# OpenVZ Installation Guide

July 26, 2016

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# Chapter 1. Preparing for Installation

This chapter lists the hardware, software, and network requirements for OpenVZ and explains how to prepare for installing OpenVZ from a USB flash drive.

## 1.1. Hardware Compatibility

### 1.1.1. Requirements for Standalone Installations

The recommended hardware requirements for running OpenVZ as a standalone installation are as follows:

- x86-64 platform with hardware virtualization support: Intel VT-x (with "unrestricted guest") or AMD-V,

  **Note:** To check if the Intel processor supports the "unrestricted guest" feature: 1) Download `vmxcap.py` from https://github.com/qemu/qemu/blob/master/scripts/kvm/vmxcap, 2) Run `python vmxcap.py | grep -i unrest`. The result must be `yes`.

- CPU: at least 4 cores, a 64-bit processor is required for running 64-bit guest operating systems,
- RAM: 4 GB or more,
- HDD: 64 GB or more,
- SSD (optional): at least 30 GB (at least 32 GB with `/boot`)
- Network: an Ethernet network adapter and a valid IP address.

The actual number of virtual machines and containers you can run on a physical server and their performance depend on resources they will consume.

### 1.1.2. System Limits

The table below lists the current hardware limits for OpenVZ servers:

| Hardware | Theoretical | Certified |
|---|---|---|
| RAM | 64 TB | 256 GB |
| HDD | 16 TB | 16 TB |

## 1.2. Network Requirements

To connect to a physical server with OpenVZ, you need to establish a network connection between this server and the remote computer. So, you must have a valid IP address for the physical server as well as know the default gateway, network mask, and DNS configuration.

## 1.3. Preparing for Installation from USB Storage Drives

To install OpenVZ from a USB storage drive, you will need a 2 GB or higher-capacity USB drive and the OpenVZ distribution ISO image.

Make a bootable USB drive by transferring the distribution image to it with `dd`.

**Important!** Be careful to specify the correct drive to transfer the image to.

For example, on Linux:

```
# dd if=openvz-iso-7.0.0-3469.iso of=/dev/sdb
```

And on Windows (with dd for Windows):

```
C:\>dd if=openvz-iso-7.0.0-3469.iso of=\\?\Device\Harddisk1\Partition0
```

# Chapter 2. Installing OpenVZ

This chapter explains how to install OpenVZ.

## 2.1. Starting Installation

OpenVZ can be installed from

- DVD discs
- USB drives (see Section 1.3, “Preparing for Installation from USB Storage Drives” on page 5)
- PXE servers (see the *Installation via PXE Server* guide for information on installing OpenVZ over the network)

**Note:** Time synchronization via NTP is enabled by default.

To start the installation, do the following:

1. Configure the server to boot from a DVD or USB drive.
2. Boot the server from the chosen media and wait for the welcome screen:

### 2.1.1. Choosing Installation Type

You can install OpenVZ in one of the following modes:

- graphics (default, recommended), see Section 2.2, “Installing OpenVZ in Graphics Mode” on page 7,
- basic graphics (in case of issues with video card drivers), see Section 2.3, “Installing OpenVZ in Basic Graphics Mode” on page 13,
- graphics via VNC, Section 2.4, “Installing OpenVZ via VNC” on page 14,
- text, Section 2.5, “Installing OpenVZ in Text Mode” on page 14.

Your further installation steps will differ depending on the chosen mode.

### 2.1.2. Enabling Forced Detection of SSDs

Certain solid-state drives (SSDs) may not be autodetectable by the installer. To avoid this problem, you can force the installer to identify the required drives as SSDs by doing the following:

1. Select the required installation option (e.g., **Install OpenVZ**) and press **E** to start editing it.

2. Add `ssd_hack=sd<N>[,…]` at the end of the line starting with `linux /images/pxeboot/vmlinuz`. For example:

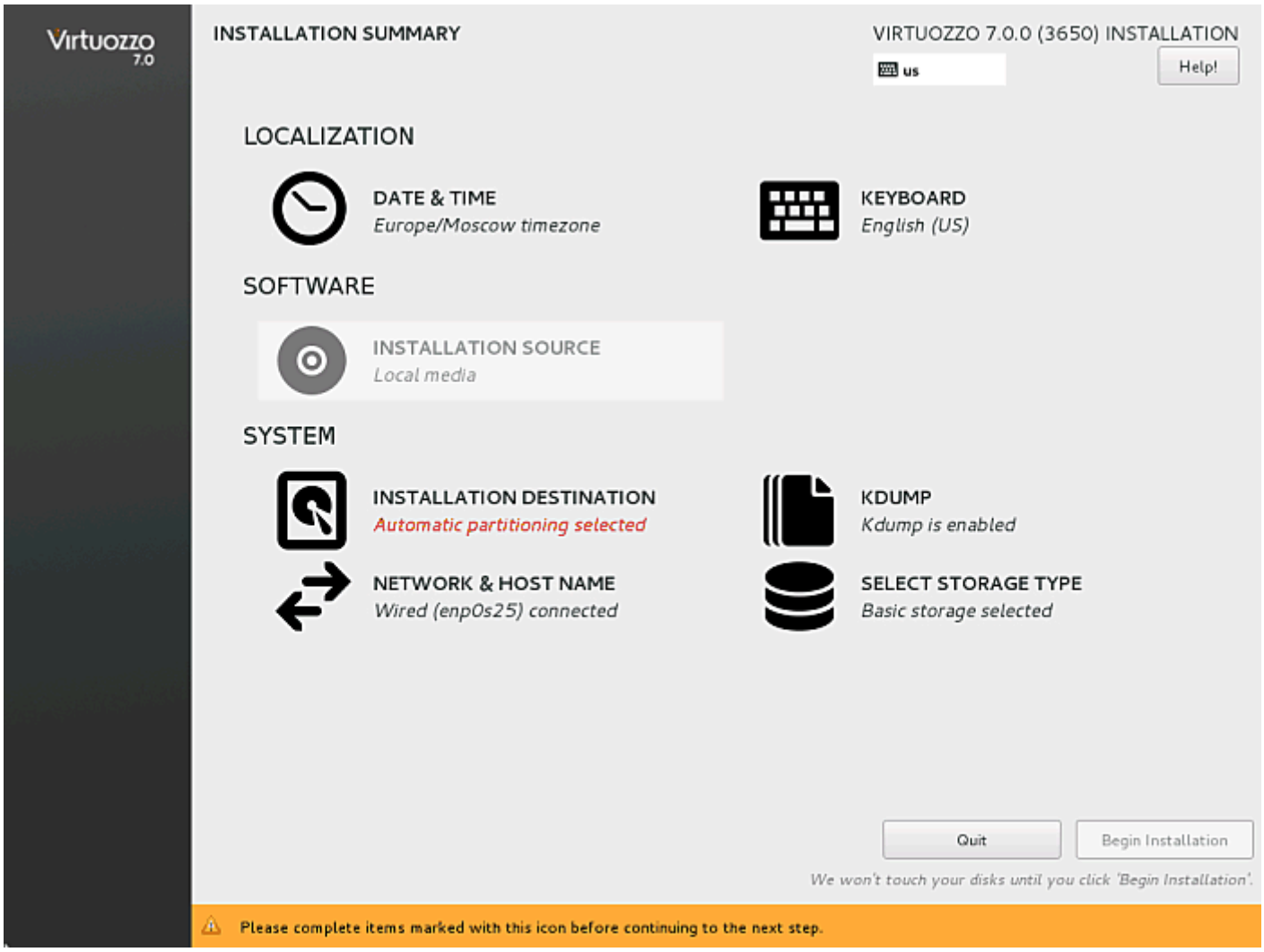
```
linux /images/pxeboot/vmlinuz inst.stage2=hd:LABEL=openvz-iso-7.0.0-3469.iso quiet ip=dh
```

3. Press **CTRL-X** to start booting the chosen installation option.

The installer should identify the specified drives as SSDs.

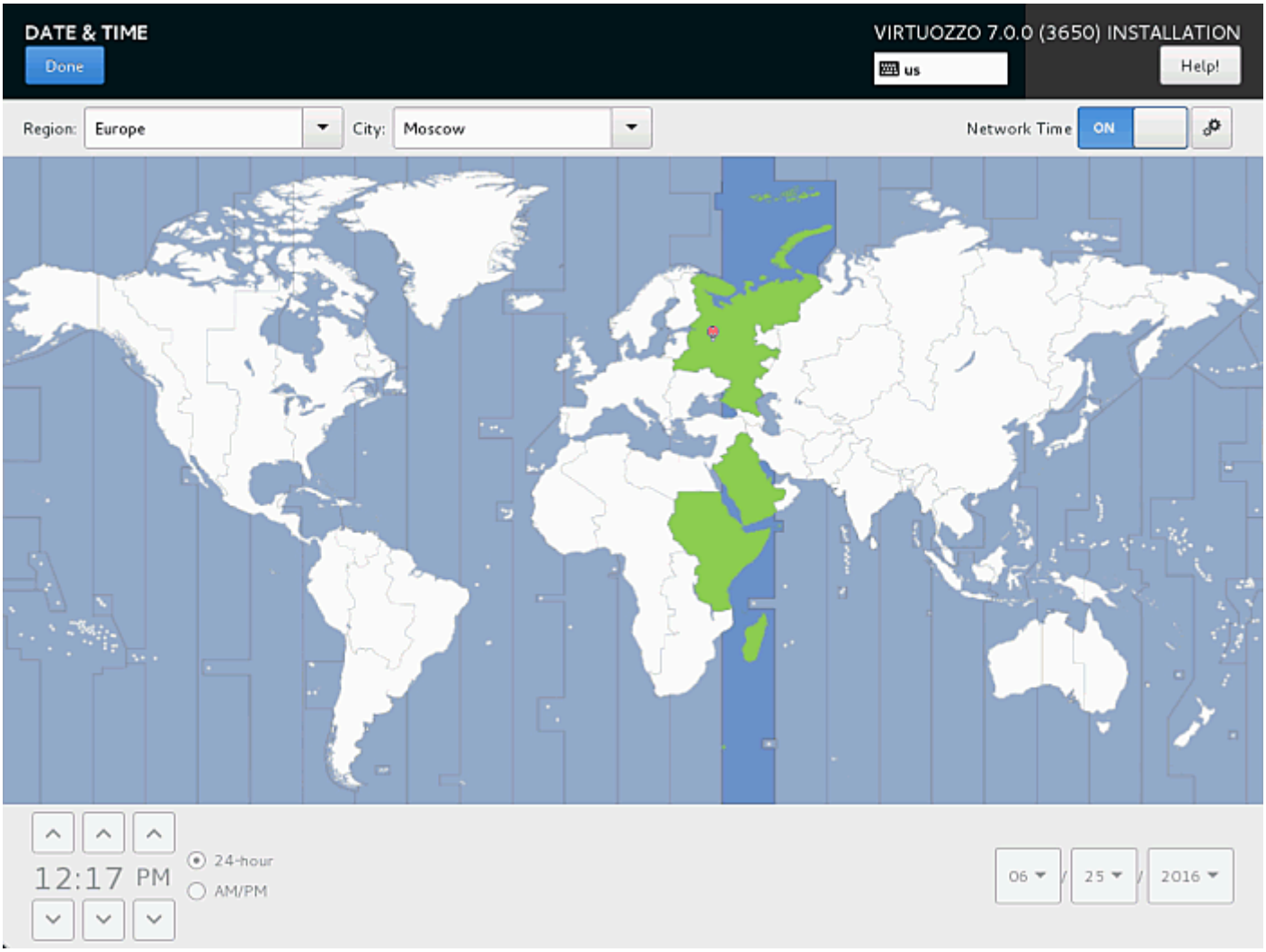
## 2.2. Installing OpenVZ in Graphics Mode

