

Course Virtual Machine Manual (Part of Tutorial 1)

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IMPORTANT DISCLAIMER

- The virtual machine in the Lab **can be deleted any time.**
Do not expect the machine or the data you created in it to be there at the next lecture.
- As a rule of thumb, you should **learn how to reinstall the machine** as explained in this document every time you access the lab.
- We recommend you **use the same computer** for each session or you will be forced to reinstall the machine.
- Before finishing a session you should always **send all important information to yourself via email**, or using other cloud services of your choice.
For **code**, we suggest to use **github** that will be taught during the course.
- **PRIVACY and SECURITY:**
 - The machine is an insecure object. Everyone can read it if not deleted.
You must not insert or save private information, passwords and other sensitive data in the course virtual machine.
 - **You agree NOT to use the machine for criminal acts for which you will be retained the sole responsible. The machine creation is logged to your user and the activity can be extracted by system administrators if requested by legal authorities.**

The course "Virtual Machine"

- A *Virtual Machine* is a *software emulation* of an *hardware machine*.
(you'll learn more about this during the course)
- The name is usually shortened into **VM**
- A VM usually consist of two files:
 - A *machine definition file*, that specifies the machine configuration
 - A *disk image file*, which is a software representation of an hardware harddisk.
- For better user experience, the teacher set up a fine-tuned machine for the course, that contains all we will need. You should learn the installation steps because the virtual machines we will be using can be wiped at any time for security reasons.

1. Installation

- A. In a Lab machine
- B. On your Laptop

A. Installing in a **Lab machine**

A.1. Getting the machine

- I placed it for you in some shared storage:
S:\Courses\fysik\MNXB01
- **Select** and **copy** the folder called
LubuntuVM
- Create a folder called MNXB01 in the folder
C:\Temp
- **Paste** the LubuntuVM folder inside
C:\Temp\MNXB01\
- It might take some time, so listen to me while the
copy transfer is ongoing.
- Feeling lost? Follow the detailed guide at slide [51](#)
or ask the teachers for help.

A. Installing in a **Lab machine**

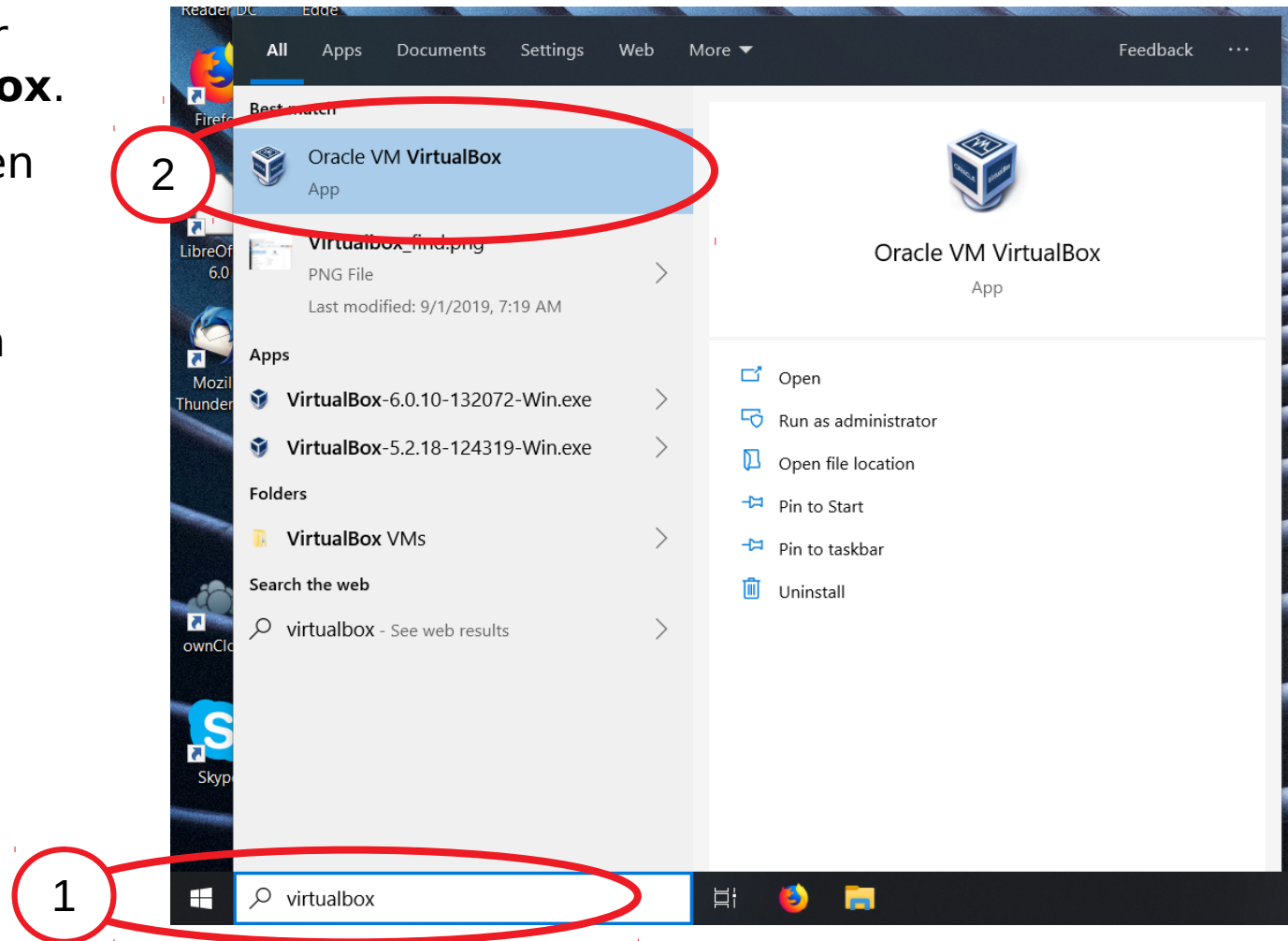
A.2 Open VirtualBox

We will use an hypervisor software called **VirtualBox**.

Luckily it has already been installed by a system administrator in the LAB

A.2.1 Find the application called **VirtualBox**.

You can search it by writing the name in the search bar in Windows 10 or click on the windows logo and browse the existing applications.



A.2.2 Click on the icon  to *open (or run or execute)* the VirtualBox application

A. Installing in a **Lab machine**

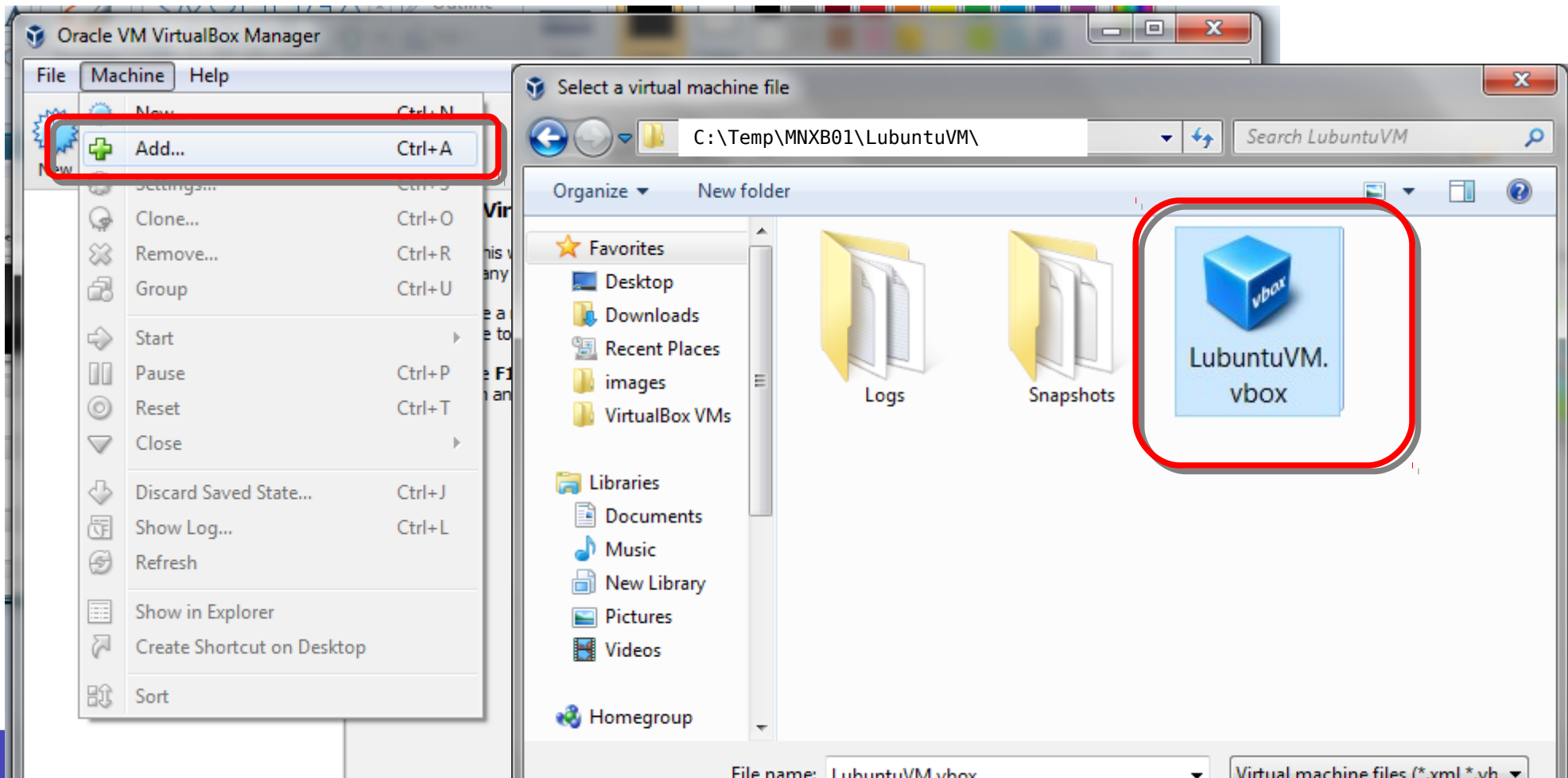
A.3. Add the course custom VM to the hypervisor

A.3.1 Open the machine with VirtualBox:

Machine → Add...

and select the file

C:\Temp\MNXB01\LubuntuVM\LubuntuVM.vbox
(the blue icon)



B. Installing on your laptop

B.1. Getting the VM

- (Recommended, faster) Ask the teacher for a USB stick that contains the machine
 - Or Download it from <http://www.hep.lu.se/staff/paganelli/fileshare/LubuntuVM.zip> and extract the zip file.
NOTE: the download and extraction might be slow.
- **OBS!:** The machine requires at least 20GB of space so make sure you have enough room on your harddisk.

B. Installing **on your Laptop**

B.2. Download VirtualBox

We will use an hypervisor software called **VirtualBox**.

