstatIncomingPackets	Incoming traffic, in packets, consumed by the container.
SWSOFT-VIRTUOZZO-MIB::envNetstatOutgoingBytes	Outgoing traffic, in bytes, consumed by the container.
SWSOFT-VIRTUOZZO-MIB::envNetstatOutgoingPackets	Outgoing traffic, in packets, consumed by the container.

16.3 Logging In to Physical Servers via SOAP API

Virtuozzo Automator supports using SOAP API on the VA Agent side. This is intended for developers who want to write their own additions to VA Agent using SOAP API.

The support for SOAP is provided by an Apache HTTP Server module that listens on port 4646. The module comes in an optional package `va-pp-httpd` that is not included into the VA Agent package group. You will need to install the package on slave servers to which you will send SOAP requests:

```
# yum install va-pp-httpd
```

The module will start alongside Apache:

```
# systemctl start httpd
# systemctl enable httpd
```

Now requests sent to port 4646 will be redirected by Apache to the SOAP module that will, in turn, process and send them to VA Agent.

16.4 Logging In to Virtuozzo Storage Management Panel

Note: This feature is only supported for Virtuozzo Hybrid Server 7.

From Virtuozzo Automator, you can log in to the Virtuozzo Storage management panel to manage and monitor your Virtuozzo Storage clusters. To do this, Click the **Storage** link in the left menu to open the management panel login screen in a separate browser tab and enter your Virtuozzo Storage credentials.

By default (i.e. if you installed both the VA MN and Virtuozzo Storage management panel on the same node) the **Storage** link points to the IP address or hostname of the Virtuozzo Storage management panel specified during Virtuozzo installation. The default port is 8888.

If you happen to have the management panels on different nodes, you can add the link to the Virtuozzo Storage management panel to VA MN manually by installing the Virtuozzo Storage integration plugin:

1. On the VA Management Node, run

```
# yum install va-cc-storage
```

2. On each hardware node in the VA infrastructure, run

```
# yum install va-agent-storage
```

3. Specify the IP address of the Virtuozzo Storage management node in the `pvacc.conf` configuration file located on the VA Management Node. For example, if the container with the Virtuozzo Storage management panel has the IP address 10.30.10.101, do the following:

- 3.1. On the VA Management Node, open the `/etc/opt/pva/cc/pvacc.conf` file, locate the `<storage>` element and change the `local` IP address to `10.30.10.101`:


```
<storage>
  <web-panel>
    <address>10.30.10.101</address>
    <port>8888</port>
  </web-panel>
</storage>
```

3.2. Restart the `va-cc` service to apply changes:

```
# systemctl restart va-cc
```

You can configure the port value in the same way if needed.

16.5 Changing Master and Slave Servers IP Addresses

If the master server IP address changes for some reason, you have to additionally configure slave servers registered with it:

1. On each slave server, open the `/var/opt/pva/agent/etc/vzagent.conf` file, locate the `<ns1:address>` and `<host>` elements and change the old master server IP address to the new one. For example:

```
<node>
<...>
<host>10.30.10.101</host>
<...>
<ns1:address>10.30.10.101</ns1:address>
<...>
</node>
```

2. Restart the `va-agent` service to apply changes:

```
# systemctl restart va-agent
```

If the IP address of a slave server changes for some reason and you want to keep its VA settings, you have to additionally configure the master server:

1. On the master server, open the `/var/opt/pva/mn/etc/vzagent.conf` file, locate the corresponding `<ns1:address>` and `<host>` elements with the old slave server IP address and change it to the new IP address. For example:

```
<node>
<...>
<host>10.30.10.102</host>
```

```
<...>
<ns1:address>10.30.10.102</ns1:address>
<...>
</node>
```

2. Restart the `va-mn` service to apply changes:

```
# systemctl restart va-mn
```

Alternatively, you can unregister the slave server from Virtuozzo Automator and re-register it with the new IP address, but in this case VA settings for this server will be lost.

