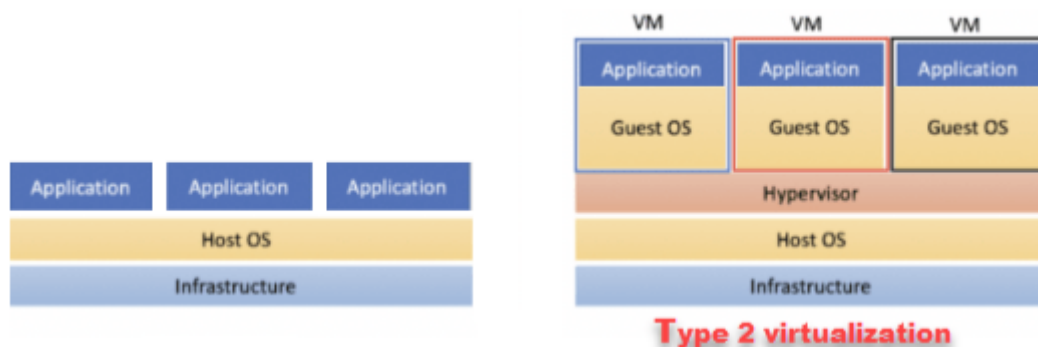


Installatie

Virtualisatie

Om servers te installeren die diensten aanbieden (zoals een minecraft server!) heb je een server nodig met een openbaar IP-adres. Meestal zou je naar een cloudprovider gaan waar je voor een vast bedrag/maand een server kunt huren. Voor deze cursus zullen we dit proces ook simuleren met behulp van een lokale virtuele machine. Dit kan ons dan ook helpen voor wanneer we eens geen Internet-connectie hebben bijvoorbeeld.

Virtualisatie is een concept waarbij je een computersysteem met een besturingssysteem virtueel op een ander systeem kunt laten draaien. Dit maakt het mogelijk om meerdere *gast besturingssystemen* met hun eigen virtuele hardware op één *host system* te hebben.



In deze cursus zullen we dus een lokale Virtuele Machine installeren als backup voor een Cloud instance waarin we normaal gezien zullen werken.

Ubuntu Server Image

Voor deze cursus willen we het besturingssysteem [Ubuntu-server](#) gebruiken en installeren in een virtuele omgeving. Dit is een op Debian gebaseerde distro.

?> :fa-solid fa-list-check: Download het `.iso` bestand voor Ubuntu server met behulp van [deze link](#).

Een `.iso` bestand is een exacte kopie van een CD/DVD. Je gebruikt dit later om het besturingssysteem in de virtuele machine te installeren.

The screenshot shows the Canonical Ubuntu website's 'Get Ubuntu Server' page. The navigation bar includes links for Products, Use cases, Support, Community, and Get Ubuntu. The 'Downloads' section is active, with sub-links for Desktop, Server, Core, and Cloud. Under 'Manual installation', a red arrow points to the 'Manual installation' tab. The main heading is 'Ubuntu 24.04 LTS'. A text block explains that this is the latest LTS version, offering five years of free security and maintenance updates, extended to 10 years with Ubuntu Pro. A green 'Download 24.04 LTS' button is highlighted with a red arrow, with '2.7GB' indicated next to it. Below the button are links for 'Alternative downloads' and 'Alternative architectures'. The Ubuntu logo is visible in the bottom left corner.

Virtualisatie software

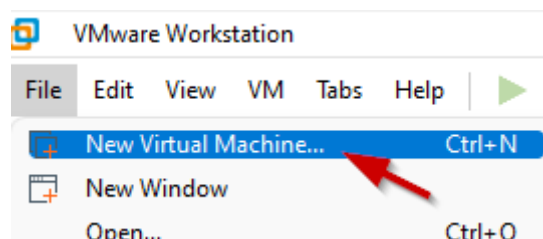
Om virtualisatie te gebruiken zijn er verschillende opties. De meest voorkomende virtualisatiesoftware is:

- VMware Workstation
- Virtualbox
- Hyper-V

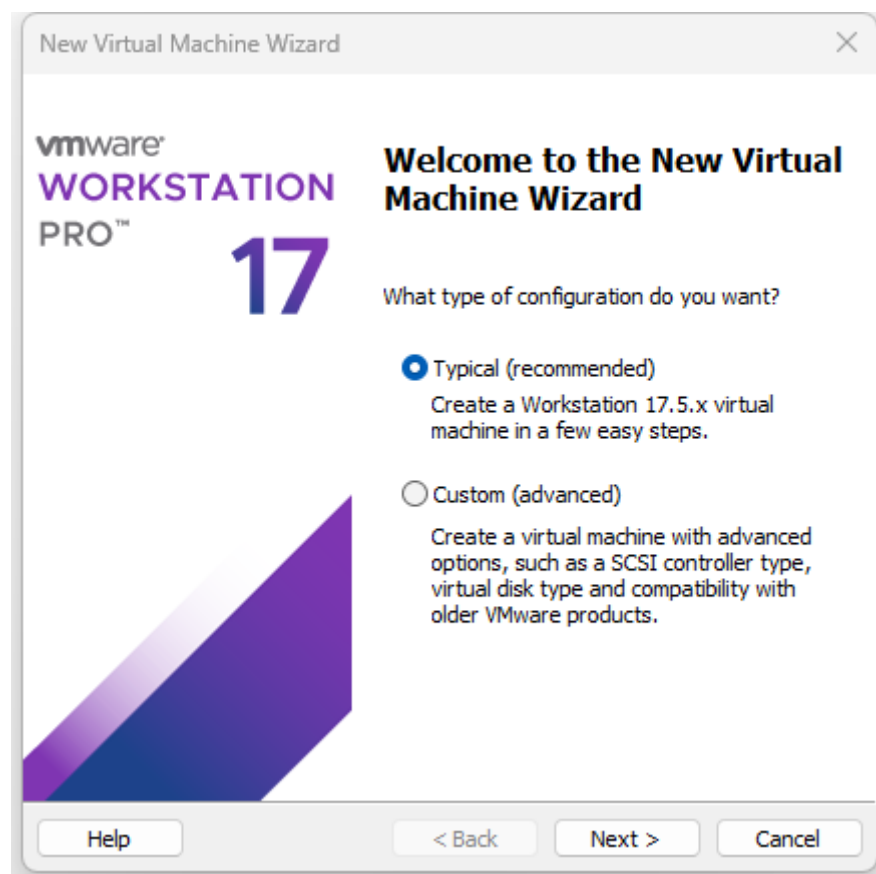
In deze cursus zullen we VMware Workstation gebruiken en ondersteunen, maar de andere softwarepakketten hebben hetzelfde doel.

