

Open source tools: Making a VM server

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Open source tools

- Hypervisor – VirtualBox
- Operating system – Ubuntu Server
- Remote access (SSH, SFTP)
- Linux commands

Virtualization (Hypervisor)

- Focus on **VirtualBox**, software for virtualization
- VirtualBox **enables** creating of a **virtual environment** and let us install a **guest operating system**
- VirtualBox is **Type 2 hypervisor**, it runs as an application within **host operating system**.
- Alternatively, **Type 1 hypervisors** are installed directly onto hardware (“**bare metal**” hypervisor)

VirtualBox download and install

- Link: <https://www.virtualbox.org/wiki/Downloads>



VirtualBox

Download VirtualBox

Here, you will find links to VirtualBox binaries and its source code.

VirtualBox binaries

By downloading, you agree to the terms and conditions of the respective license.

- **VirtualBox platform packages.** The binaries are released under the terms of the GPL version 2.
 - [VirtualBox 5.1.8 for Windows hosts](#) ↗x86/amd64
 - [VirtualBox 5.1.8 for OS X hosts](#) ↗amd64
 - [VirtualBox 5.1.8 for Linux hosts](#) ↗
 - [VirtualBox 5.1.8 for Solaris hosts](#) ↗amd64
- **VirtualBox 5.1.8 Oracle VM VirtualBox Extension Pack** ↗All supported platforms
 - Support for USB 2.0 and USB 3.0 devices, VirtualBox RDP and PXE boot for Intel cards. See [this chapter from the User Manual](#) for an Pack. The Extension Pack binaries are released under the [VirtualBox Personal Use and Evaluation License \(PUEL\)](#).
*Please install the extension pack with the same version as your installed version of VirtualBox:
If you are using [VirtualBox 5.0.26](#), please download the extension pack ↗here.*
- **VirtualBox 5.1.8 Software Developer Kit (SDK)** ↗All platforms
 - See the [changelog](#) for what has changed.

You might want to compare the [SHA256](#) checksums or the [MD5](#) checksums to verify the integrity of downloaded packages. *The SHA256 checks the MD5 algorithm must be treated as insecure!*

Note: After upgrading VirtualBox it is recommended to upgrade the guest additions as well.

User Manual

The VirtualBox User Manual is included in the VirtualBox binaries above. If, however, you would like to take a look at it without having to install it [here](#).

VirtualBox

- Creating a virtual machine (VM)
- Carefully select:
 - Number of CPUs,
 - RAM memory,
 - Hard drive size
 - Network adapter (Bridge mode)

The use of VirtualBox

- We need an operating system

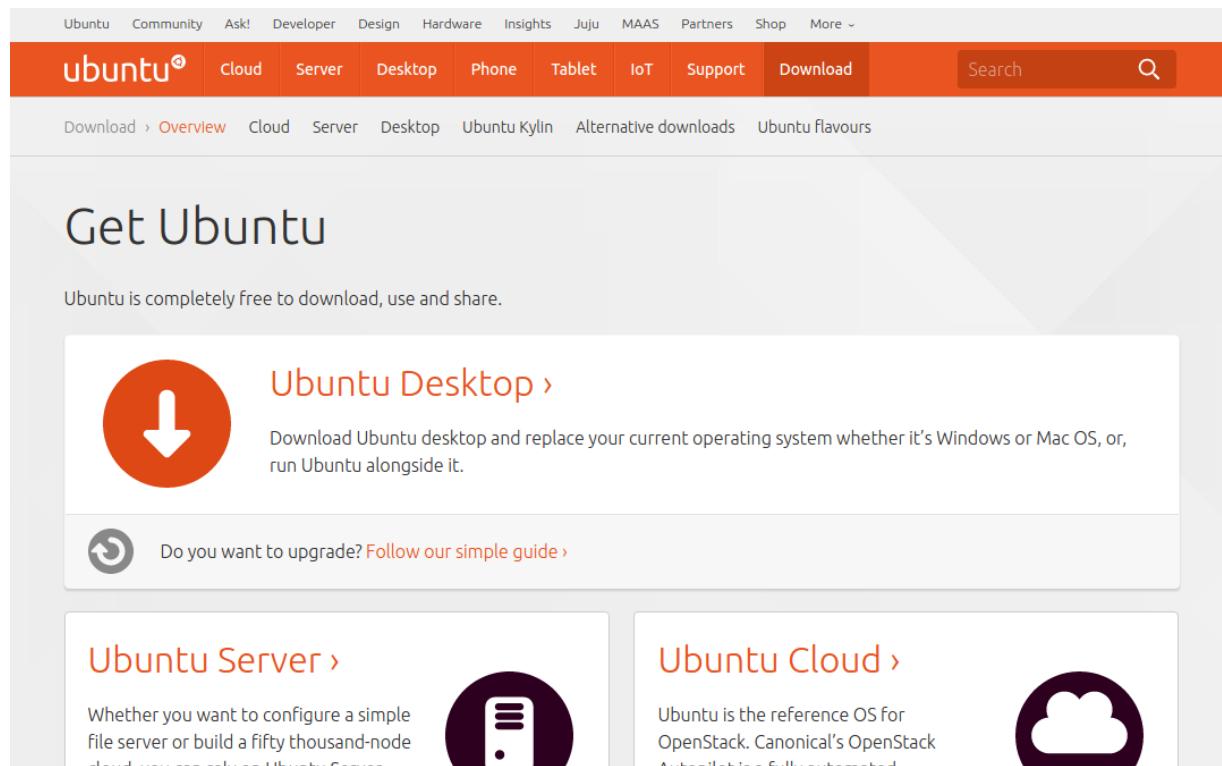


Ubuntu Linux OS

- **Open source**
- Ubuntu is one of the most popular **Linux** distros
- Often used on **servers** on **Internet** and **Cloud**

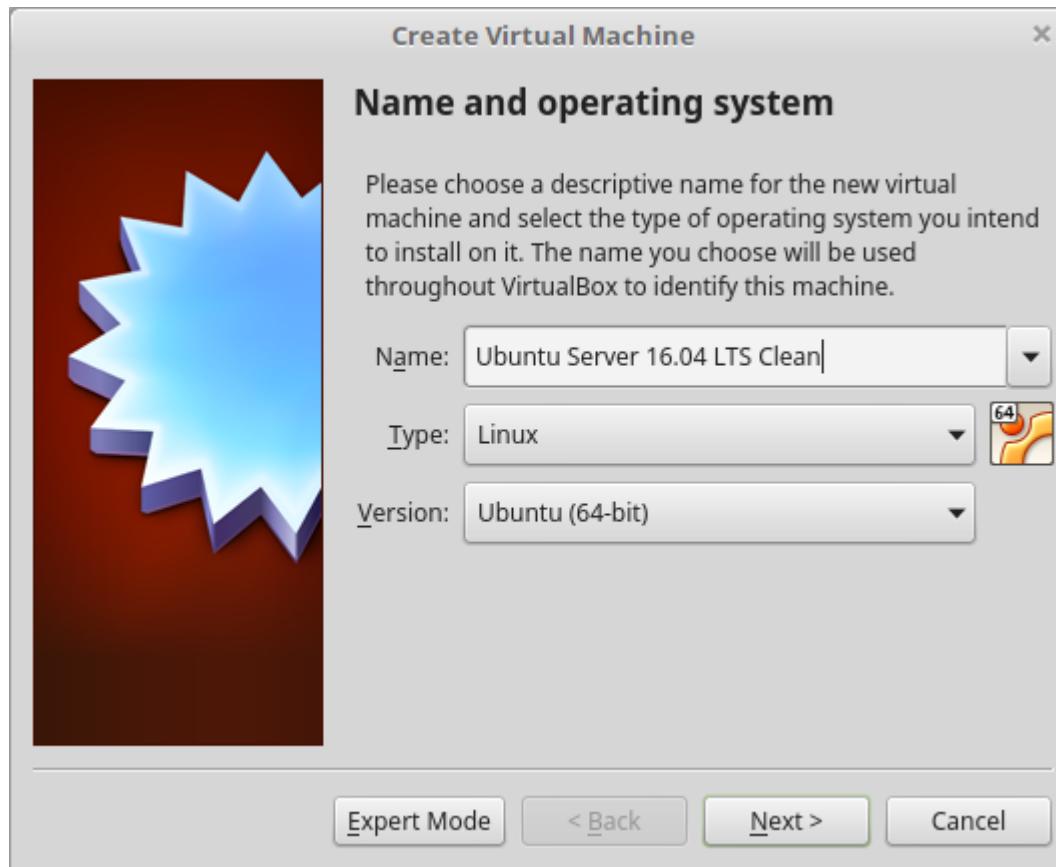
Downloading Ubuntu ISO file

- Link: <https://www.ubuntu.com/download>
- Server LTS, 64-bit, ISO file



VirtualBox – Creating a VM

- Name VM and select the OS



VirtualBox – Creating a VM

The image consists of two side-by-side screenshots of the VirtualBox 'Create Virtual Machine' wizard.

