



# Virtuozzo Hybrid Server 7

## Upgrade Guide

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## CHAPTER 1

# Introduction

This guide describes how to upgrade

- Virtuozzo 6 to Virtuozzo Hybrid Server 7 in both local storage and Virtuozzo Storage scenarios,
- OpenVZ 7 to Virtuozzo Hybrid Server 7.

When upgrading Virtuozzo 6, you can:

- Upgrade Virtuozzo 6 servers by using temporary spare Virtuozzo 6 servers.
- Migrate VMs and containers from Virtuozzo 6 servers to new Virtuozzo Hybrid Server 7 servers.
- Upgrade Virtuozzo 6 servers in-place if certain requirements are met.

The exact steps to perform differ depending on scenario and are described further in the guide.

Note the following:

- This guide refers to other documentation that you will need to complete the upgrade: [Virtuozzo 6 User's Guide](#), [Virtuozzo 6 Upgrade Guide](#), [Virtuozzo Hybrid Server 7 Installation Guide](#).
- You can upgrade to Virtuozzo Hybrid Server 7 from Virtuozzo 6 and OpenVZ 7 only. If your servers run older virtualization products, you will first need to upgrade them to Virtuozzo 6 or OpenVZ 7, respectively. For instructions, see the [Virtuozzo 6 Upgrade Guide](#) or OpenVZ documentation.

## CHAPTER 2

# Upgrading to Virtuozzo Hybrid Server 7 with CLI Management

This chapter describes how to upgrade the following:

- Virtuozzo 6 servers with local storage to Virtuozzo Hybrid Server 7 with local storage,
- Virtuozzo Storage clusters based on Virtuozzo 6 to Virtuozzo Storage clusters with CLI management based on Virtuozzo Hybrid Server 7.

## 2.1 Upgrading Virtuozzo 6 with Local Storage

This section describes how to upgrade your Virtuozzo 6 servers with local storage to Virtuozzo Hybrid Server 7. You can do this by using spare servers or in-place or migrate VMs and containers to new servers running Virtuozzo Hybrid Server 7. Apply either method to each server in your Virtuozzo 6 infrastructure.

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**Note:** You will need to install a new Virtuozzo Hybrid Server 7 license on each upgraded node.

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### 2.1.1 Upgrading with Spare Virtuozzo 6 Servers

To upgrade by using a spare Virtuozzo 6 server, do the following:

1. Update both the Virtuozzo 6 server to be upgraded and the spare server to the latest version. You can do this by running `yum update` on each server.

---

**Note:** The oldest Virtuozzo 6 build eligible for upgrade is [6.0.11-3466](#).

---

2. Back up all VMs and containers on the Virtuozzo 6 server to be upgraded. You can do this with the pbackup tool as described in the [Virtuozzo 6 User's Guide](#) and use both Virtuozzo 6 and 7 hosts as backup servers.
3. Temporarily migrate VMs and containers from the Virtuozzo 6 server to be upgraded to the spare Virtuozzo 6 server. You can do this with the pmigrate tool as described in the [Virtuozzo 6 User's Guide](#).
4. Perform a fresh install of Virtuozzo Hybrid Server 7 on the Virtuozzo 6 server to be upgraded. For instructions, see the [Virtuozzo Hybrid Server 7 Installation Guide](#).
5. Migrate VMs and containers back to the upgraded server from the spare server. For more details, see [Migrating VMs and Containers from Virtuozzo 6 to Virtuozzo Hybrid Server 7](#) on page 18.
6. If you store VM and container backups on a Virtuozzo 6 server, move them to Virtuozzo Hybrid Server 7 as described in [Restoring Virtuozzo 6 Backups to Virtuozzo Hybrid Server 7](#) on page 23.

## 2.1.2 Upgrading by Migrating to New Servers

To upgrade by migrating to a new server running Virtuozzo Hybrid Server 7, do the following:

1. Update the selected Virtuozzo 6 server (from which you will migrate VMs and containers) to the latest version. You can do this by running `yum update`.

---

**Note:** The oldest Virtuozzo 6 build eligible for upgrade is [6.0.11-3466](#).

---

2. Back up all VMs and containers on the selected Virtuozzo 6 server. You can do this with the pbackup tool and use both Virtuozzo 6 and 7 hosts as backup servers.
3. Perform a fresh install of Virtuozzo Hybrid Server 7 on a different (new) server. For instructions, see the [Virtuozzo Hybrid Server 7 Installation Guide](#).
4. Migrate VMs and containers to it from the selected Virtuozzo 6 server. For more details, see [Migrating VMs and Containers from Virtuozzo 6 to Virtuozzo Hybrid Server 7](#) on page 18.
5. If you store VM and container backups on a Virtuozzo 6 server, move them to a server running Virtuozzo Hybrid Server 7 as described in [Restoring Virtuozzo 6 Backups to Virtuozzo Hybrid Server 7](#) on page 23.

### 2.1.3 Upgrading In-Place with Local Storage

**Warning:** Make sure to backup the data on the hardware node before upgrading. If the upgrade fails, you may have to install Virtuozzo Hybrid Server on said hardware node from scratch.

Hardware nodes that host only containers and no virtual machines can be upgraded to Virtuozzo Hybrid Server 7 in-place. To be eligible for in-place upgrade, the hardware node must meet the following requirements:

1. Updated to the latest version of Virtuozzo 6.

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**Note:** The oldest Virtuozzo 6 build eligible for upgrade is [6.0.11-3466](#).

---

2. No virtual machines.
3. No containers that use VZFS.
4. No templates for guest operating systems unsupported by Virtuozzo Hybrid Server 7.