B.2.1 Download and install version 6.x from the official Oracle VirtualBox webpage:

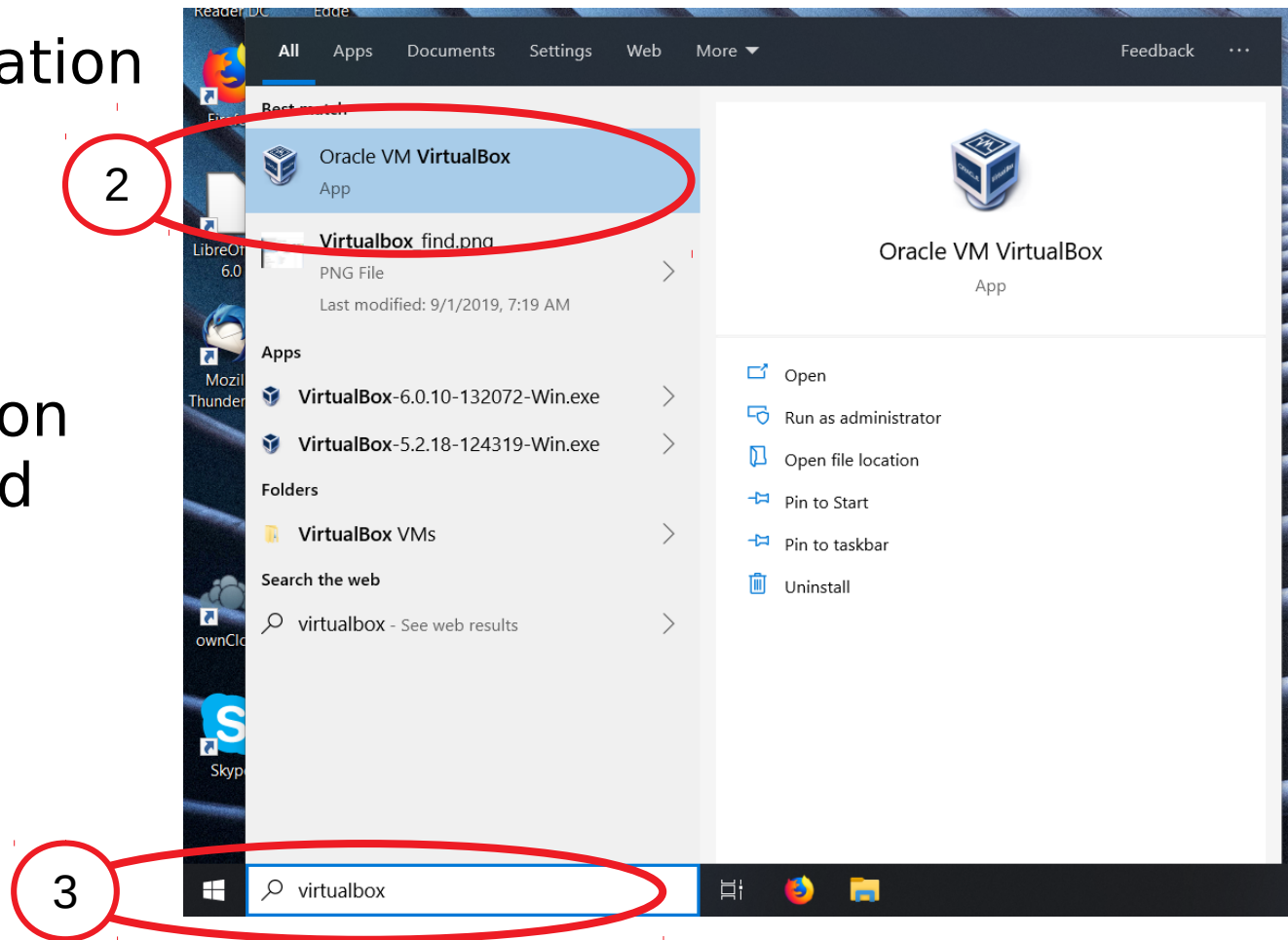
<https://www.virtualbox.org/wiki/Downloads>

It is recommended to reboot your laptop once done.
If you're already on linux, it might be available in the repositories.

B. Installing **on your Laptop**

B.2. Install and open VirtualBox

B.2.2 Find the application called **VirtualBox**. You can search it by writing the name in the search bar in Windows 10 or click on the windows logo and browse the existing applications.



B.2.3 Click on the icon the



to *open* (or *run* or *execute*) VirtualBox application

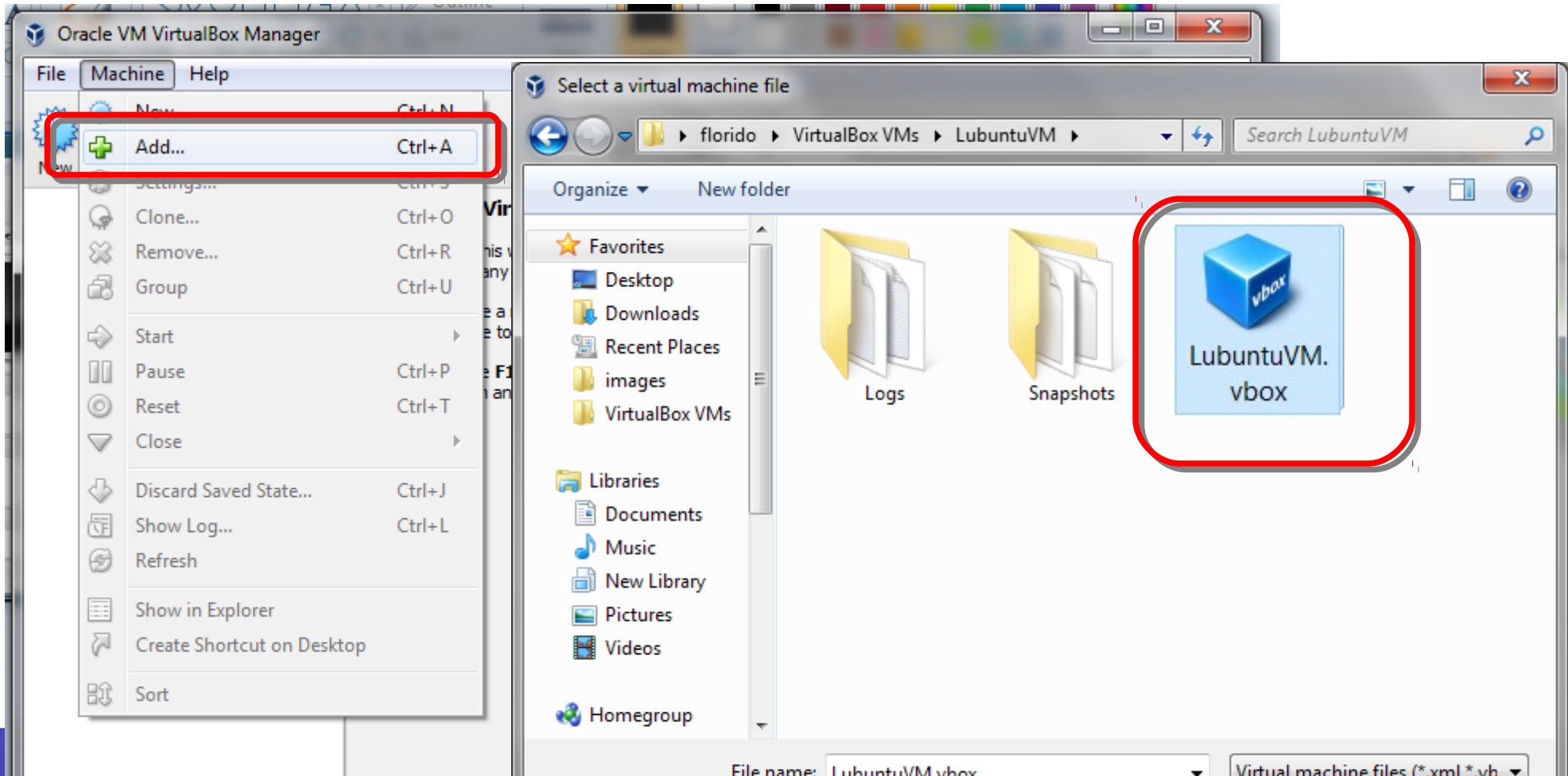
B. Installing **on your laptop**

B.3. Add the course custom VM to the hypervisor

B.3.1. Open the machine with VirtualBox:

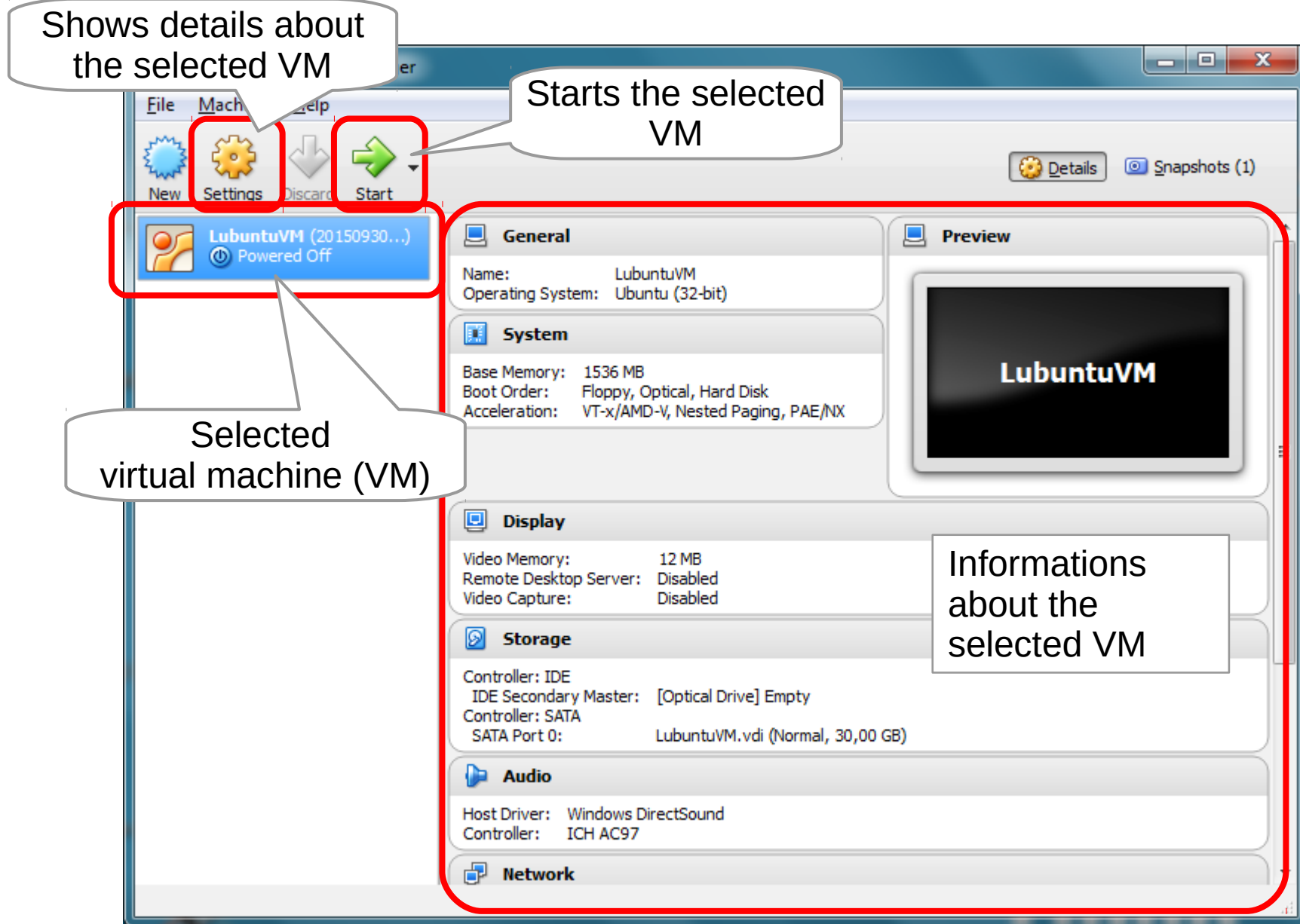
Machine → Add...

and find the file `LubuntuVM.vbox` (the blue icon) on your disk. It should be where you copied from usb/extracted the files.



