



Virtuozzo Hybrid Server 7

PXE Installation Guide

April 12, 2022

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CHAPTER 1

Introduction

This guide explains how to install Virtuozzo Hybrid Server over network using a Linux-based preboot execution environment (PXE).

You can install Virtuozzo Hybrid Server over network in one of the two modes:

- **Attended.** This mode is very much the same as installing Virtuozzo Hybrid Server from a DVD. The key difference is that the distribution files are delivered over network. In this mode, you will need to configure installation options manually. The attended mode can be used to install Virtuozzo Hybrid Server on a small number of servers.
- **Unattended.** In this mode, Virtuozzo Hybrid Server installer uses a kickstart file with instructions on how to configure the server and install Virtuozzo Hybrid Server and requires no interaction on your part. The unattended mode can be recommended to automate Virtuozzo Hybrid Server installation on a large number of servers.

In a nutshell, the PXE network installation procedure involves these steps:

1. Make the Virtuozzo Hybrid Server distribution available over network by configuring the HTTP, TFTP, and DHCP servers.
2. Create a kickstart file if unattended installation is planned.
3. Boot the client server from network and install Virtuozzo Hybrid Server in one of the two modes.

All of these steps are described in the following chapters.

CHAPTER 2

Preparing for PXE Installation

You will need the following servers to install Virtuozzo Hybrid Server over network using PXE:

- A TFTP server that will provide an environment for network boot.
- An HTTP or an FTP server that will provide the Virtuozzo Hybrid Server distribution files.
- A DHCP server that will provide network configuration for other servers.
- One or more client servers where Virtuozzo Hybrid Server will be installed. The client servers must meet the requirements described in [Preparing for Installation](#). In addition, they must have network cards with PXE support.

Note: Unless they already exist in your infrastructure, the TFTP, HTTP (FTP), and DHCP servers can share the same physical machine.

This chapter describes how to configure each of the required servers for PXE installation of Virtuozzo Hybrid Server (on the example of a RHEL-like OS, e.g., CentOS 7).

2.1 Configuring the TFTP Server

Note: If you get the “Permission denied” error when trying to connect to the TFTP server from the client server, try running `# restorecon -Rv /tftboot/` on the TFTP server.

2.1.1 Configuring TFTP Server for Installation on BIOS-based Client Servers

To configure the TFTP server for installation on BIOS-based client servers, do the following:

1. Make sure the TFTP server, Xinetd, and SYSLINUX bootloader are installed:

```
# yum install tftp-server syslinux xinetd
```

2. Edit the `/etc/xinetd.d/tftp` file to have the following:

```
service tftp
{
  disable          = no
  socket_type      = dgram
  protocol         = udp
  wait            = yes
  user            = root
  server          = /usr/sbin/in.tftpd
  server_args     = -v -s /tftpboot
  per_source      = 11
  cps             = 100 2
  flags           = IPv4
}
```

3. Copy the following files to the `/tftpboot` directory (if this directory does not exist, create it under the root `/` directory):
 - `/images/pxeboot/vmlinuz` and `/images/pxeboot/initrd.img` from the Virtuozzo Hybrid Server distribution,
 - `menu.c32` and `pxelinux.0` from the `syslinux` directory (usually `/usr/share/syslinux` or `/usr/lib/syslinux`).
4. In the `/tftpboot` directory, create the `/pxelinux.cfg` directory. In it, create the file `default`.
5. Add the following lines to `/tftpboot/pxelinux.cfg/default`:

```
default menu.c32
prompt 0
timeout 60
ontimeout VZ
menu title Virtuozzo Hybrid Server Boot Menu
label 1
  menu label Install Virtuozzo Hybrid Server 7 with GUI management
  kernel vmlinuz
  append initrd=initrd.img ui ip=dhcp inst.repo=http://<HTTP_server_IP_address>/vz
label 2
  menu label Install Virtuozzo Hybrid Server 7 with CLI management
  kernel vmlinuz
```

```
append initrd=initrd.img ip=dhcp inst.repo=http://<HTTP_server_IP_address>/vz
```

Note: For more details on the parameters you can specify in `/tftpboot/pxelinux.cfg/default`, see the documentation for `syslinux`.