For the upgrade, you will need the following:

1. Contents of the Virtuozzo Hybrid Server 7 distribution, either on a disc mounted to a local directory or available over network via HTTP.
2. A Virtuozzo Hybrid Server 7 license (optional). The existing Virtuozzo 6 license is not transferred during the upgrade. You can install a new Virtuozzo Hybrid Server 7 license during the upgrade or skip this step and install one manually after the upgrade with the `vzlicload` tool.

Note the following:

- If any containers on the Virtuozzo 6 node are set to be started automatically on reboot, they will do the same once you boot to Virtuozzo Hybrid Server 7 after the upgrade.
- In the end of the upgrade, `yum update` is launched by default to update to the latest Virtuozzo Hybrid Server 7 version from the configured repositories. You can skip this step if required.
- Upgrade logs can be found in the `/var/log/vzupgrade.log` and `/var/log/redhat*log` files.

To perform an in-place upgrade of a Virtuozzo 6 node to Virtuozzo Hybrid Server 7, do the following:

1. Install the vzupgrade package:

```
# yum install vzupgrade
```

2. Check for conditions blocking the upgrade (listed earlier):

```
# vzupgrade check --blocker
```

---

**Note:** The list of upgrade blockers is also displayed by `vzupgrade list`.

---

3. If no blockers exist, run the `vzupgrade install` command. For example:

```
# vzupgrade install --boot /dev/sda --license <license_key> --reboot
```

---

**Note:** For details on each option, see [Upgrade Tool Reference](#) on page 5.

---

The installer will run a pre-upgrade check and generate upgrade scripts (if required, you can perform this step manually before upgrading with `vzupgrade check`).

4. Having collected the required information, the installer will display a list of things to be aware of. Read the list, and, if you agree to proceed, press **Y** and **Enter**.
5. If `--reboot` is omitted, reboot the hardware node when asked by the installer. Make sure to boot from the hard drive and choose the system upgrade option in the upgrade bootloader. From this moment, the actual upgrade will start and no further interaction on your part will be required.

---

**Note:** Packages downloaded during update will be stored in `/var/lib/upgrade_pkgs`.

---

When the upgrade completes, the node will automatically reboot to Virtuozzo Hybrid Server.

### 2.1.3.1 Upgrade Tool Reference

```
vzupgrade install [--license <key> | --skip-license-upgrade]
                  [--device <mount_point> | --network <distrib_URL>]
                  [--add-repo <name>=<repository_URL>] [--boot <bootloader_destination>]
                  [--reboot] [--skip-post-update] [--clean-cache] [-h,--help]
```



Option	Description
<code>--device &lt;mount_point&gt;</code>	Mutually excludes <code>--network</code> . The mount point of the device with Virtuoizzo Hybrid Server distribution contents (e.g., a USB flash drive).
<code>--network &lt;distrib_URL&gt;</code>	Mutually excludes <code>--device</code> . The path to the Virtuoizzo Hybrid Server installation ISO image or its contents (full or netinstall).
<code>--license &lt;key&gt;</code>	Specifies the Virtuoizzo Hybrid Server license key.
<code>--skip-license-upgrade</code>	Skips license installation during upgrade. You can install a Virtuoizzo Hybrid Server license after the upgrade with the <code>vzlicload</code> tool.
<code>--add-repo &lt;name&gt;=&lt;repository_URL&gt;</code>	Specifies remote Virtuoizzo Hybrid Server and VzLinux repositories (space-separated).
<code>--boot &lt;bootloader_destination&gt;</code>	<p>Specifies destination to install Virtuoizzo Hybrid Server bootloader to. If omitted, the Virtuoizzo Hybrid Server bootloader will not be installed and the existing Virtuoizzo 6 bootloader will be modified to boot Virtuoizzo Hybrid Server.</p> <hr/> <p><b>Note:</b> Third-party bootloaders need to be updated manually if the Virtuoizzo Hybrid Server bootloader is not installed.</p> <hr/>
<code>--reboot</code>	Automatically reboots the node to the upgrade bootloader.
<code>--skip-post-update</code>	Skips the launch of <code>yum update</code> in the end of the upgrade.
<code>--clean-cache</code>	Cleans up packages from <code>/var/lib/upgrade_pkgs</code> on start so they are downloaded anew during installation. If this option is omitted (default), packages already stored in <code>/var/lib/upgrade_pkgs</code> are checked against those in the repository, updated if necessary, and used.
<code>-h, --help</code>	Shows usage information.

If the options `--device`, `--network`, and `--add-repo`, are omitted, the default repositories are used:

```
http://repo.virtuoizzo.com/vz/releases/7.0/x86_64/os/
http://repo.virtuoizzo.com/vzlinux/7/x86_64/os/
```

## 2.2 Upgrading Virtuozzo 6 with Virtuozzo Storage

This section describes how to upgrade your Virtuozzo Storage cluster based on Virtuozzo 6 to a Virtuozzo Storage cluster with CLI management based on Virtuozzo Hybrid Server 7. You can do this by using spare Virtuozzo 6 servers or in-place or migrate VMs and containers to a new Virtuozzo Storage cluster.

### 2.2.1 Upgrading with Spare Virtuozzo 6 Servers

1. Update all servers in the cluster based on Virtuozzo 6 to the latest version. You can do this by running `yum update` on each server.