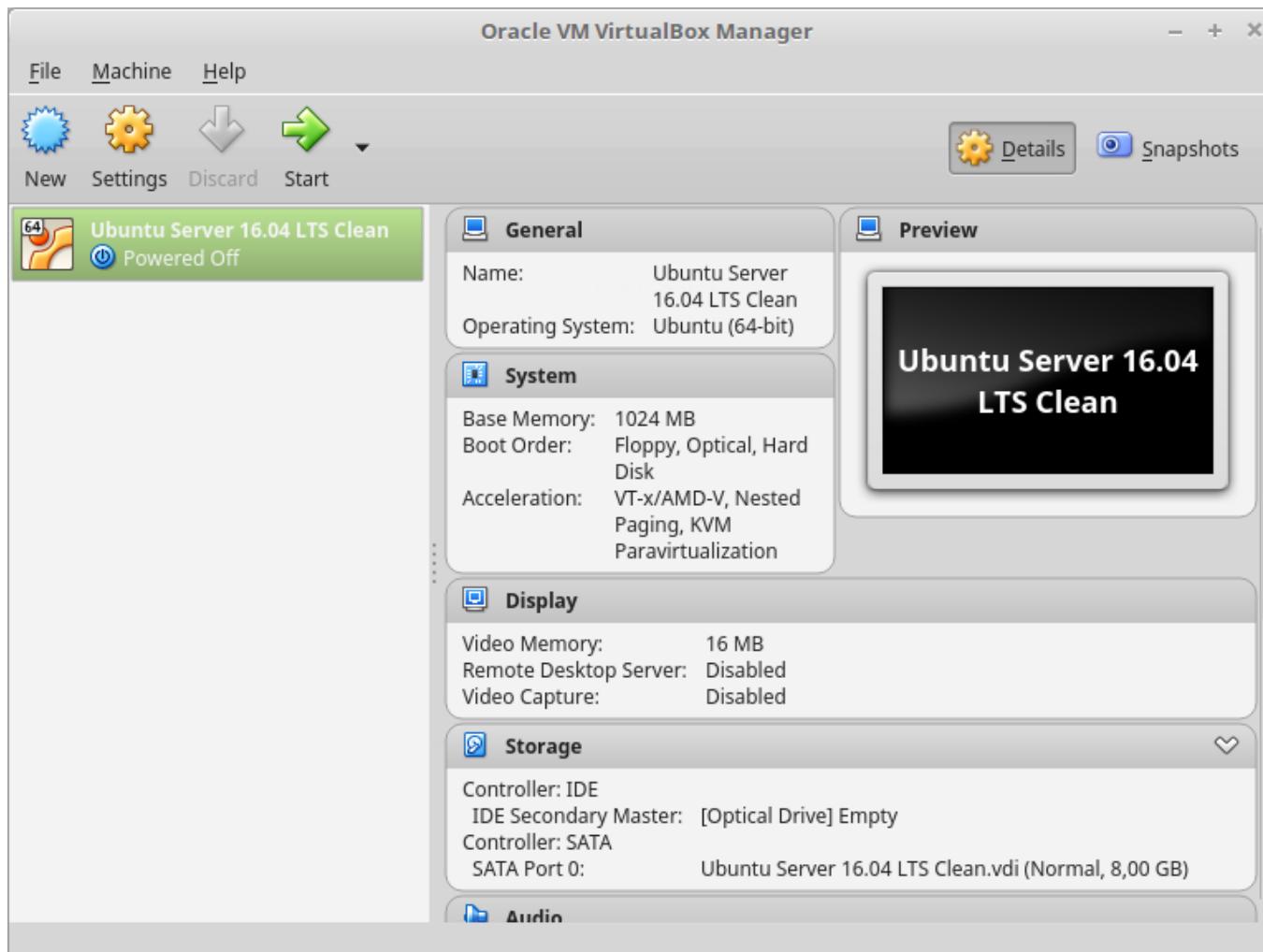
Left Screenshot: Memory size

The title bar says 'Create Virtual Machine'. The main content area has a blue starburst icon on a red background. The heading 'Memory size' is displayed. Below it, the text reads: 'Select the amount of memory (RAM) in megabytes to be allocated to the virtual machine.' A note states: 'The recommended memory size is **1024 MB**'. A horizontal slider with a green-to-red gradient is positioned below, with '4 MB' on the left and '8192 MB' on the right. The slider's value is set to '1024 MB'. Below the slider is a 'MB' unit indicator. At the bottom are three buttons: '< Back', 'Next >', and 'Cancel'.

Right Screenshot: Hard disk

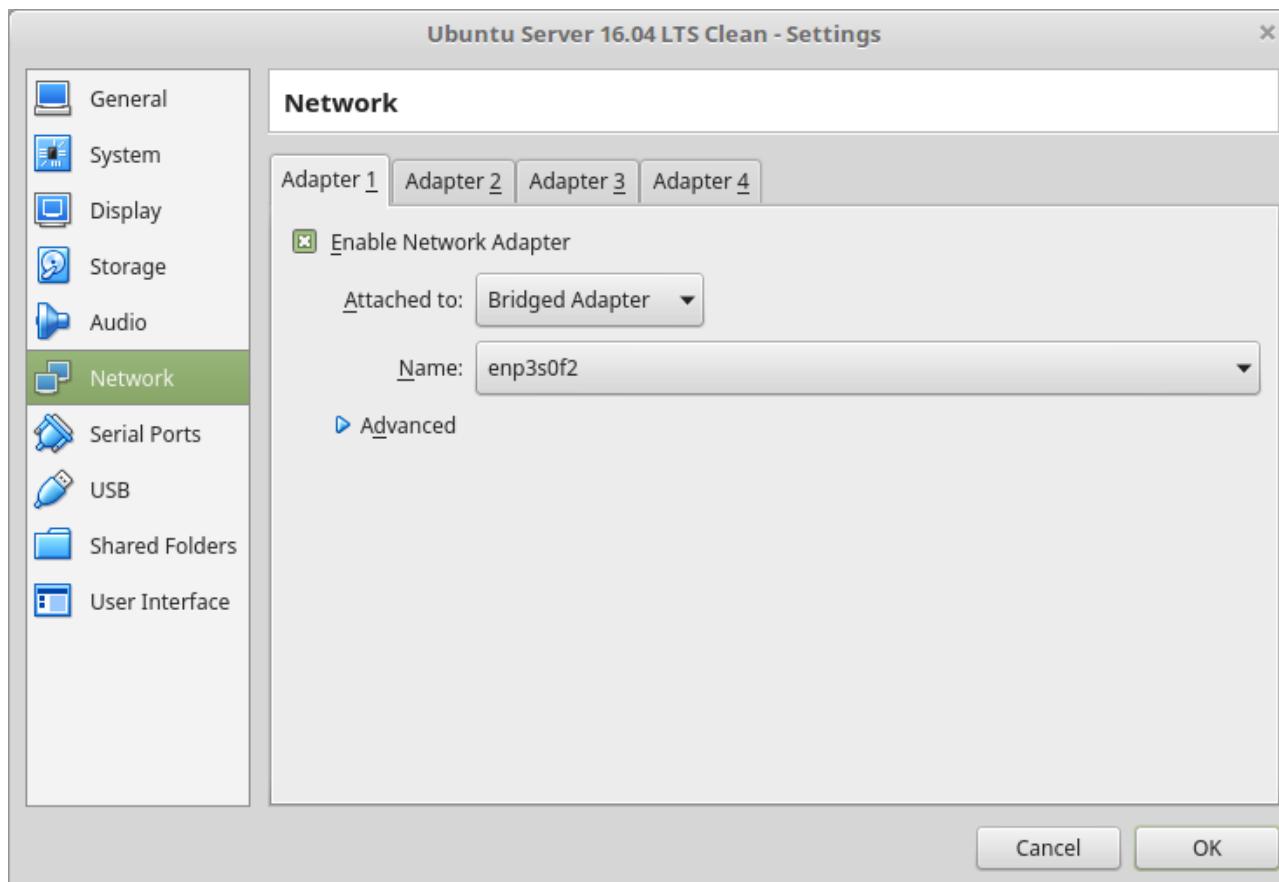
The title bar says 'Create Virtual Machine'. The main content area has a blue starburst icon on a red background. The heading 'Hard disk' is displayed. Below it, the text reads: 'If you wish you can add a virtual hard disk to the new machine. You can either create a new hard disk file or select one from the list or from another location using the folder icon.' A note states: 'If you need a more complex storage set-up you can skip this step and make the changes to the machine settings once the machine is created.' Below this, the text 'The recommended size of the hard disk is **8,00 GB**' is shown. Three radio button options are listed: 'Do not add a virtual hard disk' (unselected), 'Create a virtual hard disk now' (selected, indicated by a green circle), and 'Use an existing virtual hard disk file' (unselected). A dropdown menu is open, showing 'Empty' as the current selection. At the bottom are three buttons: '< Back', 'Create', and 'Cancel'.

