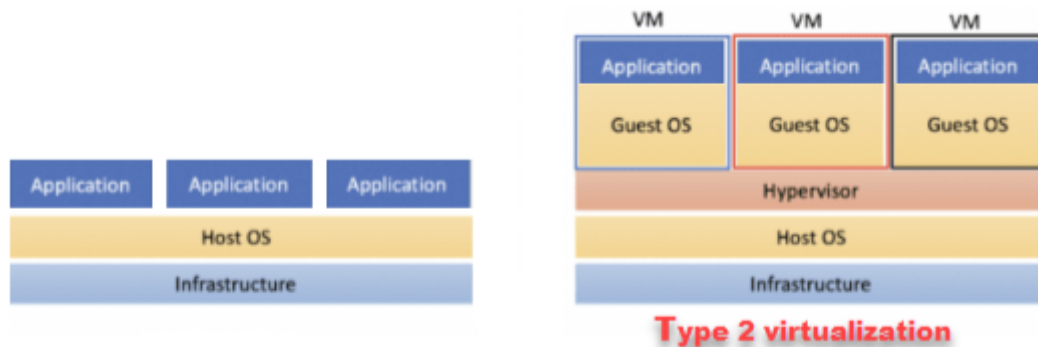


Installation

Virtualisation

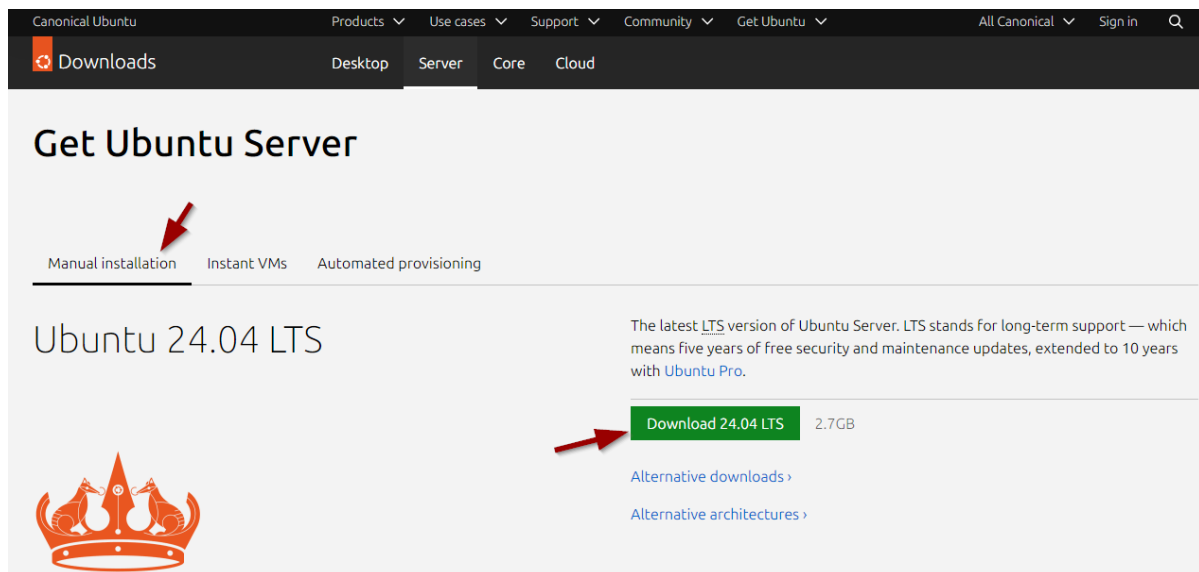
To install servers that offer services (such as a minecraft server!) you will need a server with a public IP address. Usually you would go to a cloud provider where you can rent a server for a fixed fee / month. For this course we will simulate this process by using a virtual machine.

Virtualisation is a concept where you can run a computer system with an operating system virtually on another system. This makes it possible to have multiple *guest operating systems* with their own virtual hardware on one *host system*.



For this course we want to use and install the operating system [Ubuntu server](#) in a virtual environment. For this course we will use a debian based distro.

?> :fa-solid fa-list-check: Download the `.iso` file for Ubuntu server using [this link](#). A `.iso` file is an exact copy of a CD/DVD. You will use this later to install the operating system in your virtual machine.



Virtualisation software

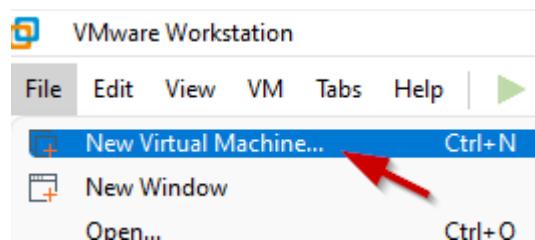
To use virtualisation there are several options. The most common virtualisation software is:

- VMware Workstation
- Virtualbox
- Hyper-V

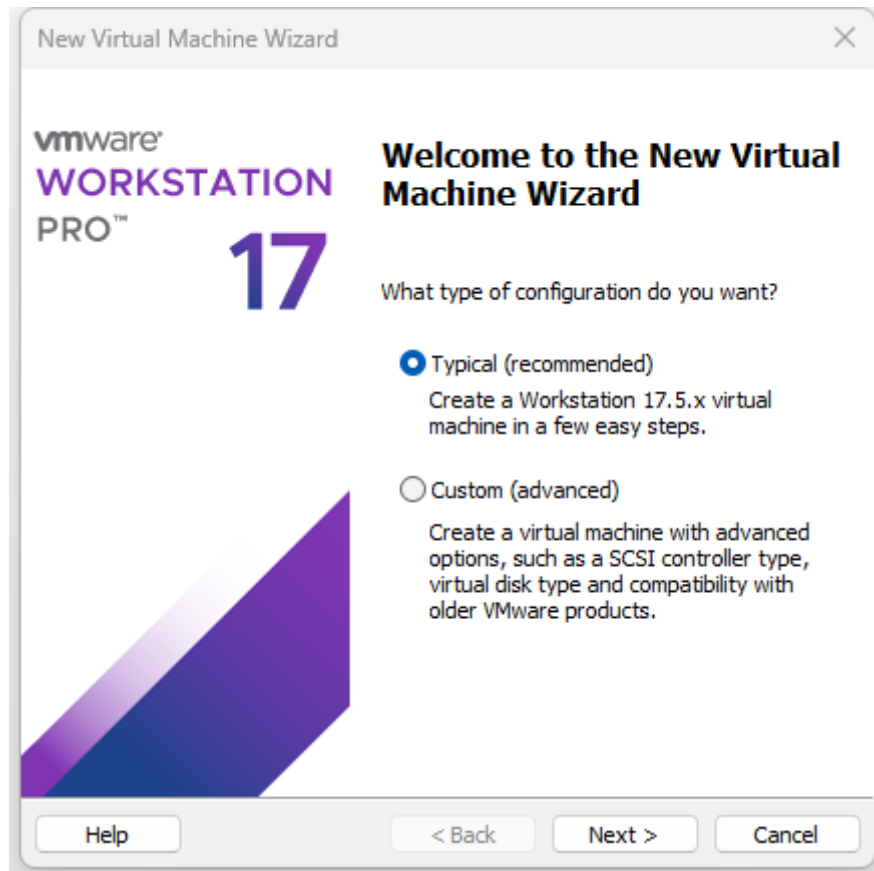
In this course we will use and support VMware Workstation but the other software packages have the same purpose.