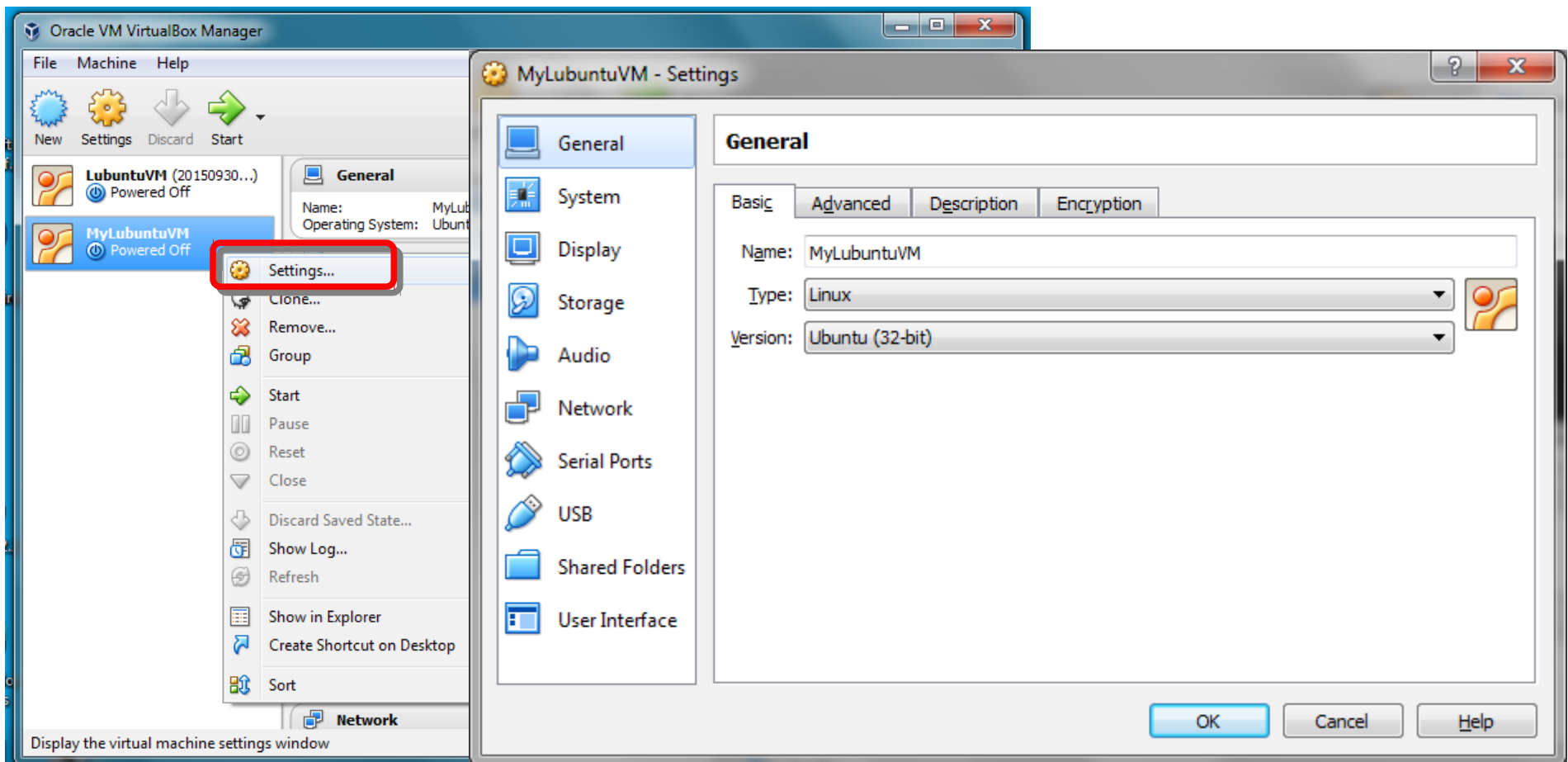
2. Quick VirtualBox Manual

2.1.VirtualBox interface explained

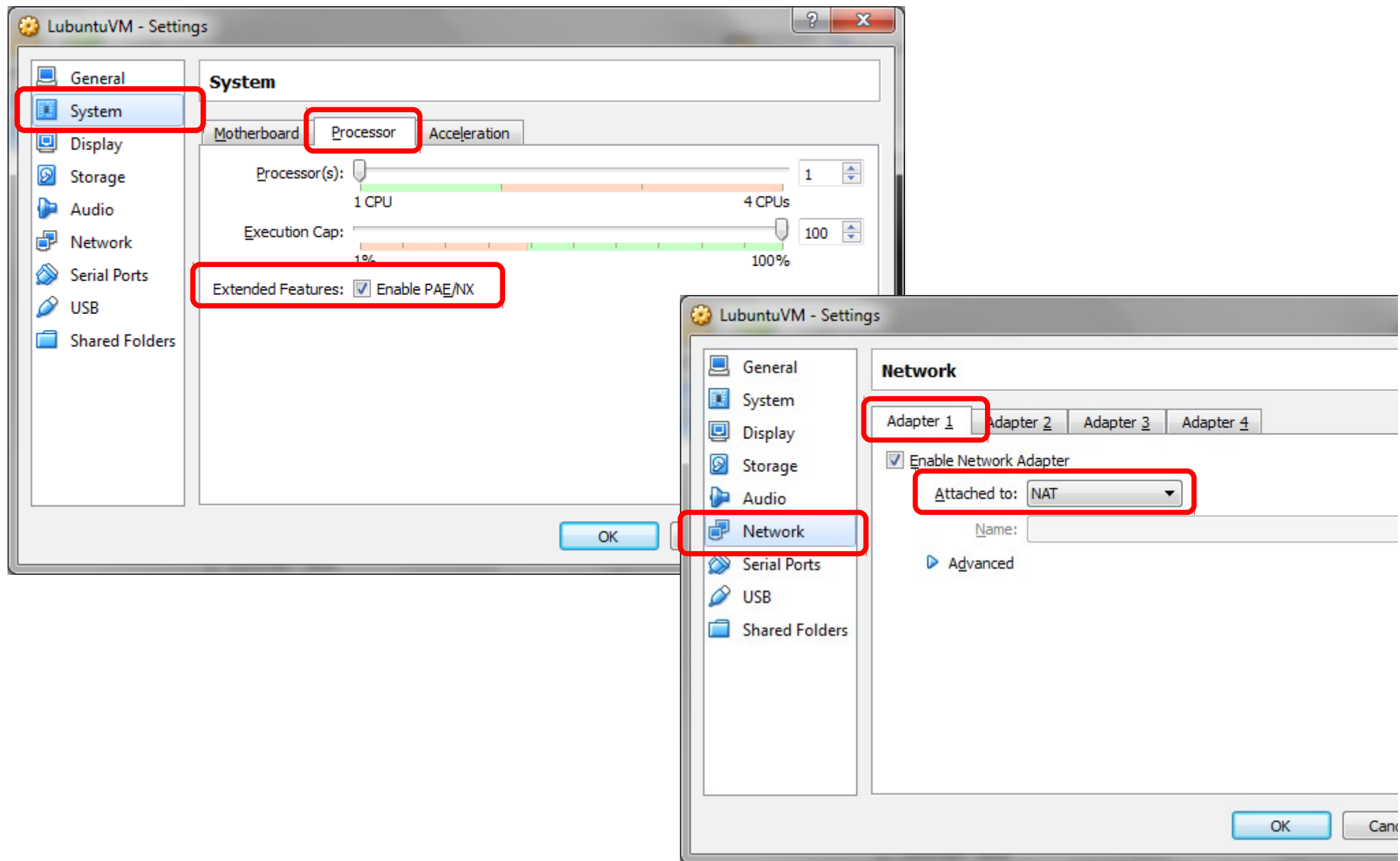


2.2. Review the VM virtual hardware

- Right-click on the machine MyLubuntuVM and select "Settings..."
- Browse around the hardware options. Any comments?



2.3. Enable PAE and NAT



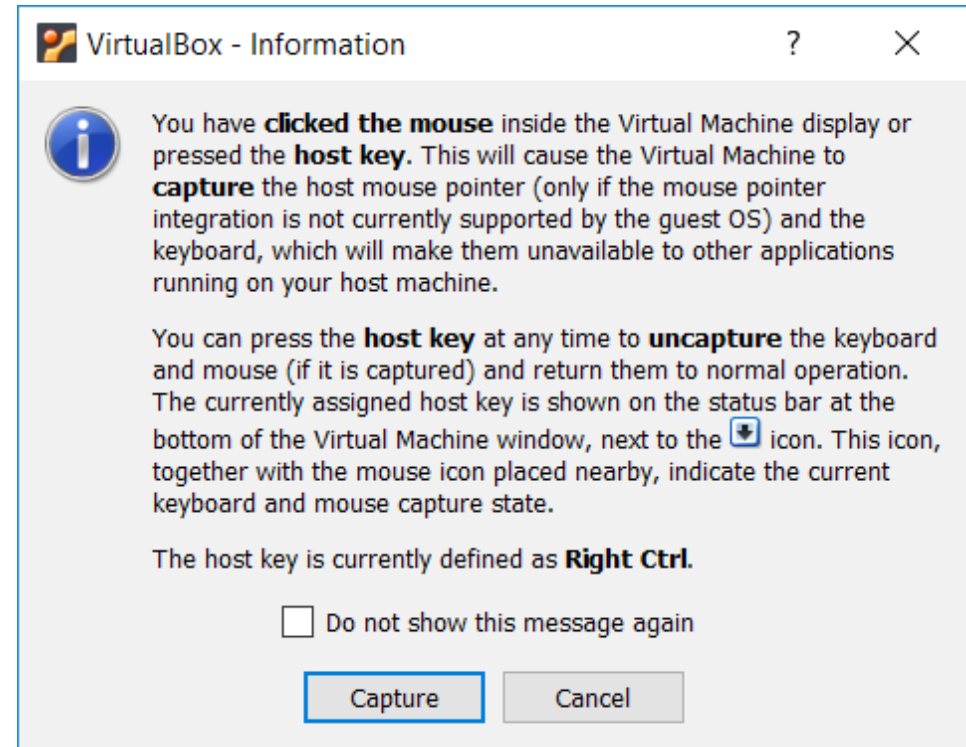
2.4. Host Key **Right Ctrl**, your best friend

This dialog will appear when you click inside the VM screen. It informs you that the host mouse pointer and keyboard will be grabbed by the virtual machine after you press *Capture*, sometimes making it impossible to interact with the host.

To give back control to the host you should press the **Host Key**. By default, the host key is the **Right Ctrl** key.

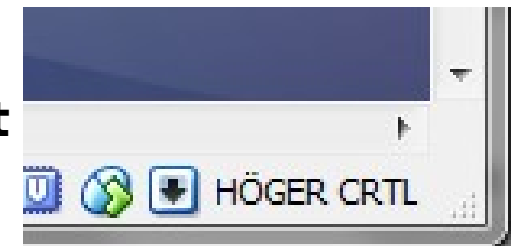
Note that on Apple machines the Host key may be different.

You can review and redefine the Host Key and other shortcuts in File→ Preferences→ Input



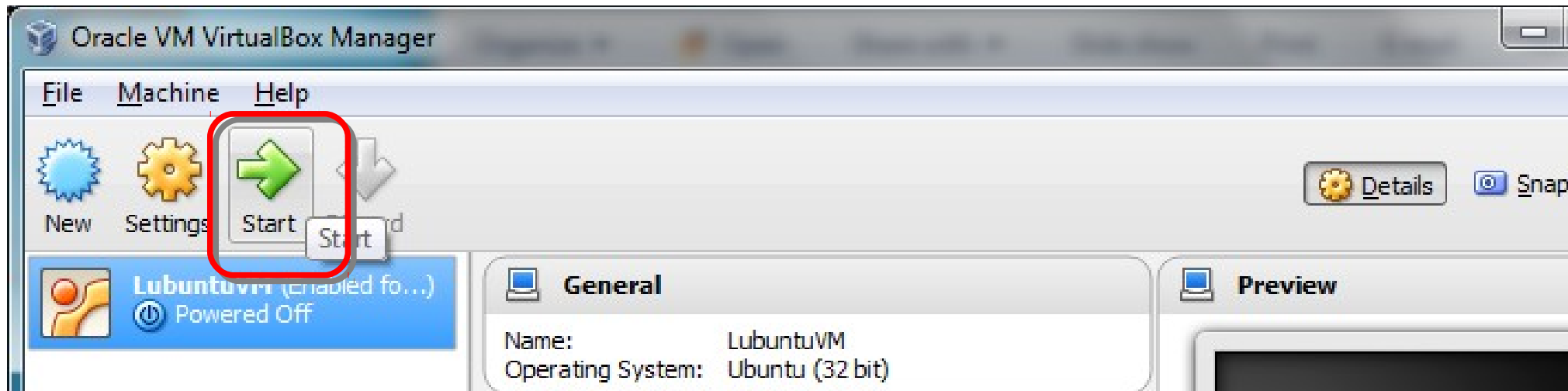
The host key is usually shown in the **lower right** corner of the machine window.

(seems the developer was confused, it should be CTRL!)