To install OpenVZ in the graphics mode, choose the **Install OpenVZ** option on the welcome screen. After the installation program loads, you will see the **Installation Summary** screen. On this screen, you need to specify a number of parameters required to install OpenVZ.




### 2.2.1. Setting Date and Time

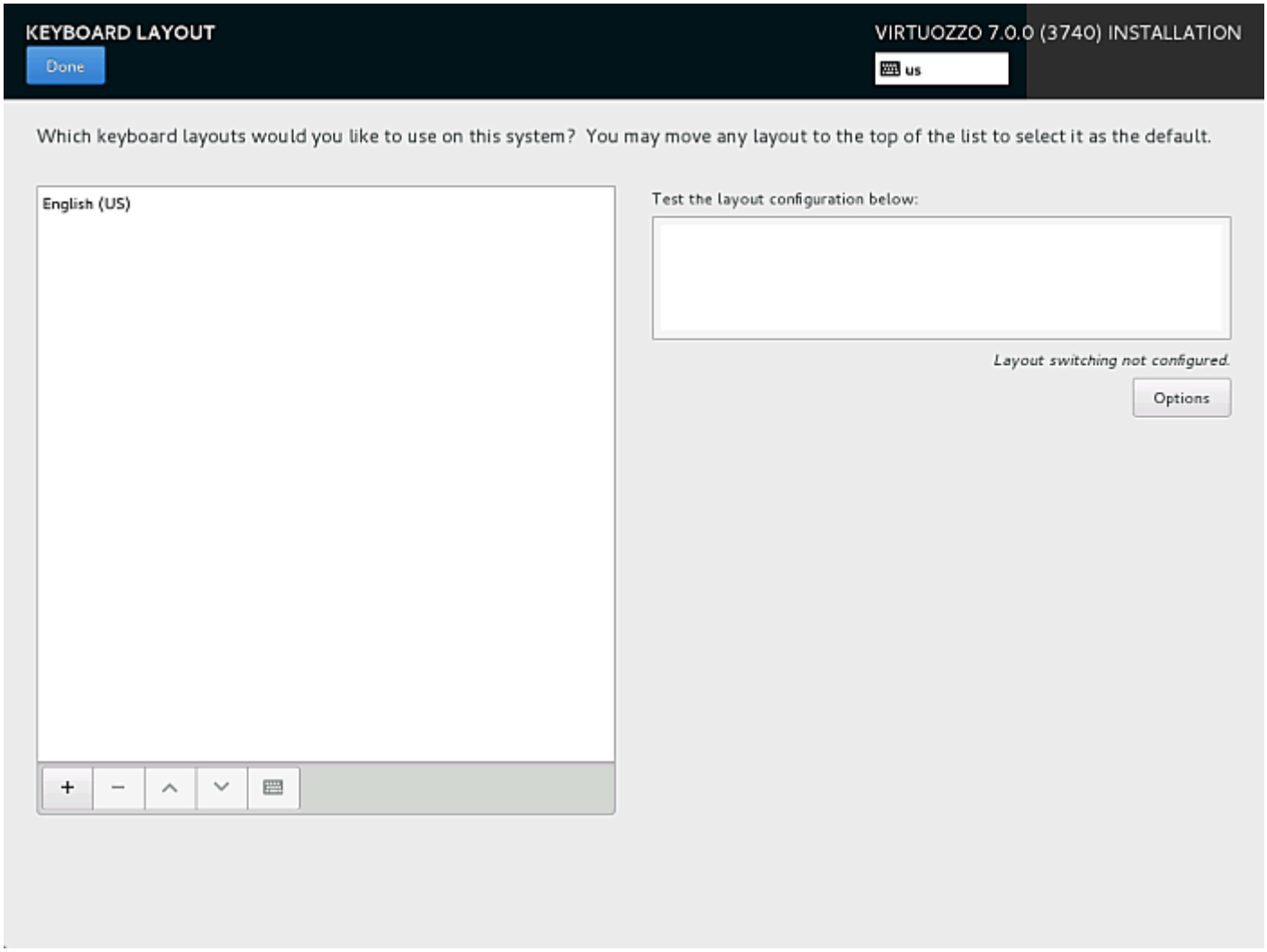
If you need to set the date and time for your OpenVZ installation, open the **DATE & TIME** screen and make the necessary changes.