---

**Note:** The oldest Virtuozzo 6 build eligible for upgrade is [6.0.11-3466](#).

---

2. Choose a server to upgrade in the cluster and migrate VMs and containers from it to other Virtuozzo 6 servers in the cluster.
3. Remove chunk servers from the server:
  - 3.1. Find out which chunk servers are stored on the server by running `pstorage -c <cluster_name> top` on any cluster server.
  - 3.2. Initiate removal of chunk servers from the server by running `pstorage -c <cluster_name> rm-cs --wait <CS_ID>` for each chunk server on the server.
4. Wait until the required chunk servers are removed and Virtuozzo Storage rebuilds. To monitor this process, run `pstorage -c <cluster_name> top` on any cluster server. The status of the chunk servers being removed will become `releasing` and the number of replicas on them will start dwindling. When the number of replicas on a CS reaches zero, the CS will be removed both from the server and the `pstorage top` output. Make sure that no chunk servers are left on the server to be upgraded.
5. Perform a fresh install of Virtuozzo Hybrid Server 7 on the server. During installation, choose to create a new Virtuozzo Storage cluster. For instructions, see the [Virtuozzo Hybrid Server 7 Installation Guide](#).
6. Choose another Virtuozzo 6 server in the old cluster and migrate VMs and containers from it to the new Virtuozzo Storage cluster based on Virtuozzo Hybrid Server 7. For details, see [Migrating VMs and Containers from Virtuozzo 6 to Virtuozzo Hybrid Server 7](#) on page 18.

7. If you have iSCSI targets on your Virtuozzo Storage cluster based on Virtuozzo 6, move them to the new Virtuozzo Storage cluster based on Virtuozzo Hybrid Server 7. For details, see [Moving iSCSI Targets between Virtuozzo Storage Clusters](#) on page 21.
8. Perform a fresh install of Virtuozzo Hybrid Server 7 on the second server. During installation, choose to join the new Virtuozzo Storage cluster based on Virtuozzo Hybrid Server 7. For instructions, see the [Virtuozzo Hybrid Server 7 Installation Guide](#).
9. Repeat steps 6-8 for the remaining servers in the old cluster until all Virtuozzo 6 servers are upgraded to Virtuozzo Hybrid Server 7.
10. If you store VM and container backups on a Virtuozzo 6 server, move them to a Virtuozzo Hybrid Server 7 server as described in [Restoring Virtuozzo 6 Backups to Virtuozzo Hybrid Server 7](#) on page 23.

## 2.2.2 Upgrading by Migrating to a New Virtuozzo Storage Cluster

To upgrade by migrating VMs and containers from an old Virtuozzo Storage cluster based on Virtuozzo 6 to a new Virtuozzo Storage cluster based on Virtuozzo Hybrid Server 7, do the following:

1. Update all servers in the cluster based on Virtuozzo 6 to the latest version. You can do this by running `yum update` on each server.

---

**Note:** The oldest Virtuozzo 6 build eligible for upgrade is 6.0.11-3466.

---

2. On a different set of servers, create a new Virtuozzo Storage cluster based on Virtuozzo Hybrid Server 7. For instructions, see the [Virtuozzo Hybrid Server 7 Installation Guide](#).
3. Migrate VMs and containers from the old cluster to the new cluster. For more details, see [Migrating VMs and Containers from Virtuozzo 6 to Virtuozzo Hybrid Server 7](#) on page 18.
4. If you have iSCSI targets on your Virtuozzo Storage cluster based on Virtuozzo 6, move them to the new Virtuozzo Storage cluster based on Virtuozzo Hybrid Server 7. For details, see [Moving iSCSI Targets between Virtuozzo Storage Clusters](#) on page 21.
5. If you store VM and container backups on a Virtuozzo 6 server, move them to a Virtuozzo Hybrid Server 7 server as described in [Restoring Virtuozzo 6 Backups to Virtuozzo Hybrid Server 7](#) on page 23.

## 2.2.3 Upgrading In-Place with Virtuozzo Storage

Virtuozzo 6 hardware nodes in a Virtuozzo Storage cluster can be upgraded in-place to Virtuozzo Hybrid Server 7 as follows:

1. Update all servers in the cluster to the latest version of Virtuozzo 6. You can check versions on all cluster nodes with `pstorage -c <cluster_name> stat`.

---

**Note:** The oldest Virtuozzo 6 build eligible for upgrade is [6.0.11-3466](#).

---

2. Add at least two spare Virtuozzo Hybrid Server 7 servers to the cluster to ensure high availability of virtual environments that will be hosted on the upgraded Virtuozzo Hybrid Server 7 servers. To do this, perform a fresh install of Virtuozzo Hybrid Server 7 on two or more servers. During installation, choose to join your Virtuozzo Storage cluster and tick the checkbox for the **Client Server Role** that will automatically enable HA for virtual machines and containers registered on the server. For more details, see [Joining an Existing Virtuozzo Storage Cluster](#).

---

**Important:** After you update the last node with the MDS server to Virtuozzo Hybrid Server 7, you will not be able to create or re-create Virtuozzo 6 MDS servers. In addition, you will not be able to use Virtuozzo 6 CS servers or clients (cluster mountpoints on Virtuozzo 6 nodes) in a cluster without Virtuozzo 6 MDS servers.

---

3. If you have iSCSI targets registered on the Virtuozzo 6 server, stop and unregister them from the server before the upgrade. For example, for the target `iqn.2014-04.com.pstorage:test1` run:

```
# pstorage-iscsi stop -t iqn.2014-04.com.pstorage:test1
# pstorage-iscsi unregister -t iqn.2014-04.com.pstorage:test1
```

4. If you have virtual machines on the Virtuozzo 6 server, migrate them to the newly added Virtuozzo Hybrid Server 7 servers as described in [Migrating VMs and Containers from Virtuozzo 6 to Virtuozzo Hybrid Server 7](#) on page 18.
5. Upgrade each cluster node, one at a time, to Virtuozzo Hybrid Server 7 as described in [Upgrading In-Place with Local Storage](#) on page 4.
6. Re-register the iSCSI targets and restart them on the upgraded Virtuozzo Hybrid Server 7 server. For example, for the target `iqn.2014-04.com.pstorage:test1` run:

```
# vstorage-iscsi register -t iqn.2014-04.com.pstorage:test1
# vstorage-iscsi start -t iqn.2014-04.com.pstorage:test1
```

7. When only three Virtuozone 6 servers are left to upgrade, migrate all virtual environments from them to the upgraded Virtuozone Hybrid Server 7 servers. For more details, see [Migrating VMs and Containers from Virtuozone 6 to Virtuozone Hybrid Server 7](#) on page 18.
8. Repeat step 5 for the remaining servers until all Virtuozone 6 servers are upgraded to Virtuozone Hybrid Server 7.