2.5. Start the machine

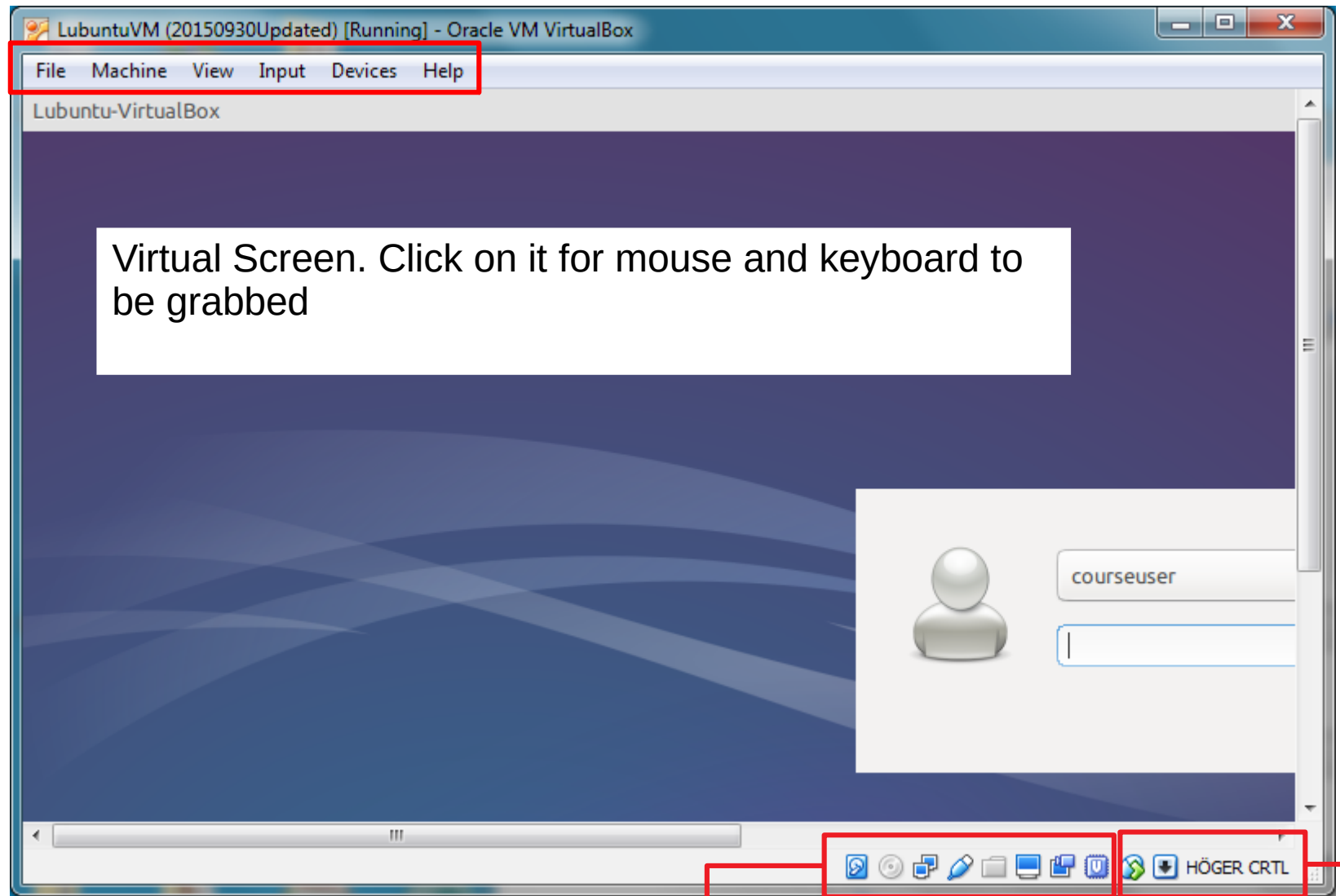
- Click on the Start arrow.



2.6. VirtualBox interface explained 2

The running machine interface

Machine menu.
Try to go Fullscreen
Using the View menu!
Shortcut:
RightCtrl + F

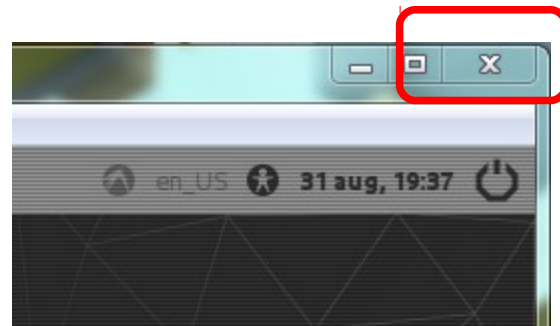


Hardware status, move the mouse pointer over it to see a description tooltip

Keyboard and mouse status.
Use right (höger) Ctrl to ungrab

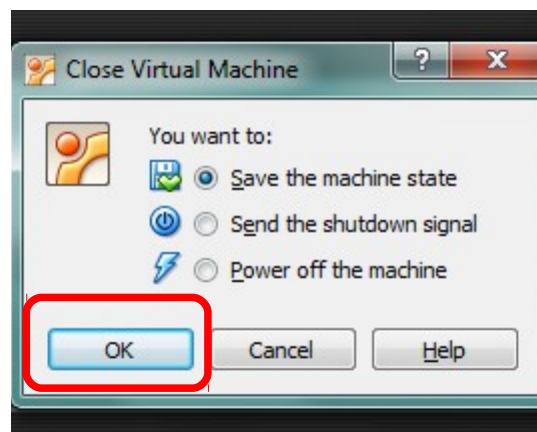
2.7.1 Freezing the machine state thanks to virtualization

- Have no time to finish the assignments? No problem! You can freeze time by using the property that a Von Neumann Machine is a finite state machine.
- Close the machine window



2.7.2. Freezing the machine state thanks to virtualization

- On the dialog that appears, click on *"Save the machine state"*

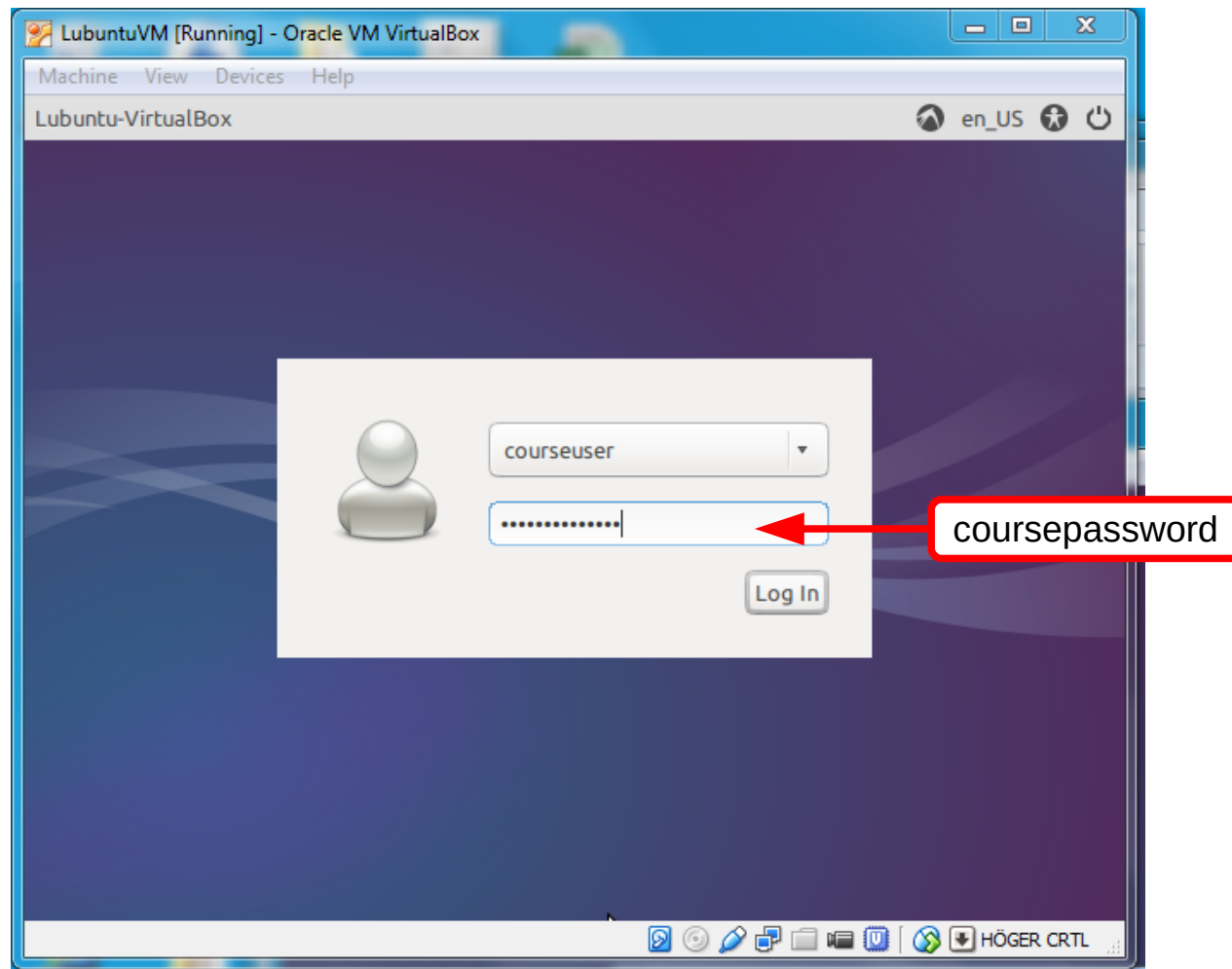


- The machine is now hibernated. All your work is saved as you could stop time.
 - All the RAM content is saved to disk.
- Start the machine again. What happens?
 - All the RAM is reloaded into memory and the machine is in the same state as when we last closed it.

3. The Lubuntu Desktop Environment

3.1. First steps in lubuntu usage: **login**

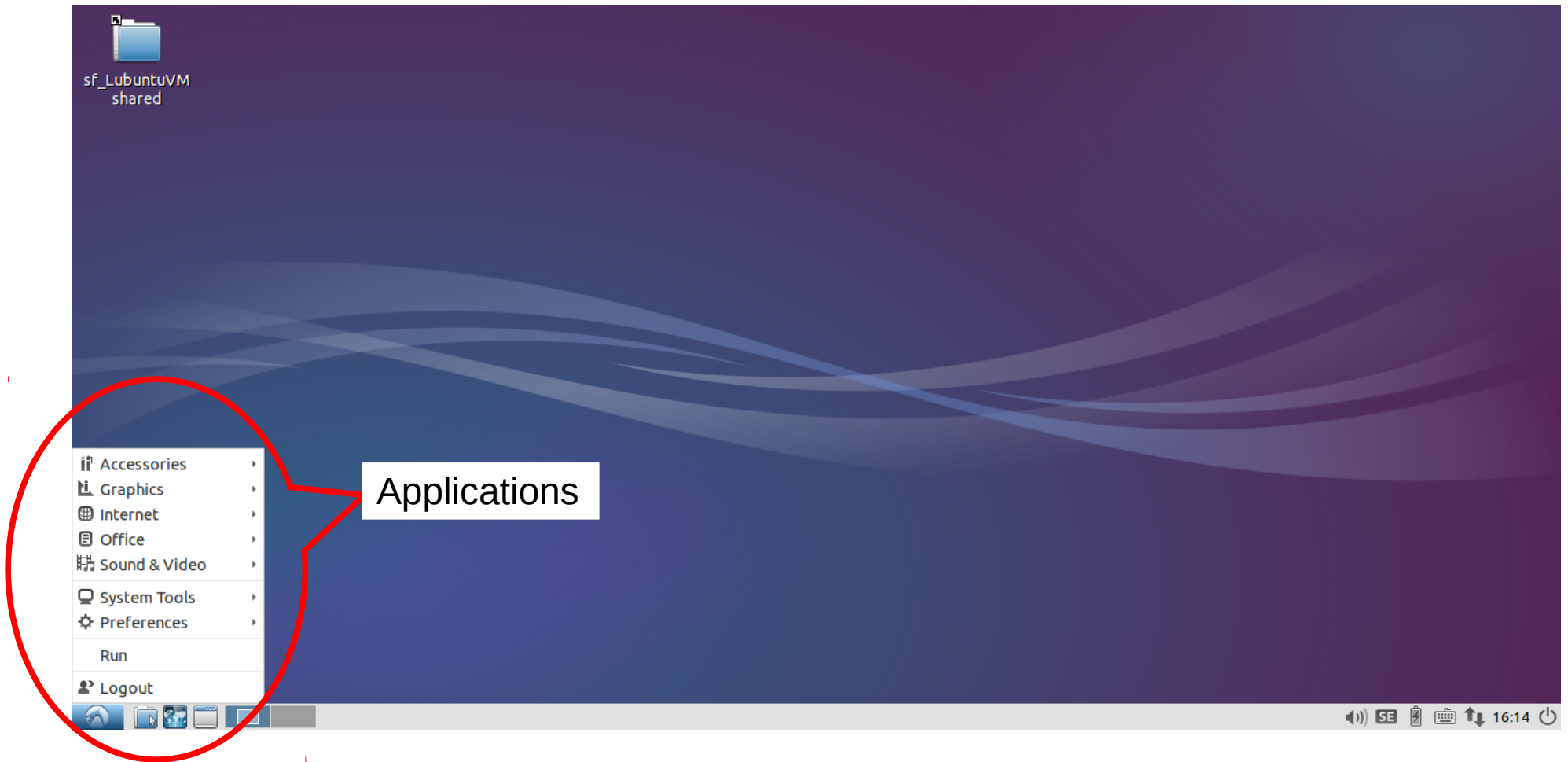
Login using the user name courseuser and password coursepassword