Create a new VM

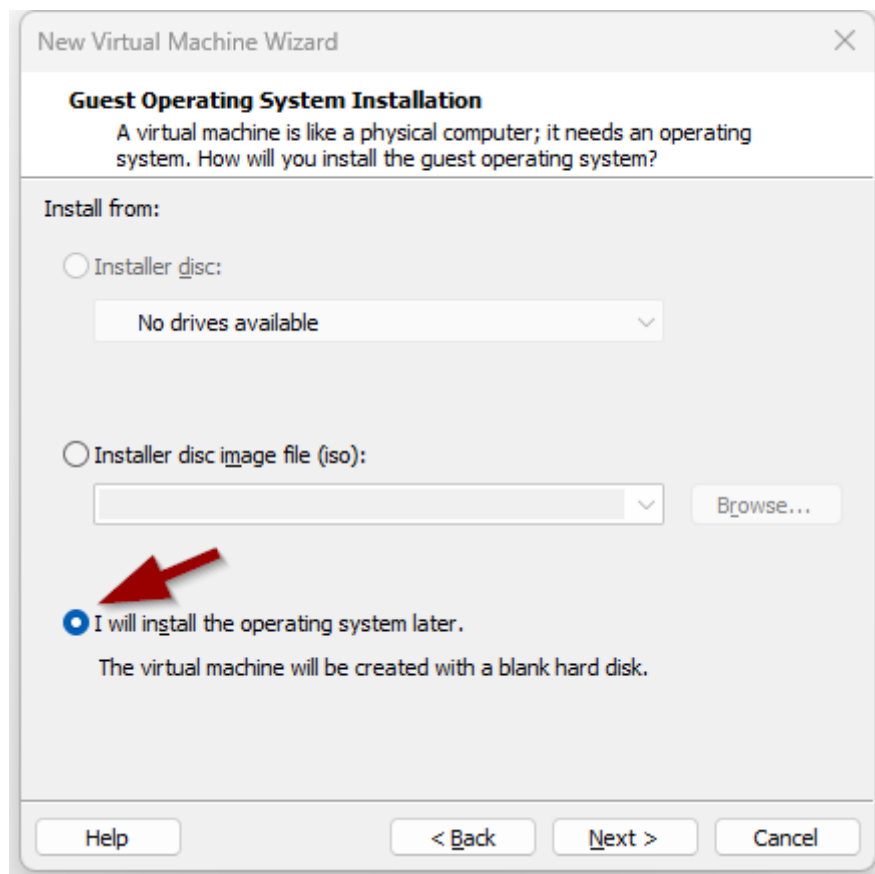
To create a new virtual machine (VM) in VMWare you go to the menu `File > New virtual machine`. The wizard to create a new VM will appear.



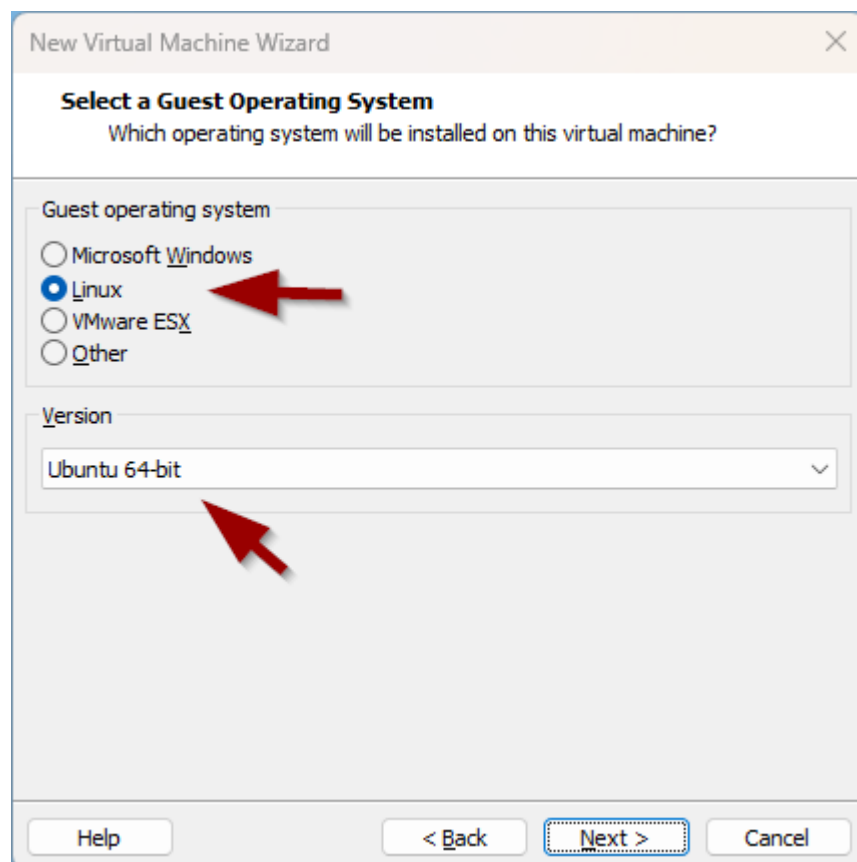
In the first screen we select the option `Typical`:



Next we choose to `I will install the operating system later`:



Next we choose the operating system `Linux`. In the version dropdown we select `Ubuntu 64 bit`. This is the Linux distribution that we will use during this course.



In the next screen we give the virtual machine a name. You can also specify a different folder to store the virtual machine on your computer.

?> Caution! Do not save your VM files to a directory on your host that is synced with the cloud (OneDrive, Dropbox, Google Drive)?. Your VM will crash and you will lose everything from within this VM!

New Virtual Machine Wizard

Name the Virtual Machine
What name would you like to use for this virtual machine?

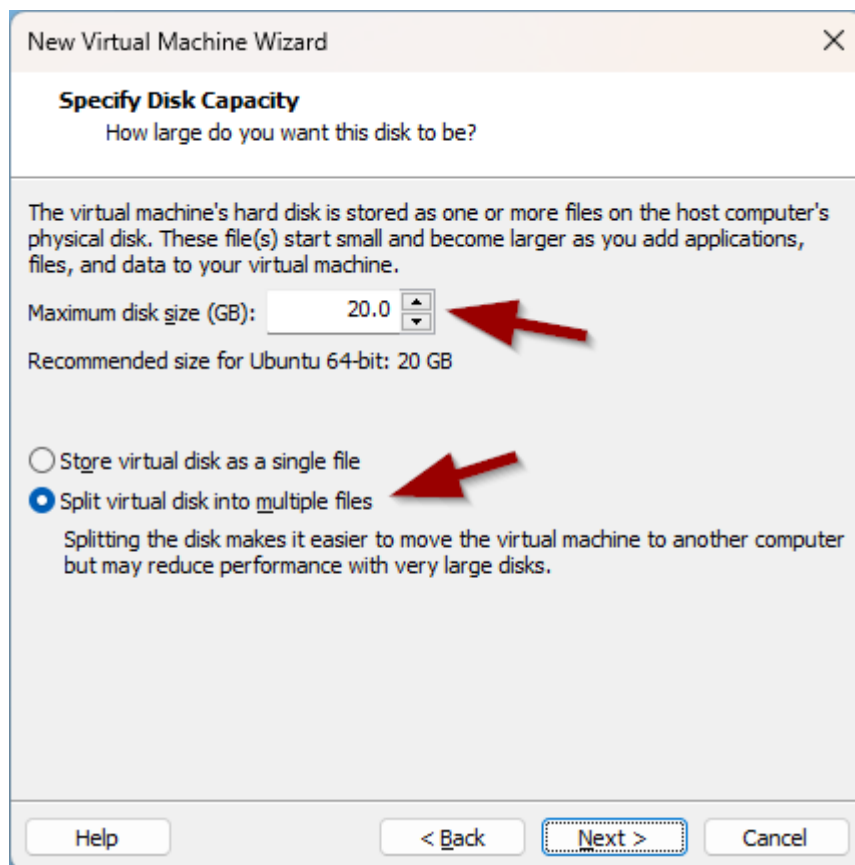
Virtual machine name:
Ubuntu Server

Location:
C:\Virtual Machines\Ubuntu Server Browse...