If at some point your cluster happens to be populated with both Virtuozone 6 and Virtuozone Hybrid Server 7 hardware nodes, it will retain the functionality of Storage for Virtuozone 6 but not gain the new features of Storage for Virtuozone Hybrid Server 7 like erasure coding. As soon as the last Virtuozone 6 MDS server is removed and the total count of Virtuozone Hybrid Server 7 MDS servers reaches three, the cluster will begin operating with complete functionality offered by Storage for Virtuozone Hybrid Server 7.

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**Note:** Even though Virtuozone Storage supports mixed clusters, it is recommended to eventually upgrade all nodes in the cluster to Virtuozone Hybrid Server 7.

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## CHAPTER 3

# Upgrading to Virtuoazzo Storage with GUI Management

This chapter describes how to upgrade the following:

- Virtuoazzo 6 and Virtuoazzo Hybrid Server 7 servers with local storage to Virtuoazzo Storage with GUI management based on Virtuoazzo Hybrid Server 7.
- Virtuoazzo Storage clusters with CLI management based on Virtuoazzo 6 and Virtuoazzo Hybrid Server 7 to Virtuoazzo Storage clusters with GUI management based on Virtuoazzo Hybrid Server 7.

## 3.1 Upgrading Virtuoazzo 6 and Virtuoazzo Hybrid Server 7 with Local Storage

This section describes how to upgrade Virtuoazzo 6 or Virtuoazzo Hybrid Server 7 servers with local storage to Virtuoazzo Storage with GUI management based on Virtuoazzo Hybrid Server 7. To do this you will need spare servers to deploy a new Virtuoazzo Storage cluster with GUI management.

---

**Note:** After upgrading a node in a mixed cluster, you cannot migrate VEs (virtual machines and containers) created in datastores with encoding EC 3+2, 5+2, 7+2, or 17+3 from VHS 7.5 Update 4 to VHS 7.5 Update 3. However, the migration of VEs created in local datastores and datastores with a 3-replica and 2-replica data redundancy mode is available. A mixed cluster is not supported and exists during the upgrade only.

---

To upgrade your Virtuoazzo Hybrid Server servers with local storage, follow the steps below:

1. If you are upgrading a Virtuoizzo 6 server, update it to the latest version. You can do this by running `yum update`.

---

**Note:** The oldest Virtuoizzo 6 build eligible for upgrade is [6.0.11-3466](#).

---

2. On a set of spare servers, create and configure a new Virtuoizzo Storage cluster with GUI management based on Virtuoizzo Hybrid Server 7. For instructions, see [Installing with GUI Management and Managing Storage](#).
3. Create datastores for VMs, containers, and backups as described in [Managing Datastores](#).
4. Log in to Virtuoizzo Automator and choose to place VMs, containers, and backups in the created datastores for all servers from the cluster. For instructions, see [Configuring Virtual Environments Host Settings](#).
5. Choose a Virtuoizzo Hybrid Server server with local storage to upgrade and migrate VMs and containers from it to the new cluster. For more details, see [Migrating VMs and Containers from Virtuoizzo 6 to Virtuoizzo Hybrid Server 7](#) on page 18 and [Migrating Virtual Machines and Containers](#).
6. If you store VM and container backups on the server with local storage, move them to a server from the new cluster:
  - Backups of Virtuoizzo 6 VMs or containers can be restored on a Virtuoizzo Hybrid Server 7 server as described in [Restoring Virtuoizzo 6 Backups to Virtuoizzo Hybrid Server 7](#) on page 23
  - Backups of Virtuoizzo Hybrid Server 7 VMs or containers can be placed in a new Virtuoizzo Storage datastore by moving their files to `/mnt/vstorage/vols/datastores/<datastore_name>`
7. Reinstall Virtuoizzo Hybrid Server 7 on the server to upgrade. During installation, choose to install these components:
  - Storage for Virtuoizzo Storage, see [Installing Storage on the Second and Other Servers](#), and
  - Compute for Virtuoizzo Automator, see [Installing Compute on the Second and Other Servers](#)
8. In the Virtuoizzo Storage management panel, assign the network roles to the server's network interfaces (see [Configuring Node Network Interfaces](#)) and add the server to the cluster (see [Adding Nodes to the Cluster](#)).
9. In Virtuoizzo Automator, choose datastores for the node as you did in step 4.
10. Repeat steps 7-9 for the remaining servers with local storage until all of them are upgraded and joined

to Virtuozzo Storage cluster with GUI management based on Virtuozzo Hybrid Server 7.

## 3.2 Upgrading Virtuozzo 6 and 7 with Virtuozzo Storage

This section describes how to upgrade Virtuozzo Storage with CLI management based on Virtuozzo 6 or 7 to Virtuozzo Storage with GUI management based on Virtuozzo Hybrid Server 7. The procedure consists of two major parts: upgrading the first cluster node and upgrading the second and other cluster nodes.

---

**Important:** In a mixed cluster, it is critical to upgrade metadata services (MDS) last.

---

---

**Note:** After upgrading a node in a mixed cluster, you cannot migrate VEs (virtual machines and containers) created in datastores with encoding EC 3+2, 5+2, 7+2, or 17+3 from VHS 7.5 Update 4 to VHS 7.5 Update 3. However, the migration of VEs created in local datastores and datastores with a 3-replica and 2-replica data redundancy mode is available. A mixed cluster is not supported and exists during the upgrade only.

