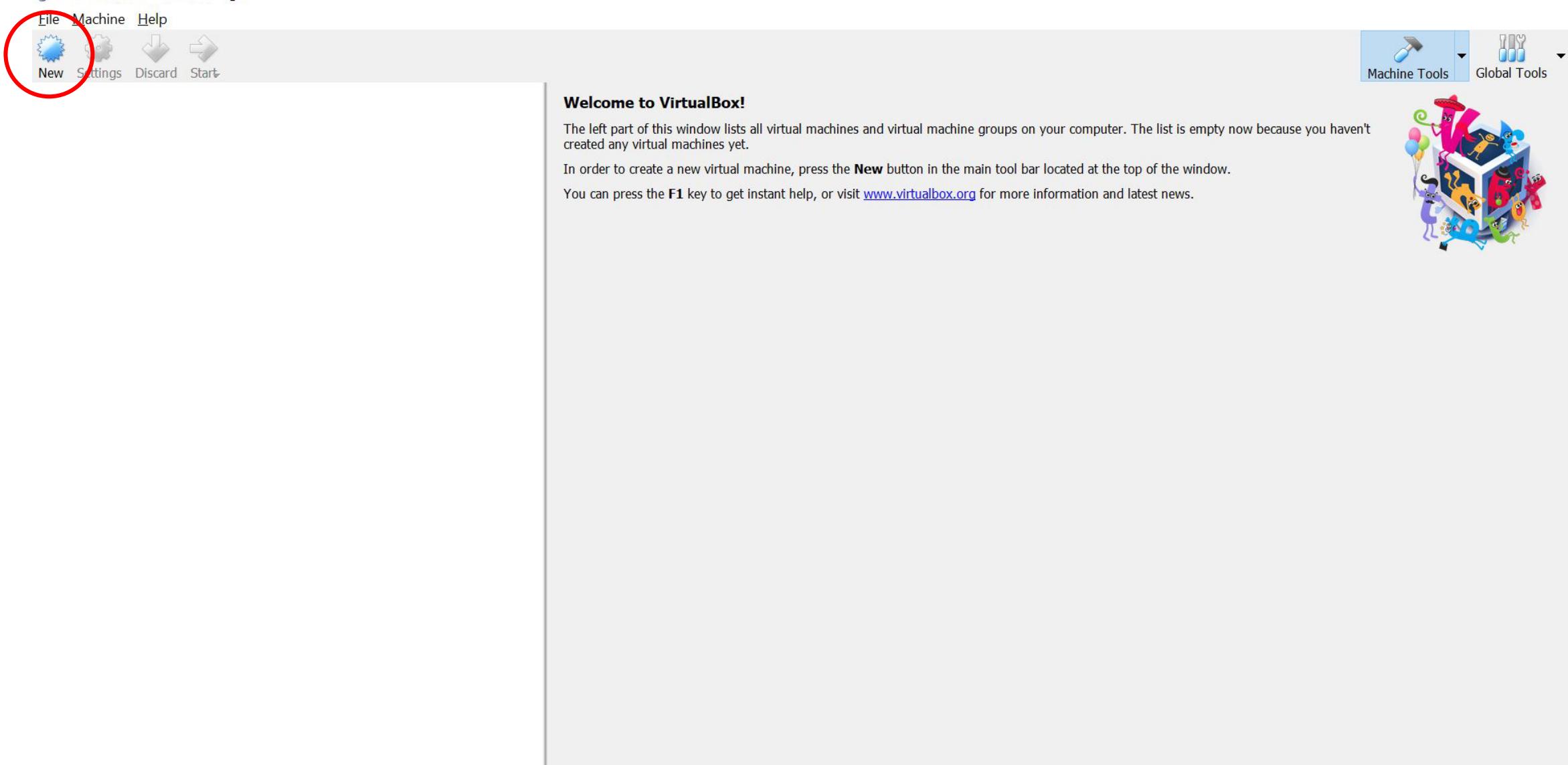


# Installation Virtual Machine in VirtualBox

A Visual Guide



Open VB -> click 'New' (blue icon)

[← Create Virtual Machine](#)

## Name and operating system

Please choose a descriptive name for the new virtual machine and select the type of operating system you intend to install on it. The name you choose will be used throughout VirtualBox to identify this machine.

Name:

Type:  

Version:

[Expert Mode](#)

[Next](#)

[Cancel](#)

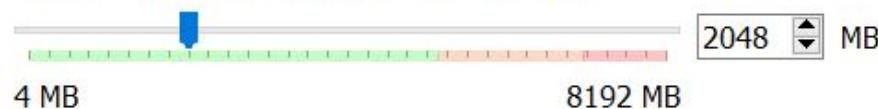
Choose OS, storage location and name

[← Create Virtual Machine](#)

## Memory size

Select the amount of memory (RAM) in megabytes to be allocated to the virtual machine.

The recommended memory size is **1024 MB**.

[Next](#)[Cancel](#)

Allocate RAM memory (advised is to use not more than one fourth of your computer memory)

The image shows three sequential steps of a 'Create Virtual Hard Disk' wizard:

- Step 1: Hard disk**

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.

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.

The recommended size of the hard disk is **10,00 GB**.

Do not add a virtual hard disk  
 Create a virtual hard disk now  
 Use an existing virtual hard disk file
- Step 2: Hard disk file type**

Please choose the type of file that you would like to use for the new virtual hard disk. If you do not need to use it with other virtualization software you can leave this setting unchanged.

VDI (VirtualBox Disk Image)  
 VHD (Virtual Hard Disk)  
 VMDK (Virtual Machine Disk)
- Step 3: Storage on physical hard disk**

Please choose whether the new virtual hard disk file should grow as it is used (dynamically allocated) or if it should be created at its maximum size (fixed size).

A **dynamically allocated** hard disk file will only use space on your physical hard disk as it fills up (up to a maximum **fixed size**), although it will not shrink again automatically when space on it is freed.

A **fixed size** hard disk file may take longer to create on some systems but is often faster to use.

Dynamically allocated  
 Fixed size

Make new virtual hard drive (choose VHD)

?

X

← Create Virtual Hard Disk

## File location and size

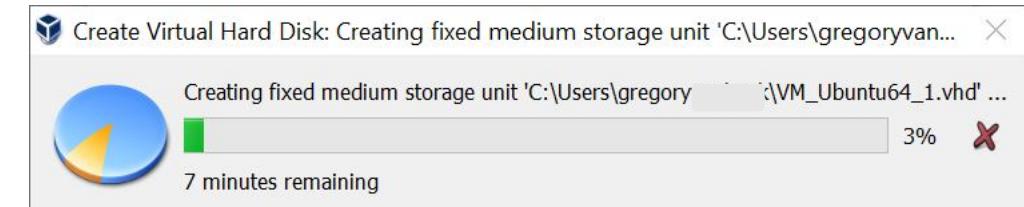
Please type the name of the new virtual hard disk file into the box below or click on the folder icon to select a different folder to create the file in.

C:\Users\gregoryv\VM\_Ubuntu64\_1.vhd 

Select the size of the virtual hard disk in megabytes. This size is the limit on the amount of file data that a virtual machine will be able to store on the hard disk.

4,00 MB  2,00 TB

50,00 GB



Create

Cancel

Choose size of VHD (recommended is a minimal amount 50GB)

The screenshot shows the Oracle VM VirtualBox Manager interface. At the top, there's a menu bar with 'File', 'Machine', and 'Help'. Below the menu is a toolbar with icons for 'New', 'Settings' (which is circled in red), 'Discard', and 'Start'. A blue header bar displays a thumbnail of a virtual machine named 'Vm\_Ubuntu64\_1' and its status as 'Powered Off'. On the right side, there's a section titled 'Welcome to VirtualBox!' with instructions about the window's purpose and how to get help. Below this, two tool details are shown: 'Details' (for observing VM properties) and 'Snapshots' (for managing VM snapshots). A cartoon penguin holding a wrench is positioned on the right side of the main content area.

**Welcome to VirtualBox!**

The left part of this window lists all virtual machines and virtual machine groups on your computer.