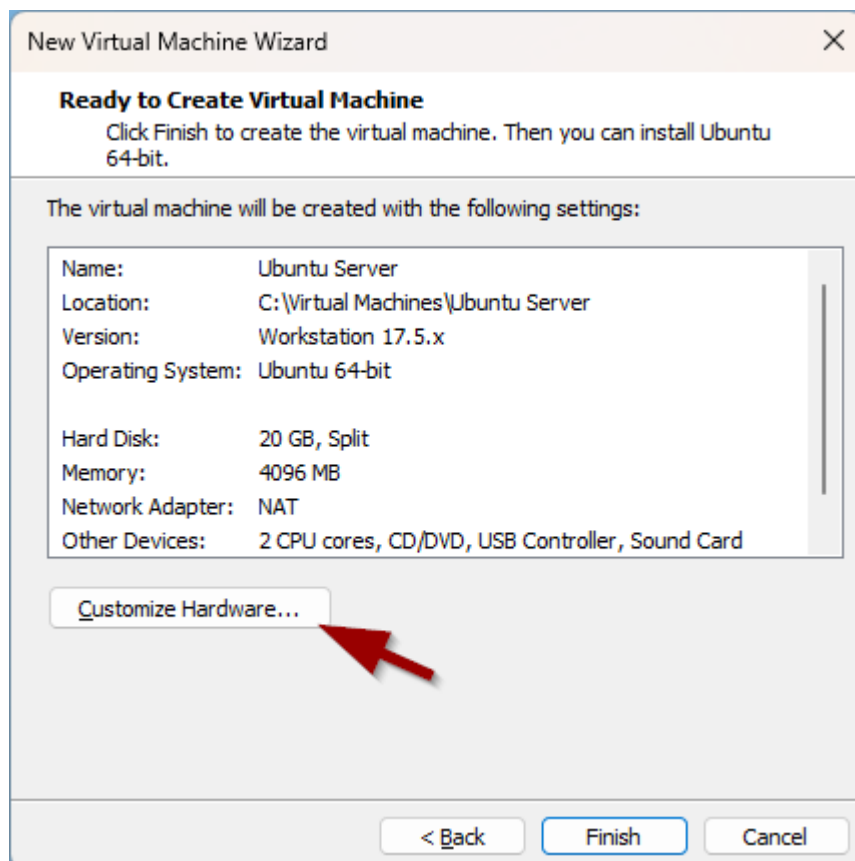
The default location can be changed at Edit > Preferences.

< Back Next > Cancel

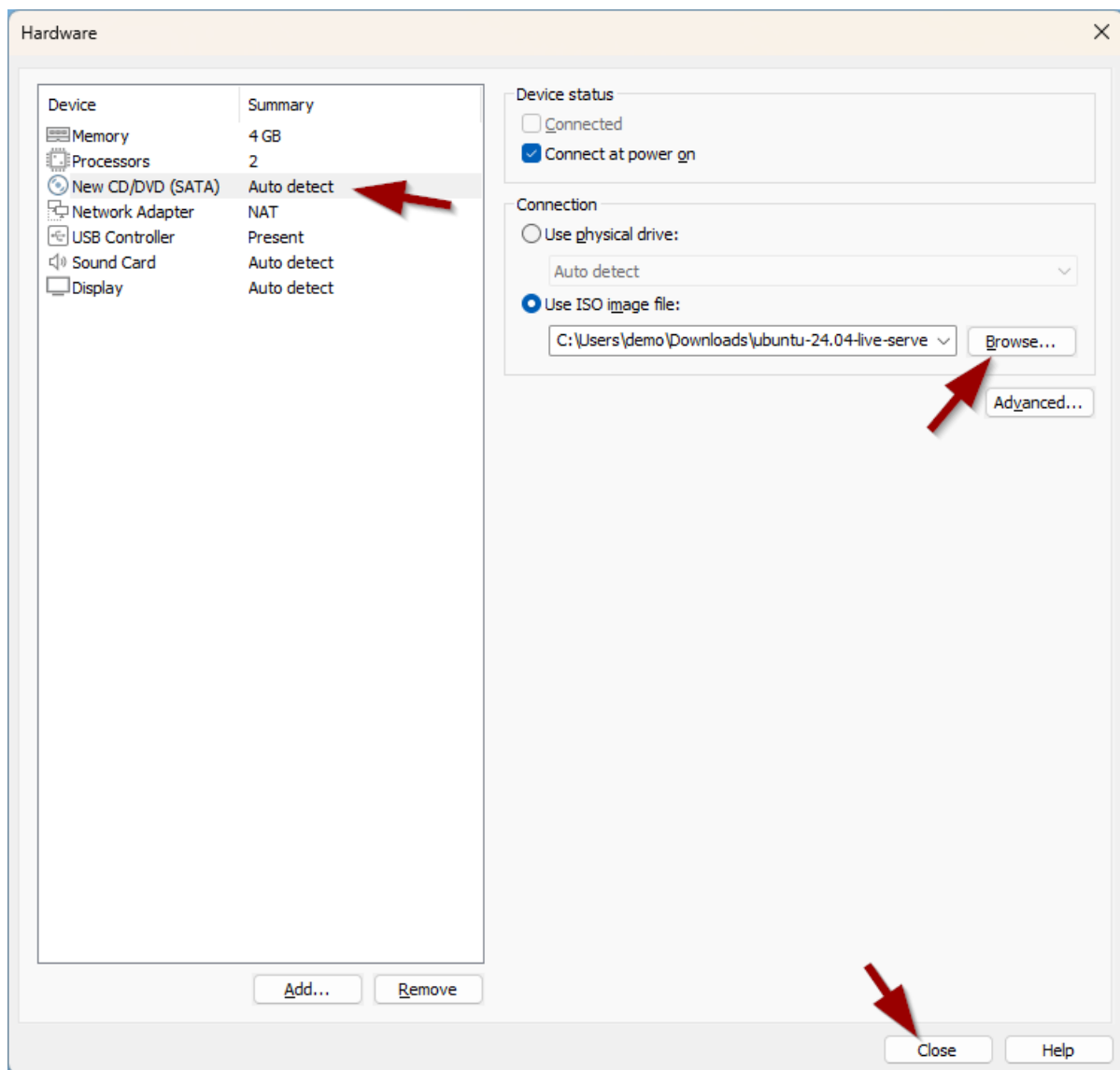
In the next screen we configure the virtual harddisk size for the VM. We will create a disk that has 20GB storage. We can expand this later if needed:



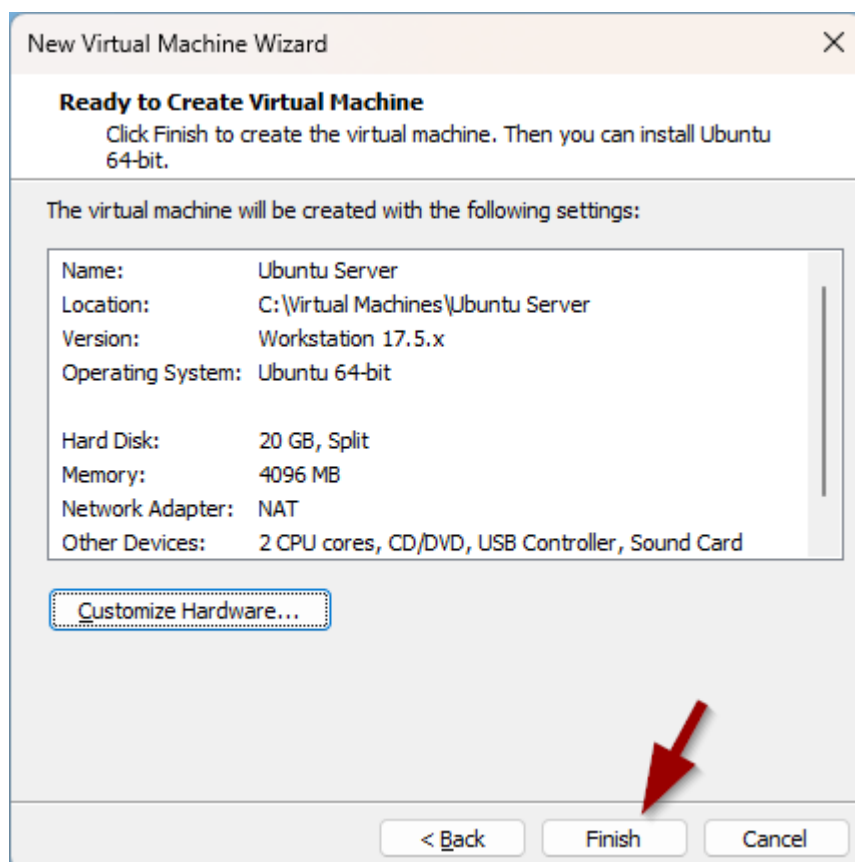
We have to click on `Customize Hardware` to configure the virtual machine a little more:



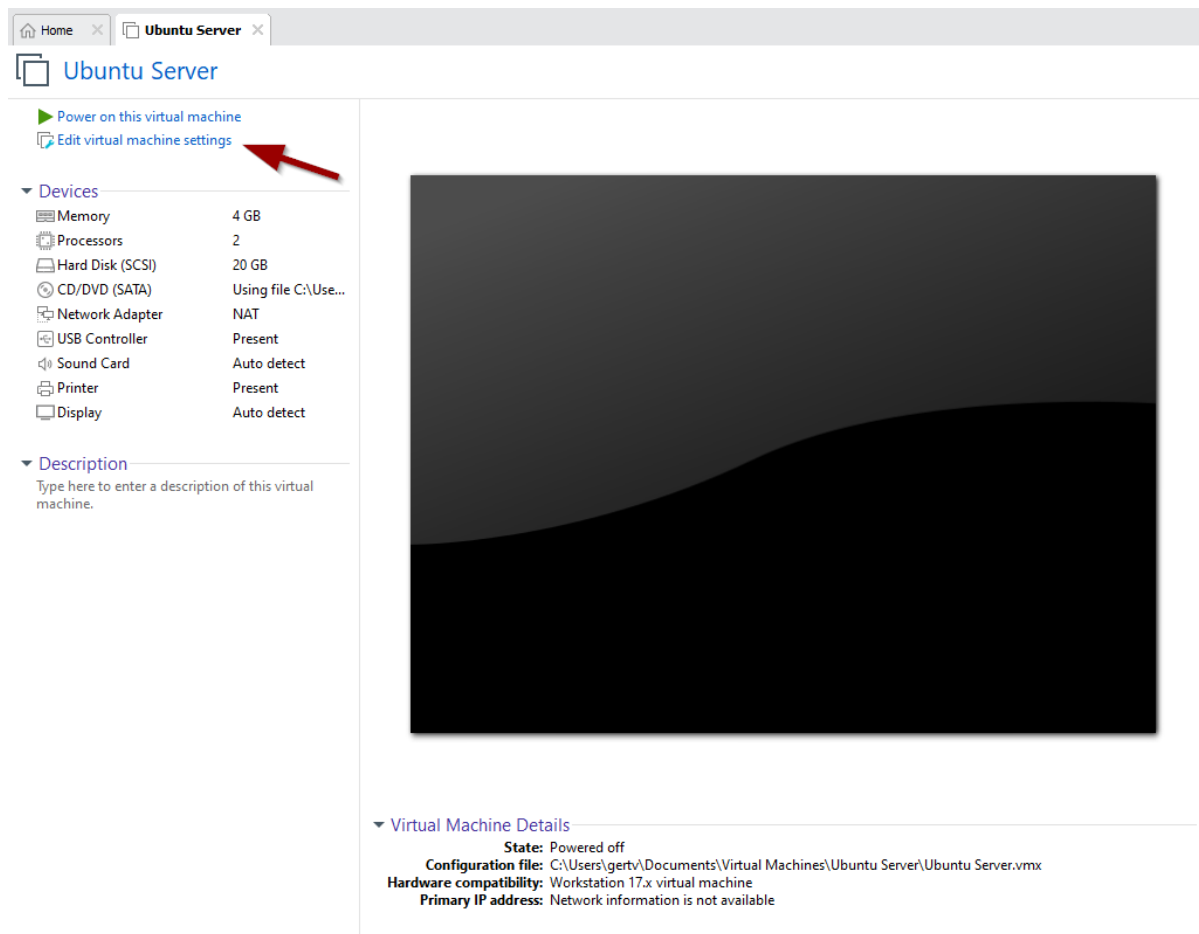
We still need to link the Ubuntu-server ISO file to the virtual CD-rom drive. We do this by selecting `New CD/DVD` and browsing to the downloaded `iso` file:



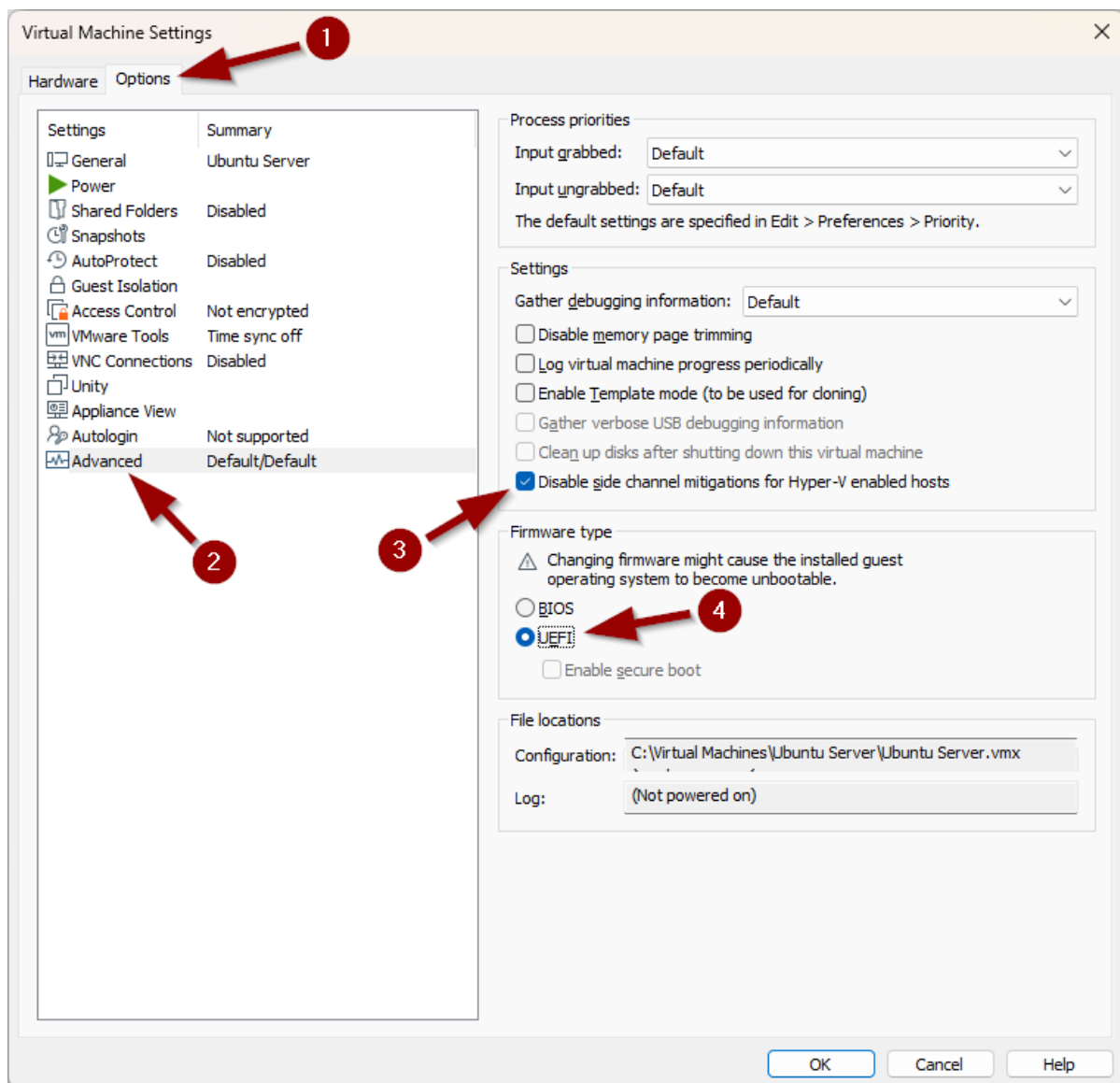
Click on **Finish** and the virtual machine will be created.