## 2.2.2. Selecting the Keyboard Layout

The selected keyboard layout can be used during installation and, once the installation is complete, in the console (e.g., for entering localized descriptions, configuration file comments, and such).

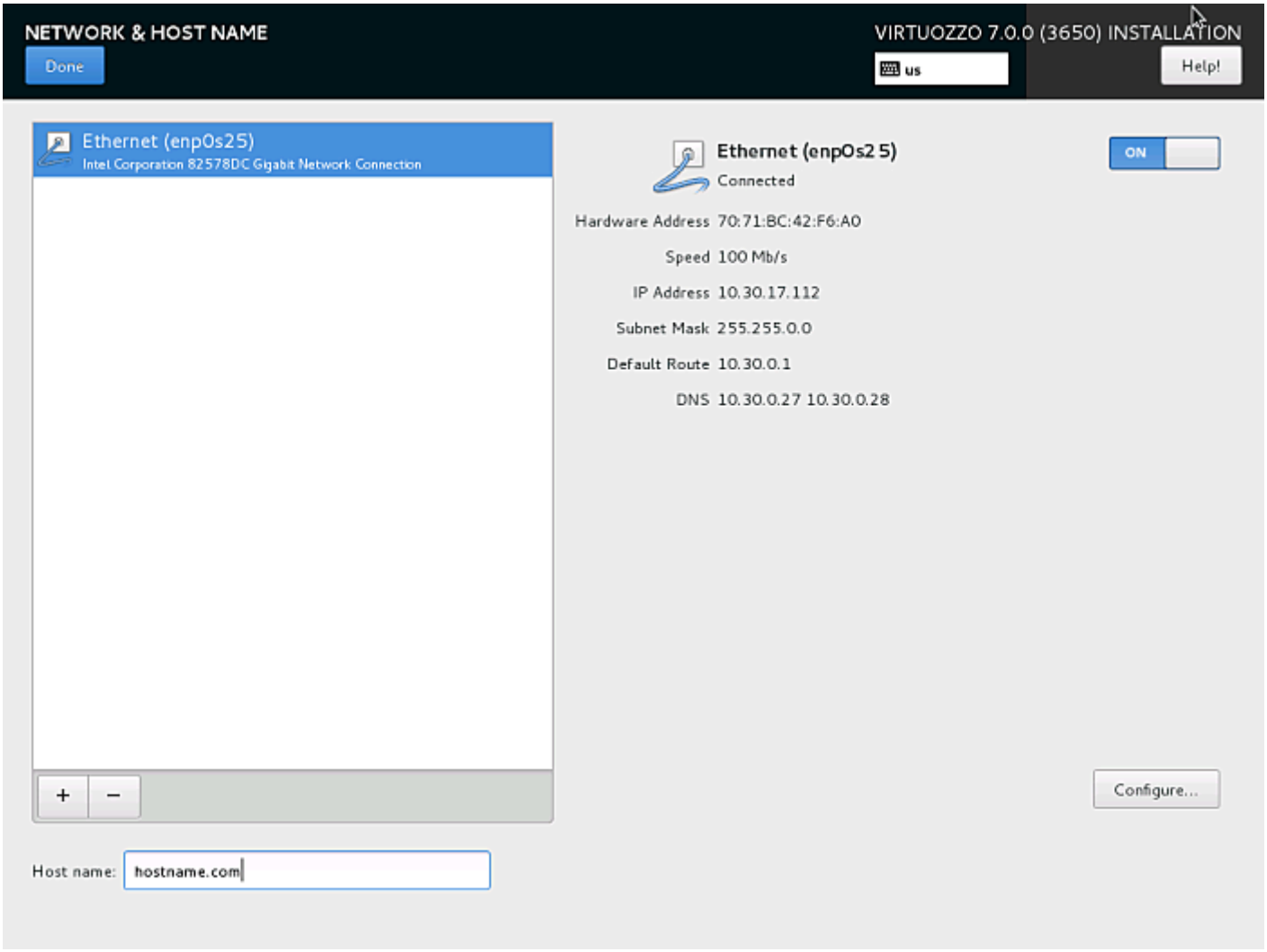
If you need to change the default English (US) keyboard layout, open the **KEYBOARD** screen, click the plus sign to add a layout, and click **Options** to choose a key combination for switching layouts.