Een nieuwe VM maken

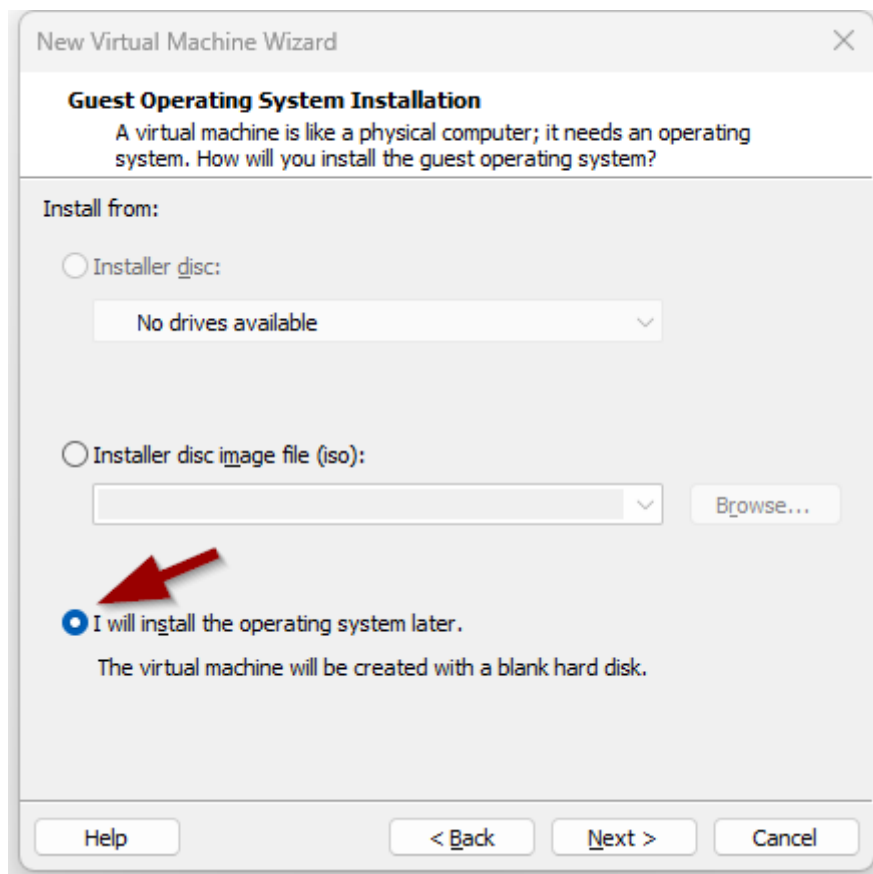
Om een nieuwe virtuele machine (VM) aan te maken in VMWare ga je naar het menu **File > New virtual machine**. De wizard om een nieuwe VM te maken wordt weergegeven.



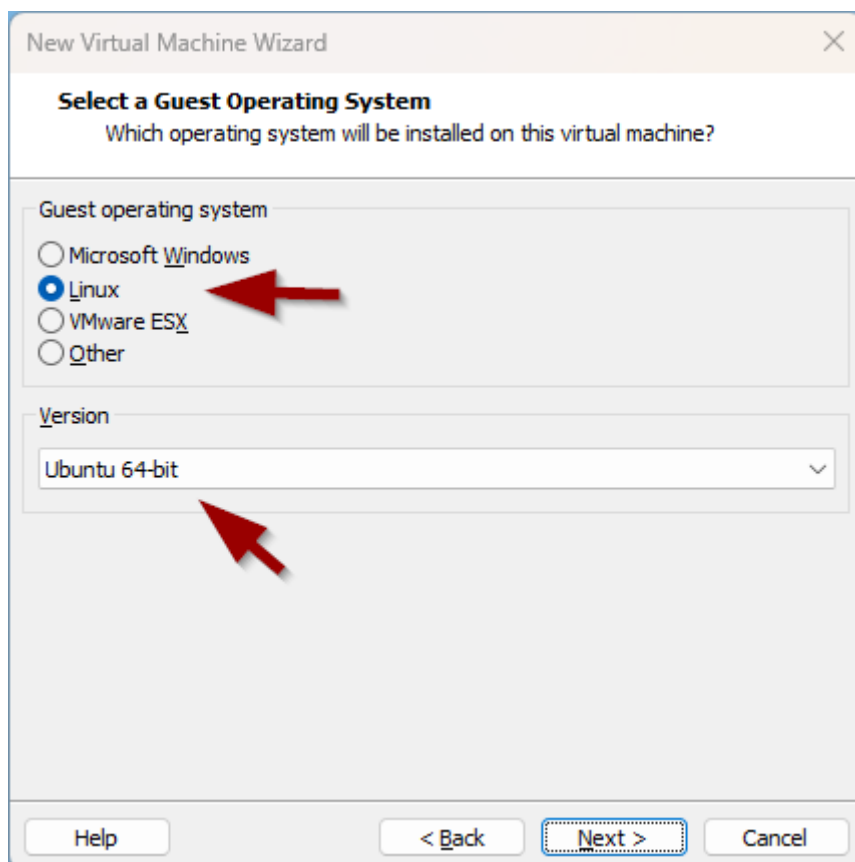
In het eerste scherm selecteren we de optie **Typical**:



Vervolgens kiezen we voor **I will install the operating system later**:



Vervolgens kiezen we voor het besturingssysteem **Linux**. In de versie dropdown selecteren we **ubuntu 64 bit**. Dit is de Linux-distributie die we tijdens deze cursus zullen gebruiken.



In het volgende scherm geven we de virtuele machine een naam. Je kunt ook een andere map opgeven om de virtuele machine op je computer op te slaan.

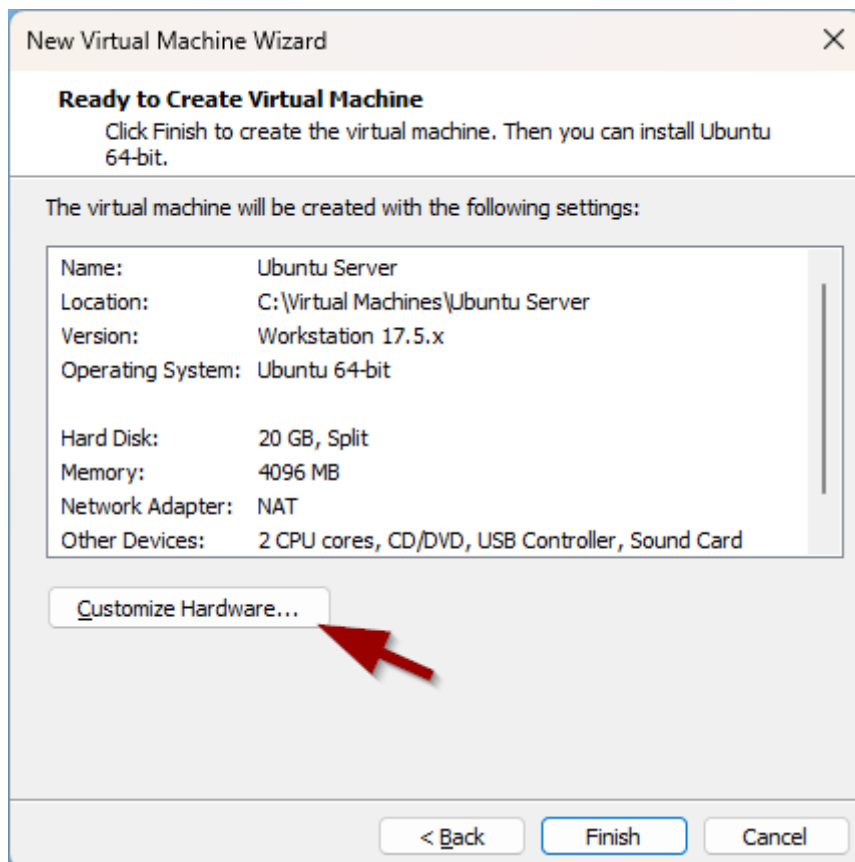
?> Let op dat je de bestanden van de VM niet opslaat in een map die gesynct wordt met de cloud (OneDrive, Dropbox, Google Drive)?. Je VM zal crashed en je zal alles in de VM kwijt zijn!

The screenshot shows the 'New Virtual Machine Wizard' dialog box, specifically the 'Name the Virtual Machine' step. The title bar says 'New Virtual Machine Wizard' with a close button. The main heading is 'Name the Virtual Machine' with a subtitle 'What name would you like to use for this virtual machine?'. There are two input fields: 'Virtual machine name:' with the text 'Ubuntu Server' and 'Location:' with the text 'C:\Virtual Machines\Ubuntu Server'. A 'Browse...' button is next to the location field. Below the location field, it says 'The default location can be changed at Edit > Preferences.' At the bottom, there are three buttons: '< Back', 'Next >', and 'Cancel'. Two red arrows point to the 'Virtual machine name' and 'Location' fields.