6. Start the `xinetd` service:

```
# systemctl start xinetd.service
```

Or restart it if already running:

```
# systemctl restart xinetd.service
```

7. If necessary, allow incoming connections to the TFTP service in the firewall:

```
# firewall-cmd --add-service=tftp --permanent
# systemctl restart firewalld.service
```

2.1.2 Configuring TFTP Server for Installation on EFI-based Client Servers

To configure the TFTP server for installation on EFI-based client servers, do the following:

1. Make sure the TFTP server and Xinetd are installed:

```
# yum install tftp-server xinetd
```

2. Edit the `/etc/xinetd.d/tftp` file to have the following:

```
service tftp
{
  disable          = no
  socket_type      = dgram
  protocol         = udp
  wait             = yes
  user             = root
  server           = /usr/sbin/in.tftpd
  server_args      = -v -s /tftpboot
  per_source       = 11
  cps              = 100 2
  flags            = IPv4
}
```

3. Copy the following files from the Virtuozzo Hybrid Server distribution to the `/tftpboot` directory (if this directory does not exist, create it under the root `/` directory):

- `/images/pxeboot/vmlinuz`,

- /images/pxeboot/initrd.img,
- /EFI/BOOT/grubx64.efi.

4. In the /tftpboot directory, create the grub.cfg file.

5. Add the following lines to /tftpboot/grub.cfg:

```
set timeout=60
  menuentry 'Virtuozzo Hybrid Server 7 with GUI management' {
    linuxefi vmlinuz ui ip=dhcp inst.repo=http://<HTTP_server_IP_address>/vz
    initrdefi initrd.img
  }
  menuentry 'Virtuozzo Hybrid Server 7 with CLI management' {
    linuxefi vmlinuz ip=dhcp inst.repo=http://<HTTP_server_IP_address>/vz
    initrdefi initrd.img
  }
```

6. Start the xinetd service:

```
# systemctl start xinetd.service
```

Or restart it if already running:

```
# systemctl restart xinetd.service
```

7. If necessary, allow incoming connections to the TFTP service in the firewall:

```
# firewall-cmd --add-service=tftp --permanent
# systemctl restart firewalld.service
```

2.2 Configuring the HTTP Server

To configure the HTTP server to deliver Virtuozzo Hybrid Server distribution files over network, do the following:

1. Make sure the HTTP server package is installed and the service is running. For example:

```
# yum install httpd
# systemctl start httpd.service
```

2. Copy the contents of your Virtuozzo Hybrid Server installation DVD or ISO image to a directory on the HTTP server (e.g., /var/www/html/vz). The directory must have the r-x access permissions so that client server(s) can boot from this location (e.g., <HTTP_server_IP_address>/vz) over network. To set access permissions to the /var/www/html/vz directory, run:


```
# chmod 755 /var/www/html/vz
```

2.3 Configuring the DHCP Server

To configure the DHCP server, do the following:

1. Make sure the DHCP server package is installed:

```
# yum install dhcp
```

2. Add the following lines to the file `/etc/dhcp/dhcpd.conf` (Or `/etc/dhcpd.conf`):

- For installation on BIOS-based client servers:

```
next-server <TFTP_server_IP_address>;  
filename "/pxelinux.0";
```

- For installation on EFI-based client servers:

```
next-server <TFTP_server_IP_address>;  
filename "/grubx64.efi";
```

3. Start the DHCP server if you installed it in step 1:

```
# systemctl start dhcpd.service
```

Or restart the existing DHCP server:

```
# systemctl restart dhcpd.service
```

2.4 Configuring Client Servers

The only configuration step required for each client server where Virtuozzo Hybrid Server will be installed is to enable network boot in BIOS or EFI setup.

CHAPTER 3

Preparing a Kickstart File

To install Virtuozzo Hybrid Server in the unattended mode, you will need a kickstart file. A kickstart file is a text file containing options that instruct the installer how to configure the target physical server and install Virtuozzo Hybrid Server. Kickstart files used in Virtuozzo Hybrid Server installations are similar to those used to install RHEL-like distributions.