The right part of this window represents a set of tools which are currently opened (or can be opened) for the currently chosen machine. For a list of currently available tools check the corresponding menu at the right side of the main tool bar located at the top of the window. This list will be extended with new tools in future releases.

You can press the F1 key to get instant help, or visit [www.virtualbox.org](http://www.virtualbox.org) for more information and latest news.

**Details**

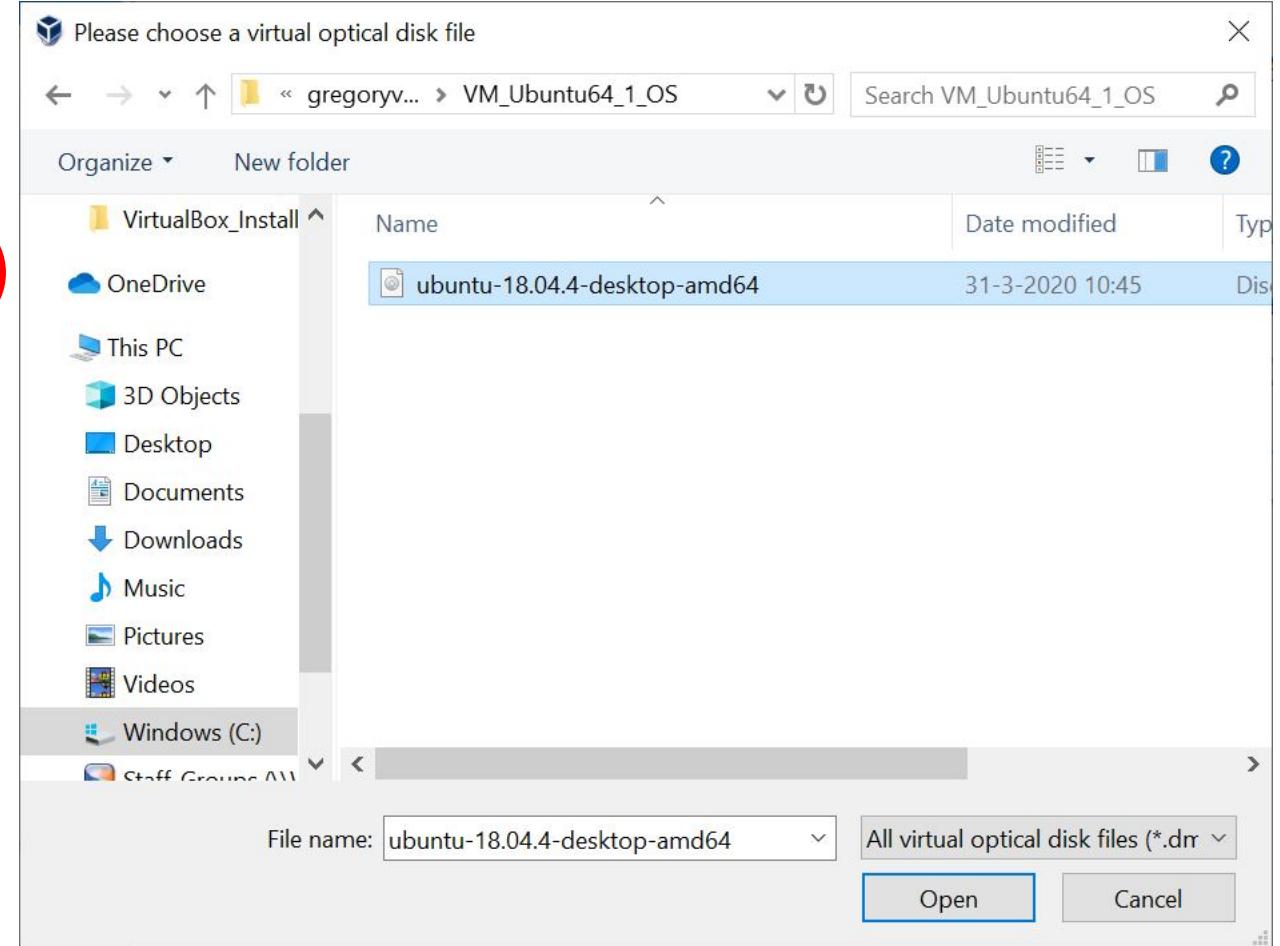
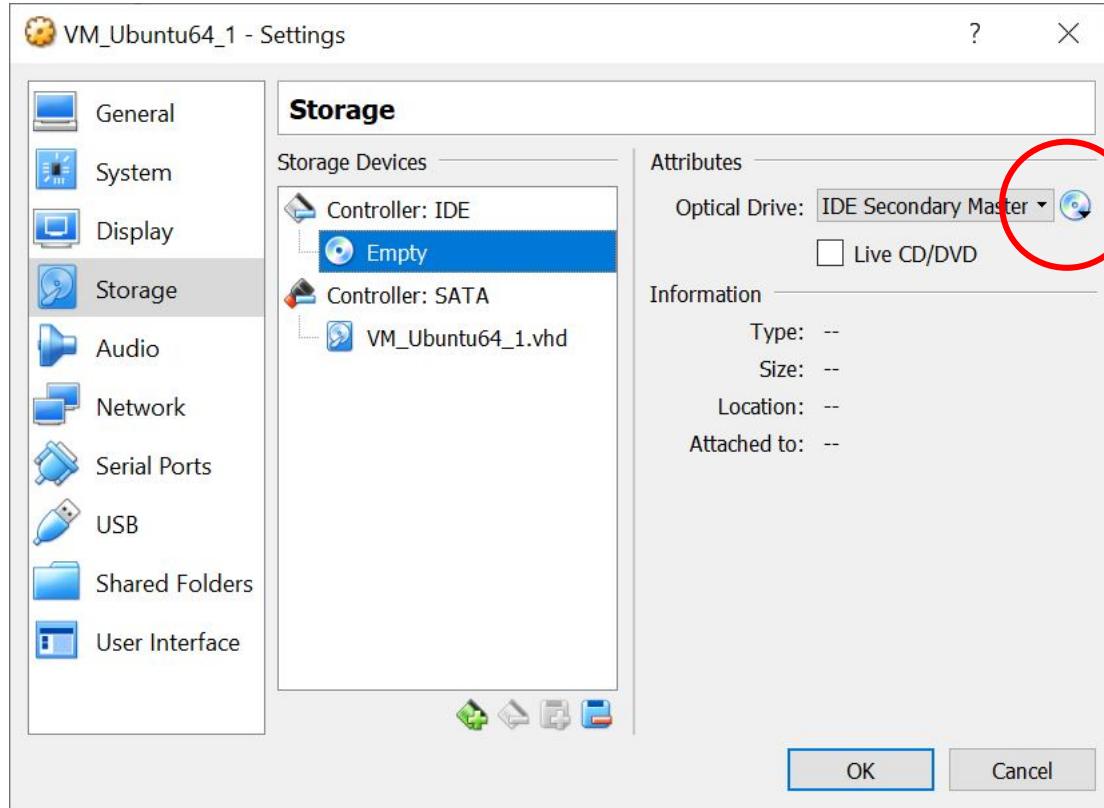
Tool to observe virtual machine (VM) details. Reflects groups of [properties](#) for the currently chosen VM and allows basic operations on certain properties (like the machine storage devices).

**Snapshots**

Tool to control virtual machine (VM) snapshots. Reflects [snapshots](#) created for the currently selected VM and allows snapshot operations like [create](#), [remove](#), [restore](#) (make current) and observe their properties. Allows to [edit](#) snapshot attributes like [name](#) and [description](#).

Download the Ubuntu 18.04.4 LTS operating system (<https://ubuntu.com/download/desktop>) and save the 'Disc Image File' at a convenient location.

Go to settings of your new virtual machine (VM) (yellow gear symbol) and go to the storage tab.



Click 'empty' under 'Controller IDE'. Next to 'IDE Secondary master' click the blue CD icon and select 'choose/create a virtual optical disk'. Click 'Add' and choose your downloaded Linux OS.