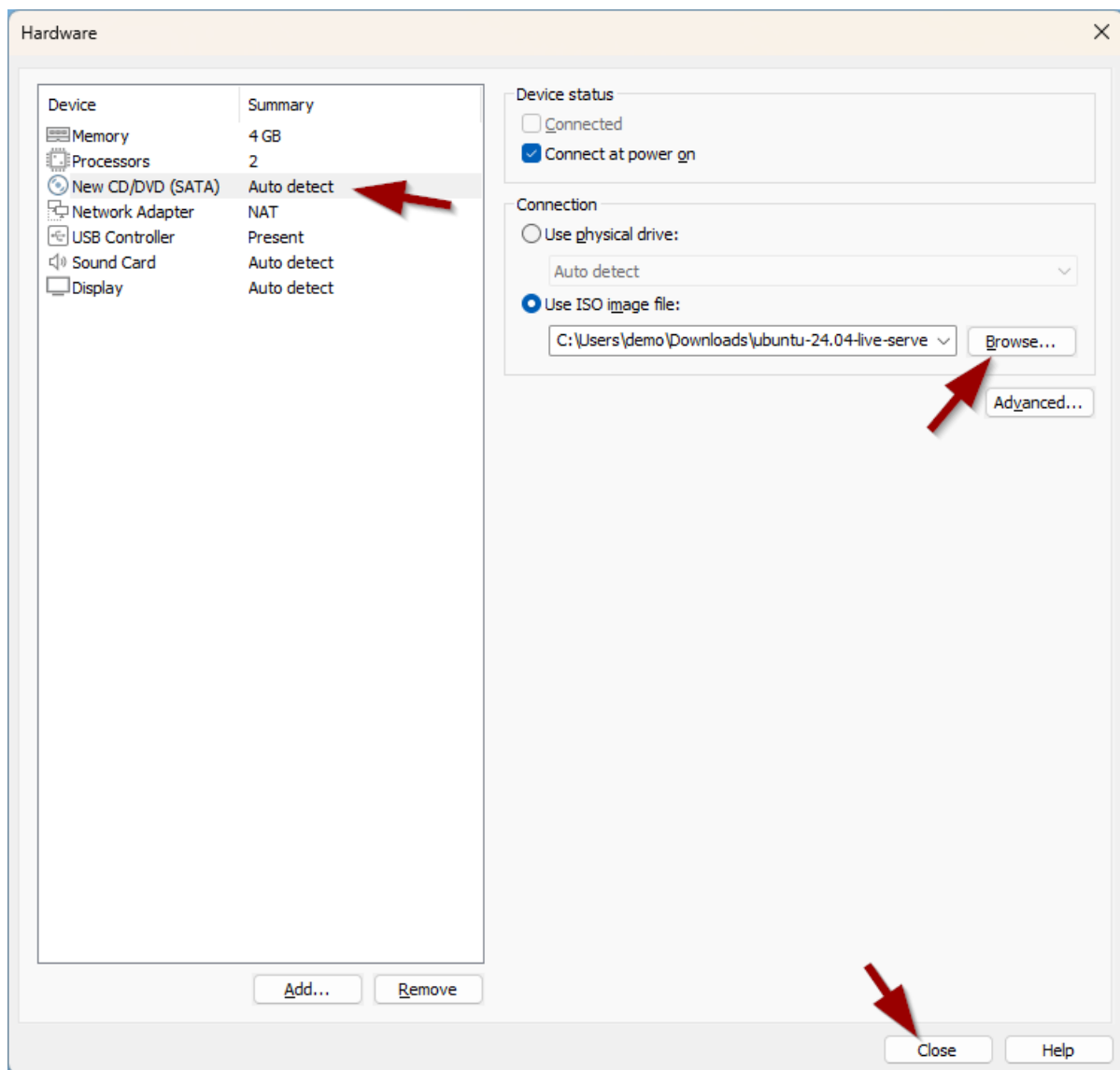
In het volgende scherm configureren we de grootte van de virtuele harde schijf voor de VM. We zullen een schijf maken met 20 GB opslag. We kunnen dit later uitbreiden als dat nodig is:

The screenshot shows the 'New Virtual Machine Wizard' dialog box, specifically the 'Specify Disk Capacity' step. The title bar says 'New Virtual Machine Wizard' with a close button. The main heading is 'Specify Disk Capacity' with a subtitle 'How large do you want this disk to be?'. There is a paragraph of text: 'The virtual machine's hard disk is stored as one or more files on the host computer's physical disk. These file(s) start small and become larger as you add applications, files, and data to your virtual machine.' Below this, there is a 'Maximum disk size (GB):' label followed by a text box containing '20.0' and a spinner button. A 'Recommended size for Ubuntu 64-bit: 20 GB' is shown below. There are two radio buttons: 'Store virtual disk as a single file' and 'Split virtual disk into multiple files'. The 'Split virtual disk into multiple files' option is selected. Below the radio buttons, there is a paragraph of text: 'Splitting the disk makes it easier to move the virtual machine to another computer but may reduce performance with very large disks.' At the bottom, there are four buttons: 'Help', '< Back', 'Next >', and 'Cancel'. Two red arrows point to the 'Maximum disk size (GB)' field and the 'Split virtual disk into multiple files' radio button.

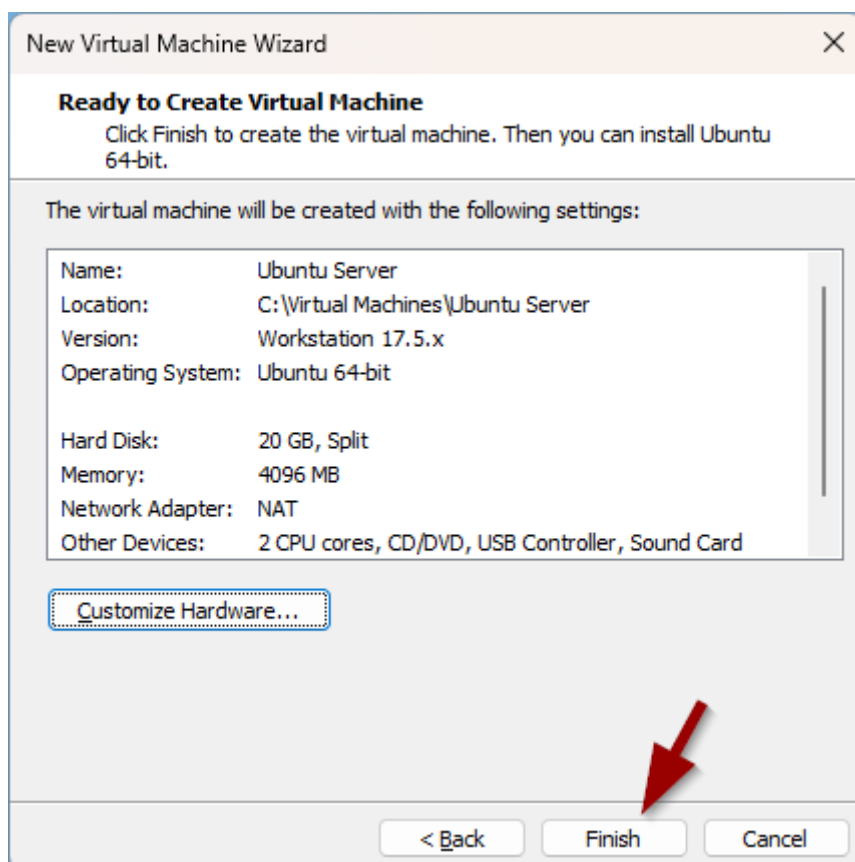
We moeten op **Customize Hardware** klikken om de virtuele machine verder te configureren:



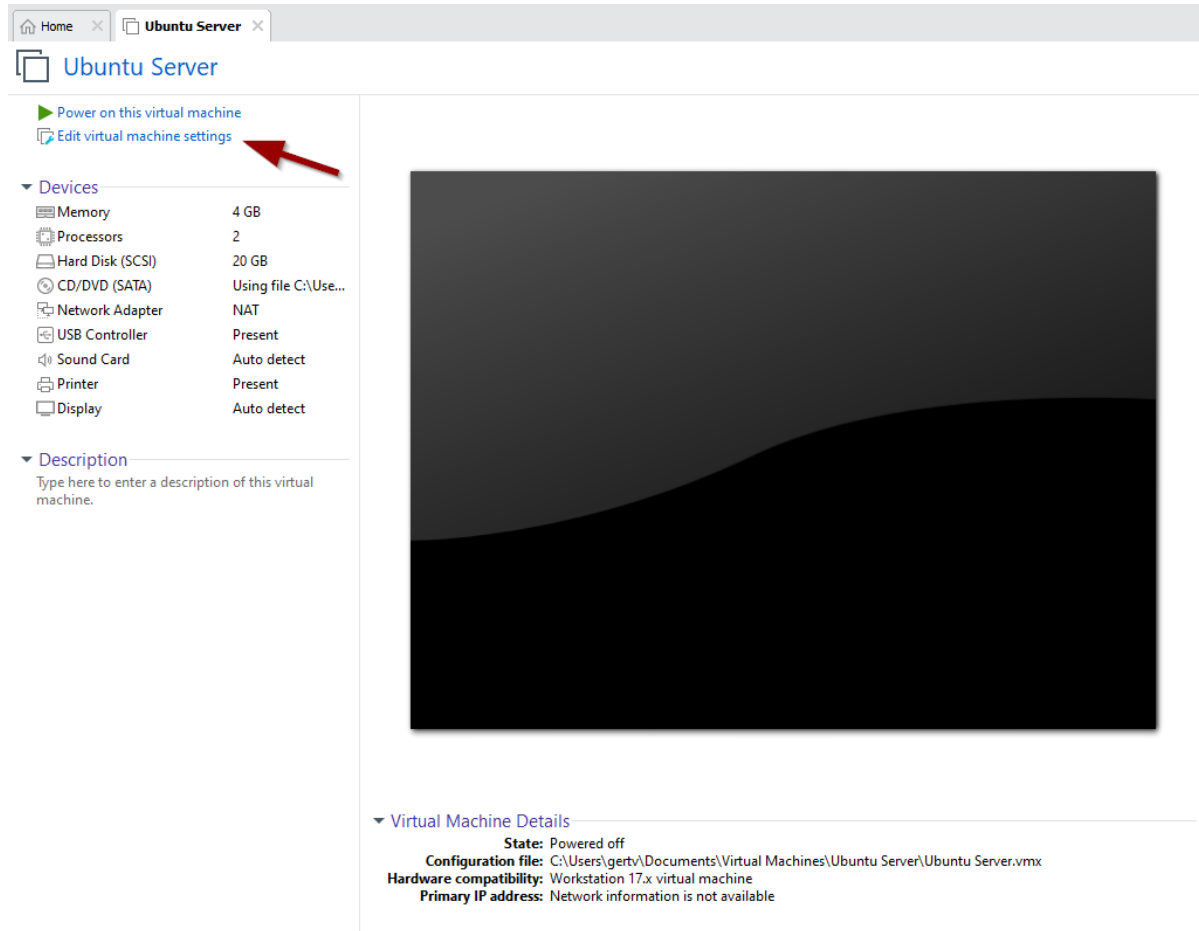
We moeten nog steeds het ISO-bestand van de Ubuntu-server koppelen aan het virtuele cd-rom-station. Dit doen we door **New CD/DVD** te selecteren en naar het gedownloadte **iso** bestand te bladeren:



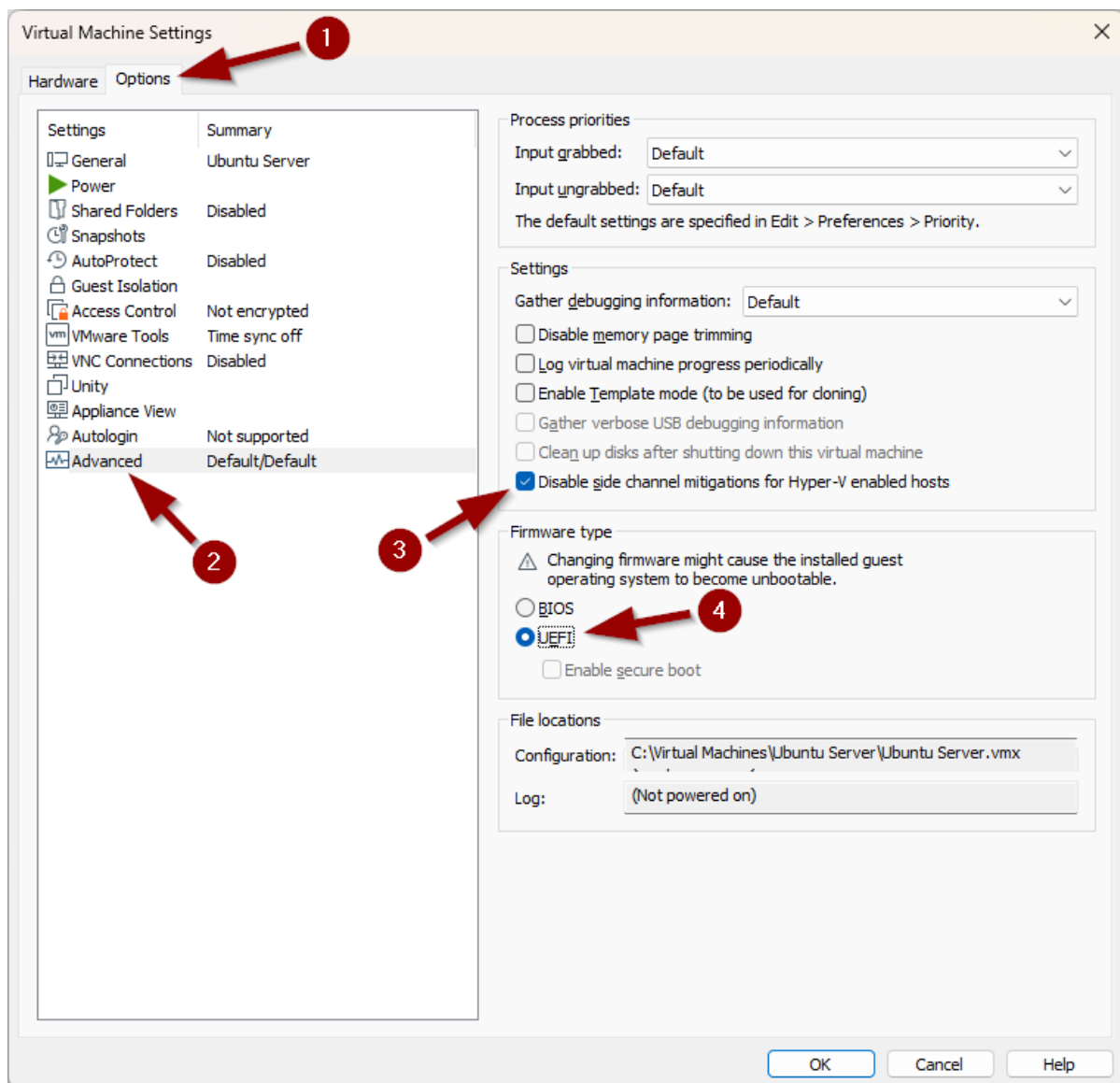
Klik op **Finish** en de virtuele machine wordt gemaakt.