16.6 Enabling Support for Virtuozzo 6 Nodes

Virtuozzo Automator 7 enforces the use of TLS 1.2 and newer by default, while the Virtuozzo Automator 6 agents installed on Virtuozzo 6 nodes only support TLS 1.0. For this reason, Virtuozzo 6 nodes may appear as offline in Virtuozzo Automator 7. To enable full support for Virtuozzo Automator 6 agents in Virtuozzo Automator 7, allow the use of TLS 1.0 as follows:

1. Set the `ssl_high_security` parameter to 0 in the configuration file `/var/opt/pva/mn/etc/vzagent.conf`.

For example:

```
<packet xmlns:ns1=...>
  <data>
    <system>
      <configuration>
        <ssl_high_security>0</ssl_high_security>
      </configuration>
    </system>
  </data>
</packet>
```

2. Restart the Virtuozzo Automator management node service:

```
# systemctl restart va-mn
```

CHAPTER 17

Troubleshooting

Virtuozzo Automator is an indispensable means for solving various kinds of problems related to the virtual environment functioning. It is still more flexible due to its ability to work with not running virtual environments.

17.1 Services Inaccessibility

Various tasks you are accustomed to perform by means of a virtual environment (accessing your website 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 virtual environment is running. To this effect, log in to Virtuozzo Automator and check the virtual environment status in the **Status** field in the virtual environment table (see *Managing Virtual Environments* on page 50) or in the **Virtual Environment Summary** table on the virtual environment dashboard. You can also determine if the virtual environment is running or down with the help of the **Service Unavailable** screen by clicking the corresponding link provided on this screen. If the virtual environment is down, click the **Start/Stop Virtual Environment** link on the menu and press the **Start Virtual Environment** button. Wait a little for the virtual environment and all the services to start.
2. Go to the **Services** page (see *Managing Container Services* on page 82) 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 `mysql` must be running for the Plesk control panel to handle your requests, `httd` - for your web site to function properly, `sshd` - for the virtual environment to be accessible by ssh, 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 virtual environment 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 a virtual environment and you are currently working with the panel, the **Service Unavailable** screen may sometimes be displayed when you are trying to perform a 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 virtual environment, as the Plesk installation might be broken.

17.2 Network Problems

Problem

The virtual environment 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 virtual environment.
- Log in to Virtuozzo Automator and check the problem virtual environment hostname and IP address.
- Log in to Virtuozzo Automator and change the virtual environment root password (see [Adjusting Container Configuration and Advanced Settings](#) on page 104).
- Log in to Virtuozzo Automator and disable the `iptables` service inside the problem virtual environment.

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

17.3 Backup Problems

Problem

On the backup Node, some of the multiple scheduled backup tasks fail with the “unauthorized request” error.

Solution

This may be caused by the VA Agent’s limit for the amount of simultaneous sessions on the backup Node. Set to 20 by default, the limit may be too low for multiple backup tasks. Try raising the VA Agent’s limit for the amount of simultaneous sessions on the backup Node. To do it, add the `<user_session_limit>` parameter to the `<sessionm>` section of the `/var/opt/pva/agent/etc/vzagent.conf` file. For example:

```
<sessionm>
<configuration>
<user_session_limit>200</user_session_limit>
...
</configuration>
</sessionm>
```

Propagate this adjustment to every backup Node involved.

17.4 File Problems

Virtuozzo Automator is tuned to not allow giant files to be uploaded to virtual environments or the physical server. This setting can be controlled in the `/etc/httpd/conf/httpd.conf` file inside the Service virtual environment:

```
# grep Limit httpd.conf
LimitRequestBody 536870912
```

The `LimitRequestBody` parameter specifies the maximal file size (in bytes) allowed to be uploaded to a virtual environment by means of Virtuozzo Automator. The default value of the example above is 512 Mb. If you need to allow virtual environment administrators to upload larger (or smaller, for that matter) files to their virtual environments, change this value at your discretion. If the parameter is absent, just add it to the file.

17.5 Listing Users

Problem

When viewing a list of users on the **Users** tab of the Virtuozzo Automator **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 Virtuozzo Automator.
- 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 Virtuozzo Automator. If it is possible, set this attribute manually for the users to be displayed in Virtuozzo Automator.
- Try to delete the authentication database from Virtuozzo Automator 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.

17.6 Group Operations

Problem

Some Virtuozzo Automator functions work incorrectly if two or more physical servers are registered. Among these functions are viewing logs, viewing top resource-using virtual environments, managing licenses, and some others.

Solution

Many Virtuozzo Automator group operations rely on the system time being synchronized among all the physical servers constituting the Group. If the physical servers have different system time, various problems might occur. You should keep the system time synchronized among the physical servers with the help of built-in operating system tools or third-party solutions.