## 2.2.3. Configuring Network

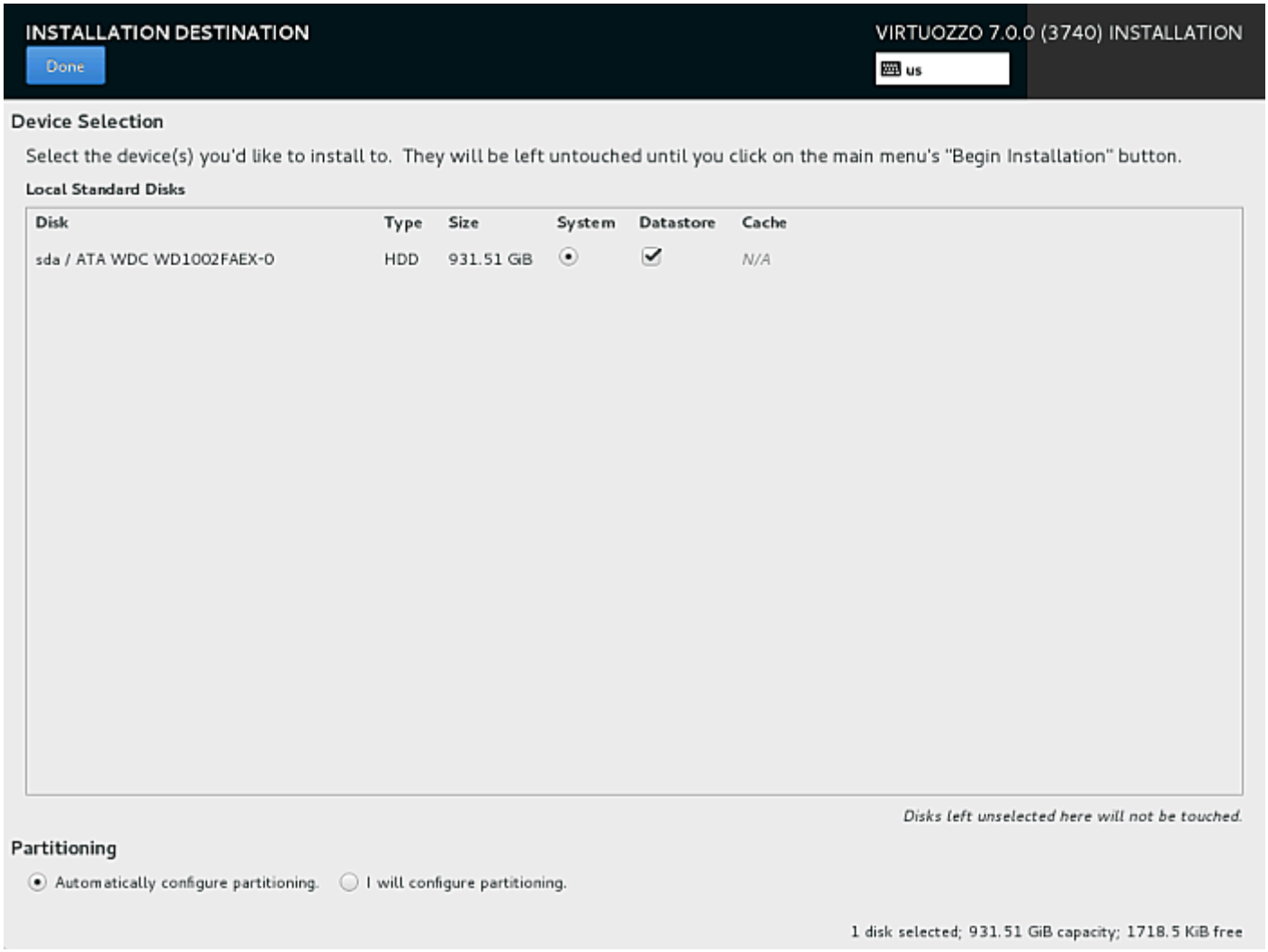
Usually network is configured automatically by the installation program. If you need to modify network settings, you can do so on the **NETWORK & HOST NAME** screen.

To install OpenVZ, you will need to have at least one network card configured and you will also need to provide a hostname: either a fully qualified domain name (`<hostname>.<domainname>`) or a short name (`<hostname>`).




## 2.2.4. Partitioning the Hard Drives

Having chosen the storage type, you need to choose partitioning options on the **INSTALLATION DESTINATION** screen.




Firstly, you will need to choose which of the disks are marked as **System**, **Datastore**, and **Cache**:

- Use the **System** radio button to select a disk where the root partition with OpenVZ system files (mounted to `/`) will be kept.
- Use **Datastore** checkboxes to mark disks where virtual machines and containers will be kept. All such disks will be organized into a single volume group and mounted to the `/vz` mount point. At least one disk need to be marked as a data store.