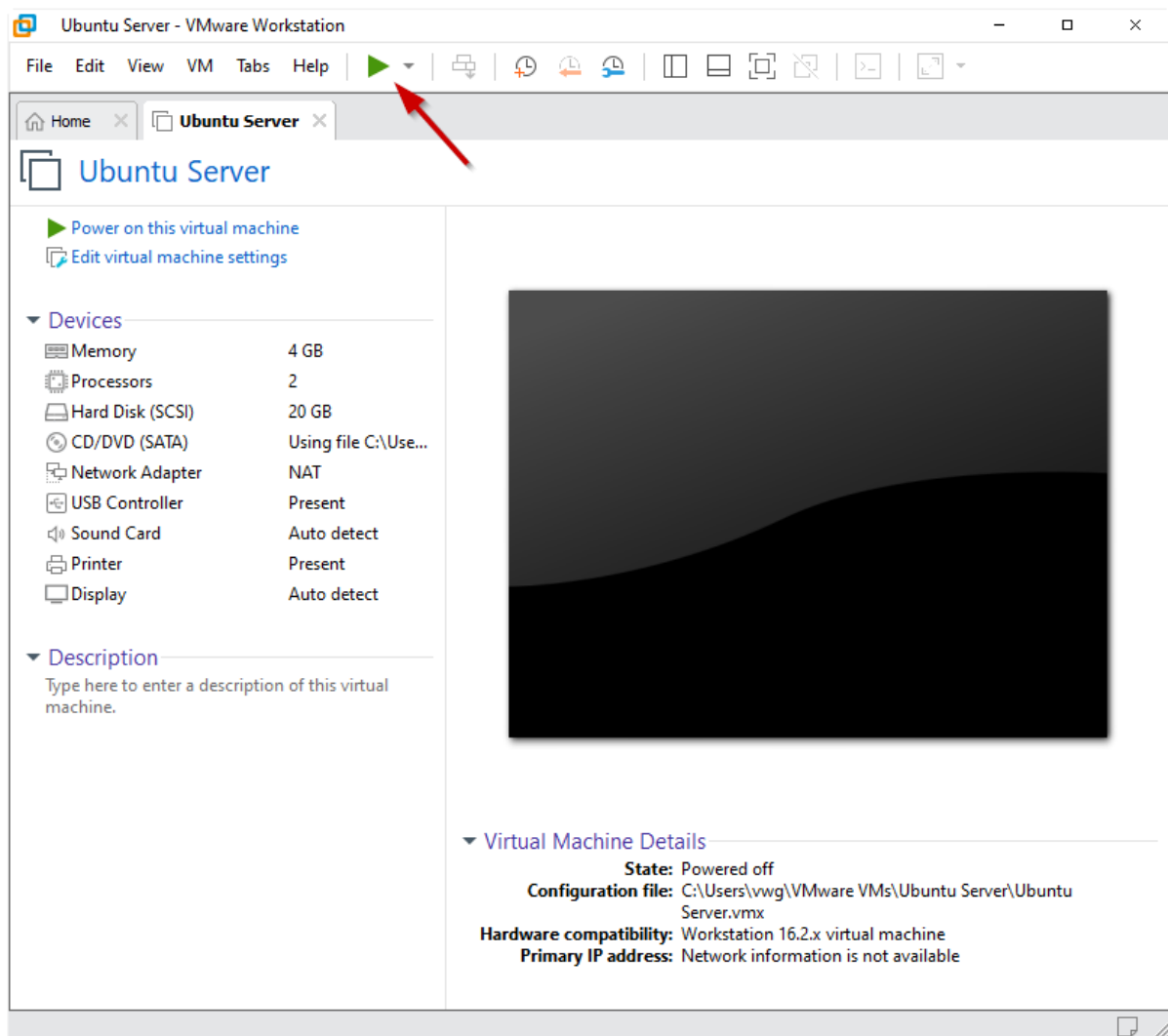
We kunnen nu de UEFI bios nog instellen. Klik hiervoor op `Edit virtual machine settings`.



Ga naar het tabblad `options`, klik op `Advanced` en selecteer de optie `UEFI`. Hier vind je ook de instelling omtrent `Side channel mitigations` zou je daar straks een waarschuwing van krijgen tijdens het starten van de Virtuele Machine.



Je kunt de VM nu opstarten door op het groene pijltje te klikken. Hiermee wordt de virtuele machine opgestart en wordt het installatieproces uitgevoerd.



Installatie Ubuntu-server

Zoals eerder beschreven zullen we de distro Ubuntu gebruiken. Na het maken en opstarten van de virtuele machine is er een installatieproces dat we moeten doorlopen. Je zal merken dat er geen muisaanwijzer beschikbaar is. We gebruiken de pijltjestoetsen en enter om door de stappen te navigeren.

?> Resulteert het opstarten van de VM in de fout `This host supports Intel VT-x, but Intel VT-x is disabled`? Dan moet je de VT-X-optie activeren in de BIOS van je laptop. Meer informatie is te vinden in [dit artikel](#).

?> Als je je VM wilt verlaten en je muis terug wilt krijgen in het besturingssysteem van je laptop (=Windows), moet je op `CTRL + ALT` drukken!

We maken de keuze om Ubuntu te proberen of te installeren:

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 starten het installatieproces door een taal te selecteren. We kiezen voor Engels:

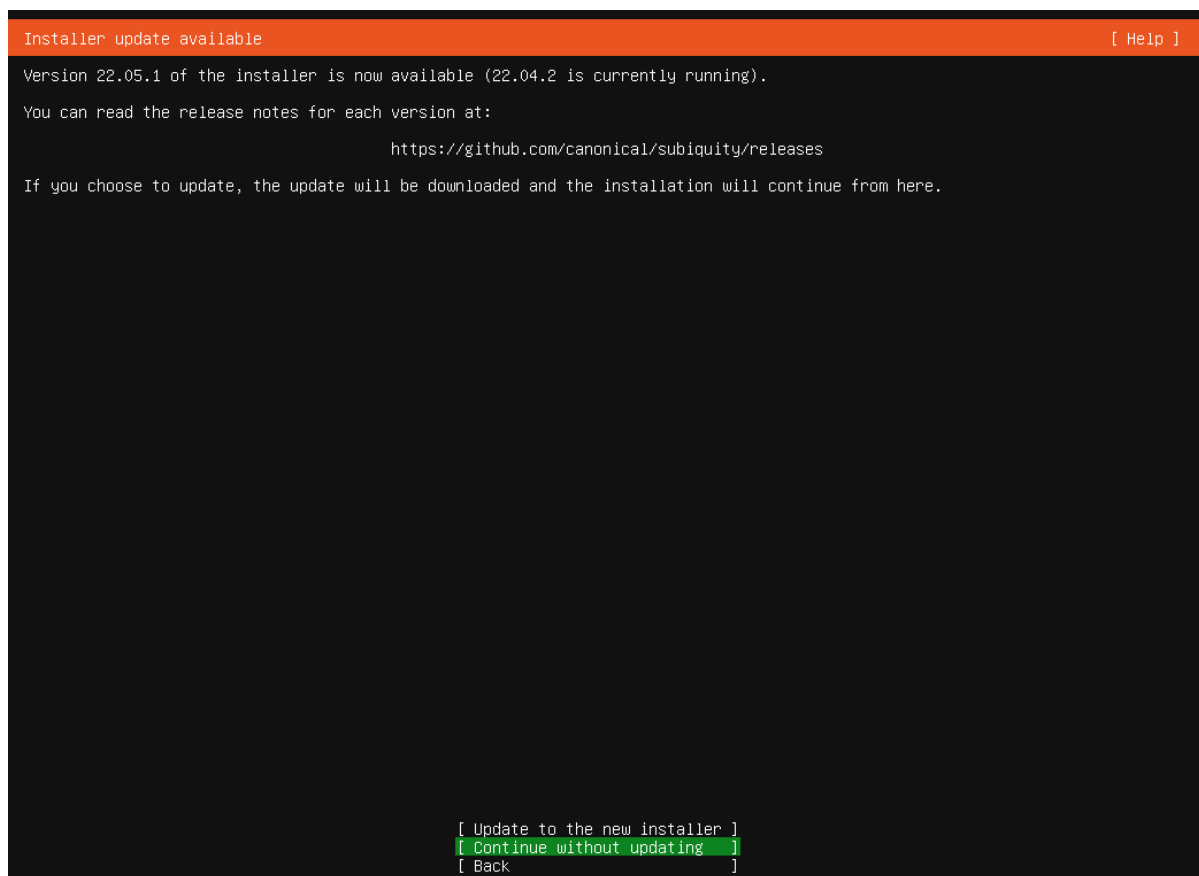
Willkommen! Bienvenue! Welcome! Добро пожаловать! Welkom!