The two groups of options you can use in Virtuozzo Hybrid Server kickstart files are:

- The standard options suitable for all RHEL-like distributions
- Options specific to Virtuozzo Hybrid Server (including those for Virtuozzo Storage with GUI and CLI management)

Note: The Virtuozzo Hybrid Server EULA is accepted automatically during kickstart installations.

The following sections describe both groups in detail, explain how to create your own kickstart file, and make it accessible over network.

3.1 Standard Kickstart Options

Your kickstart file may include any of the standard Linux options used in kickstart files for installing Linux operating systems. For the full list of these options and their explanations, consult the respective Linux documentation (e.g., the [Red Hat Enterprise Linux Installation Guide](#)).

Listed below are the mandatory options and commands that you must include in each kickstart file:

Option	Description
auth	Specifies authentication options for the Virtuozzo Hybrid Server physical server.
bootloader	Specifies the way of installing the bootloader.
install	Tells the system to install Virtuozzo Hybrid Server either from <code>nfs</code> or <code>url</code> (for FTP and HTTP installations, respectively). Specify this option to perform a clean installation of Virtuozzo Hybrid Server.
cmdline	Do not start the X Window System and do not show the installer GUI.
keyboard	Sets the system keyboard type.
lang	Sets the language to use during installation and the default language to use on the installed system.
part	Creates partitions on the server.
rootpw	Sets the root user's password.
timezone	Sets the system time zone.
clearpart	Erases partitions on specified (or all) disk drives.
autopart	Automatically creates partitions required to install Virtuozzo Hybrid Server and Virtuozzo Storage (if being installed). Note: This option must follow <code>clearpart</code> .
zerombr	Initializes unused partitions on all disk drives reachable by the installer. Note: This option must follow <code>clearpart</code> .
ignoredisk	Optional. Ignores the specified drives or all drives except the one specified. Used with one of the following arguments: <ul style="list-style-type: none"> <code>--drives=<drive>[, ...]</code>, a comma-separated list of drives to ignore. If a server has drives other than those specified in this option, the installer will ask what to do with them. <code>--only-use=<drive></code>, ignore every drive except the specified.

3.2 Additional Kickstart Options

In addition to standard Linux kickstart options, Virtuozzo Hybrid Server provides a number of own options that you need to add to your kickstart file.

3.2.1 General Options

key (mandatory)

```
key <key>
```

Installs the Virtuozzo Hybrid Server product key on the server.

%packages (mandatory)

Specifies the package groups to install on the server:

- @base, @core, mandatory, core Virtuozzo Hybrid Server packages.
- @vz, mandatory, Virtuozzo Hybrid Server OS virtualization packages.
- @ps, mandatory, Virtuozzo Hybrid Server hardware virtualization packages.
- @qemu, mandatory, QEMU-related packages.
- @clustering, optional, packages required for creating clusters from Virtuozzo Hybrid Server nodes.
- @templates, optional, Virtuozzo Hybrid Server EZ OS templates. To install only specific templates, use the %eztemplates option.
- @vstorage, optional, packages required for setting up Virtuozzo Storage clusters.
- @optional, optional, additional packages not installed by default.

cep (optional)

```
cep [--agree|--agree-node|--disagree]
```

Sets participation in the Customer Experience Program.

Option	Description
<code>--agree</code>	<p>Join the program with physical server and virtual environments. In this case, Virtuozzo Hybrid Server will periodically collect information about the configuration of your physical server and virtual machines and containers and use it to improve the product to better fit your needs.</p> <hr/> <p>Note: No private information like your name, e-mail address, phone number, or keyboard input will be collected.</p> <hr/>
<code>--agree-node</code>	<p>Join the program with physical server only. In this case, Virtuozzo Hybrid Server will periodically collect information only about the configuration of your physical server and use it to improve the product to better fit your needs.</p> <hr/> <p>Note: No private information like your name, e-mail address, phone number, or keyboard input will be collected.</p> <hr/>
<code>--disagree</code>	Do not join the program.

up2date (optional)

Does the following:

1. Configure the repositories with updates for Virtuozzo Hybrid Server software and templates.
2. Check the repositories for available updates.
3. Download and install the updated packages, if any, on the server.