Secondly, in the bottom of the screen, you will need to choose:

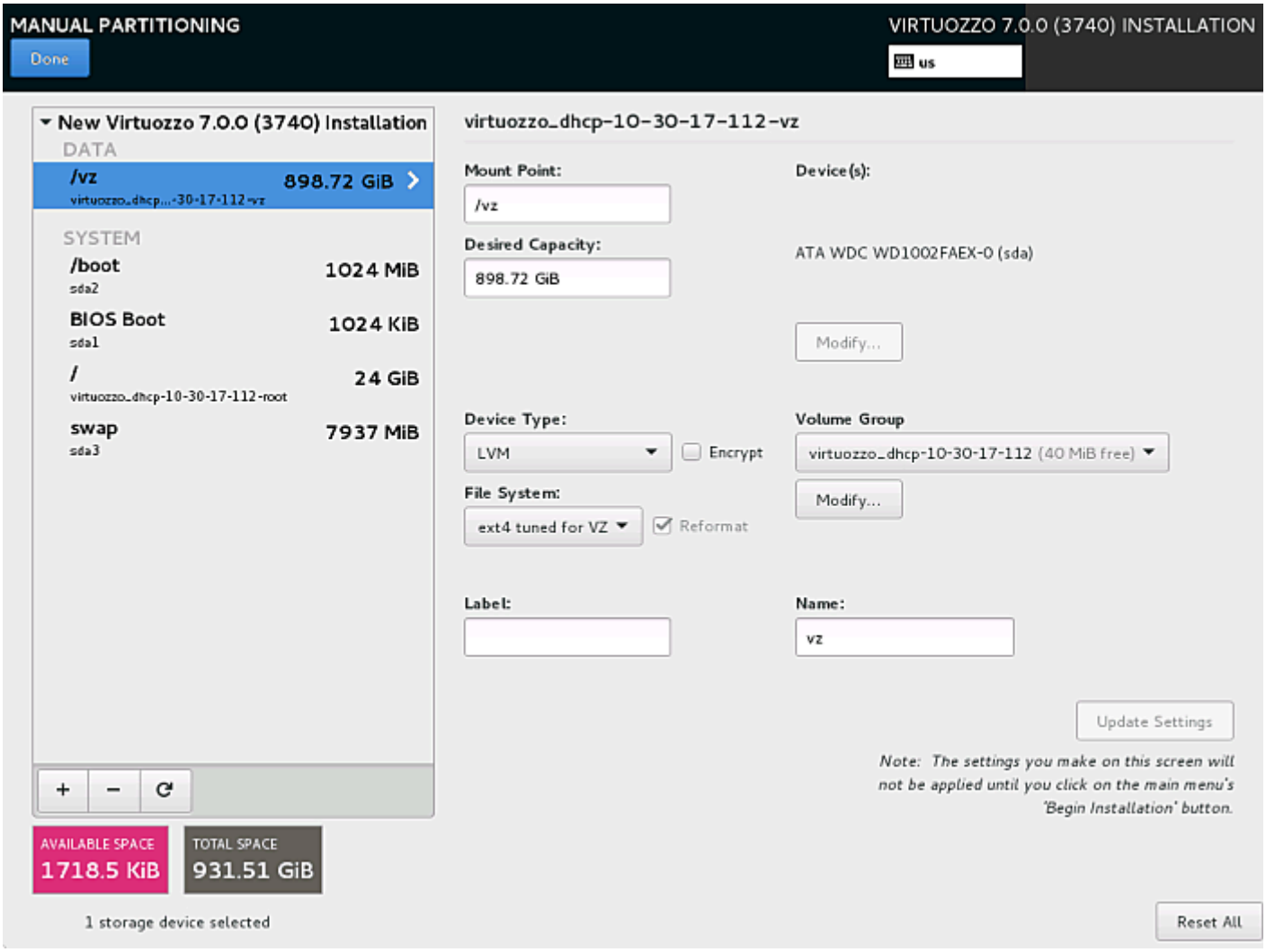
- **Automatically configure partitioning** and click **Done** to have the installation program create the default layout on the server.
- **I will configure partitioning** and click **Done** to manually partition your disk(s).

When partitioning the disks, keep in mind that OpenVZ requires these partitions:

- Boot: mount point `/boot`, 1 GB, boot partition with OpenVZ boot files, created on each HDD,
- Root: mount point `/`, 12-24 GB, root partition with OpenVZ files, created on the HDD marked **System**,

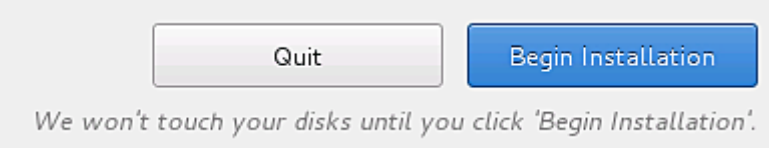
- Swap: paging partition with the `swap` file system, created on the HDD marked **System**. The size depends on RAM:
  - if RAM is below 2 GB, swap size should be twice the RAM,
  - if RAM is 2-8 GB, swap size should be equal to RAM,
  - if RAM is 8-64 GB, swap size should be half the RAM,
  - otherwise swap size should be 32 GB
- Data storage, mount point `/vz`, at least 30 GB, storage for virtual machines, containers, and OS and application templates, an LVM volume group that spans all HDDs marked **Datastore**.
- In addition, either a 1 MB partition with the BIOS boot file system or a 200 MB partition with the EFI boot file system is required depending on your server configuration.