The screenshot shows the VirtualBox application window. At the top left, there's a menu bar with 'File', 'Machine', and 'Help'. Below the menu is a toolbar with several icons: 'New' (blue gear), 'Settings' (yellow gear), 'Discard' (trash can), and 'Start' (green arrow). A red circle highlights the 'Start' button. To the right of the toolbar are 'Machine Tools' (blue square with wrench) and 'Global Tools' (blue square with two wrenches). On the left side of the main area, there's a list of virtual machines, with one named 'VM\_Ubuntu64' shown as 'Powered Off'. The main content area has a blue header bar with the text 'Welcome to VirtualBox!'. Below it, there's descriptive text about the window's purpose and how to get help. On the right side of the main area, there's a cartoon penguin holding a wrench and a hammer, standing next to a small computer monitor icon.

**Welcome to VirtualBox!**

The left part of this window lists all virtual machines and virtual machine groups on your computer.

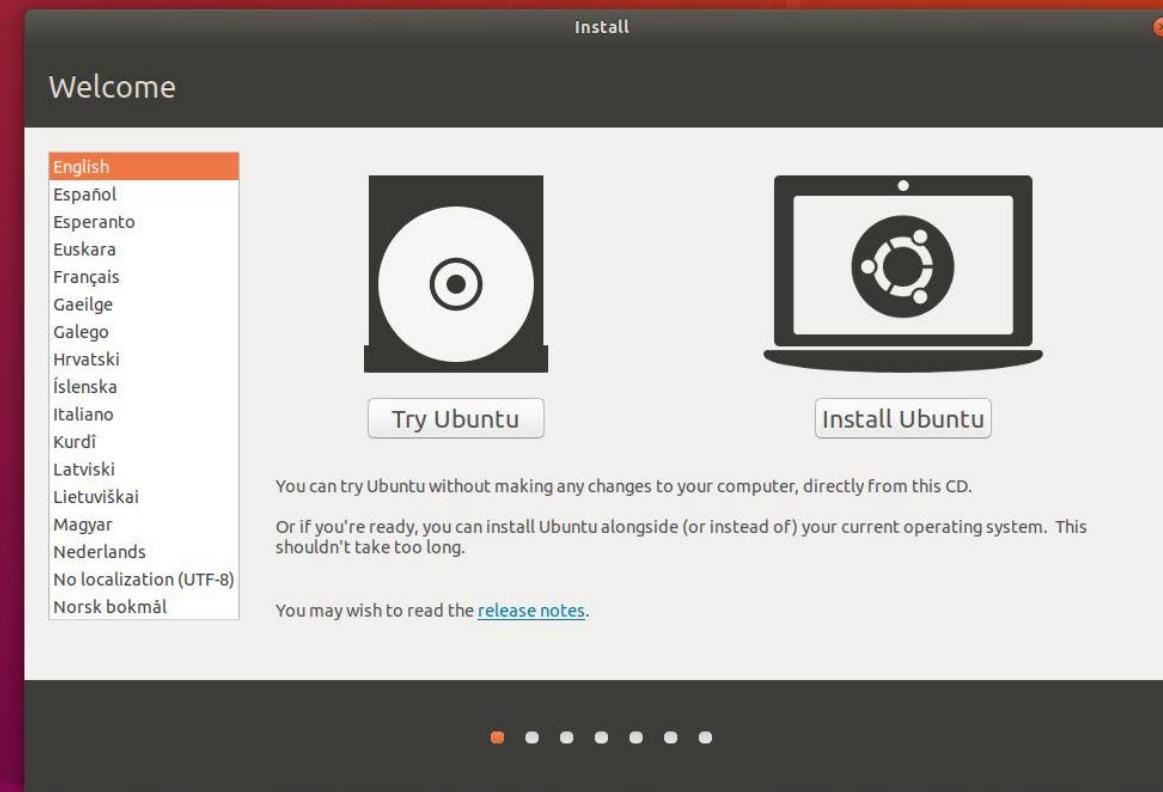
The right part of this window represents a set of tools which are currently opened (or can be opened) for the currently chosen machine. For a list of currently available tools check the corresponding menu at the right side of the main tool bar located at the top of the window. This list will be extended with new tools in future releases.

You can press the F1 key to get instant help, or visit [www.virtualbox.org](http://www.virtualbox.org) for more information and latest news.

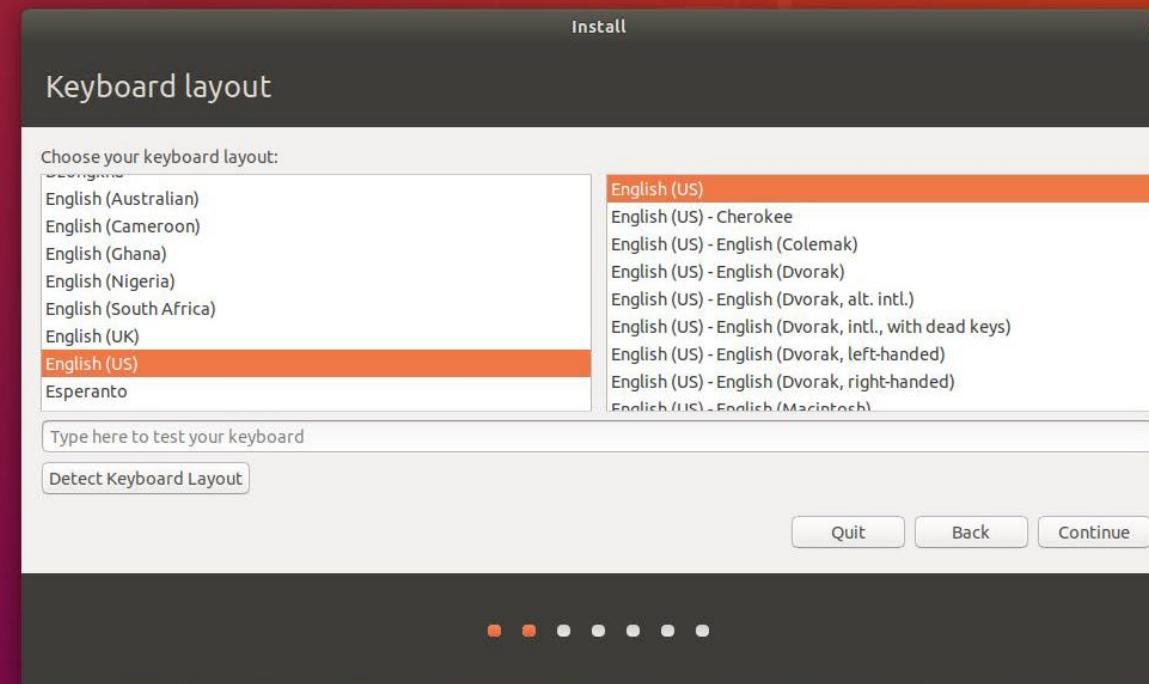
**Details**  
Tool to observe virtual machine (VM) details. Reflects groups of [properties](#) for the currently chosen VM and allows basic operations on certain properties (like the machine storage devices).

**Snapshots**  
Tool to control virtual machine (VM) snapshots. Reflects [snapshots](#) created for the currently selected VM and allows snapshot operations like [create](#), [remove](#), [restore](#) (make current) and observe their properties. Allows to [edit](#) snapshot attributes like [name](#) and [description](#).