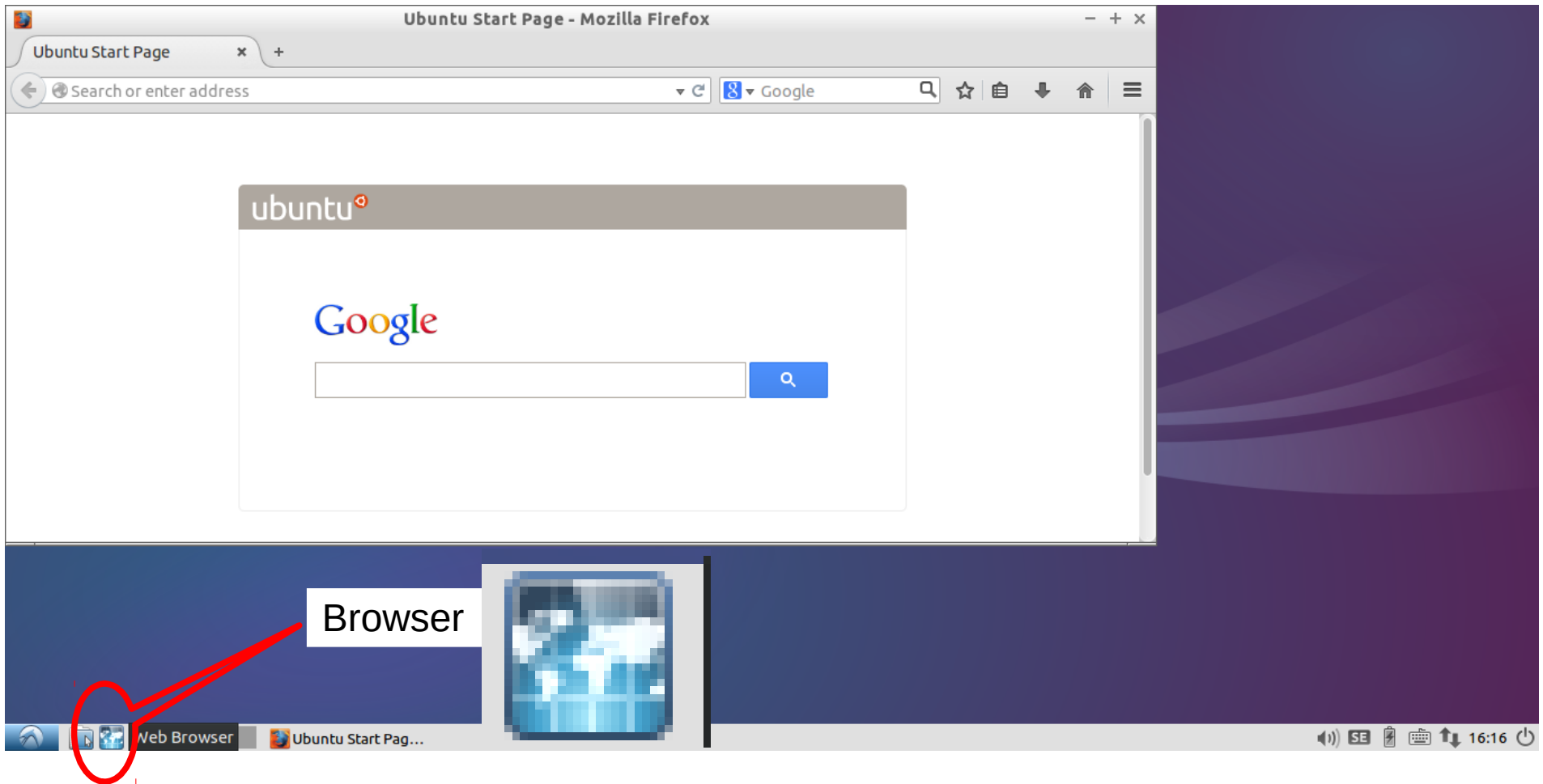
3.2.1. Moving around the desktop: **applications**



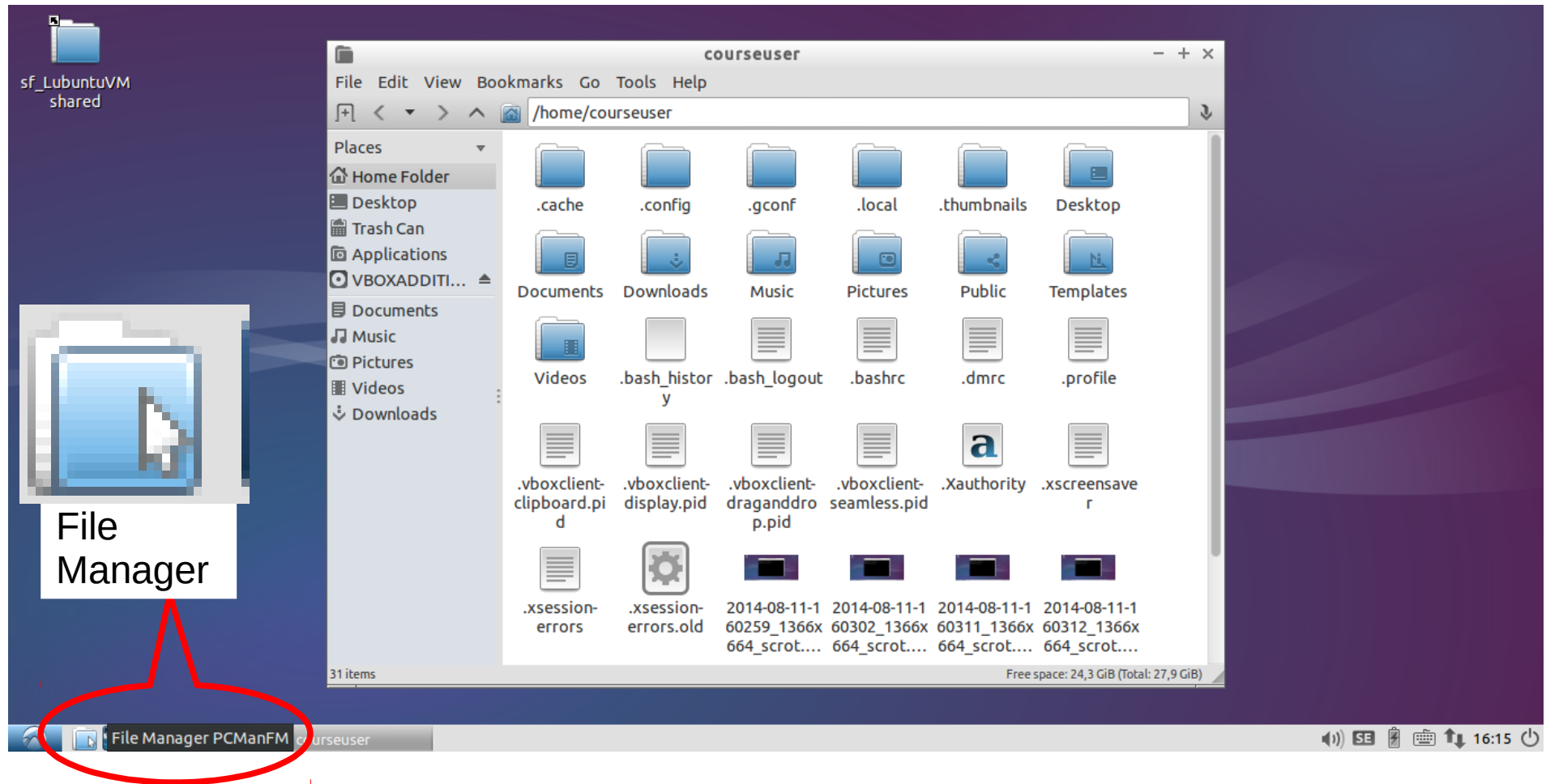
3.2.2. Moving around the desktop: **applications**



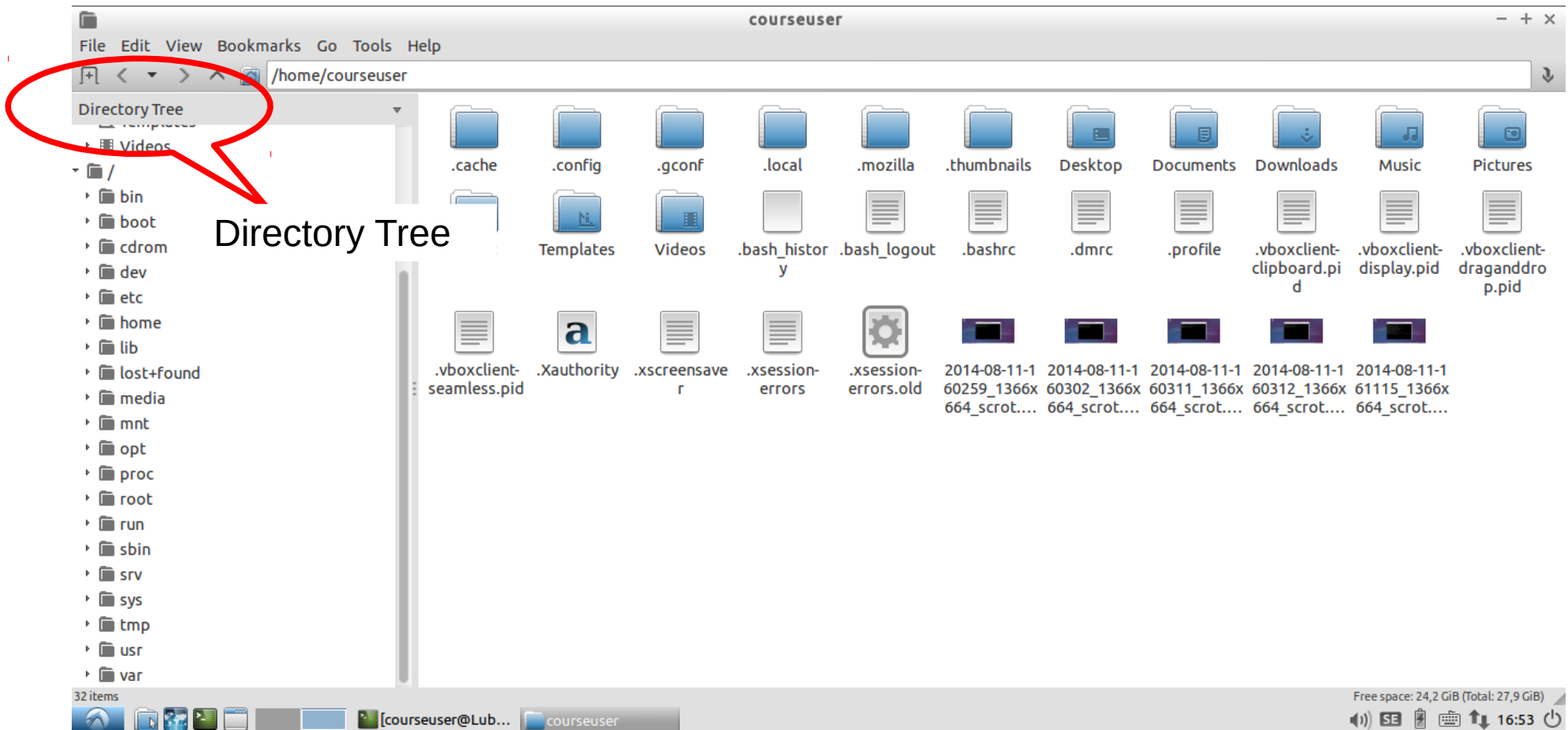
3.3. Moving around the desktop: **web browser (Firefox)**