Looking at new VM



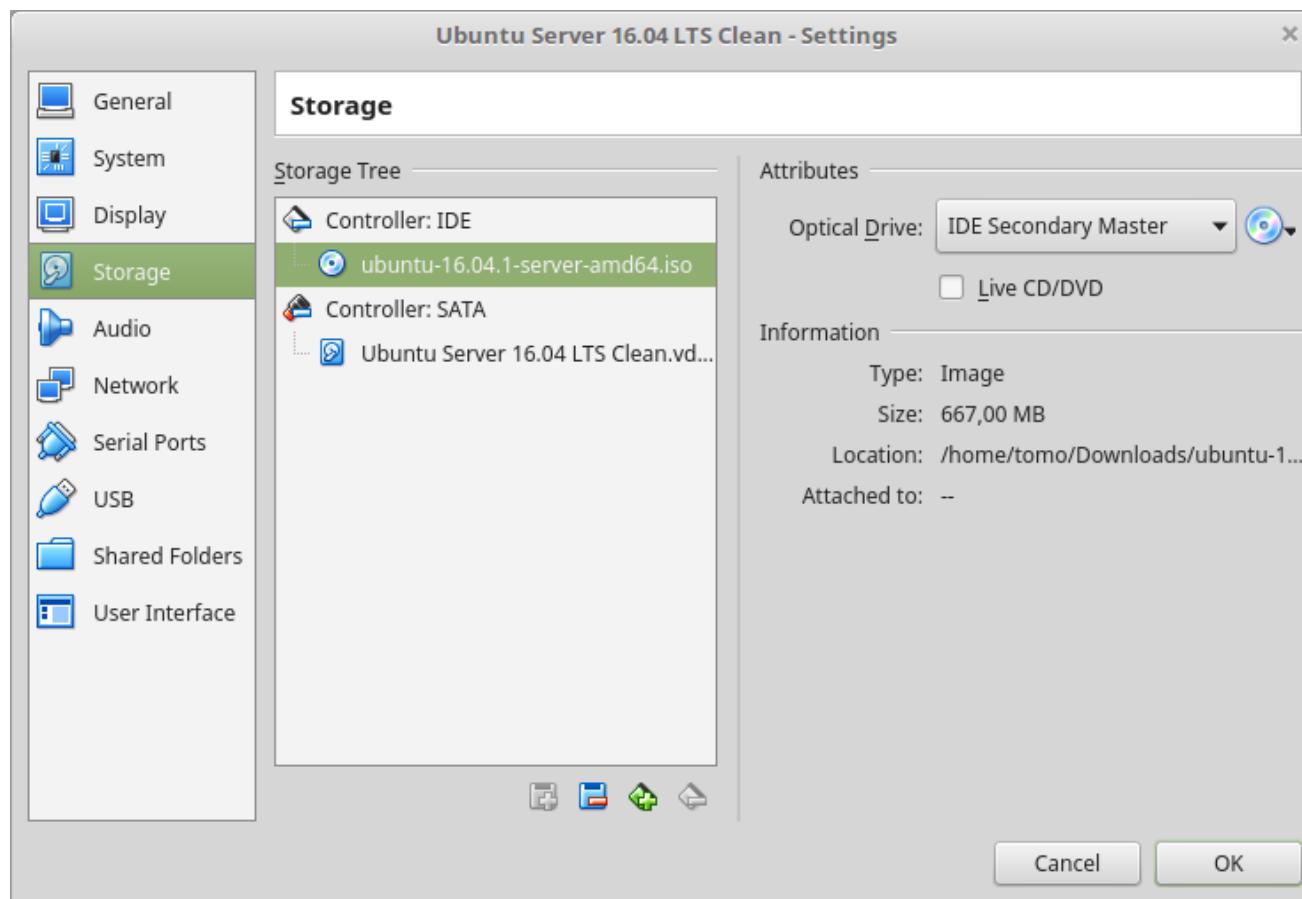
Network Settings

- Bridge mode



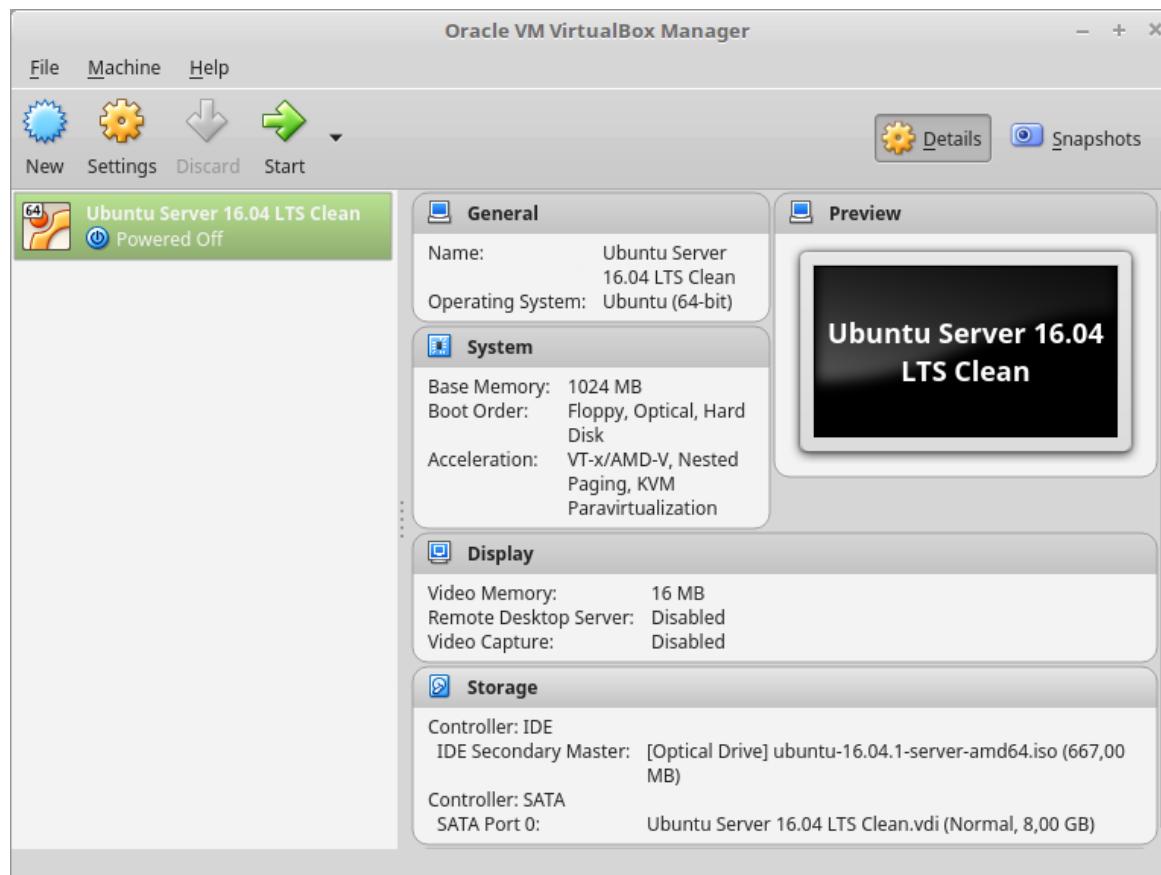
Storage Settings

- Select the ISO file



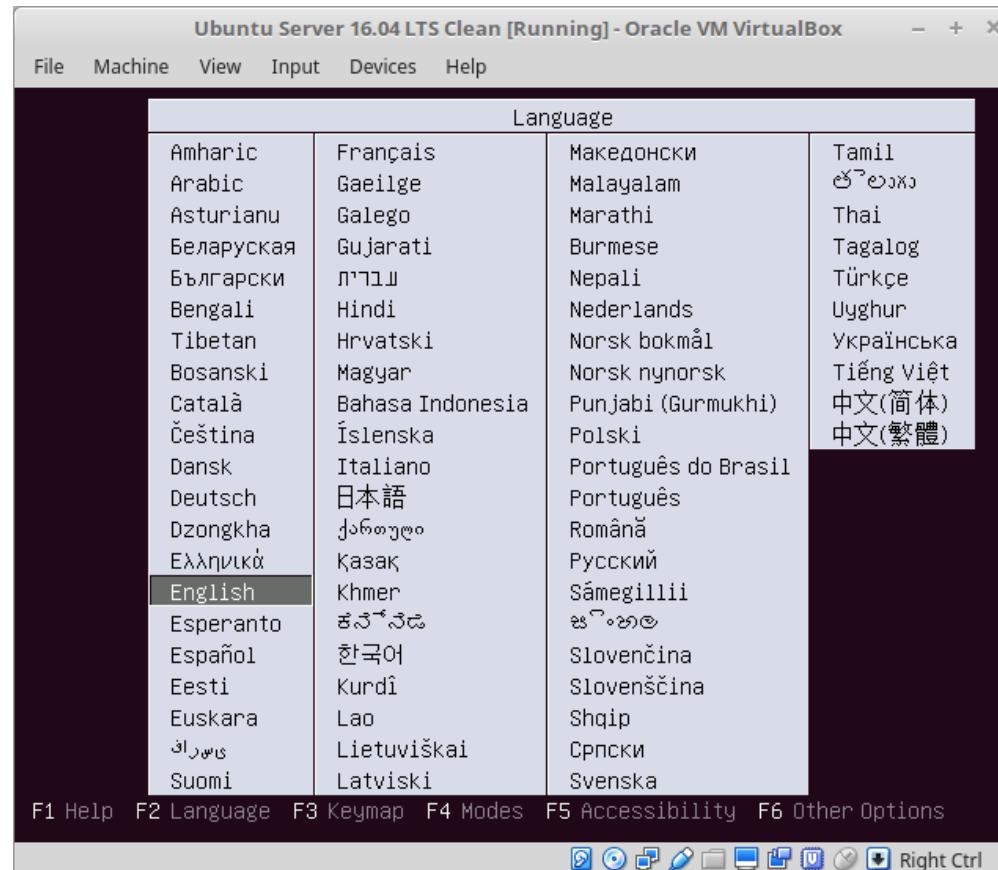
Starting the new VM

- We are ready to start...