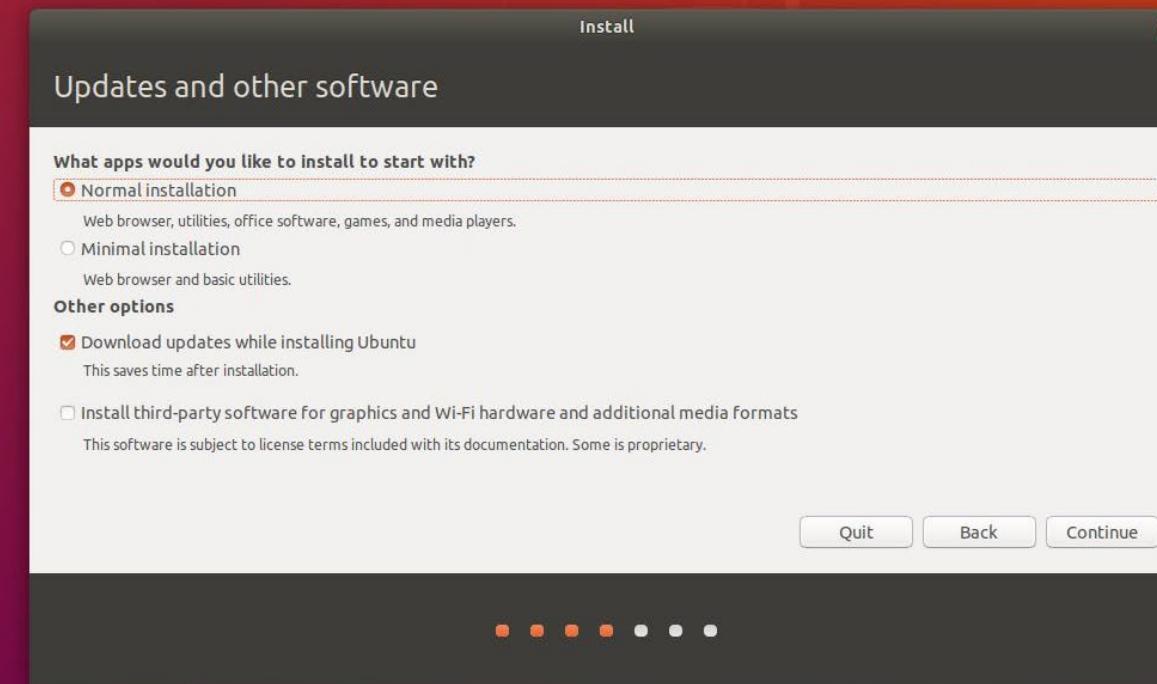
Start the VM and run the Linux install process with the recommended settings. Note that this might freeze sometimes, so it might be necessary to reinstall it a few times, especially with a slow computer or when little RAM memory is allocated for the VM.)



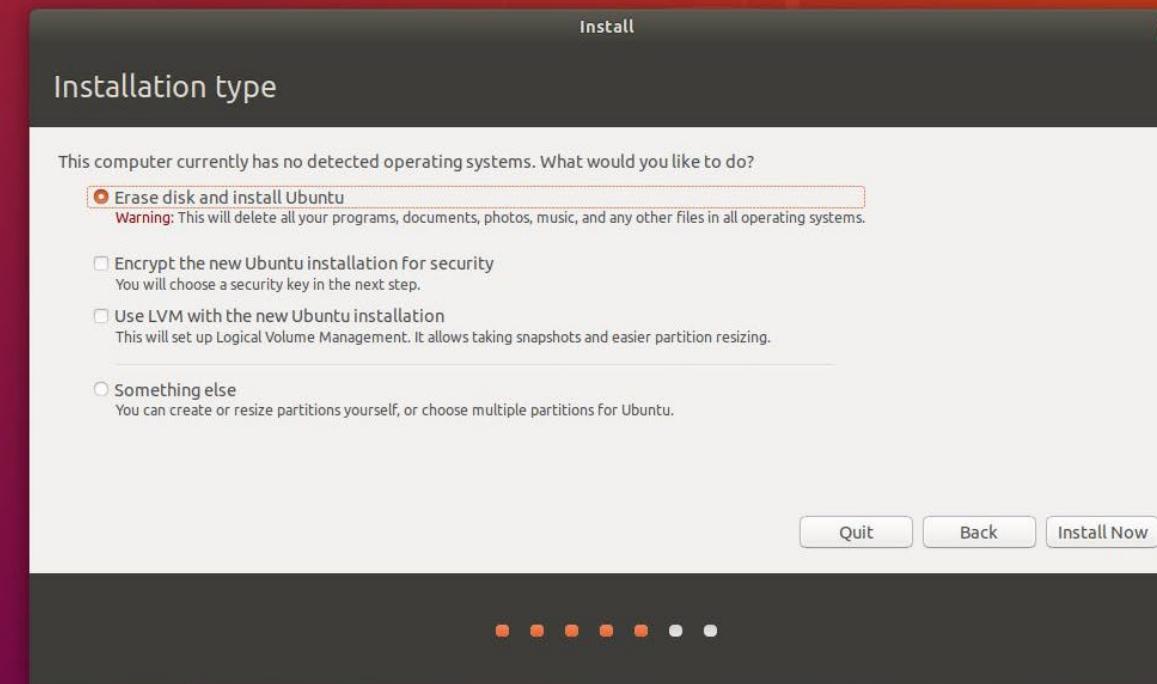
Click 'Install Ubuntu'.



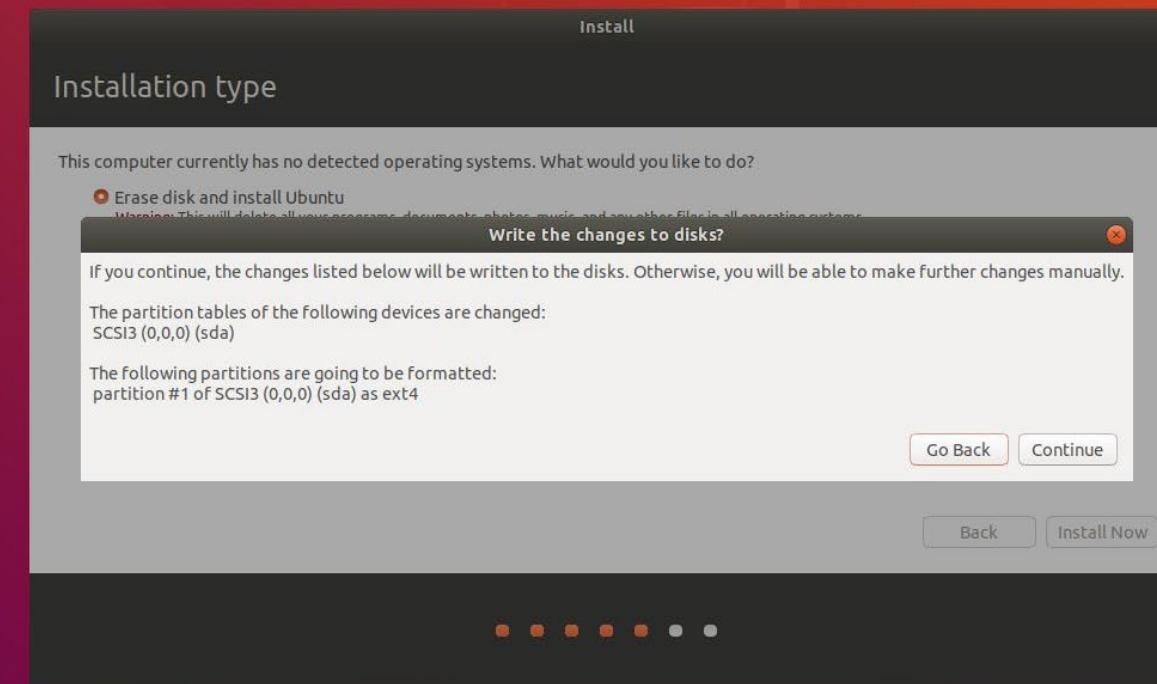
Select your preferred keyboard outlay.