3.4.1. Moving around the desktop: file browser (File Manager)

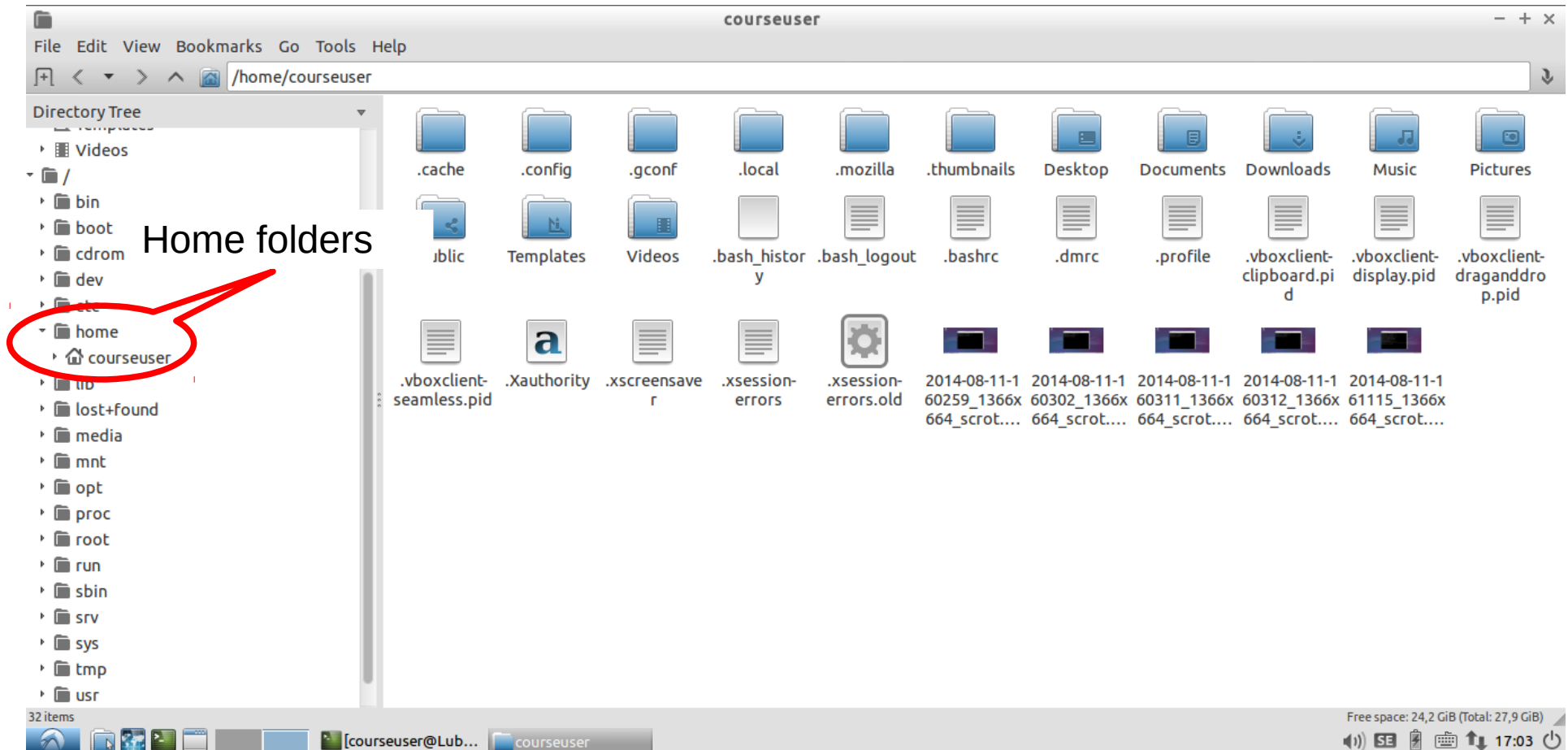


3.4.2. Moving around the desktop: Organization of files in Linux



Switch to "Directory Tree" view.
Note the start of the filesystem, called the "root",
identified by the "slash" symbol: /

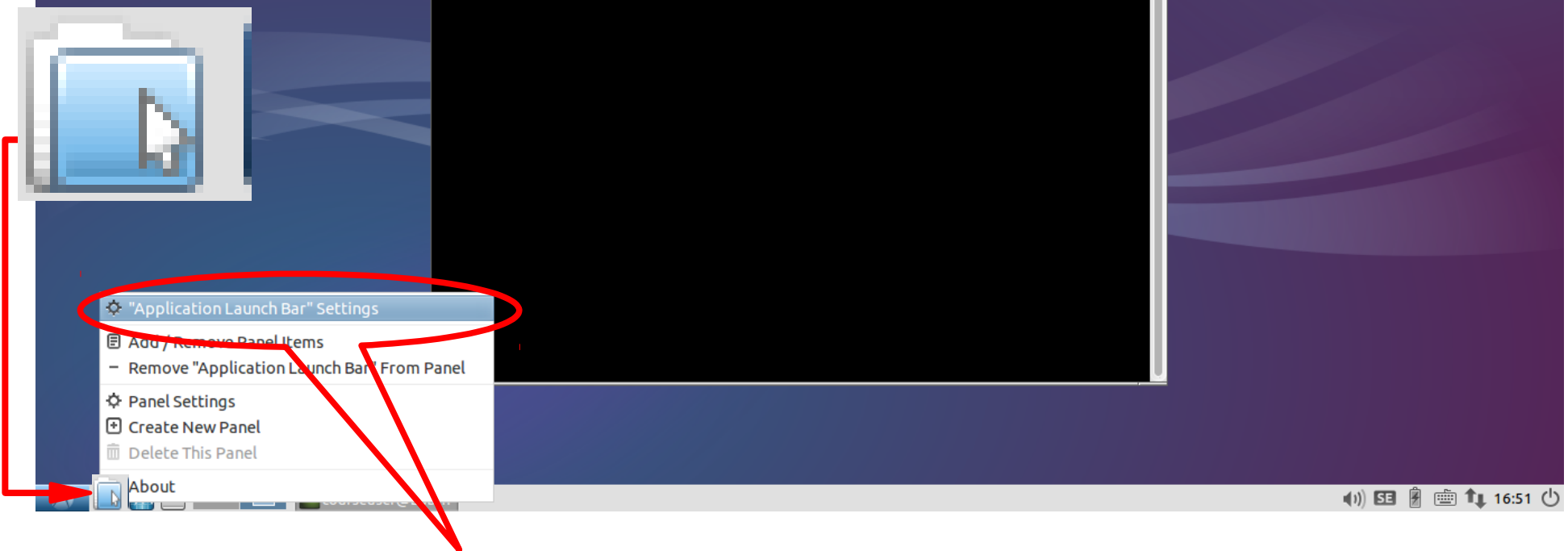
3.4.3. Moving around the desktop: Organization of files in Linux



/home/courseuser – The home directory, one folder for each user, contains the user's personal files.

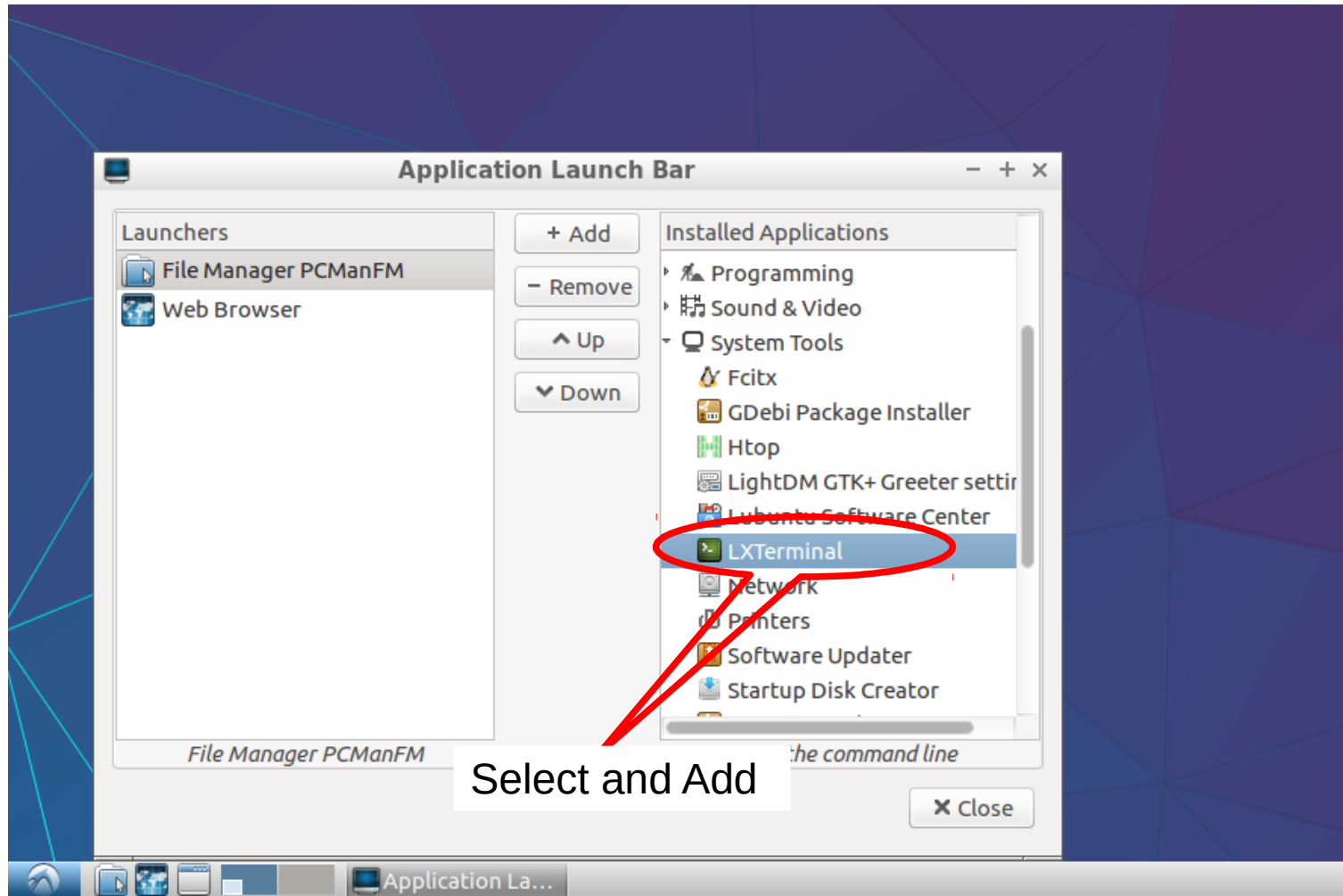
3.5.1. Customizing the desktop: Application Shortcuts

1. Right click on the filemanager icon



Click on "Application Launch Bar" settings

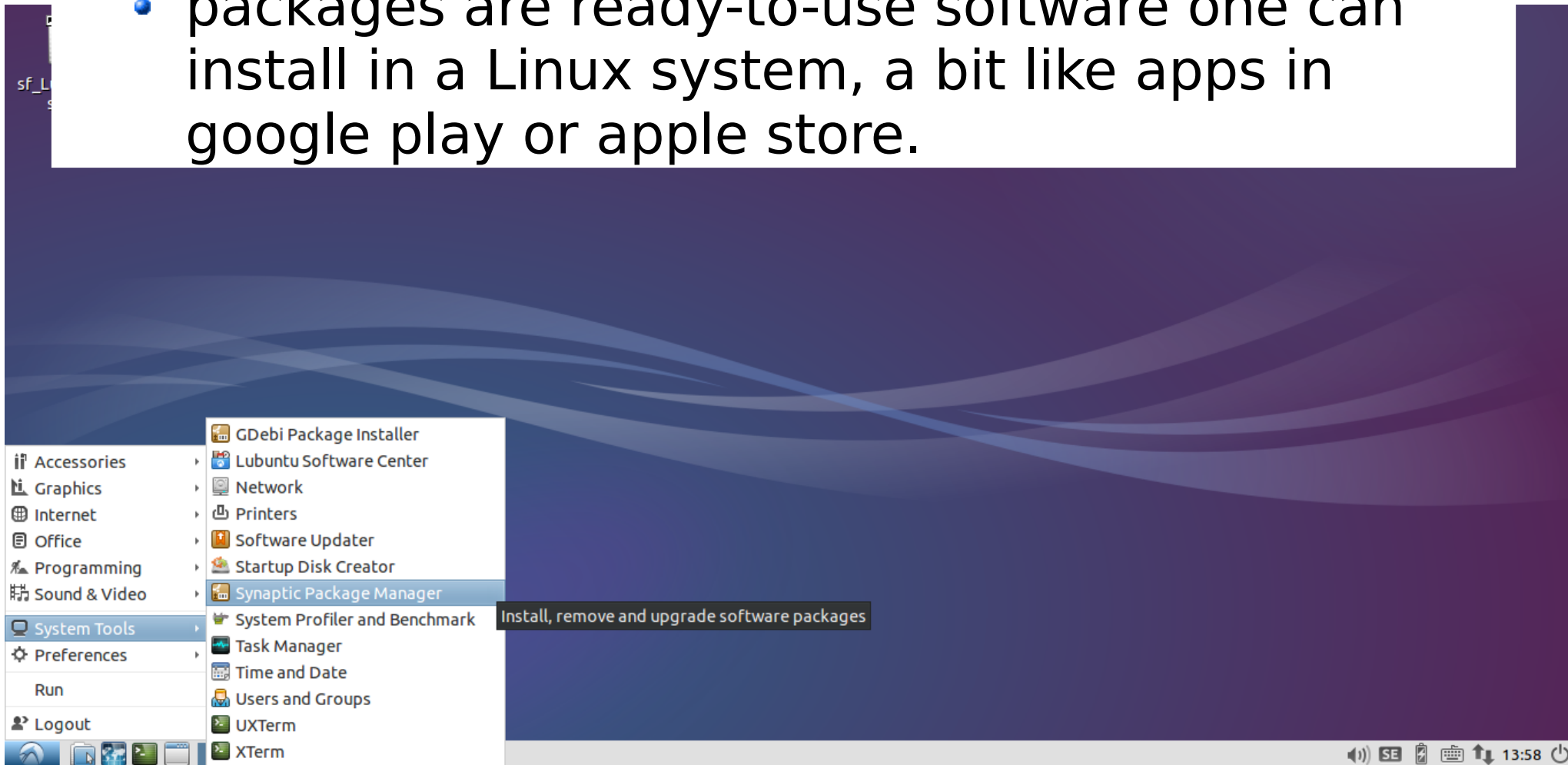
3.5.2. Customizing the desktop: Application Shortcuts



Add LXTerminal to Launchbar – we’re going to use it a lot!