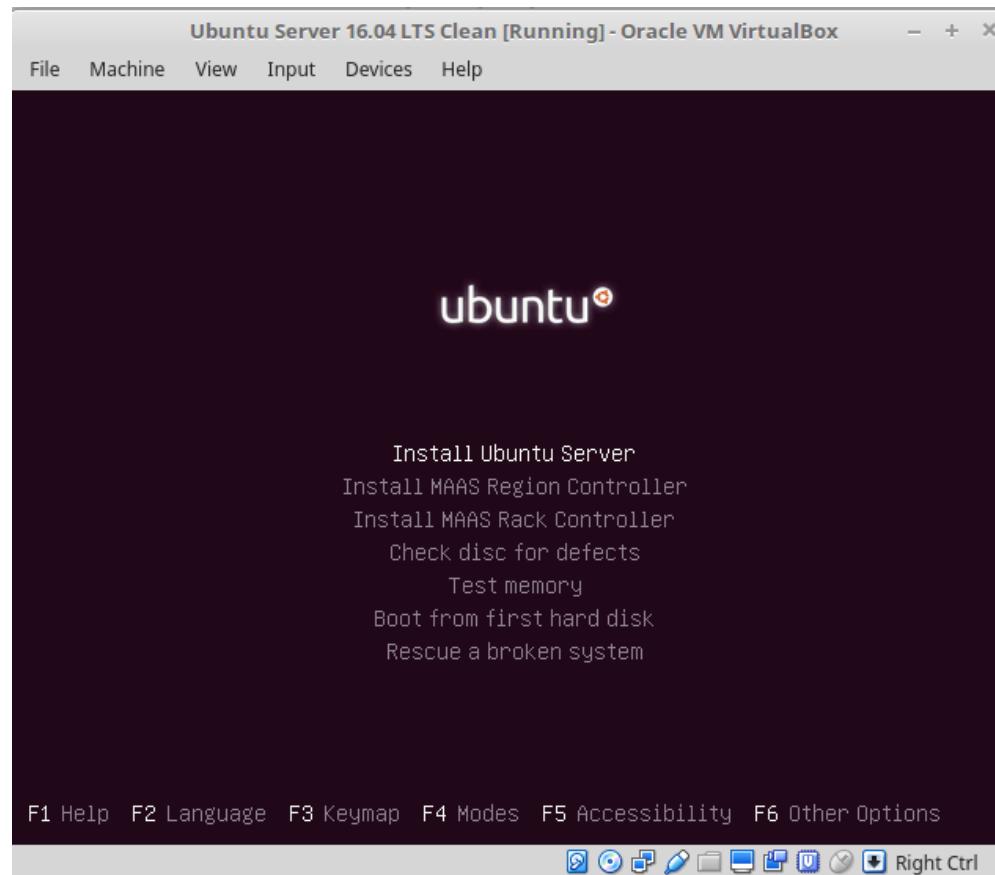
Initial start of the VM

- Booting from CD/DVD (ISO file)