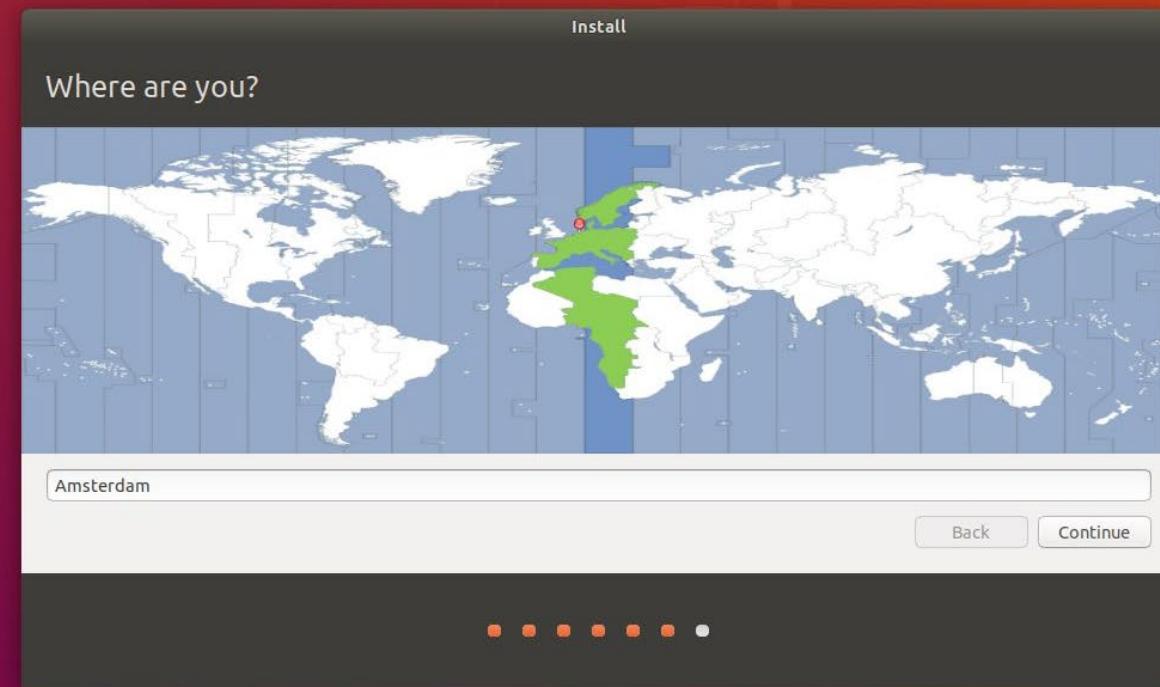
Click 'Normal Installation'.



Click 'Erase Disk and Install Ubuntu'.



Click 'Continue'.



Select your current time region

Install

### Who are you?

Your name:  ✓

Your computer's name:  ✓  
The name it uses when it talks to other computers.

Pick a username:  ✓

Choose a password:  **Good password**

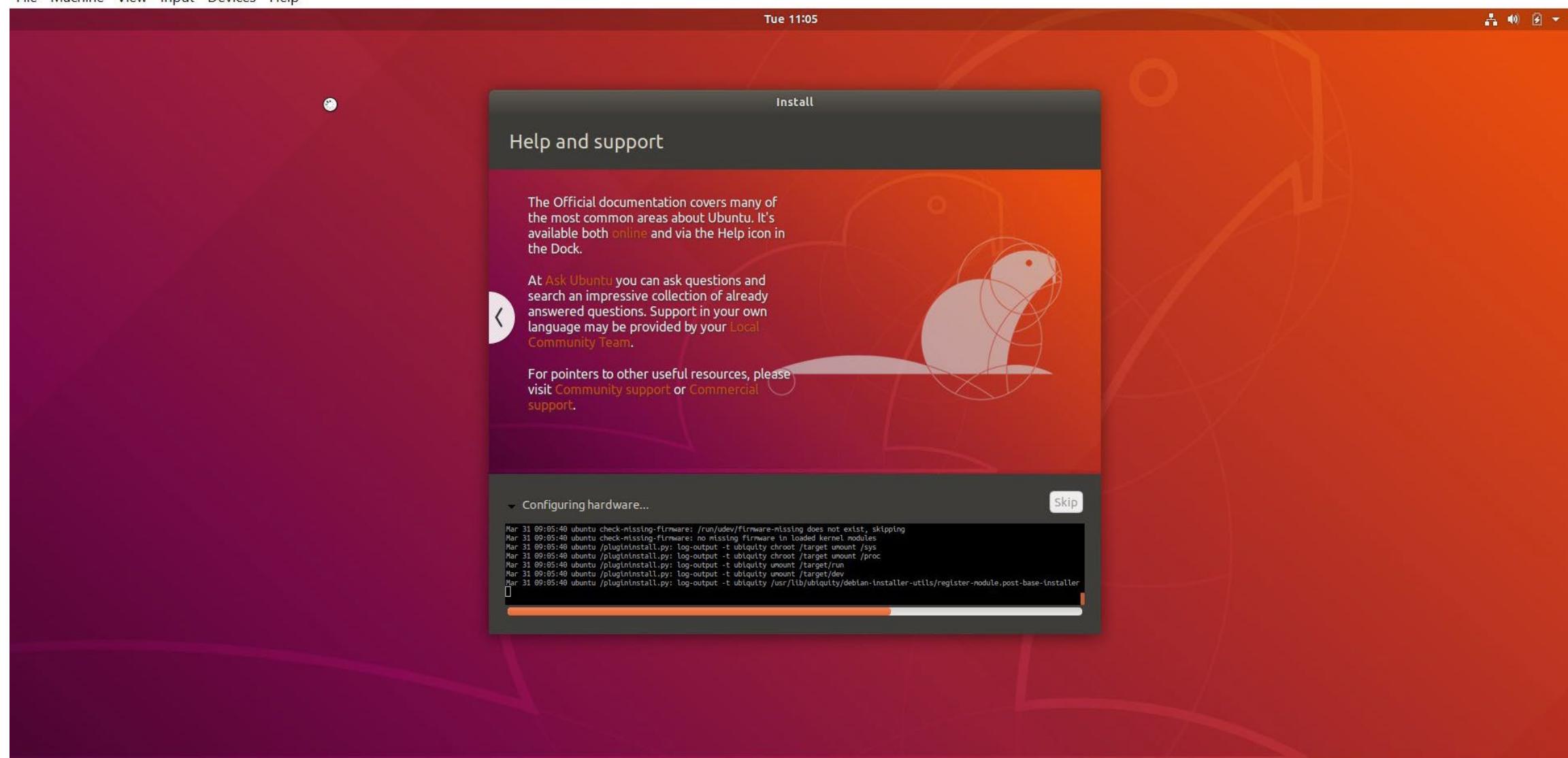
Confirm your password:  ✓

Log in automatically  
 Require my password to log in

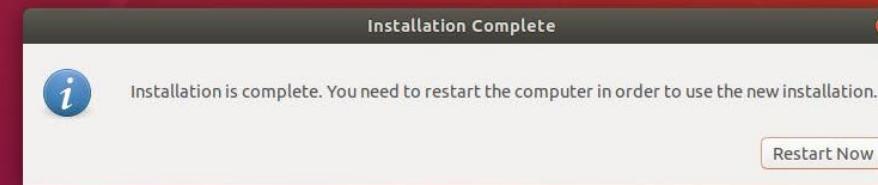
[Back](#) [Continue](#)

• • • • • •

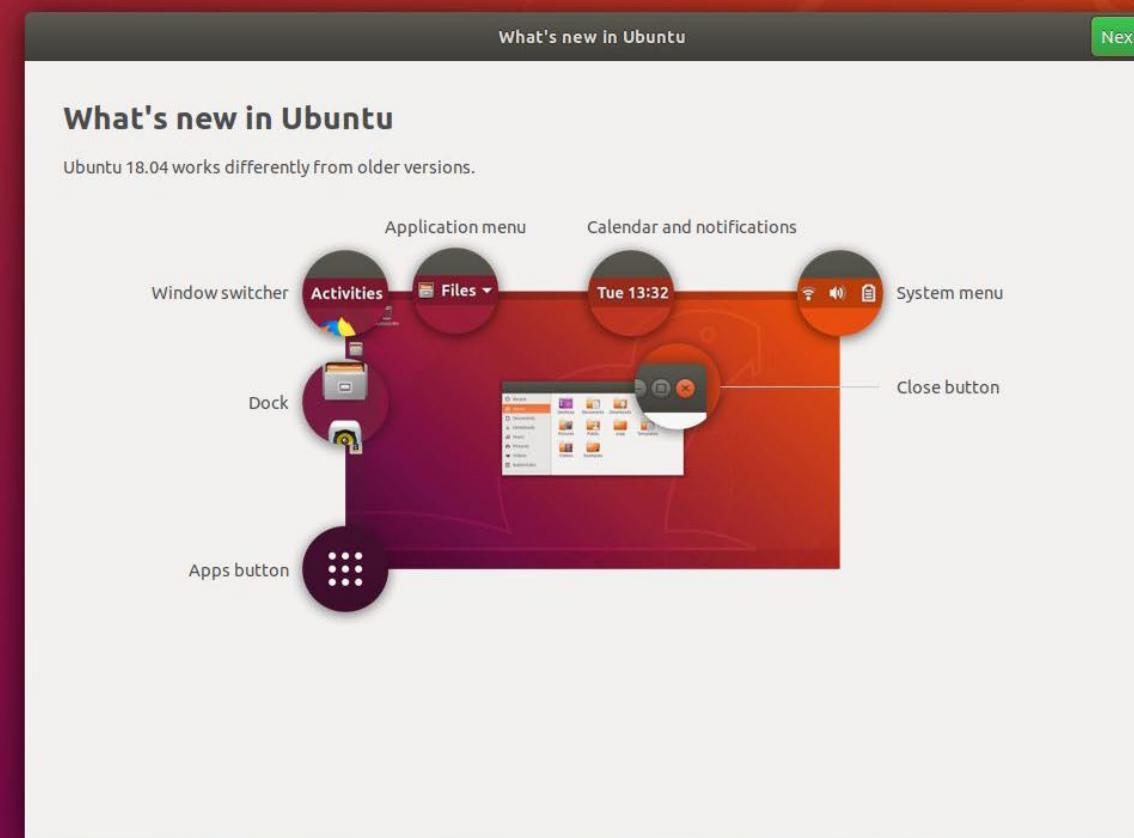
Enter your name, computername, username and password.