17.7 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 virtual environment with these problems missing. This change-over is usually effected by means of:

- Restoring the container from a working backup (see *Managing Backups on Virtual Environment Level* on page 149).
- Reinstalling the container (see *Reinstalling Containers* on page 101).

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.

- 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 *Repairing Containers* on page 103.

17.8 Getting Support

On the **Support** page, you can view information on the versions and releases for the installed VA components in the **Installed Modules** table.

The **Search Virtuozzo Knowledge Base** sections allows you to find a solution article on your own.

17.8.1 Submitting Error Codes

If, at some point of your Virtuozzo Automator 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.

For more details on these errors, see **Error Codes Reference**.

17.8.1.1 Error Codes Reference

If, when performing an operation in Virtuozzo Automator, you are presented with an unknown error code, refer to the following table:

Code	Problem	Reason	Solution
cp900	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 virtual environment. In the pop-up window you will find the information on all the operations performed on this virtual environment. Use these logs to single out an operation likely to be the source of the error.
cp1001	The password reminder is not available.	The mail relay server is not specified.	Log in to Virtuozzo Automator as the administrator, go to the Hardware Node/Configuration/Email and Notifications screen and fill in the Relay Server IP Address field.
cp1002	The password reminder is not available.	Email notifications are disabled by the administrator.	Log in to Virtuozzo Automator as the administrator, go to the Configuration Manager/Messaging screen, and select the Enable Email Notifications check box.
cp1003	A virtual environment user cannot log in to Virtuozzo Automator.	The communication with vzadmin/Authm is broken.	Log in to the physical server as root and restart VA Agent <ul style="list-style-type: none"> • on a Virtuozzo 6 node: <code>service pvaagentd restart</code>, • on Virtuozzo Hybrid Server 7 node: <code>systemctl restart va-agent</code>.

Continued on next page

Table 17.8.1.1.1 -- continued from previous page

Code	Problem	Reason	Solution
cp1004	A virtual environment user cannot log in to Plesk.	The communication with Plesk is broken.	Start Plesk in the container.
cp1005	A virtual environment user cannot cannot restore their password.	The communication with Plesk is broken.	Start Plesk in the container.
cp1006	A virtual environment user cannot log in to Virtuozzo Automator.	Unknown. Possibly, communication with vzadmin/Authm or VAAgent/sessionm is broken.	Log in to the physical server as root and consult agent.log for problem details.

CHAPTER 18

Glossary

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

Container is a virtual private server, which is functionally identical to an isolated standalone server, with its own IP addresses, processes, files, its own user database, its own configuration files, its own applications, system libraries, and so on. Containers share one *physical server* (or *Hardware node*) and one OS kernel. However, they are isolated from each other. A container is a kind of 'sandbox' for processes and users.

EZ template is a template file that points to a repository with the packages that comprise the template. EZ templates cannot be updated because the repository stays the same.

Hardware Node is a *physical server* where the Virtuozzo virtual environment software is installed for hosting virtual environments. Sometimes, it is marked as *Container 0*. In the interface, the *Hardware Node* term is used, while in the help *physical server* is being used.

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

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

Management Node. An obsolete designation of *Management Server*.

Master Server. A physical server where the Virtuozzo Automator Management Server component is installed.

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

Package set is a synonym for *Template*.

Virtuozzo Automator is a tool designed for managing *physical server* and all virtual environments residing on

them with the help of a standard Web browser on any platform.

Private area is a part of the file system where virtual environment files that are not shared with other virtual environments 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.

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

Template (or package set) is a set of original application files (packages) repackaged for mounting over Virtuozzo File System. There are two types of templates. OS Templates are used to create new virtual environments with a preinstalled operating system. Application templates are used to install an application or a set of applications in virtual environments.

UBC is an abbreviation of *User Beancounter*.

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

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

Slave Server. It is a dedicated physical server that has one of the Virtuozzo virtual technologies installed.

Virtual Machine. The computer that is emulated using Virtuozzo virtualization technology, it is functionally identical to an isolated standalone server. A virtual machine has its own virtual hardware and requires an operating system to control its hardware. The installed operating system and its applications are isolated inside the virtual machine and share physical hardware resources of the physical server where the virtual machine resides.

Virtual Environment. Is a generic name for virtual machines and containers.

Virtuozzo Control Center (or VZCC) is an obsolete designation of *Virtuozzo Automator*.

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