---

To upgrade the first node in your cluster, do the following:

1. Install all available updates on Virtuozzo Storage nodes by running `yum update` on each.

---

**Note:** The oldest Virtuozzo 6 build eligible for upgrade is [6.0.11-3466](#).

---

2. Choose a Virtuozzo Storage node to upgrade. If possible, choose one without MDS servers. Migrate VMs and containers from this node to other Virtuozzo Storage nodes. If you also keep backups on this node, move their files to a temporary location. If you have iSCSI targets registered on this node, stop the iSCSI targets if they are up and unregister them from the node (for instructions, refer to [Moving iSCSI Targets between Virtuozzo Storage Clusters](#) on page 21).

If you use Virtuozzo Automator, you can migrate VMs and containers with it. If you do not, you may need to consult the following, depending on your migration scenario:

- [Virtuozzo 6 User's Guide](#)



- [Migrating Virtual Machines and Containers](#)
- [Migrating VMs and Containers from Virtuoizzo 6 to Virtuoizzo Hybrid Server 7](#) on page 18

3. Remove chunk servers from the chosen node:

- 3.1. Find out which chunk and metadata servers are located on the node by running `pstorage -c <cluster_name> top` (Virtuoizzo 6) or `vstorage -c <cluster_name> top` (Virtuoizzo Hybrid Server 7) on any node in the cluster.
- 3.2. Initiate removal of chunk servers from the node by running `pstorage -c <cluster_name> rm-cs --wait <CS_ID>` (Virtuoizzo 6) or `vstorage -c <cluster_name> rm-cs --wait <CS_ID>` (Virtuoizzo Hybrid Server 7) for each CS on the node.
- 3.3. Wait until the chunk servers are removed from the node and Virtuoizzo Storage rebuilds.

To monitor this process, run `pstorage -c <cluster_name> top` (Virtuoizzo 6) or `vstorage -c <cluster_name> top` (Virtuoizzo Hybrid Server 7) on any node in the cluster. The status of the chunk servers being removed will change to `releasing` and the number of replicas on them will start to decrease. When the number of replicas on a CS reaches zero, the CS will be removed both from the node and `pstorage top` (`vstorage top`) output. Make sure that no chunk servers are left on the node to be upgraded.

4. If the node has metadata servers, remove them by running `pstorage -c <cluster_name> rm-mds <MDS_ID>` (Virtuoizzo 6) or `vstorage -c <cluster_name> rm-mds <MDS_ID>` (Virtuoizzo Hybrid Server 7) for each MDS on the node.
5. Perform a fresh install of Virtuoizzo Hybrid Server 7 on the node. It will be the first node in your new Virtuoizzo Storage infrastructure.

During installation, choose to install the Virtuoizzo Storage management panel (see [Installing Management Panel and Compute on the First Server](#)) and the Virtuoizzo Automator management panel (see [Installing Management Panel and Compute on the First Server](#)).

---

**Note:** If you already have Virtuoizzo Automator set up, you can use it instead. To easily switch to the Virtuoizzo Storage management panel, you can install Virtuoizzo Storage management plugin for your Virtuoizzo Automator as described in [Logging In to Virtuoizzo Storage Management Panel](#).

---

After installation, the node will show up as a storage node in the newly installed Virtuoizzo Storage management panel.

6. Manually enable backward compatibility to allow managing the cluster from the upgraded node and the new Virtuoizzo Storage management panel.

To do this, log in to the upgraded node and set the `Environment` parameter to `PCS_FORCE_CLNT_ID=1` in the `/usr/lib/systemd/system/vstorage-ui-agent.service` file. For example:

```
<...>
Environment=PCS_FORCE_CLNT_ID=1 AGENT_CONFIG<...>
<...>
```

Then restart the `vstorage-ui-agent` service:

```
# systemctl daemon-reload
# systemctl restart vstorage-ui-agent
```

7. Log in to the Virtuoizzo Storage management panel and assign the network role **Storage** to the node's network interface. For instructions, see [Configuring Node Network Interfaces](#).
8. Authenticate the node in the existing Virtuoizzo 6 cluster by running the following command on it:

```
# vstorage -c <cluster_name> auth-node
```

Specify the cluster password when prompted.

9. Register the cluster in the Virtuoizzo Storage management panel and add the already upgraded node to the cluster.

To do this:

- 9.1. In the management panel, click **ADD NODE** and save the shown token.
- 9.2. On the upgraded node, run the `/usr/libexec/vstorage-ui-agent/bin/register-storage-node.sh` script, specifying the IP address of the container with the management panel and the token you obtained earlier. For example:

```
# /usr/libexec/vstorage-ui-agent/bin/register-storage-node.sh \
-m <management_panel_IP> -t <token> -r -P
```

Specify cluster password when prompted.

The existing cluster configuration will be detected, the cluster will be added to the management panel, and the node will be added to the cluster.

After the script completes, the complete cluster parameters (physical and logical space, number of CS and MDS, etc.) will be displayed on the **OVERVIEW** screen. However, only the node you have already upgraded will be shown on the **NODES** screen.

10. In Virtuozzo Storage management panel, assign to node disks the same storage roles they had before the upgrade. For example, **Storage** (CS) and **Metadata** (MDS). For instructions, see [Assigning Disk Roles Manually](#).
11. Wait until the cluster rebalances the data between chunk servers and **HEALTHY** is shown on the **OVERVIEW** screen.
12. Create the desired datastores for VMs, containers, and backups as described in [Managing Datastores](#).

---

**Note:** If you are upgrading a Virtuozzo Storage cluster based on Virtuozzo 6, use only replication for datastores as erasure coding is not supported by Virtuozzo 6.