A typical partition layout for OpenVZ on basic storage may look like this:

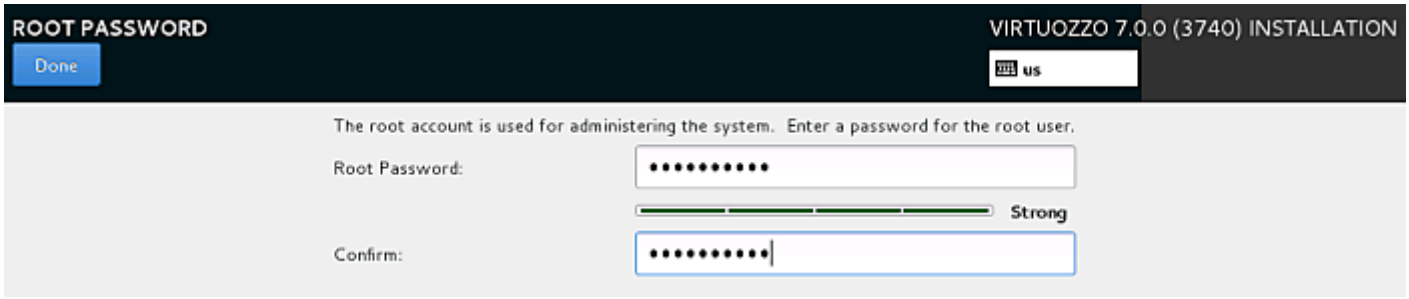


### 2.2.5. Finishing Installation

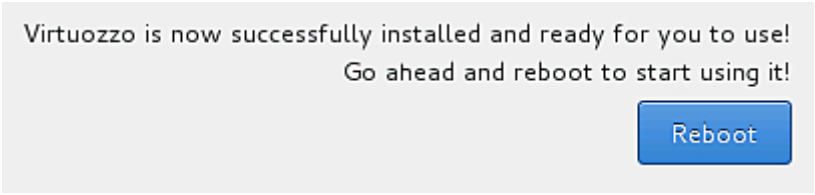
Having configured everything necessary on the **INSTALLATION SUMMARY** screen, click **Begin Installation**.




While OpenVZ is installing, create a password for the root account. Installation will not finish until the password is created.




Once the installation is complete, click **Reboot** to restart the server and boot into OpenVZ.




**Note:** If you are installing OpenVZ from a USB drive, remove said drive before restarting the server.

After you restart your OpenVZ server, you will see the login prompt as well as the server IP address and hostname that you can use to connect to the server remotely.

To manage virtual machines and containers on the OpenVZ server, you will need to log in as the root user. After you do so, you will see a shell prompt and can start creating and managing your virtual machines and containers. For quick-start instructions, run `man afterboot`. More detailed information is provided in the *OpenVZ User's Guide*.

## 2.3. Installing OpenVZ in Basic Graphics Mode

If the installer cannot load the correct driver for your video card, you can try to install OpenVZ in the basic graphics mode. To select this mode, on the welcome screen, choose **Troubleshooting-→**, then

**Install OpenVZ in basic graphics mode**. The installation process itself is the same as that in the default graphics mode (see Section 2.2, “Installing OpenVZ in Graphics Mode” on page 7).

## 2.4. Installing OpenVZ via VNC

To install OpenVZ via VNC, boot to the welcome screen and do the following

1. Select the required installation option (e.g., **Install OpenVZ**) and press **E** to start editing it.
2. Add `text` at the end of the line starting with `linux /images/pxeboot/vmlinuz`. For example:

```
linux /images/pxeboot/vmlinuz inst.stage2=hd:LABEL=openvz-iso-7.0.0-3469.iso \
quiet ip=dhcp text
```

3. Press **CTRL-X** to start booting the chosen installation option.
4. When presented with a choice of starting VNC or proceeding to the text mode, choose **1** for VNC.
5. When offered, enter a VNC password.
6. In the output that follows look up the hostname or IP address and VNC port to connect to, e.g., `192.168.0.10:1`.
7. Connect to said address in a VNC client. You will see the usual **Installation Summary** screen.

The installation process itself is the same as that in the default graphics mode (see Section 2.2, “Installing OpenVZ in Graphics Mode” on page 7).

## 2.5. Installing OpenVZ in Text Mode

To install OpenVZ in the text mode, boot to the welcome screen and do the following

1. Select the main installation option **Install OpenVZ** and press **E** to start editing it.
2. Add `text` at the end of the line starting with `linux /images/pxeboot/vmlinuz`. For example:

```
linux /images/pxeboot/vmlinuz inst.stage2=hd:LABEL=openvz-iso-7.0.0-3469.iso \
quiet ip=dhcp text
```

3. Press **CTRL-X** to start booting the chosen installation option.
4. When presented with a choice of starting VNC or proceeding to the text mode, choose **2** for text mode.
5. In the installation menu that is shown, at least set or confirm the following: installation source (press **3**), installation destination (press **5**), root password (press **8**). Also set other options if necessary.
6. Press **b** to begin installation.
7. When installation ends, press **Enter** to reboot.