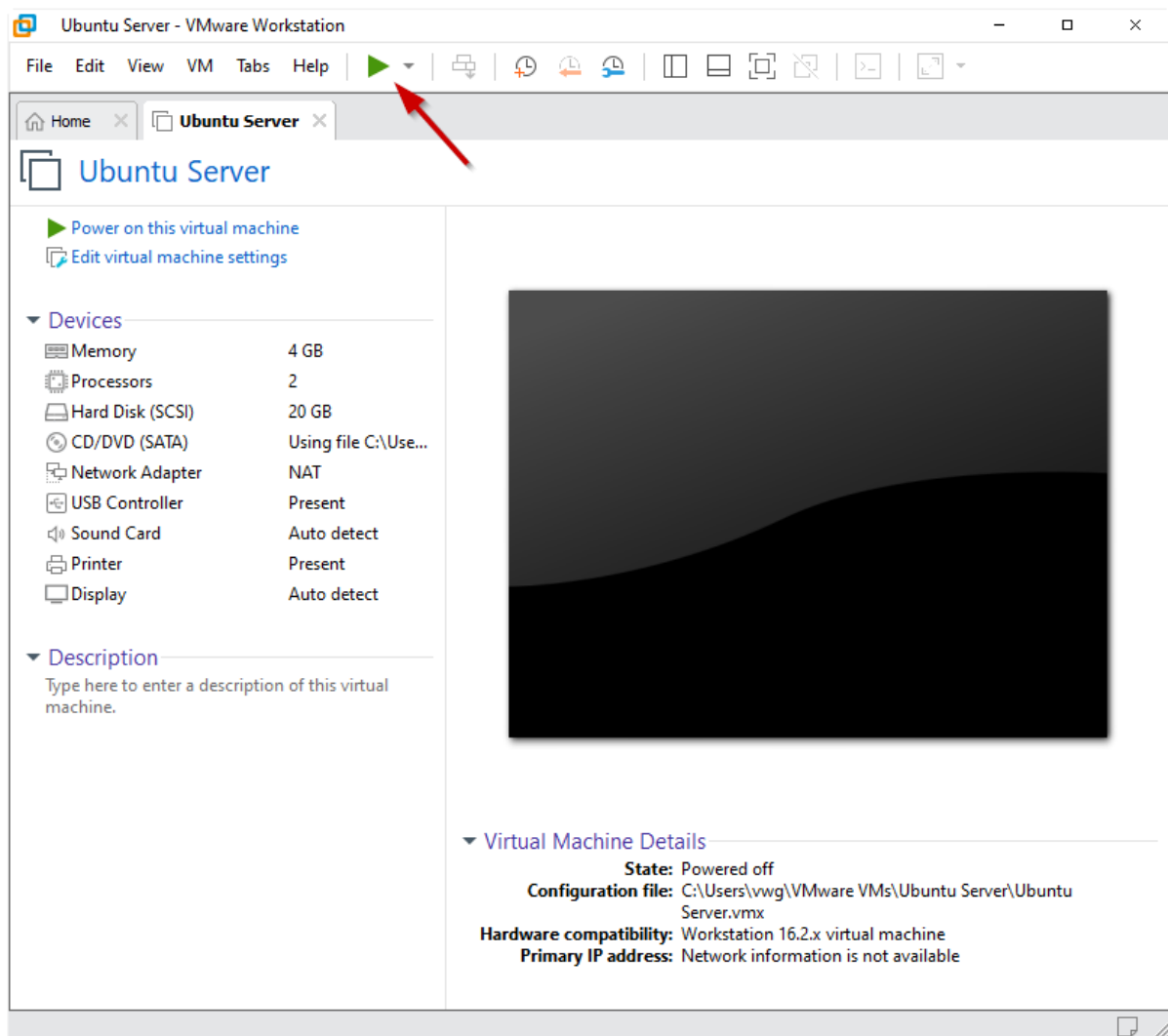
At this point we only need to change the bios to UEFI. To do this we click on **Edit virtual machine settings**.



Go to the tab **options**, click on **Advanced** and select the option **UEFI**. Note that you'll also find the setting **side channel mitigations** here in case you get a warning later on when starting your Virtual Machine.



You can now boot the VM by clicking the green arrow icon. This will boot the virtual machine and run the installation process.



Installation Ubuntu server

As described before we will use the distro Ubuntu. After creating and booting the virtual machine there will be an installation process that we need to run through. You will notice that there is no mouse pointer available. We will use the keypoint arrow keys & enter key to navigate through the steps.

?> Does booting the VM result in the error `This host supports Intel VT-x, but Intel VT-x is disabled`? You will have to activate the VT-X option in the BIOS of your laptop. More information can be found in [this article](#).

?> If you want to leave your VM and get your mouse back in the OS of your laptop (=Windows) you'll have to press `CTRL+ALT` !

We make the choice to Try or Install:

GNU GRUB version 2.12

***Try or Install Ubuntu Server**

Boot from next volume

UEFI Firmware Settings

Use the ▲ and ▼ keys to select which entry is highlighted.
Press enter to boot the selected OS, 'e' to edit the commands
before booting or 'c' for a command-line.
The highlighted entry will be executed automatically in 22s.

We start the installation process by selecting the language. We choose English:

Willkommen! Bienvenue! Welcome! Добро пожаловать! Welkom!

[Help]

Use UP, DOWN and ENTER keys to select your language.

[Asturianu	▶]
[Bahasa Indonesia	▶]
[Català	▶]
[Deutsch	▶]
[English	▶]
[English (UK)	▶]
[Español	▶]
[Français	▶]
[Galego	▶]
[Hrvatski	▶]
[Latviski	▶]
[Lietuviškai	▶]
[Magyar	▶]
[Nederlands	▶]
[Norsk bokmål	▶]
[Occitan	▶]
[Polski	▶]
[Português	▶]
[Suomi	▶]
[Svenska	▶]
[Čeština	▶]
[Ελληνικά	▶]
[Беларуская	▶]
[Русский	▶]
[Српски	▶]
[Українська	▶]

We skip the installer update if you see this screen:

```
Installer update available [ Help ]
Version 22.05.1 of the installer is now available (22.04.2 is currently running).
You can read the release notes for each version at:
    https://github.com/canonical/subiquity/releases
If you choose to update, the update will be downloaded and the installation will continue from here.

[ Update to the new installer ]
[ Continue without updating ]
[ Back ]
```

Choose the correct keyboard layout. For `azerty` select `Belgian`:

```
Keyboard configuration [ Help ]
Please select your keyboard layout below, or select "Identify keyboard" to detect your layout automatically.

Layout: [ Belgian ▼ ]
Variant: [ Belgian ▼ ]

[ Identify keyboard ]

[ Done ]
[ Back ]
```

In the next 7 steps we don't make any changes. We just press `Done` or `Continue` :

Choose the base for the installation.