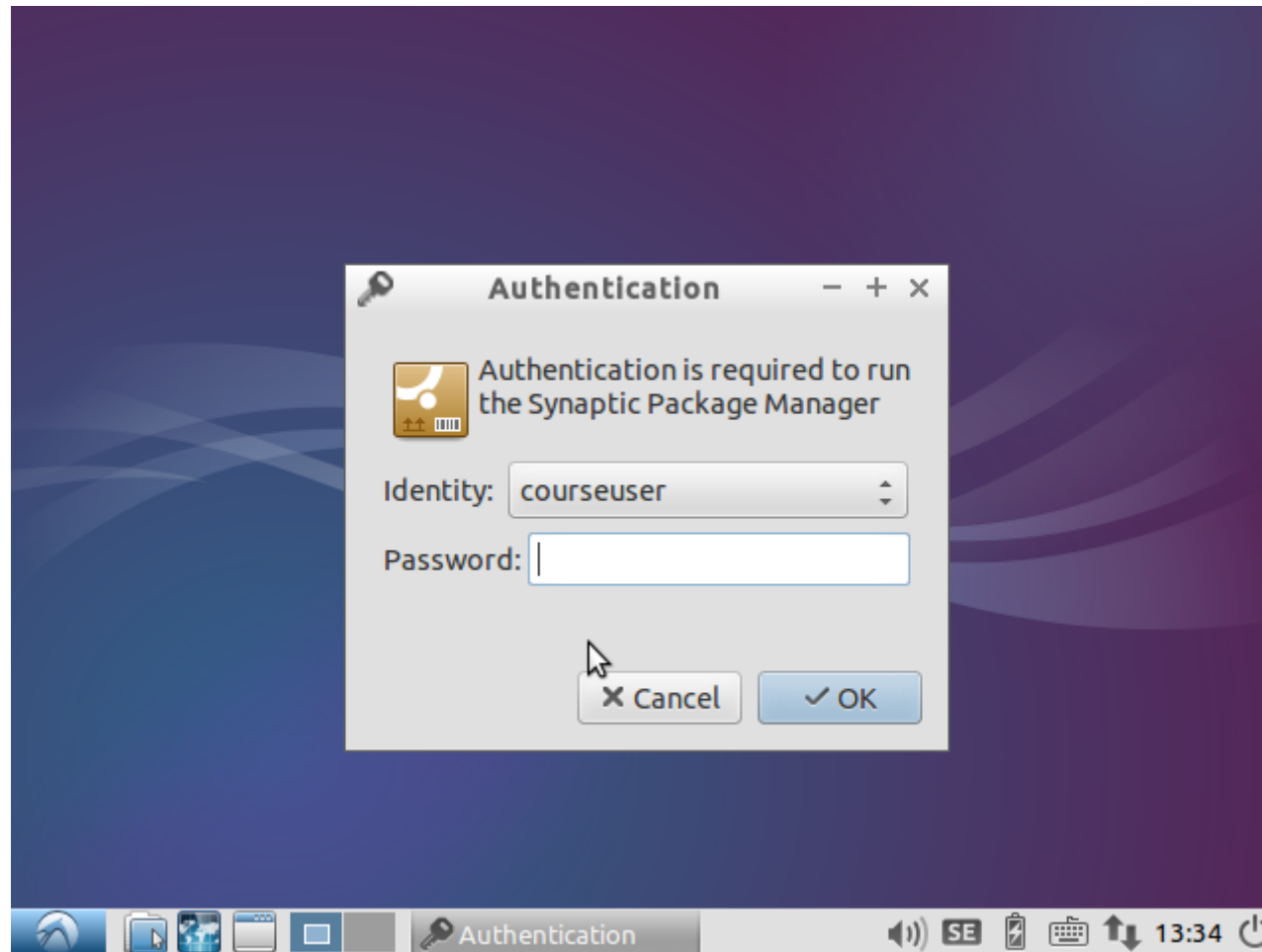
3.6.1. Installing software from repositories

- Synaptic: tool to search "packages"
 - packages are ready-to-use software one can install in a Linux system, a bit like apps in google play or apple store.

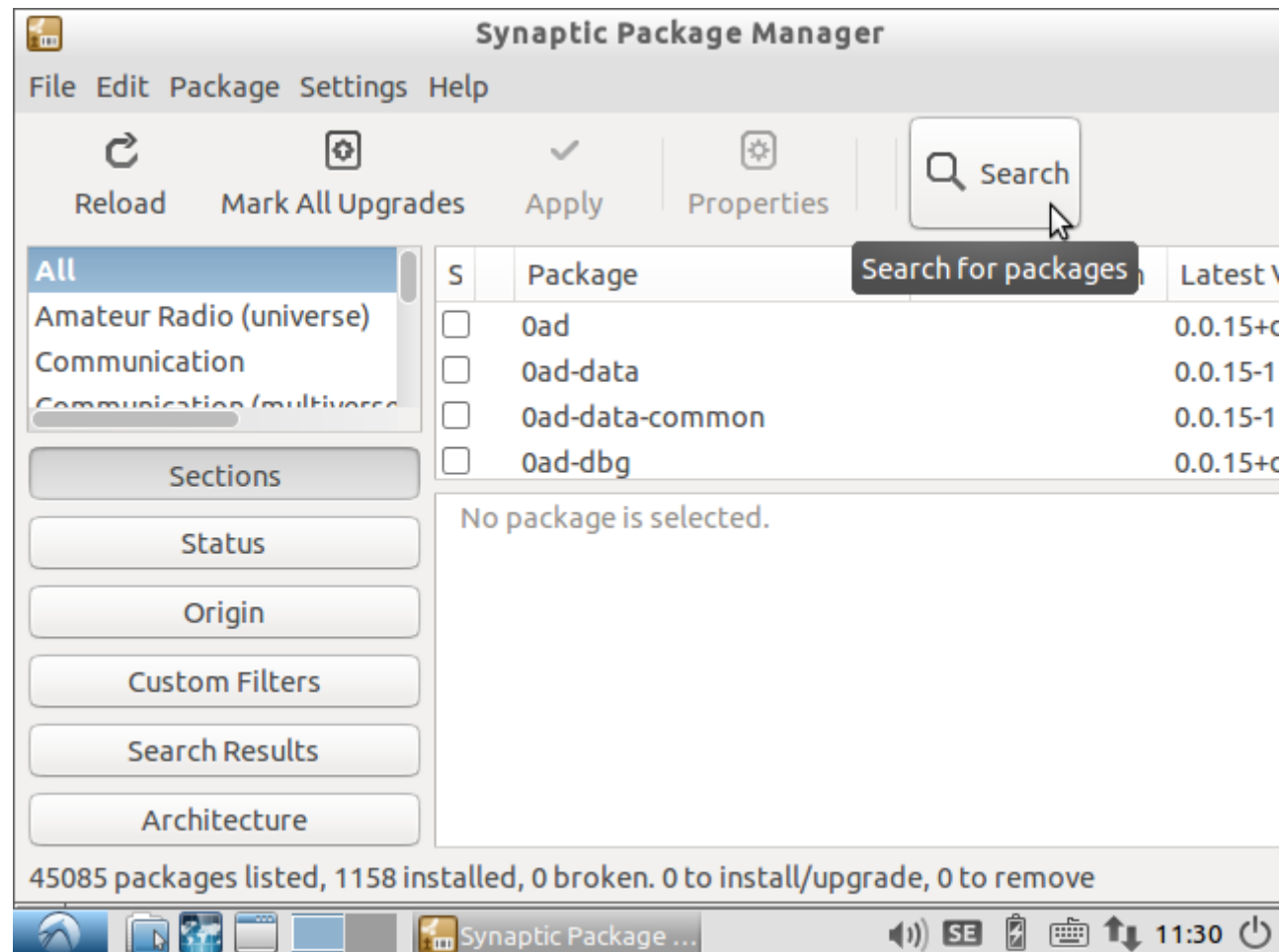


3.6.2. Installing software from repositories

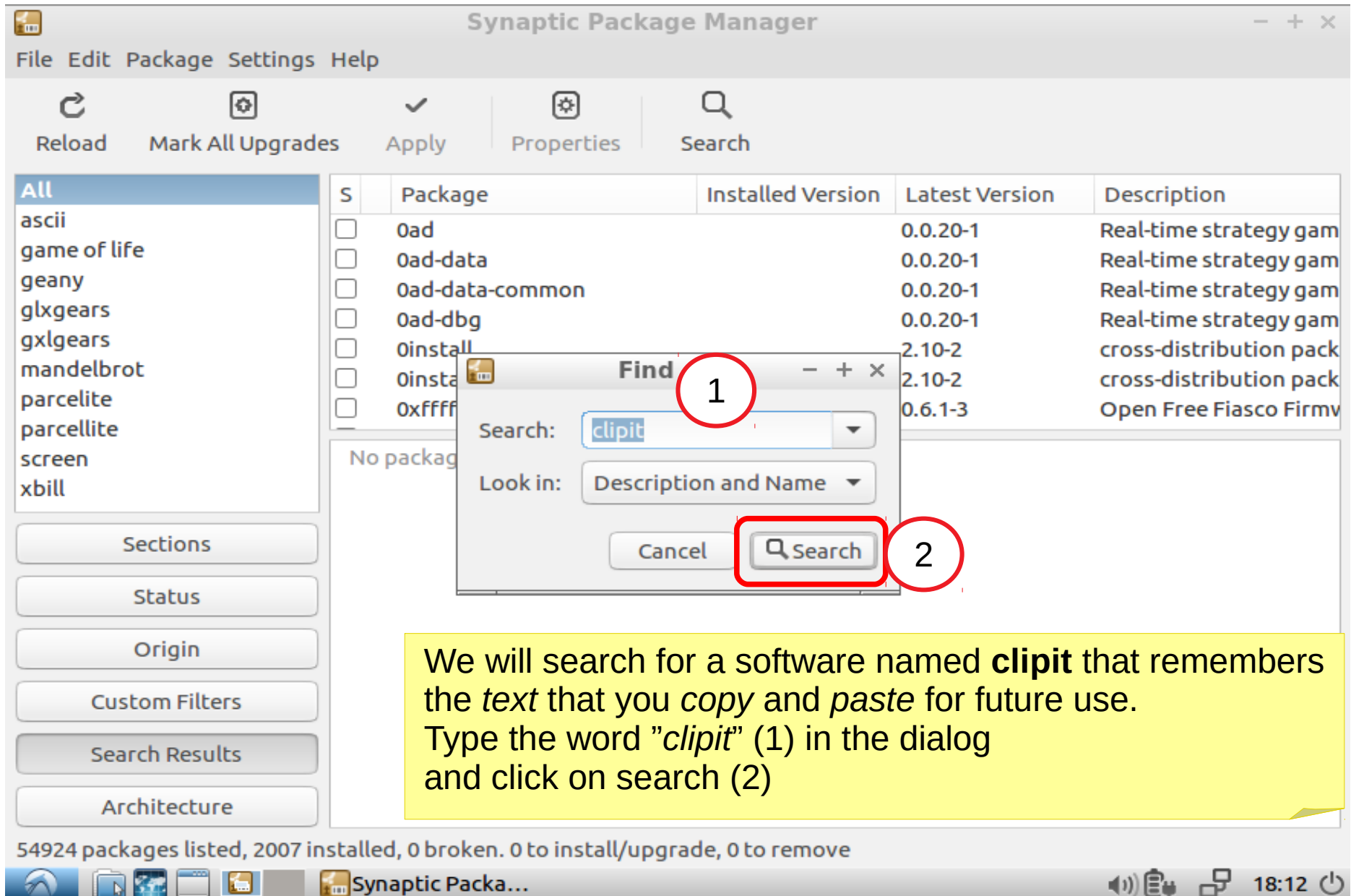
- Adding software requires superuser privileges, one must authenticate again.