Using this option, you can ensure that you have the latest Virtuozzo Hybrid Server software packages and templates right after the installation, without the need to manually check for updates.

readykernel -disable-autoupdate (optional)

Disables the automatic downloading and installation of the latest ReadyKernel patches for the current kernel. With automatic updating enabled by default, ReadyKernel will check for new patches daily at 12:00 server time. If a patch is available, ReadyKernel will download, install, and load it for the current kernel.

nosfxtemplate (optional)

Skips installation of default cached EZ OS templates. Currently these EZ OS templates are installed by default:

- vzlinux-7-x86_64
- centos-7-x86_64
- centos-6-x86_64
- ubuntu-16.04-x86_64
- ubuntu-14.04-x86_64
- debian-8.0-x86_64
- debian-8.0-x86_64-minimal

%eztemplates (optional)

Installs specific EZ OS templates. All available templates are in the /Packages directory of the Virtuozzo Hybrid Server distribution. You can identify them by the ending part `-ez-<version>.vz7.noarch.rpm` (e.g., `vzlinux-7-x86_64-ez-7.0.0-12.vz7.noarch.rpm`). Template names must be specified without the ending part, one per line, for example:

```
%eztemplates
vzlinux-7-x86_64
centos-7-x86_64
%end
```

When using this parameter, keep in mind the following:

- If you specify an empty list, no templates will be installed on the server.
- If you skip this parameter, all templates included in the Virtuozzo Hybrid Server distribution will be installed on the server.
- Specify `--cache` next to an OS template name to cache it after installation. To cache all installed OS templates, specify `--cache` after `%eztemplates`.

Note: To be able to cache OS templates for certain Linux distributions (e.g., Red Hat Enterprise Linux), you may need to first create repositories with the necessary packages for these OS templates.

prlnet (optional)

```
prlnet --name <name> [--ip-scope-start <start_IP_addr> --ip-scope-end <end_IP_addr>]
      [--ip <adapter_IP_addr>[/<mask>]] [--dhcp-ip <DHCP_IP_addr>]
      [--dhcp-server <on|off>] [--dhcp6-server <on|off>]
      [--ip6-scope-start <start_IP_addr> --ip6-scope-end <end_IP_addr>]
      [--ip6 <adapter_IP_addr>[/<mask>]] [--dhcp-ip6 <DHCP_IP_addr>]
```

Defines the range of IP addresses (IPv4 and IPv6) the DHCP server will be able to allocate to virtual machines in the defined host-only network; virtual adapter IP address (IPv4 and IPv6) and subnet mask; DHCP server IP address (IPv4 and IPv6); and enables or disables the virtual DHCP server (DHCPv4 or DHCPv6).

If you omit one or more parameters, the following default values will be used:

- --ip-scope-start: 10.37.130.1,
- --ip-scope-end: 10.37.130.254,
- --ip: 10.37.130.2/255.255.255.0,
- --dhcp-ip: 10.37.130.1,
- --dhcp-server: on,
- --ip6-scope-start: fdb2:2c26:f4e4::,
- --ip-scope-end: fdb2:2c26:f4e4::ffff,
- --ip6: fdb2:2c26:f4e4::1/ffff:ffff:ffff:ffff::,
- --dhcp-ip6: fdb2:2c26:f4e4::,
- --dhcp6-server: on.

vztturlmap (optional)

Redefines the default locations of repositories with EZ OS and application templates for various operating systems (see `/etc/vztt/ur1.map`). To set a custom repository, specify the OS name followed by = and the URL (e.g., `$FC_SERVER=http://myfedorarepo.com` for Fedora). Separate multiple URLs with spaces.

Note: To cache OS templates for certain operating systems (e.g., RHEL and SLES), first create repositories with the necessary packages for these OS templates.

3.2.2 Options Specific to Virtuozzo Storage with GUI Management

Important: You can only use one set of options, for either GUI or CLI management.

container (optional, mutually excludes register_vaagent/register_vstorage_ui)

```
container --special=va-mn --ip=<VA_MN_IPv4_addr> [--hostname=<VA_MN_hostname>]
          --rootpw=<VA_MN_passwd>
container --special=vstorage-ui --ip=<vstorage_UI_IPv4_addr> [--hostname=<vstorage_UI_hostname>]
          --rootpw=<vstorage_UI_passwd>
```

Creates containers for Virtuozzo Automator Management Node and Virtuozzo Storage management panel. You will need to specify container's IP address and hostname, type of the management panel to install, and root user's password.