[Help]

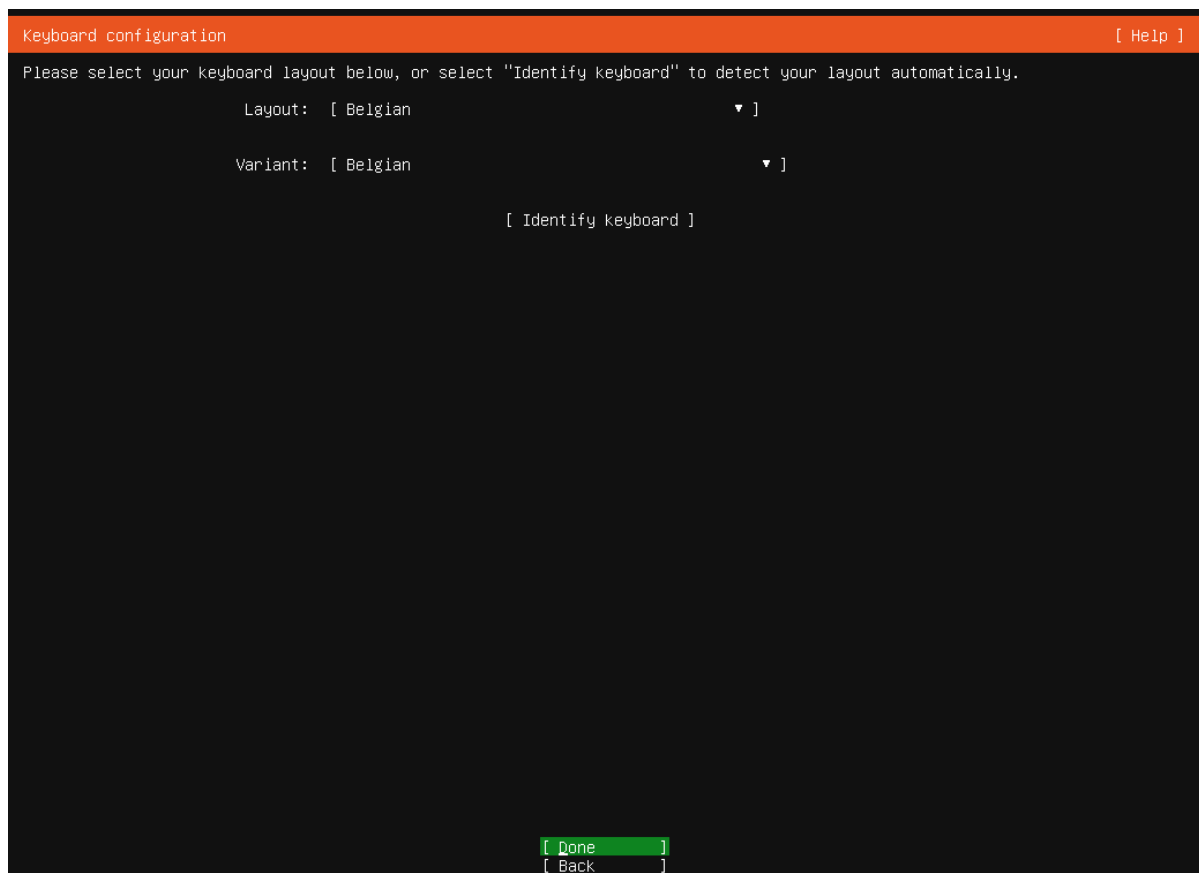
Use UP, DOWN and ENTER keys to select your language.

[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 slaan de update van het installatieprogramma over indien je dit schermje krijgt:



Kies de juiste toetsenbordindeling. Voor **azerty** selecteert je **Belgian**:



In de volgende 7 stappen brengen we geen wijzigingen aan. We drukken gewoon op **Done** of **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 ]
```

Vervolgens maken we een gebruikersaccount aan dat we gebruiken om in te loggen op het besturingssysteem. We gebruiken de volgende inloggegevens:

```
Gebruikersnaam: student
Servernaam: ubserv
wachtwoord: 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]

Op de vraag om te upgraden naar Ubuntu Pro behouden we het antwoord `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