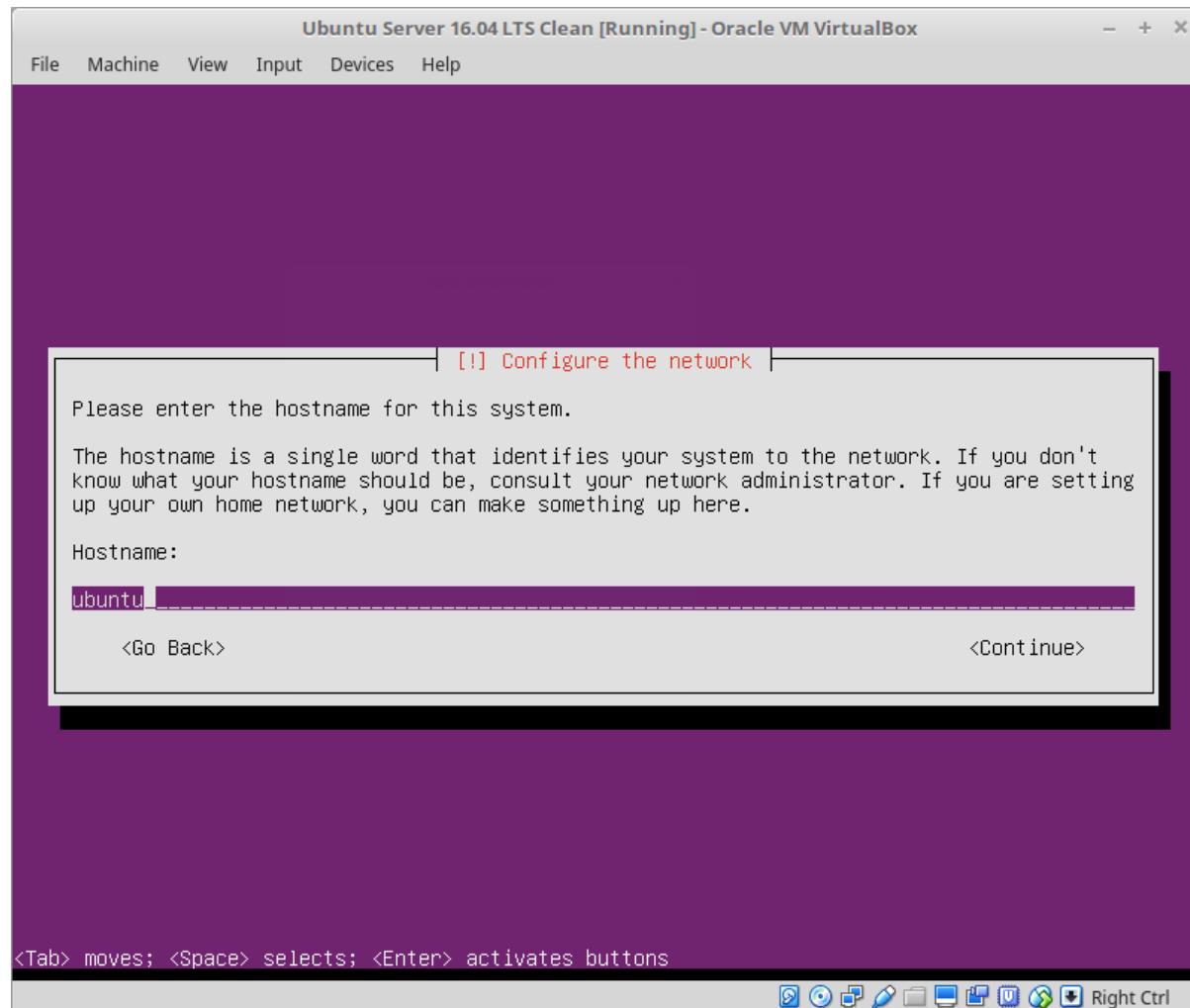


Starting Ubuntu installation

- Right CTRL “releases” the mouse

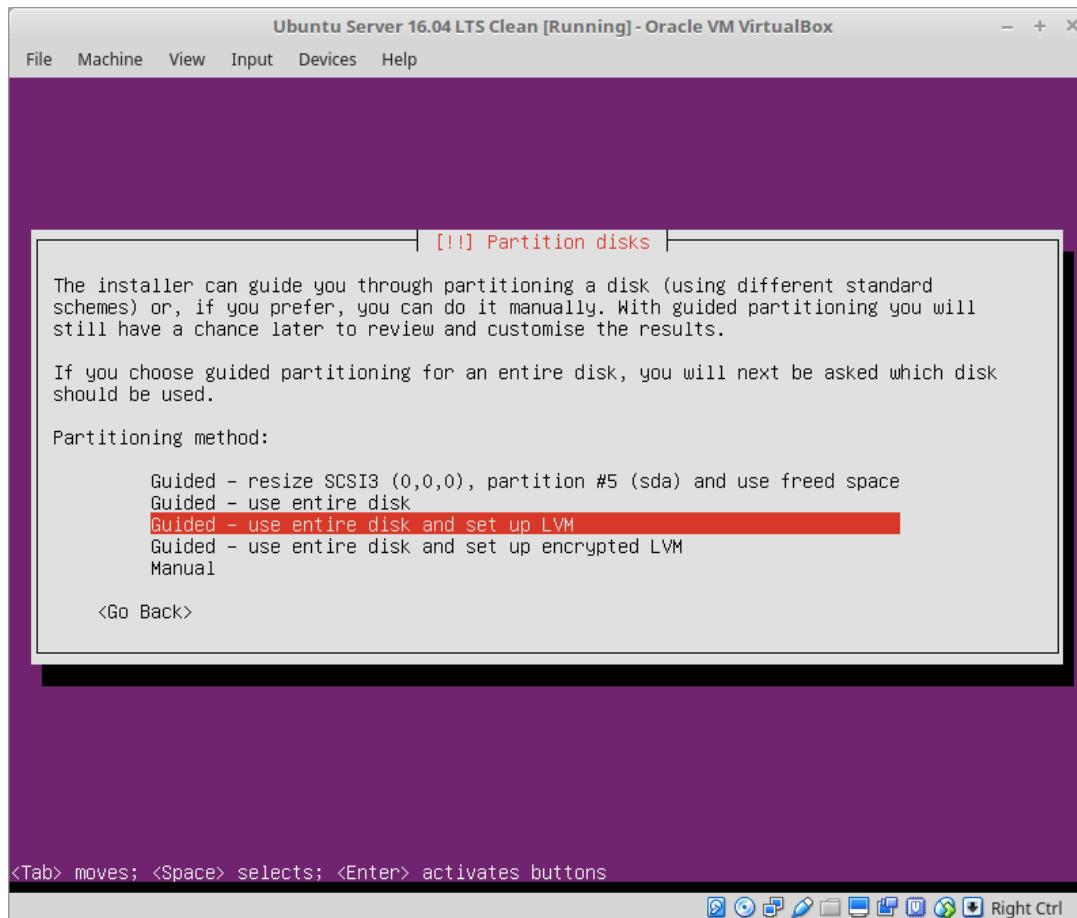


Installing Ubuntu to the VM



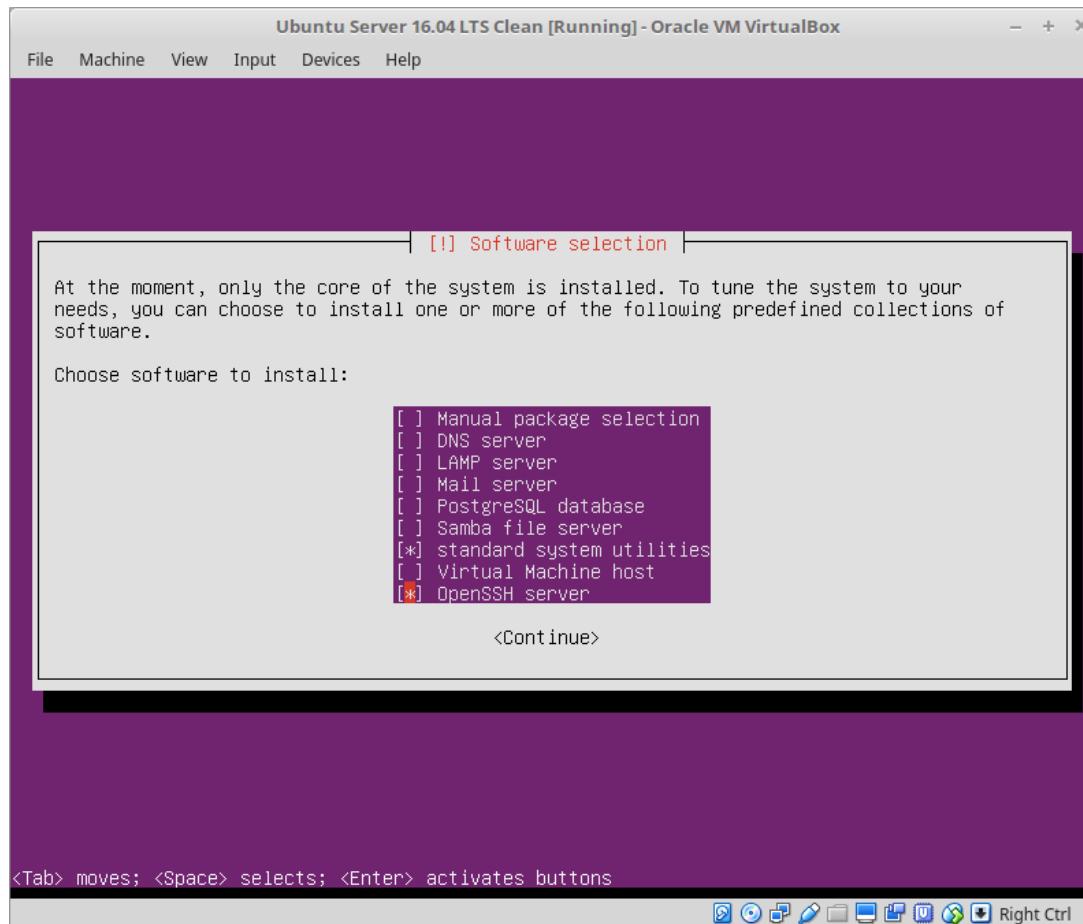
Installing Ubuntu to the VM

- Disk partition, for now select default



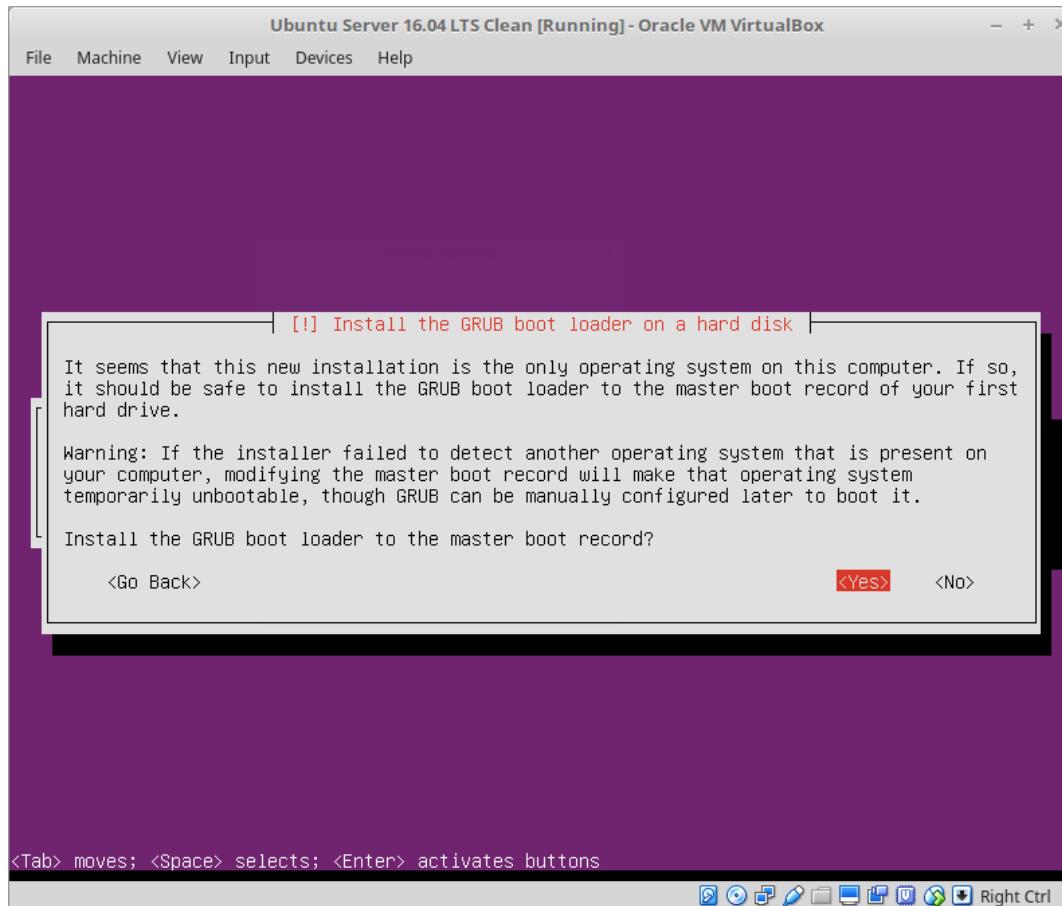
Additional software

- Select OpenSSH server



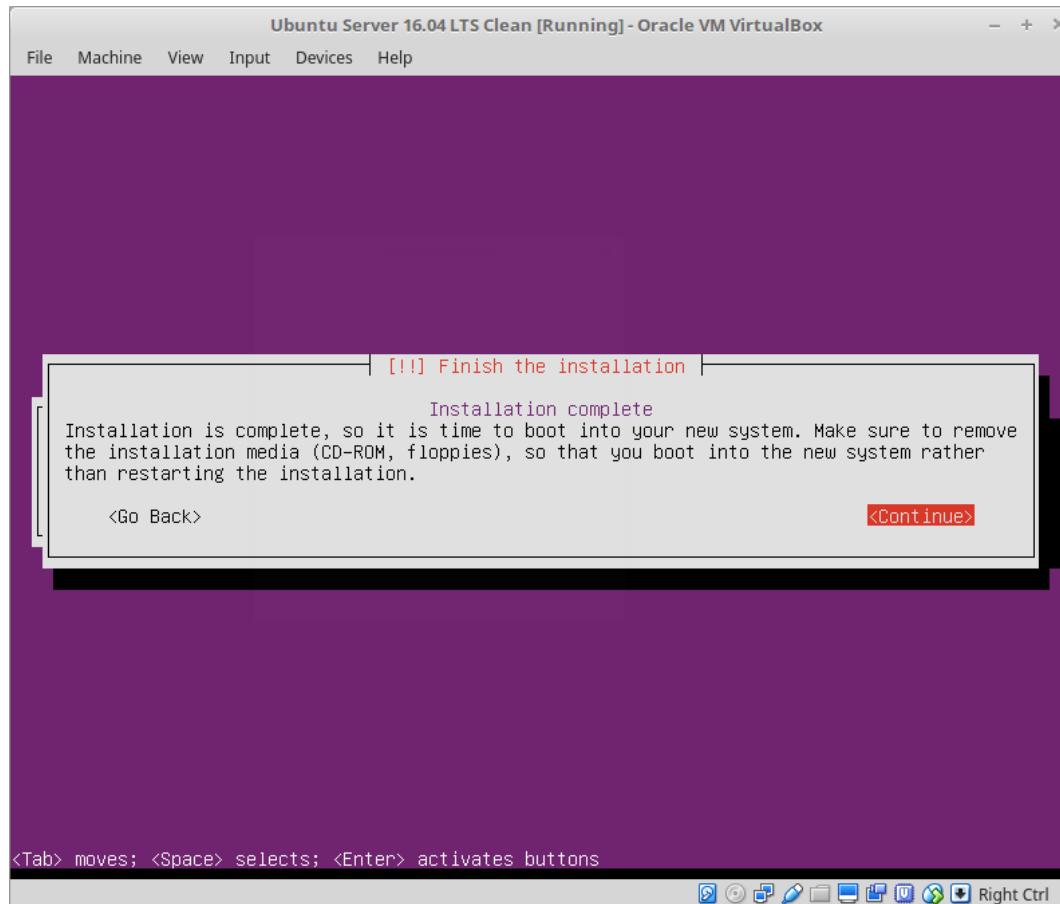
Finalizing installation

- GRUB boot loader



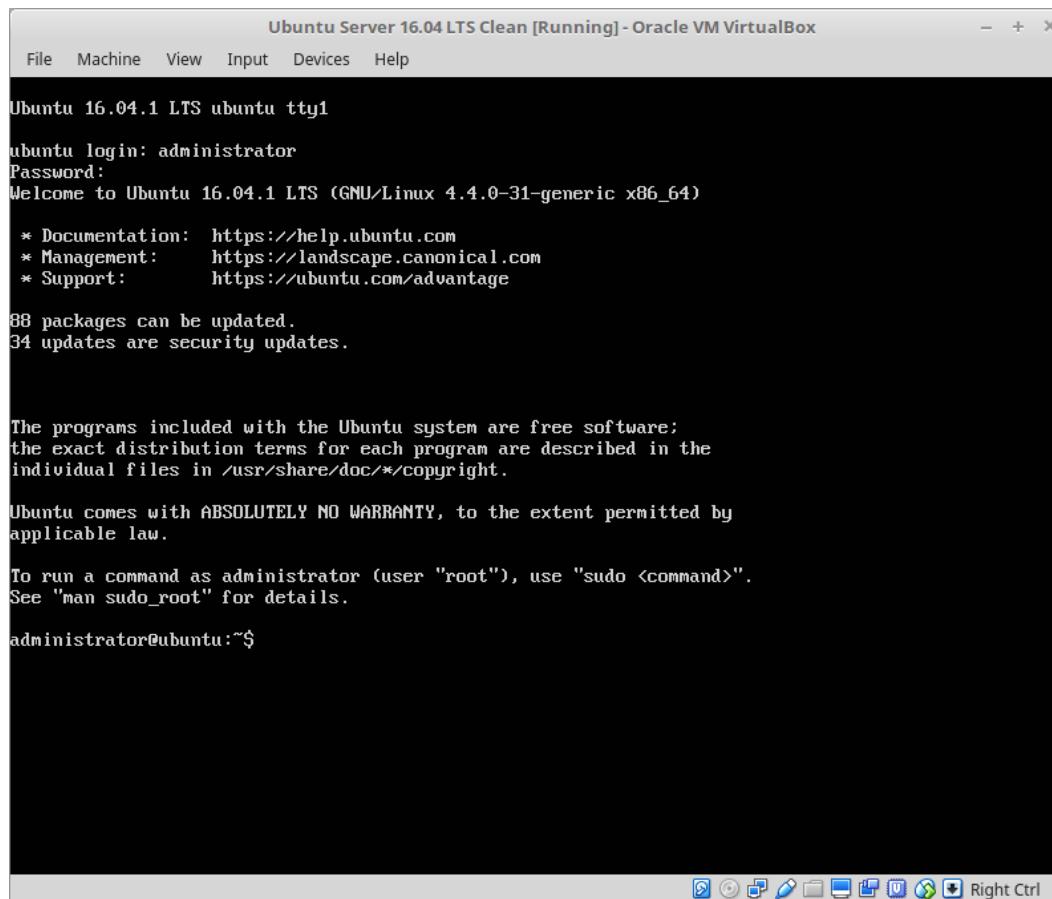
Starting the VM

- Rebooting after the installation



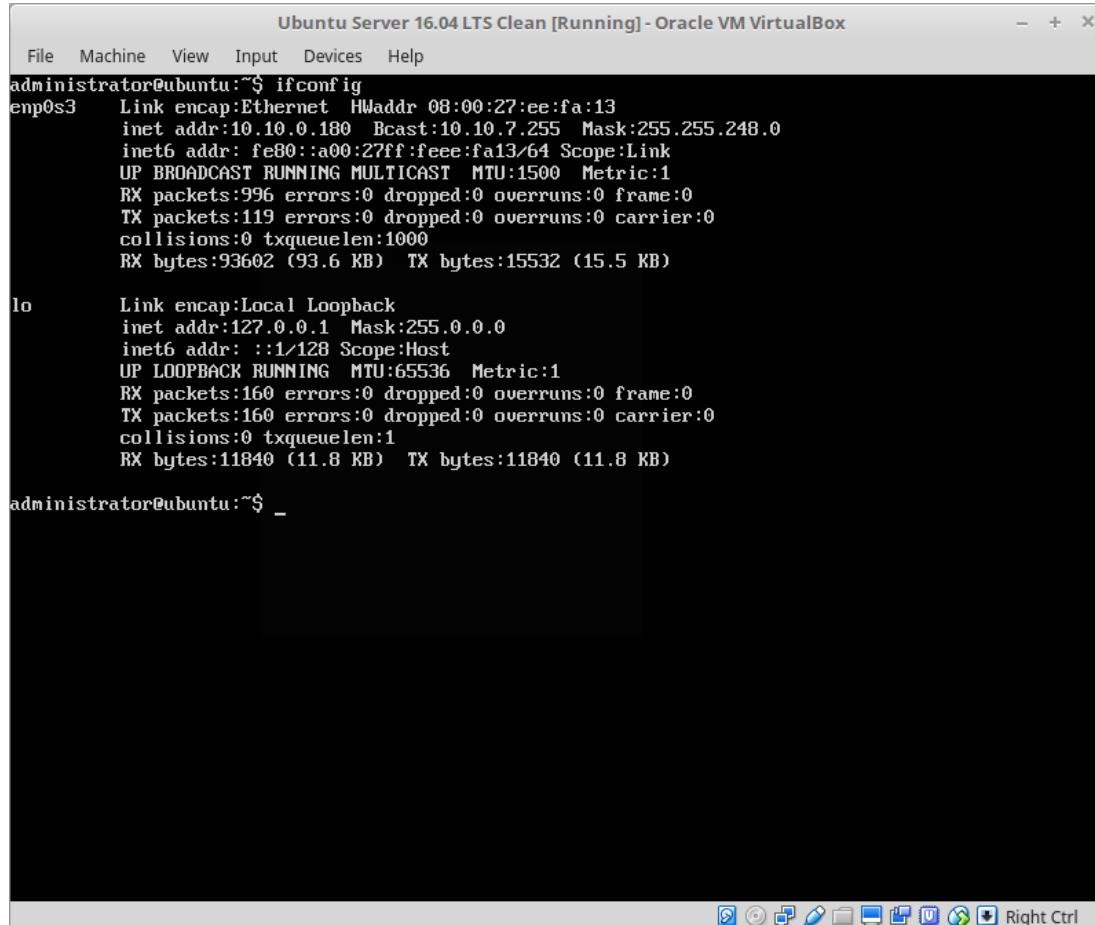
VM server

- Looking at new VM server via **VirtualBox**



Network test

- Commands **ifconfig, ping, CTRL+C**



The screenshot shows a terminal window titled "Ubuntu Server 16.04 LTS Clean [Running] - Oracle VM VirtualBox". The window contains the output of the "ifconfig" command. The output shows two network interfaces: "enp0s3" and "lo".

```
Ubuntu Server 16.04 LTS Clean [Running] - Oracle VM VirtualBox