The install process should now start and should last more than 15 to 30 minutes (depending on how fast your computer is). If it takes a lot of time without progressing, restart the machine with the arrow in the top right corner.



Restart the VM. If after restarting the VM ask to 'remove the start up medium', press enter. If the VM doesn't start up after that, turn the VM off (press the cross in the top right corner to close the window) and start the VM again.



If the installation is successful, the VM should look something like this. It is advised not to install many programs other than the ones needed for data processing (to save memory). The VM is now working, but for easy sharing of files between the physical computer and the VM, a shared folder can be created.

File Machine View Input Devices Help

Activities Terminal

di 13:50

gregoryvanbeek@VM1-TUD253938: ~



File Edit View Search Terminal Help  
To run a command as administrator (user "root"), use "sudo <command>".  
See "man sudo\_root" for details.

```
gregoryv @VM1- 1:~$ sudo apt update
[sudo] password for gregoryv :
Hit:1 http://nl.archive.ubuntu.com/ubuntu bionic InRelease
Hit:2 http://nl.archive.ubuntu.com/ubuntu bionic-updates InRelease
Hit:3 http://nl.archive.ubuntu.com/ubuntu bionic-backports InRelease
Get:4 http://security.ubuntu.com/ubuntu bionic-security InRelease [88,7 kB]
Get:5 http://security.ubuntu.com/ubuntu bionic-security/main amd64 DEP-11 Metadata [38,5 kB]
Get:6 http://security.ubuntu.com/ubuntu bionic-security/main DEP-11 48x48 Icons [17,6 kB]
Get:7 http://security.ubuntu.com/ubuntu bionic-security/main DEP-11 64x64 Icons [41,5 kB]
Get:8 http://security.ubuntu.com/ubuntu bionic-security/universe amd64 DEP-11 Metadata [42,1 kB]
Get:9 http://security.ubuntu.com/ubuntu bionic-security/universe DEP-11 48x48 Icons [16,4 kB]
Get:10 http://security.ubuntu.com/ubuntu bionic-security/universe DEP-11 64x64 Icons [111 kB]
Get:11 http://security.ubuntu.com/ubuntu bionic-security/multiverse amd64 DEP-11 Metadata [2464 B]
Fetched 358 kB in 2s (159 kB/s)
Reading package lists... Done
Building dependency tree
Reading state information... Done
107 packages can be upgraded. Run 'apt list --upgradable' to see them.
gregoryv @VM1- 1:~$
```



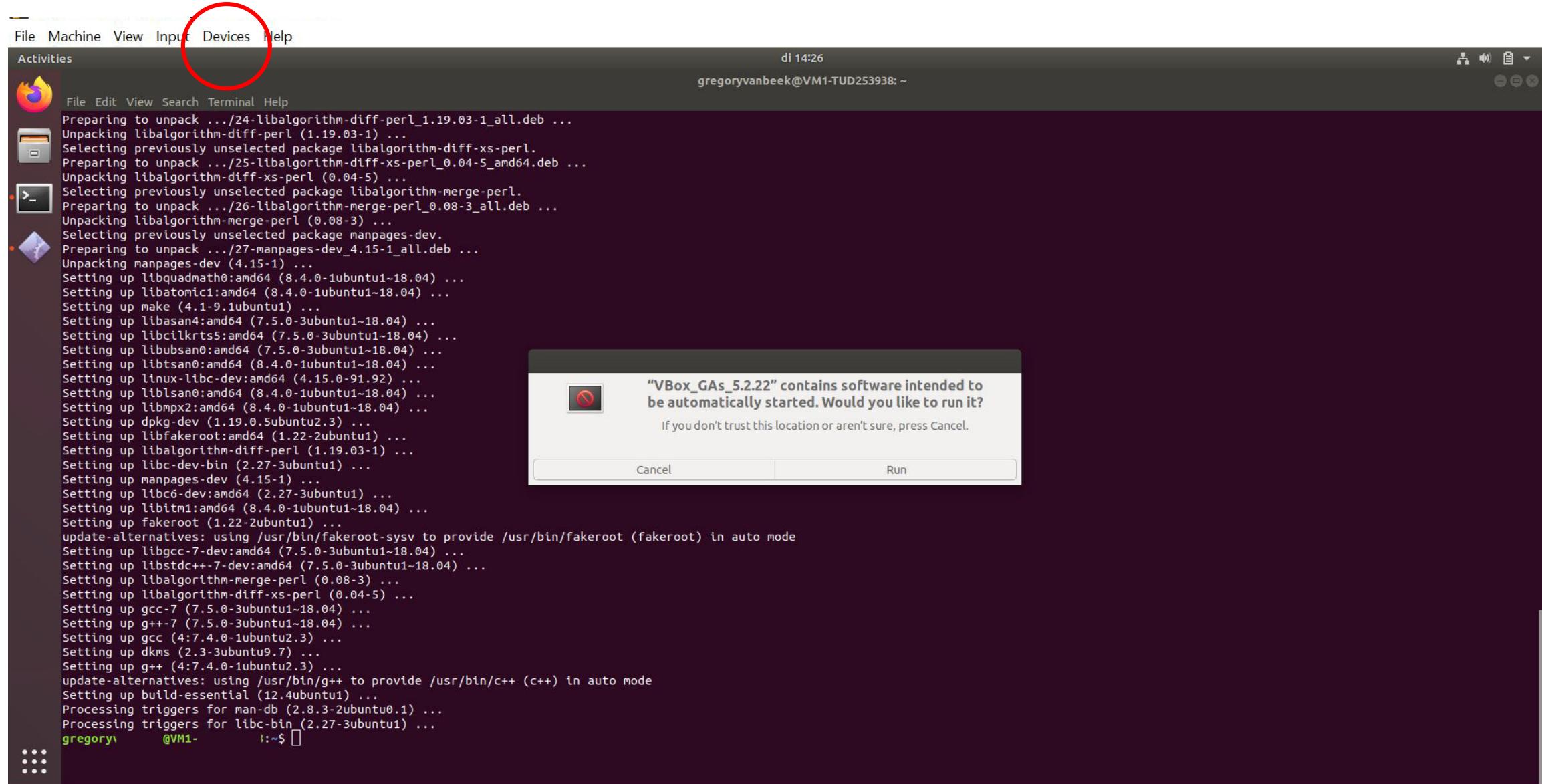
To add a shared folder, 'guest additions' needs to be installed in the VM. For this, enter 'sudo apt update'

When finished, enter 'sudo apt upgrade' and restart the system and restart the VM.