☒ Ubuntu Server

The default install contains a curated set of packages that provide a comfortable experience for operating your server.

☐ Ubuntu Server (minimized)

This version has been customized to have a small runtime footprint in environments where humans are not expected to log in.

Additional options

☐ Search for third-party drivers

This software is subject to license terms included with its documentation. Some is proprietary. Third-party drivers should not be installed on systems that will be used for FIPS or the real-time kernel.

[Done]
[Back]

Configure at least one interface this server can use to talk to other machines, and which preferably provides sufficient access for updates.

NAME	TYPE	NOTES
[ens33	eth	- ▶]
DHCPv4 192.168.109.130/24		
00:0c:29:e4:20:ab / Intel Corporation / 82545EM Gigabit Ethernet Controller (Copper) (PRO/1000 MT Single Port Adapter)		

[Create bond ▶]

[Done]
[Back]

If this system requires a proxy to connect to the internet, enter its details here.

Proxy address:

If you need to use a HTTP proxy to access the outside world, enter the proxy information here. Otherwise, leave this blank.

The proxy information should be given in the standard form of "http://[[user][:pass]@host[:port]]/".

[Done]
[Back]

If you use an alternative mirror for Ubuntu, enter its details here.

Mirror address: http://be.archive.ubuntu.com/ubuntu/

You may provide an archive mirror to be used instead of the default.

This mirror location passed tests.

```
Get:1 http://be.archive.ubuntu.com/ubuntu noble InRelease [256 kB]
Get:2 http://be.archive.ubuntu.com/ubuntu noble-updates InRelease [126 kB]
Get:3 http://be.archive.ubuntu.com/ubuntu noble-backports InRelease [126 kB]
Fetched 508 kB in 1s (429 kB/s)
Reading package lists...
```

[Done]
[Back]

Configure a guided storage layout, or create a custom one:

(X) Use an entire disk

[/dev/sda local disk 20.000G ▼]

[X] Set up this disk as an LVM group

[] Encrypt the LVM group with LUKS

Passphrase:

Confirm passphrase:

[] Also create a recovery key

The key will be stored as ~/recovery-key.txt in the live system and will be copied to /var/log/installer/ in the target system.

() Custom storage layout

[Done]

[Back]

FILE SYSTEM SUMMARY

MOUNT POINT	SIZE	TYPE	DEVICE TYPE
[/	10.000G	new ext4	new LVM logical volume ▶]
[/boot	1.750G	new ext4	new partition of local disk ▶]
[/boot/efi	953.000M	new fat32	new partition of local disk ▶]

AVAILABLE DEVICES

DEVICE	TYPE	SIZE
[ubuntu-vg (new)	LVM volume group	17.316G ▶]
free space		7.316G ▶]

[Create software RAID (md) ▶]
[Create volume group (LVM) ▶]

USED DEVICES

DEVICE	TYPE	SIZE
[ubuntu-vg (new)	LVM volume group	17.316G ▶]
ubuntu-lv	new, to be formatted as ext4, mounted at /	10.000G ▶]

DEVICE	TYPE	SIZE
[/dev/sda	local disk	20.000G ▶]
partition 1	new, primary ESP, to be formatted as fat32, mounted at /boot/efi	953.000M ▶]
partition 2	new, to be formatted as ext4, mounted at /boot	1.750G ▶]
partition 3	new, PV of LVM volume group ubuntu-vg	17.317G ▶]

[Done]

[Reset]

[Back]

```
Storage configuration [ Help ]

FILE SYSTEM SUMMARY

MOUNT POINT      SIZE      TYPE      DEVICE TYPE
[ /               10.000G   new ext4   new LVM logical volume ▶ ]
[ /boot           1.750G   new ext4   new partition of local disk ▶ ]
[ /boot/efi       953.000M new fat32   new partition of local disk ▶ ]

AVAILABLE DEVICES

DEVICE                                TYPE                                SIZE
[ ubuntu-vg (new)                    LVM volume group                   17.316G ▶ ]
  free space                          7.316G ▶ ]

[ Create so
[ Create vo

USED DEVICE

DEVICE
[ ubuntu-vg
  ubuntu-lv
[ /dev/sda
  partition
  partition
  partition

Confirm destructive action

Selecting Continue below will begin the installation process and
result in the loss of data on the disks selected to be formatted.

You will not be able to return to this or a previous screen once the
installation has started.

Are you sure you want to continue?

[ No ]
[ Continue ]

[ Done ]
[ Reset ]
[ Back ]
```

Next up we create a user account that we use to login to the operating system. We use following credentials:

```
username: student
server name: ubserv
password: pxl
```

Profile configuration

[Help]

Enter the username and password you will use to log in to the system. You can configure SSH access on a later screen, but a password is still needed for sudo.

Your name:

Your servers name:
The name it uses when it talks to other computers.

Pick a username:

Choose a password:

Confirm your password:

[Done]

We answer the question to upgrade to Ubuntu Pro with `Skip for now`

Upgrade to Ubuntu Pro

[Help]

Upgrade this machine to Ubuntu Pro for security updates on a much wider range of packages, until 2034. Assists with FedRAMP, FIPS, STIG, HIPAA and other compliance or hardening requirements.

[About Ubuntu Pro ►]

☐ Enable Ubuntu Pro

☒ Skip for now

You can always enable Ubuntu Pro later using the 'pro attach' command.

[Continue]

[Back]

For Extra Packages we will only opt to install `SSH server` :

You can choose to install the OpenSSH server package to enable secure remote access to your server.

[X] Install OpenSSH server

[X] Allow password authentication over SSH

[Import SSH key ►]

AUTHORIZED KEYS

No authorized key

[Done]
[Back]

These are popular snaps in server environments. Select or deselect with SPACE, press ENTER to see more details of the package, publisher and versions available.

[]	microk8s	canonical✓	Kubernetes for workstations and appliances	►
[]	nextcloud	nextcloud✓	Nextcloud Server - A safe home for all your data	►
[]	wekan	xet7	Open-Source kanban	►
[]	kata-containers	katacontainers✓	Build lightweight VMs that seamlessly plug into the containers ecosystem	►
[]	docker	canonical✓	Docker container runtime	►
[]	canonical-livepatch	canonical✓	Canonical Livepatch Client	►
[]	rocketchat-server	rocketchat✓	Rocket.Chat server	►
[]	mosquitto	mosquitto✓	Eclipse Mosquitto MQTT broker	►
[]	etcd	canonical✓	Resilient key-value store by CoreOS	►
[]	powershell	microsoft-powershell✓	PowerShell for every system!	►
[]	sabnzbd	safihre	SABnzbd	►
[]	wormhole	snapcrafters🔥	get things from one computer to another, safely	►
[]	aws-cli	aws✓	Universal Command Line Interface for Amazon Web Services	►
[]	google-cloud-sdk	google-cloud-sdk✓	Google Cloud SDK	►
[]	slcli	softlayer	Python based SoftLayer API Tool.	►
[]	doctl	digitalocean✓	The official DigitalOcean command line interface	►
[]	conjure-up	canonical✓	Package runtime for conjure-up spells	►
[]	postgresql10	cmd✓	PostgreSQL is a powerful, open source object-relational database system.	►
[]	heroku	heroku✓	CLI client for Heroku	►
[]	keepalived	keepalived-project✓	High availability VRRP/BFD and load-balancing for Linux	►
[]	prometheus	canonical✓	The Prometheus monitoring system and time series database	►