File Machine View Input Devices Help
administrator@ubuntu:~$ ifconfig
enp0s3    Link encap:Ethernet HWaddr 08:00:27:ee:fa:13
          inet addr:10.10.0.180 Bcast:10.10.7.255 Mask:255.255.248.0
          inet6 addr: fe80::a00:27ff:feee:fa13/64 Scope:Link
            UP BROADCAST RUNNING MULTICAST MTU:1500 Metric:1
            RX packets:996 errors:0 dropped:0 overruns:0 frame:0
            TX packets:119 errors:0 dropped:0 overruns:0 carrier:0
            collisions:0 txqueuelen:1000
            RX bytes:93602 (93.6 KB) TX bytes:15532 (15.5 KB)

lo        Link encap:Local Loopback
          inet addr:127.0.0.1 Mask:255.0.0.0
          inet6 addr: ::1/128 Scope:Host
            UP LOOPBACK RUNNING MTU:65536 Metric:1
            RX packets:160 errors:0 dropped:0 overruns:0 frame:0
            TX packets:160 errors:0 dropped:0 overruns:0 carrier:0
            collisions:0 txqueuelen:1
            RX bytes:11840 (11.8 KB) TX bytes:11840 (11.8 KB)

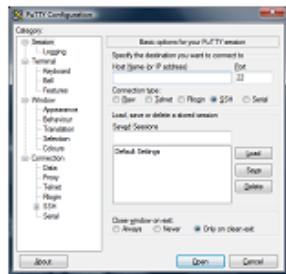
administrator@ubuntu:~$ _
```