---

13. Log in to Virtuozzo Automator, open the node summary, and choose to place VMs, containers, and backups in the created Virtuozzo Storage datastores. For instructions, see [Configuring Virtual Environments Host Settings](#).
14. Register existing Virtuozzo 6 nodes in Virtuozzo Automator:
  - 14.1. Update the VA Agent on these nodes to the latest version as described [here](#).
  - 14.2. Add Virtuozzo 6 nodes to Virtuozzo Automator one by one by clicking **New... > Hardware Node** and providing the necessary details.
15. From Virtuozzo Automator, migrate VMs and containers back to the upgraded node. They will be placed in the specified datastore(s). In addition, if you previously moved backups to the temporary location, you can place them in a new Virtuozzo Storage datastore by moving their files to `/mnt/vstorage/vols/datastores/<datastore_name>`.
16. To re-register iSCSI targets on this node, refer to [Moving iSCSI Targets between Virtuozzo Storage Clusters](#) on page 21.

The first node is upgraded. Proceed with the remaining nodes, choosing ones without MDS servers first.

1. Choose a node to upgrade. Migrate VMs and containers, move backups, and unregister iSCSI targets from it as you did for the first node.
2. Remove chunk servers from the node as you did for the first node.
3. Perform a fresh install of Virtuozzo Hybrid Server 7 on the node. During installation, choose to install these components:
  - Storage for Virtuozzo Storage, see [Installing Storage on the Second and Other Servers](#), and

- Compute for Virtuocho Automator, see [Installing Compute on the Second and Other Servers](#)
4. In the Virtuocho Storage management panel, assign the network roles to node's network interfaces as you did for the first node and add it to the cluster as explained in [Adding Nodes to the Cluster](#).

---

**Important:** When assigning disk roles in a mixed cluster, make sure that the number of Virtuocho 6 MDS servers is never equal to that of Virtuocho Hybrid Server 7.

---

5. In Virtuocho Automator, choose datastores for the node as you did for the first node.
6. Re-register iSCSI targets on this node as you did for the first node.
7. Repeat these steps for the remaining nodes in the cluster until the entire cluster is upgraded to Virtuocho Storage with GUI management based on Virtuocho Hybrid Server 7.
8. Revert the changes made to the Environment parameter in the `/usr/lib/systemd/system/vstorage-ui-agent.service` file on the first node. For example:

```
<...>  
Environment=AGENT_CONFIG<...>  
<...>
```

Restart `vstorage-ui-agent`:

```
# systemctl daemon-reload  
# systemctl restart vstorage-ui-agent
```

## CHAPTER 4

# Migrating VMs and Containers from Virtuozzo 6 to Virtuozzo Hybrid Server 7

You can migrate older Virtuozzo 6 virtual machines (online) and containers (offline only) to Virtuozzo Hybrid Server 7 servers. During migration, such VMs and containers will be converted in the Virtuozzo Hybrid Server 7 format. In particular, VM devices will be replaced by those supported in Virtuozzo Hybrid Server 7 (for a list of VM hardware supported in Virtuozzo Hybrid Server 7, see [Virtual Machine Hardware](#)).

Before migrating Virtuozzo 6 virtual machines, take into account the following requirements and restrictions:

- The hardware node must be running the latest version of Virtuozzo 6 (or at least [6.0.11-3466](#)).
- The recommended and highest-supported destination hardware node version is Virtuozzo Hybrid Server 7.5 Update 4.
- The VM must have a guest OS installed.
- The VM must not have snapshots.
- The VM must be running.
- The container must be stopped.
- Windows VMs may have Virtuozzo guest tools, and Linux VMs must have installed kernel headers and kernel-devel packages.
- The system time must be synchronized on the source and destination servers, for example, by means of NTP (<http://www.ntp.org>). The reason is that certain processes running in virtual machines may rely

on system time being steady and might behave unpredictably when resumed on a destination server where time is different.

- The network must support data transfer rates of at least 1Gbps.
- The source and destination servers must belong to the same subnetwork.
- The CPUs on the source and destination servers must be manufactured by the same vendor, and the CPU capabilities of the destination server must be the same or exceed those on the source server.
- VM disks can be located on local disks, shared NFS and GFS2 storages, and iSCSI raw devices.
- Live migration is not supported for both VMs and containers. However, you can use hot VM migration, which involves the following:
  - Sending disk data in the background while the VM runs and stopping the VM to finish the migration and conversion on the destination server.
  - Restarting the VM with a guest OS on the destination server.

To migrate a running VM or a stopped or suspended container from Virtuozzo 6 to Virtuozzo Hybrid Server 7, run the following command on the Virtuozzo 6 server.

```
# prlctl migrate <VM_or_CT_name> root@<VZ7_server_IP_address_or_hostname>
```

---

**Note:** If you need to migrate a container from a Virtuozzo 6 server with local storage to a Virtuozzo Storage cluster based on Virtuozzo Hybrid Server 7, use the following command: `prlctl migrate <CT_name> root@<VZ7_server_IP_address_or_hostname>/<CT_UUID>`.

---

Migration from Virtuozzo 6 to Virtuozzo Hybrid Server 7 implies VM and container downtime that depends on network bandwidth, virtual machine RAM size, and server load. To reduce downtime, it is recommended to at least perform migration when the server load is minimal.

During migration, a virtual machine is copied to the destination server and converted to the Virtuozzo Hybrid Server 7 format. After a successful migration, the original Virtuozzo 6 VM is unregistered and the `.migrated` suffix is added to its directory name. If conversion fails, the migrated VM is deleted from the destination server and you can try again. If the second attempt also fails, you need to enable a legacy VM debug mode on the destination Virtuozzo Hybrid Server 7 server (see [Enabling Legacy VM Debug Mode](#)), make another migration attempt, send the problem report, and contact the technical support team. With the debug mode enabled, the migrated VM will not be deleted from the destination Virtuozzo Hybrid Server 7 server after conversion failure. It will remain stopped or running with disabled network to let the technical support team

study the memory dump and find out the reason for failure.