Typically, you create containers for both the VA MN and Virtuozzo Storage management panel on the first node of your infrastructure.

register_vaagent (optional, mutually excludes container)

```
register_vaagent --mn_addr=<VA_MN_IPv4_addr> --rootpw=<VA_MN_passwd>
```

Registers the node in the previously installed VA MN.

register_vstorage_ui (optional, mutually excludes container)

```
register_vstorage_ui --ui_addr=<vstorage_UI_IPv4_addr> [--token=<token>]
```

Registers the node in the previously installed Virtuozzo Storage management panel. The `--token=<token>` parameter is only required to deploy the second and other nodes in your Virtuozzo Storage infrastructure. Tokens can be obtained from the Virtuozzo Storage management panel usually installed on the first node.

3.2.3 Options Specific to Virtuozzo Storage with CLI Management

Important: You can only use one set of options, for either GUI or CLI management.

vstorage clusterpw (mandatory)


```
vstorage clusterpw <passwd>
```

Creates a new or supplies the existing password when creating or joining Virtuozzo Storage clusters.

Note: Keeping plain-text passwords in the kickstart file is a security risk if your network is not isolated. In this case, consider installing Virtuozzo Hybrid Server first and configuring Virtuozzo Storage clusters manually later.

vstorage ipaddr (optional, mutually excludes mds_create/mds_join -ip)

```
vstorage ipaddr <IP_address>
```

Sets an IP address through which Virtuozzo Storage services on this node will communicate with similar services on other cluster nodes. The network interface that has the IP address will be added to firewall's trusted zone and all ports will be open for it. It is recommended to keep this interface's network internal and separated from other networks. If the node has a single network interface, avoid opening all ports on it by creating a VLAN for internal traffic.

This option replaces the `--ip` parameter of the `vstorage mds_create` and `vstorage mds_join` options. The `--ip` parameter remains supported, but if both `ipaddr` and `--ip` are used for some reason, their values must be identical. If a storage role is selected, the IP address must be specified by either `ipaddr` or `--ip`.

vstorage mds_create (optional, mutually excludes mds_join)

```
vstorage mds_create <name> [--ip=<IP_address>]
```

Does the following:

- Creates a Virtuozzo Storage cluster with the name `<name>`. A name may contain the characters a-z, A-Z, 0-9 as well as minuses (-) and underscores (_).
- Configures the node as a metadata server (MDS) for the Virtuozzo Storage cluster.
- If `--ip` is specified, assigns the IP address `<IP_address>` to the MDS. It is recommended, however, to use `vstorage ipaddr` instead of `--ip`.

Metadata servers are part of any Virtuozzo Storage cluster. They store metadata about chunk servers, data chunks, and chunk replicas. You must set up at least one MDS for a cluster to function.

Take note of the following:

- MDS servers must have static IP addresses assigned. If you are using DHCP, you should map an IP

address to the MAC address of the MDS server.

- For detailed information on deploying and managing Virtuozzo Storage clusters, consult the [Virtuozzo Storage Administrator's Guide](#).
- The current version of Virtuozzo Storage supports setting up one cluster per kickstart file. So when specifying several `vstorage` commands, make sure that all commands use the same cluster name.

vstorage mds_join (optional, mutually excludes mds_create)

```
vstorage mds_join <name> [--ip=<IP_address>]
```

Does the following:

- Configures the node as a metadata server (MDS) for the Virtuozzo Storage cluster with the name `<name>`. A name may contain the characters `a-z`, `A-Z`, `0-9` as well as minuses (`-`) and underscores (`_`).
- If `--ip` is specified, sets `<IP_address>` as the IP address from which the node will connect to the MDS. It is recommended, however, to use `vstorage ipaddr` instead of `--ip`.

vstorage reg_timeout (optional)

```
vstorage reg_timeout <minutes>
```

Sets the number of minutes during which MDS servers, chunk servers, and clients can try to register with the master MDS server and join the cluster. Every minute, one registration attempt is made. The default value is 0, which assumes that the master MDS server is already up and running.

vstorage cs_join (optional)

```
vstorage cs_join <name> [<options>]
```

Configures the server as a chunk server for the Virtuozzo Storage cluster with the name `<name>`. You can use the following options with this command:

Option	Description
<code>--mpoint=<mnt_point></code>	Specify the mount point under which the chunk server is to be mounted on the server.
<code>--ssd=<MNT_POINT>,<SIZE></code>	Specify the mount point under which the SSD drive is to be mounted on the server.
<code>--ssd=no</code>	Specify this option to forbid the use of SSD drives for write journaling.