Remote access

- SSH terminal
- PuTTY for Windows
 - Select 32 i 64-bit version

PuTTY client for Windows

- <http://www.putty.org/>



Download PuTTY

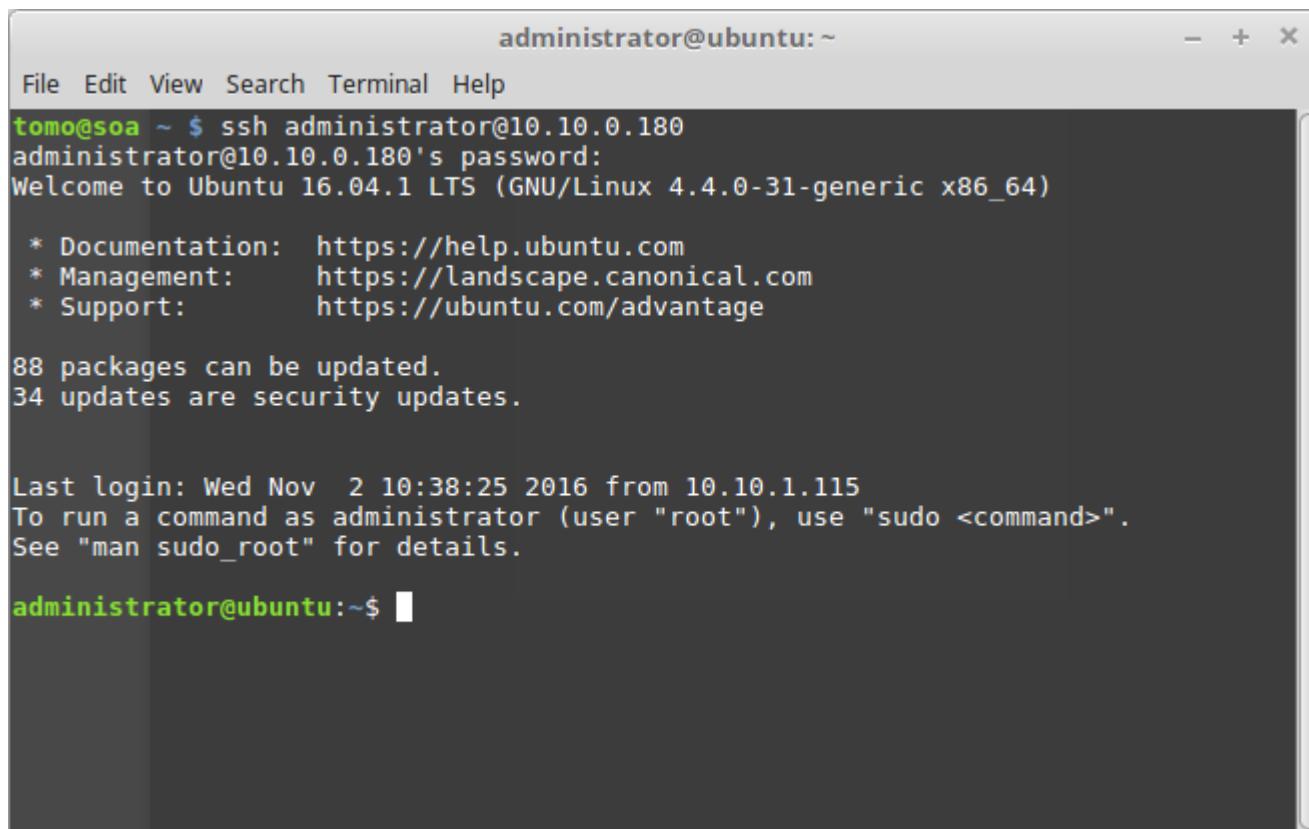
PuTTY is an SSH and telnet client, developed originally by Simon Tatham for the Windows platform. It is a free and open-source software that is available with source code and is developed and supported by a group of volunteers.

You can download PuTTY [here](#).

Below suggestions are independent of the authors of PuTTY. They are *not* to be seen as endorsements by the

Remote access via SSH

- SSH client (Linux terminal)



The screenshot shows a terminal window titled "administrator@ubuntu: ~". The window includes a menu bar with File, Edit, View, Search, Terminal, and Help. The main pane displays the following text output from an SSH session:

```
tomo@soa ~ $ ssh administrator@10.10.0.180
administrator@10.10.0.180's password:
Welcome to Ubuntu 16.04.1 LTS (GNU/Linux 4.4.0-31-generic x86_64)

 * Documentation:  https://help.ubuntu.com
 * Management:     https://landscape.canonical.com
 * Support:        https://ubuntu.com/advantage

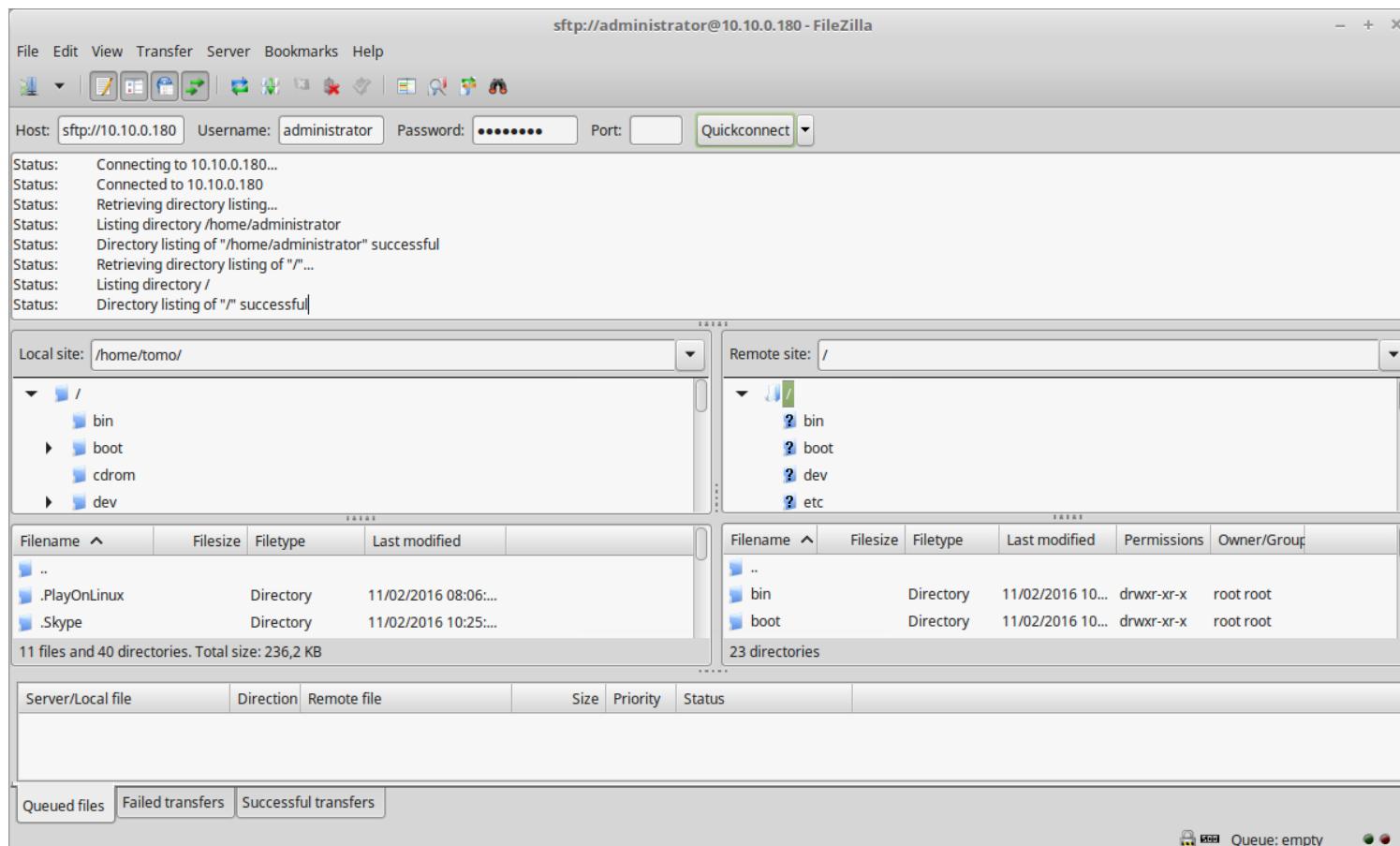
88 packages can be updated.
34 updates are security updates.

Last login: Wed Nov  2 10:38:25 2016 from 10.10.1.115
To run a command as administrator (user "root"), use "sudo <command>".
See "man sudo_root" for details.

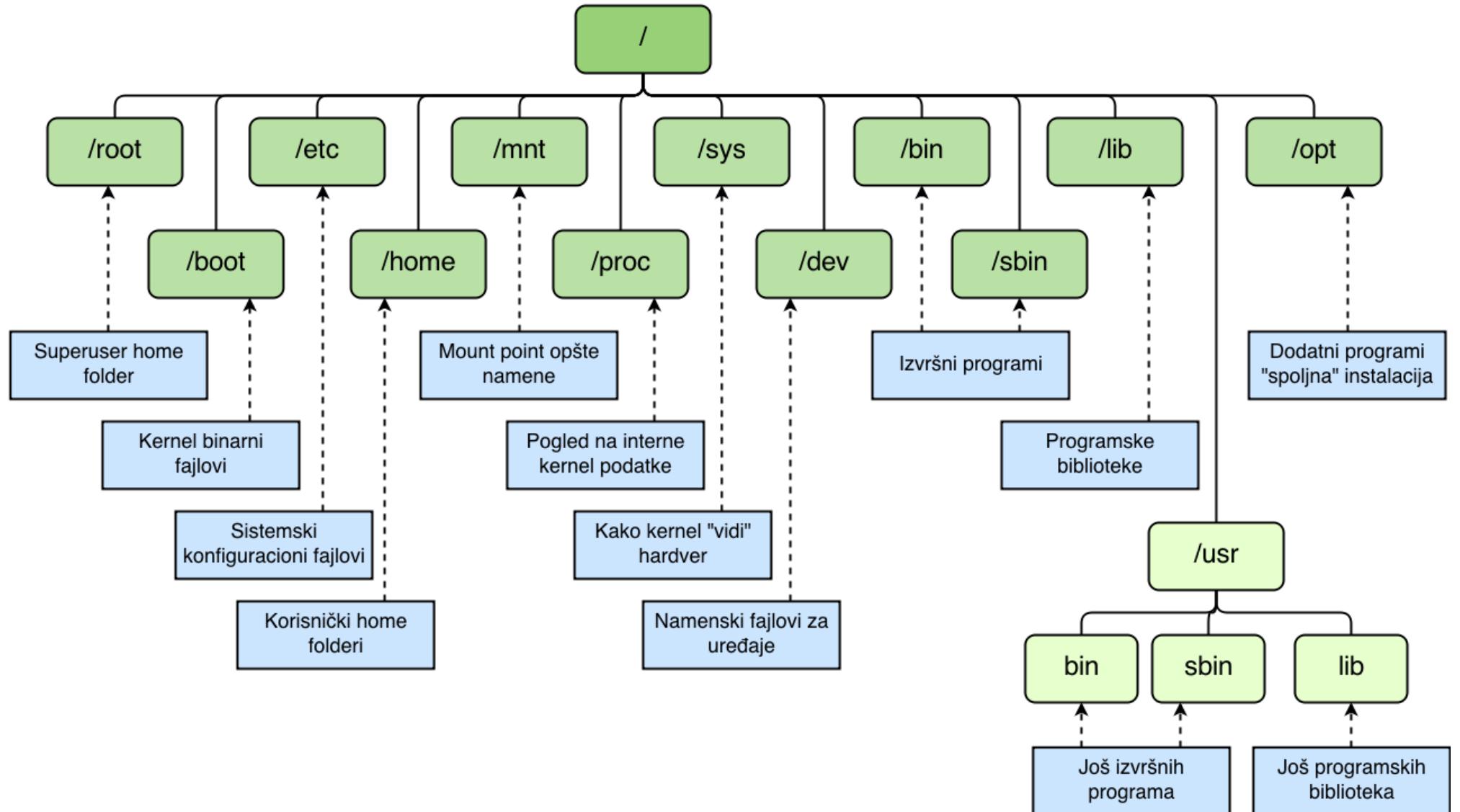
administrator@ubuntu:~$
```