Note the following:

- Network settings configured from inside Windows VMs currently cannot be preserved during migration of such VMs.
- VNC is enabled in VMs before migration so that the technical support team can locate the issue if migration fails.
- Parallels guest tools, if such exist, are automatically removed from VMs during conversion, and then Virtuozzo guest tools are installed.
- Containers with templates unsupported in Virtuozzo Hybrid Server 7 (i.e. not listed in [Virtuozzo Hybrid Server Supported Guest Operating Systems Guide](#)) cannot be reinstalled with the `prlctl reinstall` command after migration to Virtuozzo Hybrid Server 7.

## CHAPTER 5

# Moving iSCSI Targets between Virtuoizzo Storage Clusters

You can move iSCSI targets between your Virtuoizzo Storage clusters as follows:

- From a Virtuoizzo Storage cluster based on Virtuoizzo 6 to a Virtuoizzo Storage cluster with CLI management based on Virtuoizzo Hybrid Server 7
- From a Virtuoizzo Storage cluster based on Virtuoizzo 6 to a Virtuoizzo Storage cluster with GUI management based on Virtuoizzo Hybrid Server 7
- From a Virtuoizzo Storage cluster with CLI management based on Virtuoizzo Hybrid Server 7 to a Virtuoizzo Storage cluster with GUI management based on Virtuoizzo Hybrid Server 7

To move your iSCSI targets from one cluster to another, do the following:

1. Stop iSCSI targets if they are running and unregister them from the server. For example:

- On a Virtuoizzo 6 server, for the iSCSI target `iqn.2014-04.com.pstorage:test1`, run:

```
# pstorage-iscsi stop -t iqn.2014-04.com.pstorage:test1
# pstorage-iscsi unregister -t iqn.2014-04.com.pstorage:test1
```

- On a Virtuoizzo Hybrid Server 7 server, for the iSCSI target `iqn.2014-04.com.vstorage:test1`, run:

```
# vstorage-iscsi stop -t iqn.2014-04.com.vstorage:test1
# vstorage-iscsi unregister -t iqn.2014-04.com.vstorage:test1
```

2. Configure the Virtuoizzo Storage cluster where iSCSI targets will be moved:

- For a cluster with CLI management, follow the instructions given in [Preparing to Work with iSCSI Targets](#).



- For a cluster with GUI management, assign the network role **iSCSI** to the node's network interface in the Virtuoizzo Storage management panel (see [Configuring Node Network Interfaces](#)).
3. Copy the directory containing iSCSI targets from the the old Virtuoizzo Storage cluster to the new cluster. The default locations of iSCSI targets are:
    - in Virtuoizzo Storage based on Virtuoizzo 6, `/pstorage/<cluster_name>/iscsi/`,
    - in Virtuoizzo Storage with CLI management based on Virtuoizzo Hybrid Server 7, `/vstorage/<cluster_name>/iscsi/`,
    - in Virtuoizzo Storage with GUI management based on Virtuoizzo Hybrid Server 7, `/mnt/vstorage/vols/iscsi/`.
  4. Register and start the copied iSCSI targets on the upgraded Virtuoizzo Hybrid Server 7 server. For example, for the iSCSI target `iqn.2014-04.com.vstorage:test1`, run:

```
# vstorage-iscsi register -t iqn.2014-04.com.vstorage:test1
# vstorage-iscsi start -t iqn.2014-04.com.vstorage:test1
```

## CHAPTER 6

# Restoring Virtuozzo 6 Backups to Virtuozzo Hybrid Server 7

Virtuozzo Hybrid Server 7 supports restoring backups of Virtuozzo 6 VMs and containers to Virtuozzo Hybrid Server 7.

The following rules and considerations apply:

- Restore commands are run on the destination server (to which the backups will be restored).
- Only stopped virtual machines and containers can be restored from backup.
- Windows VMs without installed Virtuozzo guest tools cannot be restored from Virtuozzo 6 backups (or backed up to Virtuozzo Hybrid Server 7).
- Backups of virtual machines and containers with guests unsupported in Virtuozzo Hybrid Server 7 may not be restored correctly.
- VZFS-based containers must be converted to ploop format and backed up again before they can be restored to Virtuozzo Hybrid Server 7.
- The recommended and highest-supported destination hardware node version for restoring backups created on Virtuozzo 6 is Virtuozzo Hybrid Server 7.5 Update 4.

To restore a specific backup of a Virtuozzo 6 VM or container stored on remote Virtuozzo Hybrid Server, do the following:

1. Find out the backup ID by listing backups stored on the remote server:

```
# prlctl backup-list -s root@<backup_server>
```

2. Specify the found backup ID in the restore command:

```
# prlctl restore -t <backup_ID> -s root@<backup_server>
```

To restore a remotely stored backup of a Virtuozzo 6 VM or container after said VM or container has been migrated to Virtuozzo Hybrid Server 7, run

```
# prlctl restore <VM_or_CT_name_or_UUID> -s root@<backup_server>
```

To copy a Virtuozzo 6 VM or container backup to Virtuozzo Hybrid Server 7 and restore it there, do the following:

1. Find out the backup ID by listing backups stored on the Virtuozzo Hybrid Server:

```
# prlctl backup-list root@<backup_server>
```

2. Find out the default backup directory on Virtuozzo Hybrid Server 7:

```
prlsrvctl info | grep "Backup path"
```

3. Copy backup files to the default backup directory on Virtuozzo Hybrid Server 7. For example, if backups are stored in the default directory on a Virtuozzo 6 server, run:

```
# scp -r root@<VZ6_server>:/var/parallels/backups/<VM_UUID> \
/vz/vmprivate/backups/
```

Or, if you keep backups on network storage, attach said network storage to the default backup directory on Virtuozzo Hybrid Server 7. For example, if you store backups on an NFS share, mount this share to /vz/vmprivate/backups/.