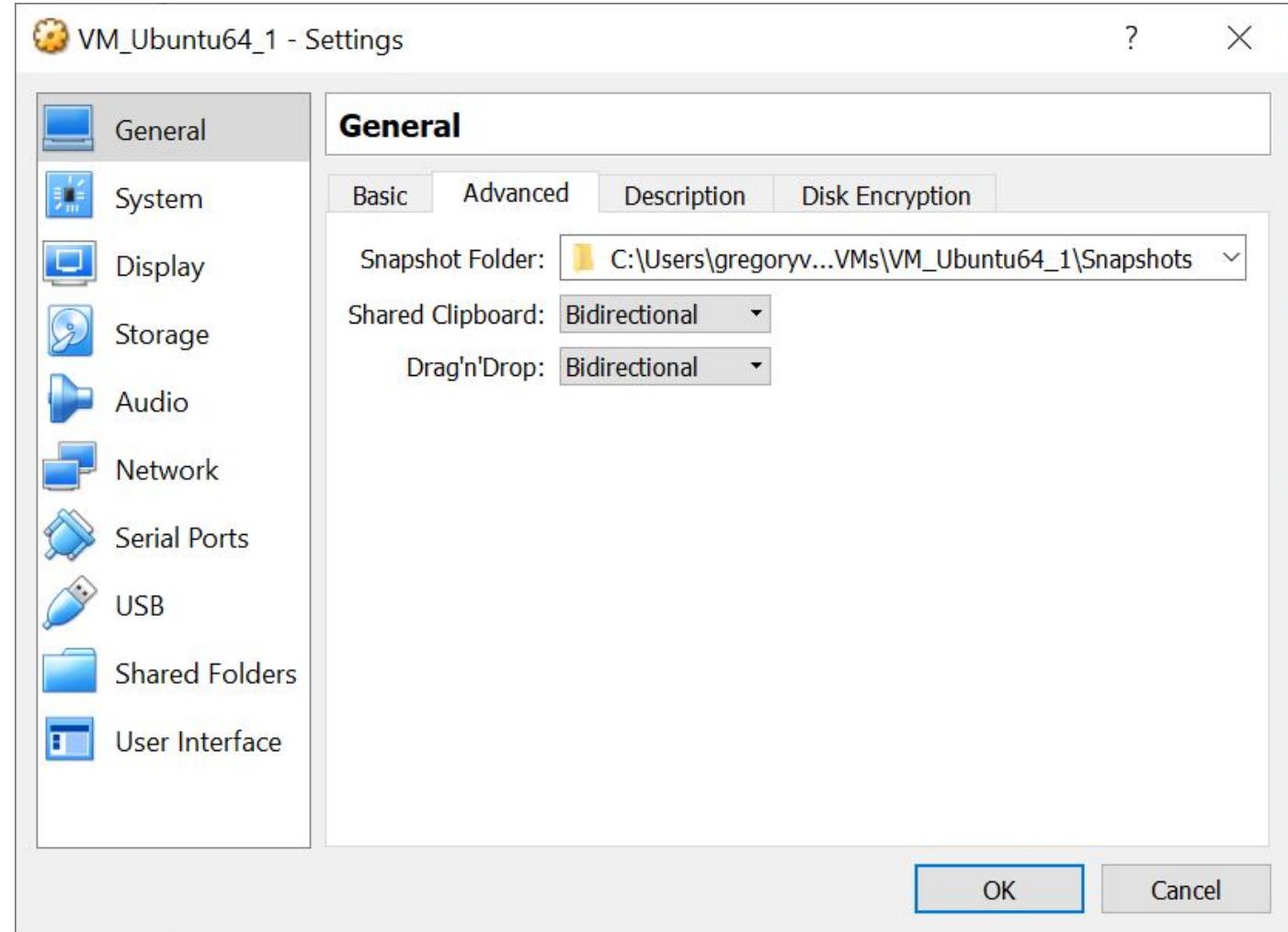


```
File Edit View Search Terminal Help
gregory  @VM1-  !:~$ sudo apt install build-essential dkms linux-headers-$(uname -r)
Reading package lists... done
Building dependency tree
Reading state information... done
linux-headers-5.3.0-45-generic is already the newest version (5.3.0-45.37~18.04.1).
linux-headers-5.3.0-45-generic set to manually installed.
The following packages were automatically installed and are no longer required:
  efibootmgr libfwup1 libwayland-egl1-mesa
Use 'sudo apt autoremove' to remove them.
The following additional packages will be installed:
  dpkg-dev fakeroot g++ g++-7 gcc gcc-7 libalgorithm-diff-perl libalgorithm-diff-xs-perl libalgorithm-merge-perl libasan4 libatomic1 libc-dev-bin libc6-dev libcilkrtss5 libfakeroot libgcc-7-dev libitm1
  liblsan0 libmpx2 libquadmath0 libstdc++-7-dev libtsan0 libubsan0 linux-libc-dev make manpages-dev
Suggested packages:
  menu debian-keyring g++-multilib g++-7-multilib gcc-7-doc libstdc++-7-dbg gcc-multilib autoconf automake libtool flex bison gcc-doc gcc-7-multilib gcc-7-locales libgcc1-dbg libgomp1-dbg libitm1-dbg
  libatomic1-dbg libasan4-dbg liblsan0-dbg libtsan0-dbg libubsan0-dbg libcilkrtss5-dbg libmpx2-dbg libquadmath0-dbg glibc-doc libstdc++-7-doc make-doc
The following NEW packages will be installed:
  build-essential dkms dpkg-dev fakeroot g++ g++-7 gcc gcc-7 libalgorithm-diff-perl libalgorithm-diff-xs-perl libasan4 libatomic1 libc-dev-bin libc6-dev libcilkrtss5 libfakeroot
  libgcc-7-dev libitm1 liblsan0 libmpx2 libquadmath0 libstdc++-7-dev libtsan0 libubsan0 linux-libc-dev make manpages-dev
0 upgraded, 28 newly installed, 0 to remove and 0 not upgraded.
Need to get 31,0 MB of archives.
After this operation, 121 MB of additional disk space will be used.
Do you want to continue? [Y/n] Y
0% [Working]
Get:1 http://nl.archive.ubuntu.com/ubuntu bionic/main amd64 libc-dev-bin amd64 2.27-3ubuntu1 [71,8 kB]
Get:2 http://nl.archive.ubuntu.com/ubuntu bionic-updates/main amd64 linux-libc-dev amd64 4.15.0-91.92 [1026 kB]
Get:3 http://nl.archive.ubuntu.com/ubuntu bionic/main amd64 libc6-dev amd64 2.27-3ubuntu1 [2587 kB]
Get:4 http://nl.archive.ubuntu.com/ubuntu bionic-updates/main amd64 libitm1 amd64 8.4.0-1ubuntu1-18.04 [27,9 kB]
Get:5 http://nl.archive.ubuntu.com/ubuntu bionic-updates/main amd64 libatomic1 amd64 8.4.0-1ubuntu1-18.04 [9192 B]
Get:6 http://nl.archive.ubuntu.com/ubuntu bionic-updates/main amd64 libasan4 amd64 7.5.0-3ubuntu1~18.04 [358 kB]
Get:7 http://nl.archive.ubuntu.com/ubuntu bionic-updates/main amd64 liblsan0 amd64 8.4.0-1ubuntu1~18.04 [133 kB]
Get:8 http://nl.archive.ubuntu.com/ubuntu bionic-updates/main amd64 libtsan0 amd64 8.4.0-1ubuntu1~18.04 [288 kB]
Get:9 http://nl.archive.ubuntu.com/ubuntu bionic-updates/main amd64 libubsan0 amd64 7.5.0-3ubuntu1~18.04 [126 kB]
Get:10 http://nl.archive.ubuntu.com/ubuntu bionic-updates/main amd64 libcilkrtss5 amd64 7.5.0-3ubuntu1~18.04 [42,5 kB]
Get:11 http://nl.archive.ubuntu.com/ubuntu bionic-updates/main amd64 libmpx2 amd64 8.4.0-1ubuntu1~18.04 [11,6 kB]
Get:12 http://nl.archive.ubuntu.com/ubuntu bionic-updates/main amd64 libquadmath0 amd64 8.4.0-1ubuntu1~18.04 [134 kB]
Get:13 http://nl.archive.ubuntu.com/ubuntu bionic-updates/main amd64 libgcc-7-dev amd64 7.5.0-3ubuntu1~18.04 [2378 kB]
Get:14 http://nl.archive.ubuntu.com/ubuntu bionic-updates/main amd64 gcc-7 amd64 7.5.0-3ubuntu1~18.04 [9381 kB]
Get:15 http://nl.archive.ubuntu.com/ubuntu bionic-updates/main amd64 gcc amd64 4:7.4.0-1ubuntu2.3 [5184 B]
Get:16 http://nl.archive.ubuntu.com/ubuntu bionic-updates/main amd64 libstdc++-7-dev amd64 7.5.0-3ubuntu1~18.04 [1471 kB]
Get:17 http://nl.archive.ubuntu.com/ubuntu bionic-updates/main amd64 g++-7 amd64 7.5.0-3ubuntu1~18.04 [9697 kB]
Get:18 http://nl.archive.ubuntu.com/ubuntu bionic-updates/main amd64 g++ amd64 4:7.4.0-1ubuntu2.3 [1568 B]
Get:19 http://nl.archive.ubuntu.com/ubuntu bionic/main amd64 make amd64 4.1-9.1ubuntu1 [154 kB]
Get:20 http://nl.archive.ubuntu.com/ubuntu bionic-updates/main amd64 dpkg-dev all 1.19.0.5ubuntu2.3 [607 kB]
Get:21 http://nl.archive.ubuntu.com/ubuntu bionic/main amd64 build-essential amd64 12.4ubuntu1 [4758 B]
Get:22 http://nl.archive.ubuntu.com/ubuntu bionic-updates/main amd64 dkms all 2.3-3ubuntu9.7 [68,1 kB]
Get:23 http://nl.archive.ubuntu.com/ubuntu bionic/main amd64 libfakeroot amd64 1.22-2ubuntu1 [25,9 kB]
Get:24 http://nl.archive.ubuntu.com/ubuntu bionic/main amd64 fakeroot amd64 1.22-2ubuntu1 [62,3 kB]
```