Continued on next page

Table 3.2.3.1 -- continued from previous page

Option	Description
<code>--tier=<TIER></code>	Specify the tier, from 0 to 3, defining the type of storage to use for storing data chunks. You can use tiers to keep different categories of data on different chunk servers.
<code>--allow-system-disk</code>	Allow creating chunk servers on system disks. Have in mind that doing so may result in cluster performance degradation.

Do not use these options except for `--ssd=no` if you are creating the default partition layout and chunk server configuration using the `autopart` standard option.

Chunk servers store the contents of virtual machines and containers as 64MB data chunks. All data chunks are replicated, and their replicas are stored on different chunk servers. You must set up at least one chunk server for a cluster to function.

vstorage client (optional)

```
vstorage client <name> [--ssd=<MNT_POINT>|--ssd=no]
```

Configures the server as a client for the Virtuozzo Storage cluster with the name `<name>`.

Option	Description
<code>--ssd=<MNT_POINT></code>	Manually specify the mount point under which the SSD drive is to be mounted on the server. Do not use this option if you are creating the default partition layout and chunk server configuration using the <code>autopart</code> standard option.
<code>--ssd=no</code>	Forbid the use of SSD drives for storing the local cache.

Clients are computers with Virtuozzo Hybrid Server 7 from where you run virtual machines and containers stored on your Virtuozzo Storage.

vstorage key (optional)

```
vstorage key <key>
```

Installs the Virtuozzo Storage product key on the server.

3.3 Kickstart File Example

Below is an example of a kickstart file that you can use to install and configure Virtuozzo Hybrid Server in unattended mode. You can use this file as the basis for creating your own kickstart files.

Important:

- To make sure the disk where you install Virtuozzo Hybrid Server is partitioned correctly, you may need to erase existing partitions with `clearpart`. This command is commented out by default to avoid accidental loss of data.
 - Keeping plain-text passwords in the kickstart file is a security risk if your network is not isolated. Consider encrypting your password according to auth parameters (e.g., with SHA512 as in this example) and using `rootpw --iscrypted <passwd_hash>`.
-

```
# Install Virtuozzo Hybrid Server.
install
# Skip loading X Window System and the installer GUI.
# cmdline
# Specify the location of the Virtuozzo Hybrid Server distribution files.
url --url http://<HTTP_server_IP_address>/vz
# Set the language for the installation and the default system language
# to US English.
lang en_US.UTF-8
# Set the keyboard layout to US English.
keyboard --vckeymap=us --xlayouts='us'
# Erase all partitions from the sda hard drive.
# clearpart --drives=sda --all --initlabel --disklabel=gpt
# Automatically creates required partitions. Requires clearpart.
autopart
# Agree to participate in the Customer Experience Program.
cep --agree
# Obtain network configuration via DHCP.
network --bootproto dhcp
# Download updated packages.
# up2date
# Set the root password for the server.
rootpw <passwd>
# Encrypt user passwords with the SHA-512 algorithm and enable shadow passwords.
auth --enablshadow --passalgo=sha512
# Set the system timezone.
timezone --utc America/New_York --ntpservers=0.pool.ntp.org,1.pool.ntp.org
# Set sda as the first drive in the BIOS boot order and write the boot record to
# MBR.
bootloader --location=mbr
```

```
# Reboot the system after installation.
reboot
# Install a Virtuozzo Hybrid Server license.
key <key>
# Install Virtuozzo Hybrid Server packages.
%packages
@^cloudserver
@base
@core
@ps
@qemu
@templates
@vstorage
@vz
kexec-tools
%end
```