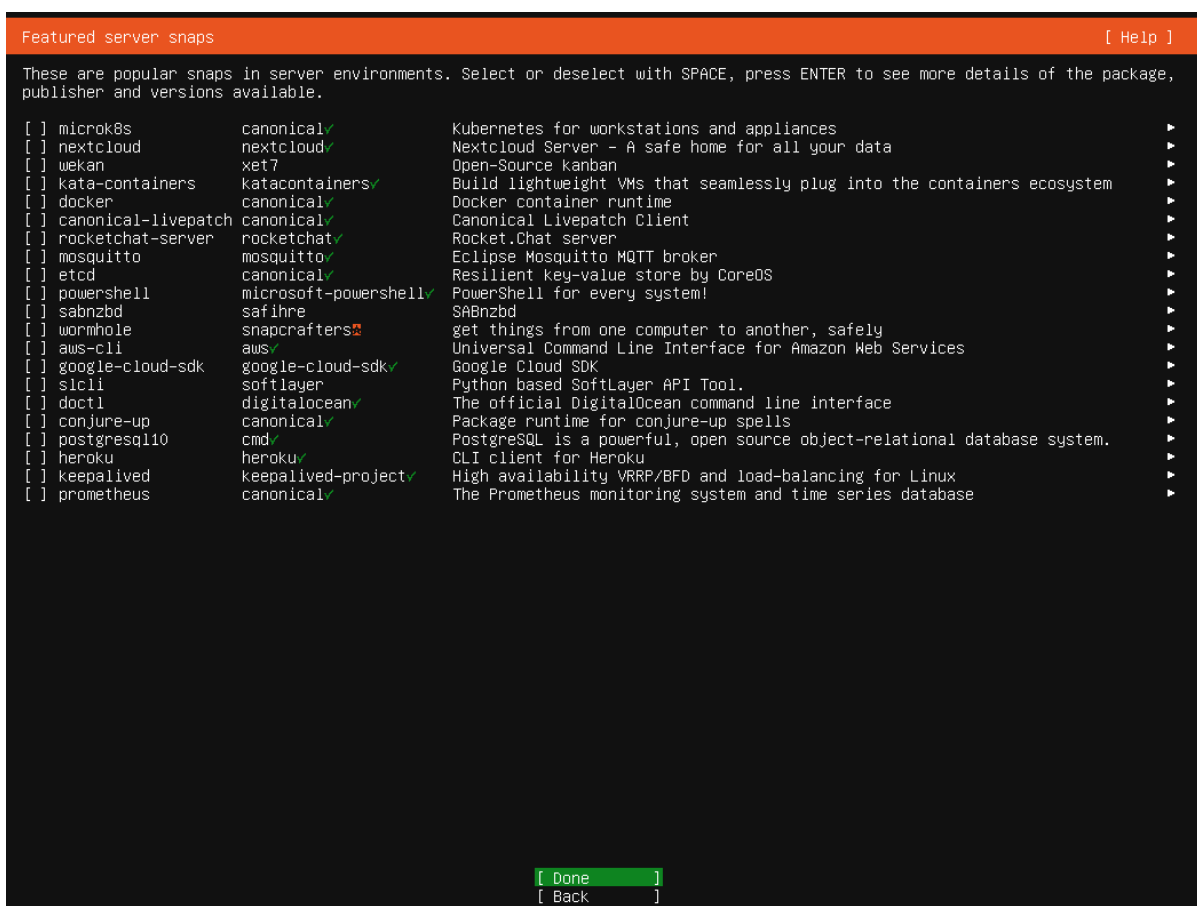
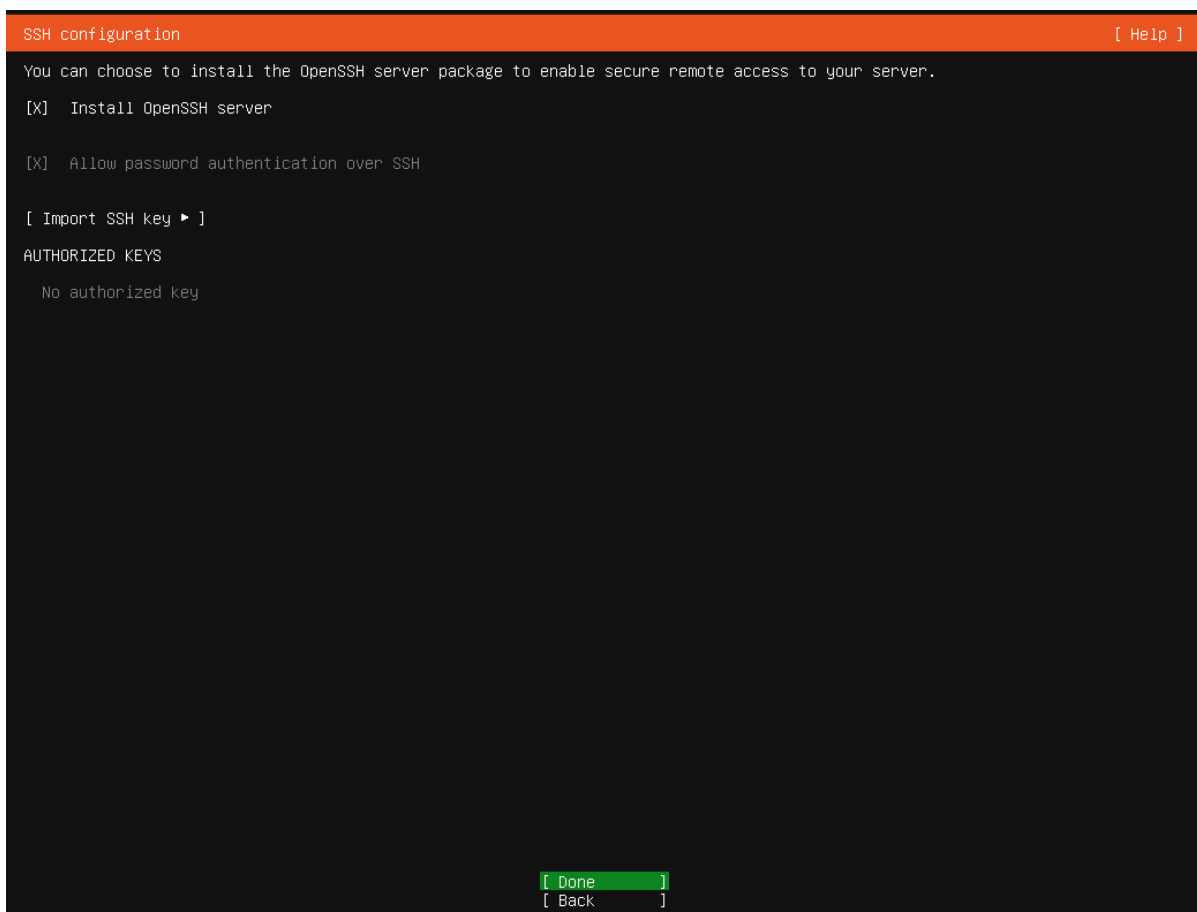
☒ Skip for now

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

[Continue]

[Back]

Als extra pakket kiezen we er voor om enkel `openssh server` te installeren:



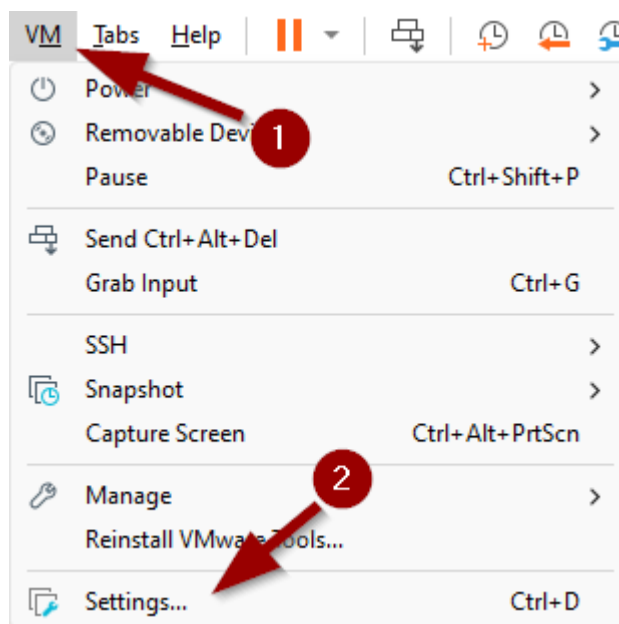
Het besturingssysteem wordt geïnstalleerd en geconfigureerd. Na een tijdje verschijnt de optie **Reboot now**. Dit geeft aan dat de installatie is voltooid:

```
Installation complete! [ Help ]

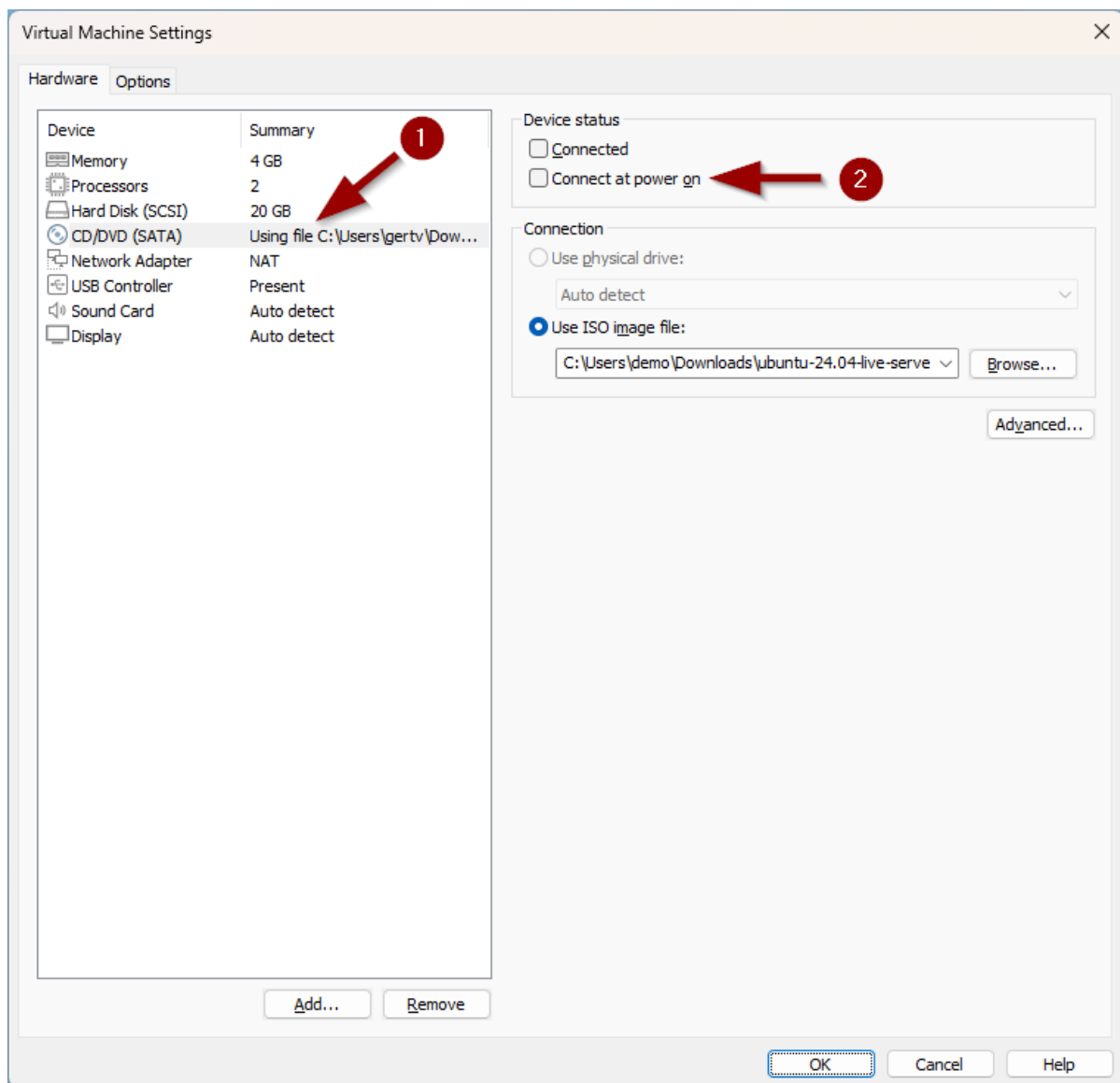
writing install sources to disk
running 'curtin extract'
curtin command extract
  acquiring and extracting image from cp:///tmp/tmp6zrw40on/mount
configuring keyboard
curtin command in-target
executing curtin install curthooks step
curtin command install
  configuring installed system
  running 'curtin 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 ]
```