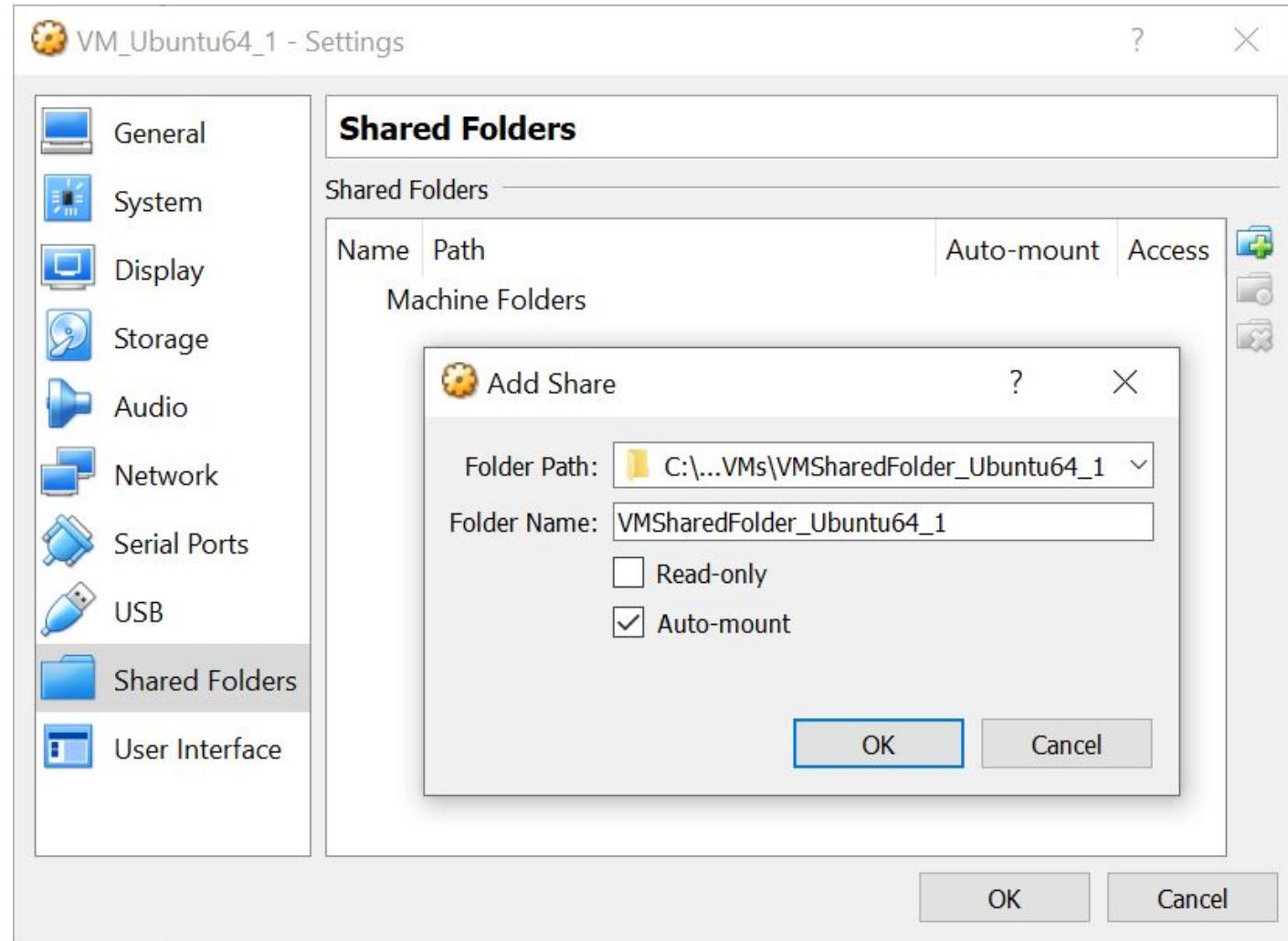
Enter 'sudo apt install build-essential dkms linux-headers -\$(uname -r)'



Click the 'devices' tab in the top of the window. Click 'Insert Guest Additions CD Image' and run the installer. Power off the VM when done.



In VB click 'settings' (yellow gear symbol) and go to the 'General' tab; 'Advanced'. Set both 'shared clipboard' and 'drag n drop' to bidirectional and click 'ok'



In VB click 'settings' again (yellow gear symbol) and go to the 'Shared Folders'. Add path to a folder that is going to be used as shared folder. Set 'Auto Mount' and click 'Ok'



Start the VM and check if the shared folder is present (either on the desktop, the files folder or in the media folder).

The screenshot shows a Linux desktop environment with a dark theme. A terminal window is open, showing the following command and its output:

```
gregoryv @VM1- 1:~$ sudo adduser gregoryv vboxsf
[sudo] password for gregoryv
Adding user `gregoryv' to group `vboxsf' ...
Adding user gregoryv to group vboxsf
Done.
gregoryv @VM1- 1:~$ id gregoryv
uid=1000(gregoryv) gid=1000(gregoryv) groups=1000(gregoryv),4(adm),24(cdrom),27(sudo),30(dip),46(plugdev),116(lpadmin),126(sambashare),999(vboxsf)
```

A red circle highlights the last line of the output, which shows the user is now part of the 'vboxsf' group.

To be able to access the folder, special permission needs to be given. For this open the Terminal app. Enter 'sudo adduser [username] vboxsf' (where [username] should be replaced with your actual username of the VM). To check, enter 'id [username]'. This should give a list that needs to include 'vboxsf' Restart the VM.

To test the shared folder, try copying the folders for ‘BWA’, ‘SAMTools’ and ‘Sambamba’ as well as the reference sequence(s) and check if they show up in the VM. To unpack the software folders, copy them to the VM (e.g. the Documents folder).

The virtual machine should now be fully operational.

If a new shared folder is wanted, the ‘guest additions’ in Linux do not need to be installed again. The new shared folder only needs to be selected in the settings menu of VirtualBox (i.e. the yellow gear symbol). Do the following steps:

- In VB click ‘settings’ again (yellow gear symbol) and go to the ‘Shared Folders’. Add path to a folder that is going to be used as shared folder. Set ‘Auto Mount’ and click ‘Ok’
- Start the VM and check if the shared folder is present (either on the desktop, the files folder or in the media folder).
- To be able to access the folder, special permission needs to be given. For this open the Terminal app.