3.3.1 Kickstart File Example for Virtuozzo Storage with GUI Management

If you need to install Virtuozzo Automator and Virtuozzo Storage, you can expand the basic example as follows:

- For the first node in your VA and Virtuozzo Storage infrastructure, add the following lines to the kickstart file:

```
container --special=va-mn --ip=<VA_MN_IPv4_addr> [--hostname=<VA_MN_hostname>] --rootpw=<VA_MN_
container --special=vstorage-ui --ip=<vstorage_UI_IPv4_addr> [--hostname=<vstorage_UI_hostname>
register_vaagent --mn_addr=<VA_MN_IPv4_addr> --rootpw=<VA_MN_passwd>
register_vstorage_ui --ui_addr=<vstorage_UI_IPv4_addr>
```

- For the second and other nodes in your VA and Virtuozzo Storage infrastructure, add the following lines to the kickstart file:

```
register_vaagent --mn_addr=<VA_MN_IPv4_addr> --rootpw=<VA_MN_passwd>
register_vstorage_ui --ui_addr=<vstorage_UI_IPv4_addr> --token=<token>
```

3.3.2 Advanced Partitioning Example

For more control on partitioning, you can replace `autopart` with a set of `part` commands to adjust the size of required partitions. In this case, each partition will have the same size on every system you install Virtuozzo Hybrid Server on. E.g., if you use the lines below, `swap` will be 4GiB and `/vz` will be 40GiB on every system (whereas if you use `autopart` swap size will depend on RAM size and `/vz` will occupy all available space).

For example, for installation on BIOS-based systems:

```
part /boot --fstype=ext4 --size=1024
part / --fstype=ext4 --size=20096
part /vz --fstype=ext4 --size=40768 --grow
part swap --size=4096
```

For installation on EFI-based systems, also specify

```
part /boot/efi --fstype=efi --size=200
```

Note the following:

- For details on possible partition sizes, see [Partitioning the Hard Drives](#).
- If you are installing Virtuozzo Storage and need to use `part`, also use `vstorage` options to configure partitions for chunk servers and clients. For details, see [Options Specific to Virtuozzo Storage with CLI Management](#) on page 13.

3.4 Making Kickstart File Accessible Over Network

To use the prepared kickstart file, make it accessible over network as follows:

1. Copy the kickstart file to the same directory on the HTTP server where the Virtuozzo Hybrid Server installation files are stored (e.g., `/var/www/html/vz`).
2. Add the option `ks=<HTTP_server_address>/<path_to_kickstart_file>` to the corresponding files on the TFTP server.

Note: The kickstart file contains the location of the Virtuozzo Hybrid Server distribution files and overrides the previously added option `inst.repo=http://<HTTP_server_IP_address>/vz` so you can remove it.

- For installation on BIOS-based systems, modify `/tftpboot/pxelinux.cfg/default`. For example, for the HTTP server at 198.123.123.198 and the kickstart file in `/var/www/html/vz/ks.cfg`, the default file may look like the following:

```
default menu.c32
prompt 0
timeout 60
```

```
ontimeout VZ
menu title Virtuozzo Hybrid Server Boot Menu
label VZ
  menu label Install Virtuozzo Hybrid Server 7
  kernel vmlinuz
  append initrd=initrd.img ip=dhcp ks=http://198.123.123.198/vz/ks.cfg
```

- For installation on EFI-based systems, modify `/tftpboot/grub.cfg`. For example, for the HTTP server at `198.123.123.198` and the kickstart file in `/var/www/html/vz/ks.cfg`, the `grub.cfg` file may look like the following:

```
set timeout=60
menuentry 'Virtuozzo Hybrid Server 7' {
  linuxefi vmlinuz ip=dhcp ks=http://198.123.123.198/vz/ks.cfg
  initrdefi initrd.img
}
```

CHAPTER 4

Launching Installation

Now that you have prepared all the servers, you can start the installation process:

1. Boot the client server from network.
2. Once the PXE boot menu loads, select the entry for Virtuozzo Hybrid Server and press **Enter**.

If you are installing Virtuozzo Hybrid Server in the attended mode, you will need to set options in the installer as laid out in [Starting Installation](#). If you are installing Virtuozzo Hybrid Server in the unattended mode using a kickstart file, no further interaction will be required from you.