[Done]
[Back]

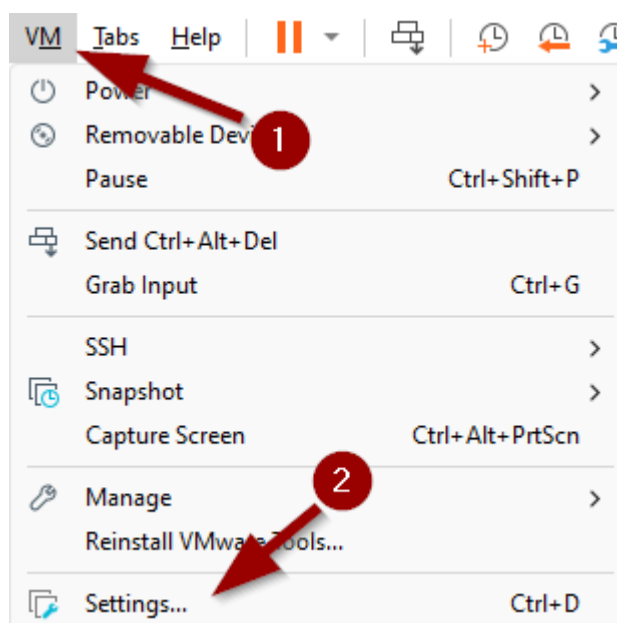
The operating system will be installed and configured. After a while the `Reboot now` option will appear. This indicates that the installation is complete:

```
Installation complete! [ Help ]

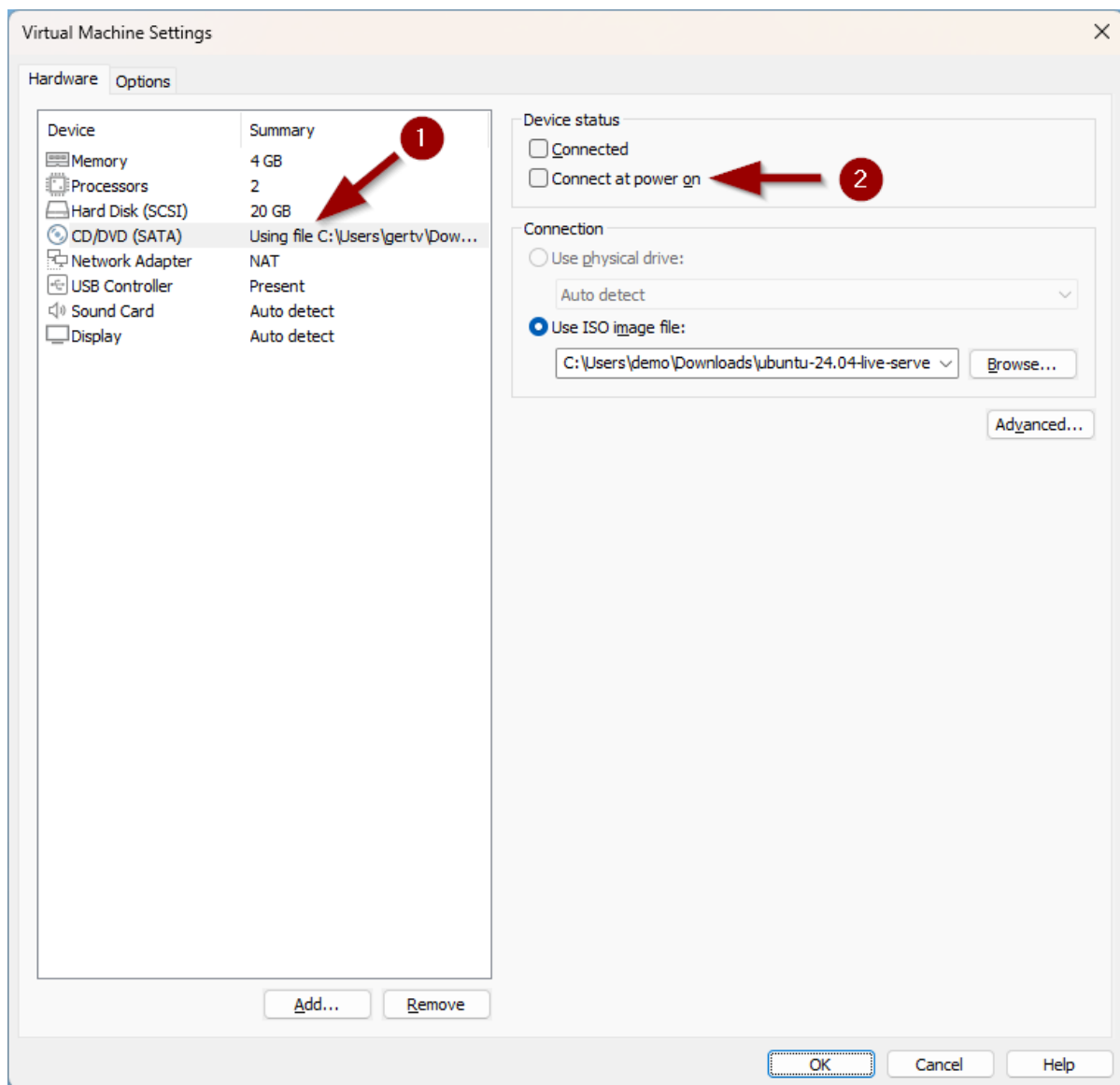
writing install sources to disk
  running 'curtin extract'
  curtin command extract
    acquiring and extracting image from cp:///tmp/tmp62rw40on/mount
configuring keyboard
  curtin command in-target
executing curtin install curthooks step
  curtin command install
    configuring installed system
      running 'curtin curthooks'
      curtin command curthooks
        configuring apt
        configuring apt
        installing missing packages
        installing packages on target system: ['efibootmgr', 'grub-efi-amd64', 'grub-efi-amd64-signed', 'shim-signed']
        configuring iscsi service
        configuring raid (mdadm) service
        configuring NVMe over TCP
        installing kernel
        setting up swap
        apply networking config
        writing etc/fstab
        configuring multipath
        updating packages on target system
        configuring pollinate user-agent on target
        updating initramfs configuration
        configuring target system bootloader
        installing grub to target devices
        copying metadata from /cdrom
final system configuration
  calculating extra packages to install
  installing openssh-server
  retrieving openssh-server
  curtin command system-install
  unpacking openssh-server
  curtin command system-install
  configuring cloud-init
  downloading and installing security updates
  curtin command in-target
  restoring apt configuration
  curtin command in-target
subiquity/Late/run:

[ View full log ]
[ Reboot Now ]
```

When we see the screen where they ask to push the 'enter'-key, we first go into the settings of the Virtual Machine :



There we uncheck that the CD/DVD has to be connected at boot time (otherwise the installation will load again each time we boot)



And then we push the 'enter'-key

```
[FAILED] Failed unmounting /cdrom.  
Please remove the installation medium, then press ENTER:  
[FAILED] Failed unmounting /cdrom.
```