Remote access SFTP

- SFTP client (FileZilla)



File structure in Linux



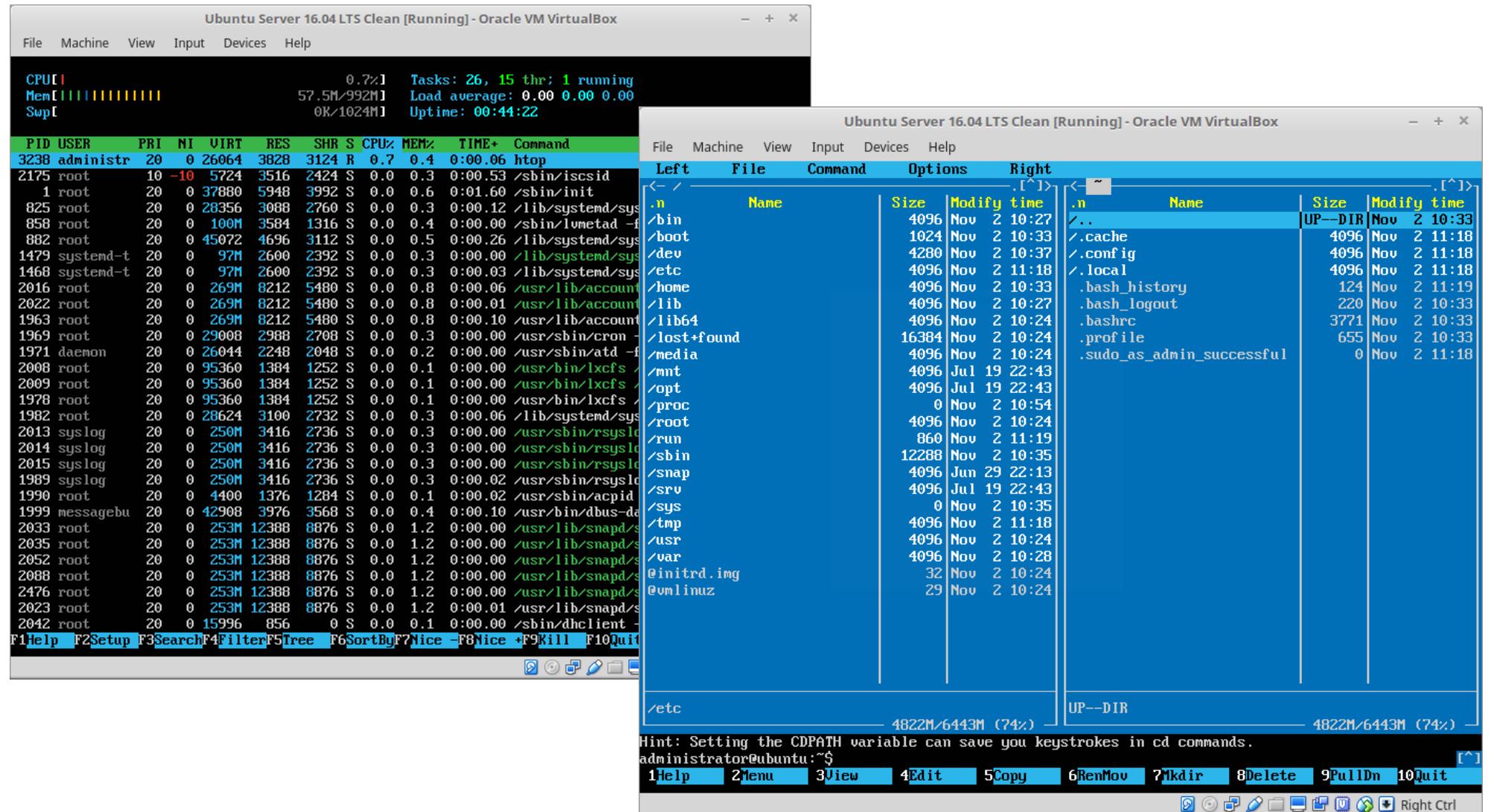
Linux commands

- **logout** – logging out
- **exit** – exiting the terminal
- **ls** – list files in current folder
- **pwd** – show current folder
- **cd** – change directory
- **man cmd** – display *cmd* instructions
- **cp** – copying files and directories
- **mv** – moving/renaming files and directories
- **rm** – removing/deleting files and directories
- **ifconfig** – show/change network adapter configuration

Run command as an Admin

- **sudo cmd** – executing commands as an administrator
- **sudo apt-get [update | upgrade | install | remove]** - program installation
- **sudo su** – switch to superuser mode
- Example:
 - sudo apt-get install **mc htop**
 - Check /etc/apt/sources.list (with nano)

htop and mc



Review

- Virtualization i VirtualBox
- Ubuntu Server operativni sistem
 - OpenSSH server
 - LAMP stack, PostgreSQL
- Accessing the VM using VirtualBox-a and remotely
 - SSH terminal (PuTTY na Windows)
 - SFTP client (FileZilla)
- Linux commands
- Utilities: htop i mc

Excercise

- Practical VirtualBox installation
- Creating a VM
- Ubuntu operating system
 - SSH, LAMP, and others.
- Introduction to Linux commands
- Utility programs (ssh, mc, htop)

Resources

- <https://www.virtualbox.org/>
- <https://www.ubuntu.com/>
- <http://www.putty.org/>
- <https://blog.splunk.net/64bit-putty/>
- Linux commands