Vervolgens zien we een venster dat vraagt om de 'enter'-toets te drukken, maar eerst gaan we in de settings van de Virtuele Machine :



Daar vinken we uit dat de CD/DVD moet geconnecteerd worden bij het opstarten (anders blijft de installatie laden telkens we de Virtuele Machine opstarten)



En dan drukken we op de 'enter'-toets

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

Zodra de server opnieuw is opgestart, moet je nogmaals op de `enter`-toets drukken om de inlogprompt te zien.

```

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:RrpcesEL8BKkVziQnvE1Q1STWBK714f4wMLxVpD0xQo 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+4cifrbYvRaJm41ApFbZ4vo4D3y0GuxUuQZ0rfTv1b1TDUcJZ79fNbNojrL/anubIA+E25MbGhbRKA40Fe+6w= root@linux-essentials
ssh-ed25519 AAAAC3NzaC1lZDI1NTE5AAAAINuskdRhVrhCV2ms0b7df2w/WEjCv6SquKBb/uz00x2j root@linux-essentials
ssh-rsa AAAAB3NzaC1yc2EAAAADAQABAAQGDTPgtPypQ70gDtJ1qhLp7h61QzND8imbdFD3R1D91wWnf41qaCcqXS8ik+YirYui5+8aiJ4yS6kXAwFnL2wD1rhEUvIMXe4QnCi1F2Kvzo0gcijc0gndsPwQ0IXr0Y+vFmaeuBT60BhJp9xvP00QqDx2b2h34BYgPs9+AScgvhT3mkPgMrC88Mt+r18T81hEK9IwoLIFyfsW06JcX0BTAqxpTFdIg7ePn09KHfI/jRf/tEiCt8a6U60qbnZUPW4SgS/xtp+agH62DvuTFz80Qd2/yUozzNmJicWb1s7FwdkQvagDN1df1ytIDHovNxd9v10+vxsKLYFXk5jNLrqlG/zX0FfifQVw6sg7gdreQR7w0hFBsvqv07S5muBRNqX7GGWYN+/DX/NxGzc6ymcyk84aRSY189sqmSBnb3mVJq32QiXUQThmvd1e5SkeNzQPzKs3Xtts5Ny1XeVvix9Wban8IkBSTNbkkXtNdsKVhX13GELtgC9ihRqqVd3hHboWM= 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

Je kan nu inloggen en beginnen werken op de server. Achter login type je `student` en druk je enter. Vervolgens type je je wachtwoord (je ziet niet wat je intypt) en drukt op 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:sIsh2itUdGSyadZ1HrPp9M5VoS3mC1Ks1MnaJmNhGDA root@ubserve (ECDSA)
<14>May 31 18:56:20 cloud-init: 256 SHA256:MwIY//R6p+cU8REvfvBSr6rmy6fStYPbZ709Hft58QQ root@ubserve (ED25519)
<14>May 31 18:56:20 cloud-init: 3072 SHA256:EYJHkg3aD0z8oSK+70Q8rC14tpIfom07JukrnVPEVo root@ubserve (RSA)
<14>May 31 18:56:20 cloud-init: -----END SSH HOST KEY FINGERPRINTS-----
-----BEGIN SSH HOST KEY KEYS-----
ecdsa-sha2-nistp256 AAAAE2VjZHNhLXNoYTItbmlzdHAyNTYAAAAIbmlzdHAyNTYAAABBBGnen6KcRrFBD0/Lgmep169KvEvp3P07Wu+DWHn/HsJnrz+1EuFQjXEhQdA1ddGj9Nv+Qd5Z/uzvtNXtu82svc=
root@ubserve
ssh-ed25519 AAAAC3NzaC1lZDI1NTE5AAAAIJw+IX5IErq2rmd4uMtX6de//Uc/NXu1Td8PIDYJEHYA root@ubserve
ssh-rsa AAAAB3NzaC1yc2EAAAADAQABAAQGDQM+Q5IE0ICU/40Me60V1719Dq+ccPctSUsuhP0GyxPIBEmZnmUzVG5tJnHgbofr6cY0jo1NmKpQbsqMK2VEHP2uXxJa1Fz+/7M0YkQJyuoemB+HLfYeTrIF7euWmY1aghkkaa2KfkIke9eVDT4D0GFMhJktY60Bf40W15zhHJmnNQD/ds0Kb5/mZzyH1xVpYDGKJh+aUbmP8QpyUGMjtFkJmzy90JI93EKvIRYmbQOKxrkIkICx0s+HFk0VF6lNvFXIU9S8u0wVzfngvYIRIJkGMHb+VaUq/Y16xkKNZSR+Fc7JYHAB2GVUSAgaoxP8KVS9+fYXMeAzhfZeuFtokUuN4jDQDVuGbIknjvvrBh/UB0rP0yNq9Nhf0EmoPELz2qhq0fgeTmHF+2FpM4inV51X8UcEJtSUOE7mQTX7zv3Gbwk2UHAdJBVQsGz3qoLohuiWajgqHZpwuYdys4G6DP1R3Nyw72uqanNorM/5pusIyz93zc8sELUBBofhzi+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:

```