# 2.6. Configuring Server Ports for OpenVZ

This section lists the ports that need to be opened for your server to operate properly. `I` in the **Description** column signals that the port should be opened for incoming traffic and `O`, for outgoing traffic.

| Port | Description |
|---|---|
| 22 | (IO) Used for secure logins via SSH. |
| 80 | (IO) Used for HTTP connections, e.g., to download OpenVZ updates and EZ templates from remote repositories. |
| 21 | (O) Used to connect to the Debian repository to cache Debian EZ templates. |
| 443 | (O) Used to send problem reports to the support team. |
| 5224 | (O) Used to connect to the Key Administrator server to update OpenVZ lease licenses. |
| 64000 | (IO) Used for remote connections to the dispatcher via Odin Automation for Cloud Infrastructure. |
| 1621, 1622 | (O) Used to migrate containers to virtual machines on servers that run OpenVZ hypervisor-based solutions. |
| 67 | Used to support host-only adapters in virtual machines. OpenVZ does not use port 67 for any external connections. |
| *<RPC ports>* | Used by various RPC services (e.g., to support NFS shares). Port numbers may differ from system to system. To learn what RPC services are registered on your server and what ports they are using, run this command:<br>`# rpcinfo -p localhost` |
| 647, 847 | Reserved by the Linux `portreserve` program for the DHCP server, if you use one. |

You may also need to additionally open ports used to connect to remote yum repositories. Though most of the repositories can be accessed via HTTP, some may require access via HTTPS or FTP. To check what repositories are currently configured for your system and what protocols are used to connect to them, run the following commands and examine their output:

```
# yum repolist -v | egrep -e 'baseurl|mirrors'
# curl http://repo.cloudlinux.com/psbm/mirrorlists/psbm6-os.mirrorlist
```

# Chapter 3. Exploring Additional Installation Options

This chapter describes how to

- boot into rescue mode
- run OpenVZ in virtual machines

## 3.1. Booting into Rescue Mode

If you experience problems with your system, you can boot into the rescue mode to troubleshoot these problems. Once you are in the rescue mode, your OpenVZ installation is mounted under `/mnt/sysimage`. You can go to this directory and make the necessary changes to your system.

To enter the rescue mode, do the following:

1. Boot your system from a OpenVZ DVD or USB drive.
2. On the welcome screen, click **Troubleshooting-→**, then **Rescue system**.
3. Once OpenVZ boots into the emergency mode, press **Ctrl+D** to load the rescue environment.
4. In the rescue environment, you can choose one of the following options:
   - Continue (press **1**): mount the OpenVZ installation in read and write mode under `/mnt/sysimage`.
   - Read-only mount (press **2**): mount the OpenVZ installation in read-only mode under `/mnt/sysimage`.
   - Skip to shell (press **3**): load shell, if your file system cannot be mounted; for example, when it is corrupted.
   - Quit (Reboot) (press **4**): reboot the server.
5. Unless you press **4**, a shell prompt will appear. In it, run `chroot /mnt/sysimage` to make the OpenVZ installation the root environment. Now you can run commands and try to fix the problems you are experiencing.
6. After you fix the problem, run `exit` to exit the chroot environment, then `reboot` to restart the system.

## 3.2. Running OpenVZ in Virtual Machines

Installing OpenVZ in virtual machines may prove useful if you want to evaluate OpenVZ.

To run virtual machines with OpenVZ, the physical server's procesor(s) must support either of these architectures: Intel VT-x (with "unrestricted guest") and EPT, or AMD-V and RVI. The following hypervisors are supported: Parallels Desktop for Mac, VMware Fusion, VMware Workstation, and VMware ESXi. Make sure that nested virtualization support is enabled in your hypervisor.

The following virtual hardware is recommended for virtual machines with OpenVZ:

- vCPU: 2 or more
- RAM: 2 GB or more
- HDD: 64 GB or more

To install OpenVZ in a VM, copy the distribution ISO image to a local drive and create a new VM from it according to your virtualization software documentation. Start the VM, boot to the OpenVZ installer, and follow the instructions in Section 2.2, “Installing OpenVZ in Graphics Mode” on page 7.

### 3.2.1. Restrictions and Peculiarities

When using OpenVZ in a virtualized environment, keep in mind the following restrictions and specifics:

- Running OpenVZ in a virtual machine is intended for evaluation purposes only, and not for production.
- If you change the configuration of a virtual machine where OpenVZ is installed, you may need to reactivate OpenVZ.
- When you start a virtual machine with OpenVZ, VMware Fusion may warn you that it requires full access to the network traffic. Ignore this message, and proceed with booting the virtual machine.
- To run in a virtualized OpenVZ environment, a virtual machine must have OpenVZ guest tools installed.
- To enable full support for virtual machines created inside OpenVZ, make sure to enable nested virtualization support for the OpenVZ VM in your virtualization software. Otherwise virtual machines created in OpenVZ will only support 32-bit operating systems and a single CPU.