4. Restore the copied backup:

```
# prlctl restore -t <backup_ID>
```

## CHAPTER 7

# Upgrading from Other Products to Virtuozzo Hybrid Server 7

Currently, you can upgrade physical or virtual servers to Virtuozzo Hybrid Server 7 from Virtuozzo Containers for Linux 4.7, OpenVZ, and CentOS 7.x:

- Containers created with Virtuozzo Containers for Linux 4.7 or OpenVZ based on kernels 2.6.18 and 2.6.32 can be migrated to Virtuozzo Hybrid Server 7.
- CentOS 7.x or OpenVZ based on kernel 3.10 can be upgraded to Virtuozzo Hybrid Server 7.

## 7.1 Migrating Containers from Legacy Products to Virtuozzo Hybrid Server 7

You can migrate containers from a server running Virtuozzo Containers for Linux 4.7 or OpenVZ based on kernels 2.6.18 and 2.6.32 to a Virtuozzo Hybrid Server 7 server. Use the `ovztransfer.sh` script freely available at <https://src.openvz.org/scm/ovz/ovztransfer.git>.

---

**Note:** Before the migration, take into account the following:

- Ensure the source node can connect to the destination node via SSH.
- The recommended and highest-supported destination hardware node version is Virtuozzo Hybrid

## Server 7.5 Update 4.

Do the following:

1. Install an SSH key on the destination server for the root user. To do this, generate a key on the source server:

```
# ssh-keygen -t rsa
```

Then transfer the key to the destination server:

```
# ssh-copy-id root@<dest_server>
```

2. Clone the script repository to the source OpenVZ server:

```
# git clone https://src.openvz.org/scm/ovz1/ovztransfer.git
```

3. Change to the /ovztransfer directory and make the script executable:

```
# chmod 755 ovztransfer.sh
```

4. Stop the containers to be migrated.
5. Initiate migration on the source OpenVZ server as follows:

```
# ./ovztransfer.sh <dest_server> <source_CT1_ID>[:<new_CT1_name>] \  
[ ... <source_CTn_ID>[:<new_CTn_name>]]
```

Where <source\_CT\_ID> (the source container ID) and <new\_CT\_name> (the new container name) must both be specified in the old numerical ID format. For example:

```
# ./ovztransfer.sh 192.168.0.10 100:200
```

So, in the example above, 200 will be the name of the resulting ploop-based container on the Virtuozzo Hybrid Server 7 server, even though said name looks like an old numerical ID.

You can tweak script behavior with the following environment variables:

- `OVZTR_METHOD`, can be `tar+ssh` (default) or `rsync`. Sets the method of transferring the data to the destination node. With the default `tar+ssh`, the container data is packed using `tar`, passed via pipe and SSH to the destination node, and unpacked. With `rsync`, the container data is copied to the destination using `rsync` over SSH.
- `OVZTR_COMPRESS`, can be `0` (disabled) or `1` (enabled). Toggles compression during data transfer. If enabled, adds the `-z` option to `tar` or `rsync`. Enabling compression saves network traffic but results in higher CPU load.

For example:

```
# export OVZTR_COMPRESS=1 OVZTR_METHOD=rsync
# ./ovztransfer.sh 192.168.0.10 100:200
```

## 7.2 Upgrading from OpenVZ Based on Kernel 3.10 to Virtuozzo Hybrid Server 7

**Warning:** This procedure cannot be reverted.

---

**Note:** Upgrading requires an Internet connection to download Virtuozzo Hybrid Server 7 packages.

---

To upgrade a server from OpenVZ based on kernel 3.10 to Virtuozzo Hybrid Server 7:

1. Run the upgrade script:

```
# do-upgrade-vz7 --key <VZ7_product_key>
```

In the process, the commercial Virtuozzo Hybrid Server 7 packages will be downloaded and installed on your server.

---

**Note:** To skip license installation, use `--skip-license` instead of `--key <VZ7_product_key>`. In this case, you will need to install a license later with the `vzlicload` tool.

---

2. Reboot the server.

## 7.3 Upgrading from CentOS 7 to Virtuozzo Hybrid Server 7

**Warning:** This procedure cannot be reverted.

Physical or virtual servers running CentOS 7.x can be upgraded to Virtuozzo Hybrid Server 7.

The server must:

- Have a clean CentOS 7.x installation without third-party drivers or packages
- Have ext4 file system on the root disk
- Meet Virtuozzo Hybrid Server 7 system requirements described in the [Installation Guide](#)
- Have Internet connection for downloading VzLinux and Virtuozzo Hybrid Server packages

To upgrade CentOS 7.x to Virtuozzo Hybrid Server 7, do the following:

1. Convert CentOS 7 to VzLinux 7. To do this, download and run the upgrade script:

```
# wget http://repo.virtuozzo.com/vzlinux/vzdeploy/vzdeploy
# chmod 755 vzdeploy
# ./vzdeploy
```

The script will replace CentOS repositories and packages with VzLinux ones, install a VzLinux kernel in addition to the current CentOS one, and activate a trial VzLinux license.

2. Upgrade VzLinux 7 to Virtuozzo Hybrid Server 7. To do this, run the script `do-upgrade-vzlin-vz7` installed with the `vzlin-release` package on previous steps.

```
# do-upgrade-vzlin-vz7 --key <VZ7_product_key>
```

---

**Note:** You can skip license installation by specifying `--skip-license` instead of `--key <VZ7_product_key>`. In this case, you will need to install a license later with the `vzlicload` tool.

---

The script will add Virtuozzo Hybrid Server 7 repositories, install Virtuozzo Hybrid Server 7 packages, and perform required configuration. No new partitions will be created during installation (e.g., `/vz` will be a directory on the root disk).

3. Reboot the server to start using Virtuozzo Hybrid Server 7.
4. Optionally, you can remove the CentOS kernel to make sure that the server always boots to the Virtuozzo Hybrid Server kernel.

```
# yum remove kernel
```