Once the server is rebooted, you will have to press the `enter` key again to see the login prompt.

```

linux-essentials login: [ 31.274222] cloud-init[1512]: Cloud-init v. 22.1-14-g2e17a0d6-0ubuntu1~22.04.5 running 'modules:config' at Tue, 07 Jun 2022 08:15:20 +0000. Up 31.20 seconds.
[ 31.390485] cloud-init[1512]: Generating locales (this might take a while)...
[ 34.195748] cloud-init[1512]: en_US.UTF-8... done
[ 34.195888] cloud-init[1512]: Generation complete.
[ 34.975662] cloud-init[1548]: Cloud-init v. 22.1-14-g2e17a0d6-0ubuntu1~22.04.5 running 'modules:final' at Tue, 07 Jun 2022 08:15:24 +0000. Up 34.91 seconds.
ci-info: no authorized SSH keys fingerprints found for user student.
<14>Jun 7 08:15:24 cloud-init: #####
<14>Jun 7 08:15:24 cloud-init: -----BEGIN SSH HOST KEY FINGERPRINTS-----
<14>Jun 7 08:15:24 cloud-init: 1024 SHA256:PIGc8XftzGs/QACod5shR0CDoIjeunoVW9nyEP3NwTo root@linux-essentials (DSA)
<14>Jun 7 08:15:24 cloud-init: 256 SHA256:iBnRgBstGi53sz+MMNWuX5KHMf5x8KMh+136Dpc7hM root@linux-essentials (ECDSA)
<14>Jun 7 08:15:24 cloud-init: 256 SHA256:1Q53VKYeBQLXuHqsF0EOCeHtB2391zS8DVHEVyXiU6Y root@linux-essentials (ED25519)
<14>Jun 7 08:15:24 cloud-init: 3072 SHA256:RrpcesEL8BKvZiQnvE1Q1STWbK714f4wMLxVpD0xQo root@linux-essentials (RSA)
<14>Jun 7 08:15:24 cloud-init: -----END SSH HOST KEY FINGERPRINTS-----
<14>Jun 7 08:15:24 cloud-init: #####
-----BEGIN SSH HOST KEY KEYS-----
ecdsa-sha2-nistp256 AAAAE2VjZHNhLXNoYTItbmlzdHAyNTYAAAAIbmlzdHAyNTYAAABBB0+4cifrbYvRaJm41ApFb24vo4D3y0GuxUuQZ0rfTv1b1TDUcJZ7W9fNbNojrL/anubIA+E25MbGhbRKA40Fe+6w= root@linux-essentials
ssh-ed25519 AAAAC3NzaC1lZDI1NTE5AAAAINuskdRhVrhCV2msOb7df2w/WEjCv6SquKBb/uz00x2j root@linux-essentials
ssh-rsa AAAAB3NzaC1yc2EAAAADAQABAAQGDTPgtPypQ70gDtJ1qhLp7h61QzND8imbdFD3R1D9lwHnf41qaCcQXs8ik+YirYui5+8aiJ4yS6KXAwFnL2wD1rhEUvIMXe4QnCi1F2Wvzo0gcijc0gndsPwQ0IXr0Y+vFmaeuBT60BhJp9xvP00QqDx2b2h34BYGPs9+AScgvhT3mkPgMrC88Wt+ri8T81hEK9IwoLIFyfSw06jcX0BTAQxpTFdIgt7ePn09KHF1/jRf/tEiCt8a6U60qbnZUPW4SgS/xtp+agH62DvutTFz80Qd2/yUozNmJicWb1s7FwdkQvAgDN1df1ytIDHovNxd9v10+vxsKLYFXk5jNLrqlG/zX0FfifQVw6sg7gdreQR7w0hFBsvqv07S5muBRNqX7G6WqYN+/DX/NxGzc6ymcyk84aRSY189sqmSBnb3mVJq32QiXUQThmvd1e5SKeNzQPzKs3Xtts5Ny1XeVvix9WBA8nIkBSTNbkkXtNDskVhX13GELtgC9ihRqqVd3hHbOWM= root@linux-essentials
-----END SSH HOST KEY KEYS-----
[ 35.141543] cloud-init[1548]: Cloud-init v. 22.1-14-g2e17a0d6-0ubuntu1~22.04.5 finished at Tue, 07 Jun 2022 08:15:24 +0000. Datasource DataSourceNone. Up 35.13 seconds
[ 35.143885] cloud-init[1548]: 2022-06-07 08:15:24,738 - cc_final_message.py[WARNING]: Used fallback datasource

```

Press <enter> to see login

Now you can log in and start working on your server. After the text login you can type `student` and push enter. Then you have to type your password (you don't see what you are typing) and push enter.

```

ci-info: no authorized SSH keys fingerprints found for user student.
Ubuntu 24.04 LTS ubserve tty1
ubserve login: <14>May 31 18:56:20 cloud-init: #####
<14>May 31 18:56:20 cloud-init: -----BEGIN SSH HOST KEY FINGERPRINTS-----
<14>May 31 18:56:20 cloud-init: 256 SHA256:sIsh2itUdGSuadZ1hrPp9MSVoS3mC1Ks1MnaJmNhGDA root@ubserve (ECDSA)
<14>May 31 18:56:20 cloud-init: 256 SHA256:MuiYz/R6p+clU8REVfVbSrfcmj6fstYPb2709Hft580Q root@ubserve (ED25519)
<14>May 31 18:56:20 cloud-init: 3072 SHA256:EvjHkg3aD0zBoSK+70Q8rC14tp1Fom07juKrnVNPvEo root@ubserve (RSA)
<14>May 31 18:56:20 cloud-init: -----END SSH HOST KEY FINGERPRINTS-----
<14>May 31 18:56:20 cloud-init: #####
-----BEGIN SSH HOST KEY KEYS-----
ecdsa-sha2-nistp256 AAAAE2VjZHNhLXNoYTItbmlzdHAyNTYAAAAIbmlzdHAyNTYAAABBBGnen6KcRFB0/Lgmep169KvEvp3P07Mw+DWHn/HsJnrz+1EwFQJXEHQda1d6GJ9nNv+Qd5Z/uzvtnXtu82svc= root@ubserve
ssh-ed25519 AAAAC3NzaC1lZDI1NTE5AAAAIJw+1X51Erq2rmd04umtX6de//Uc/NXu1Td8PIDVJEHYA root@ubserve
ssh-rsa AAAAB3NzaC1yc2EAAAADAQABAAQGDQm+Q5IEDICU/40Me60V17190q++cpCtsUsyhP0GyxPIBEmZmUzVG5tJnHgbafr6cY0jo1NmKpqbsoMKZVEHP2wXJalFz+/7M0VYkQJsgoenB+HLfYeTrIF7euAmY1agHkaazkfkIke9eVDT4dbGFMhJky60Bf40W15zhJmNNDQ/dsOKb5/mZzyH1xVpYDGKJH+aubmp8QoyUGMJtFkJmzy90JI93EkvIRYmbQQKXr1K1Cx0s+HFk0VF61nvFXIU9S8yowVfzfnvYIRI1kgMHb+vaUq/716xKNZSR+Fc7/3YHAg2ZVUSAgexP8KVS9+fYXMeazhWf2euPtkUuM4jDQDVuG6IkNjyVrBh/UB0rP0yNqN9nifeEmoFELzZQqh0fgeTmHF+zFpM41nv51X0UcJtSU0E7mQtx7zV36bwR2UhadJBVQSGz3qQLohu1NoJgH2owuqDys4669P1R3Nyw72uqanNorW/5pus1yz93zc8SELUBBofhzi+Hk= root@ubserve
-----END SSH HOST KEY KEYS-----
[ 23.210610] cloud-init[1309]: Cloud-init v. 24.1.3-0ubuntu3 finished at Fri, 31 May 2024 18:56:20 +0000. Datasource DataSourceNone. Up 23.20 seconds
[ 23.211537] cloud-init[1309]: 2024-05-31 18:56:20,346 - cc_final_message.py[WARNING]: Used fallback datasource
ubserve login:

```