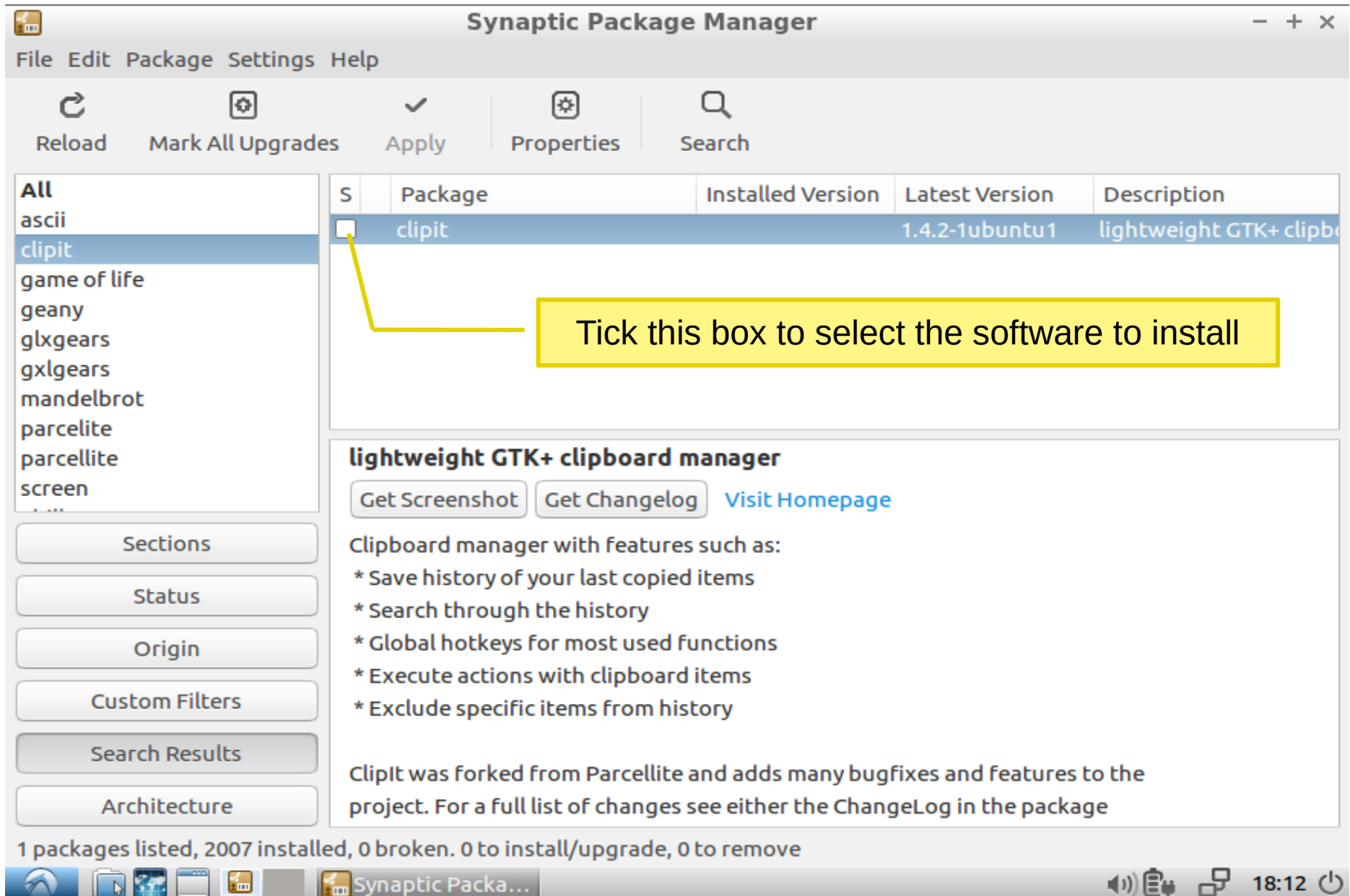
3.6.3. Installing software from repositories: Search for software



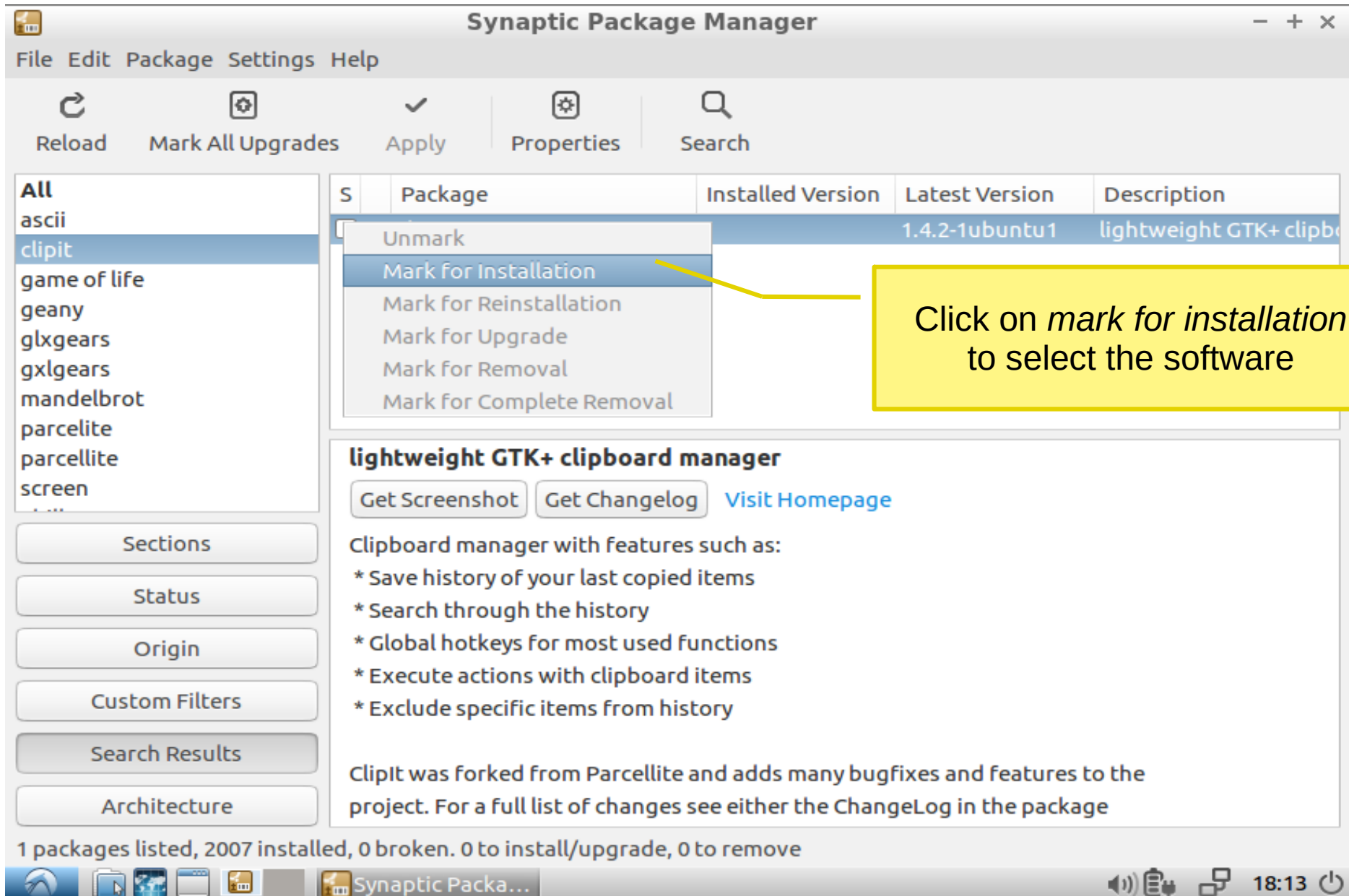
3.6.4. Installing software from repositories: search cont.



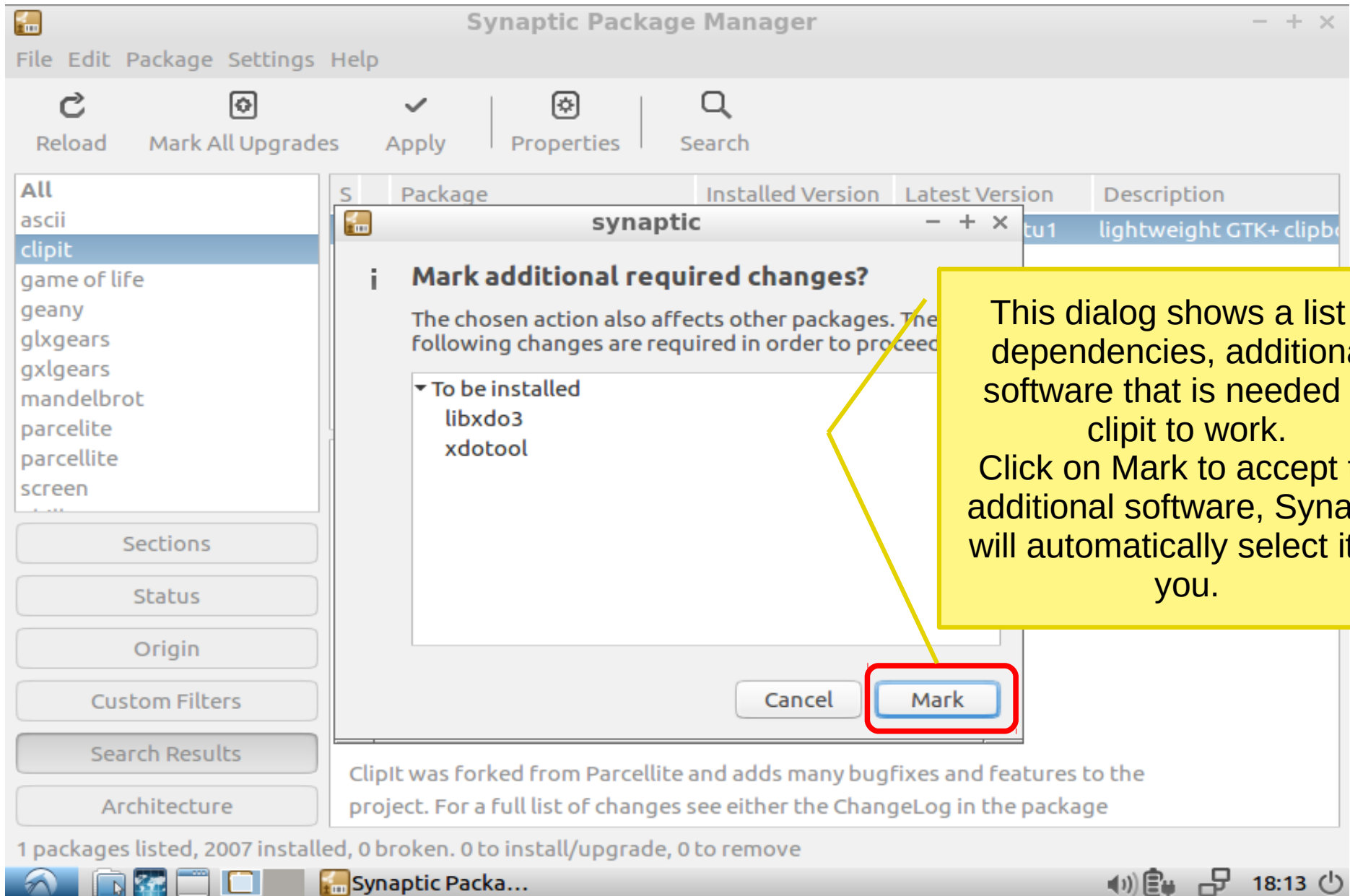
3.6.5. Installing software from repositories: found software list



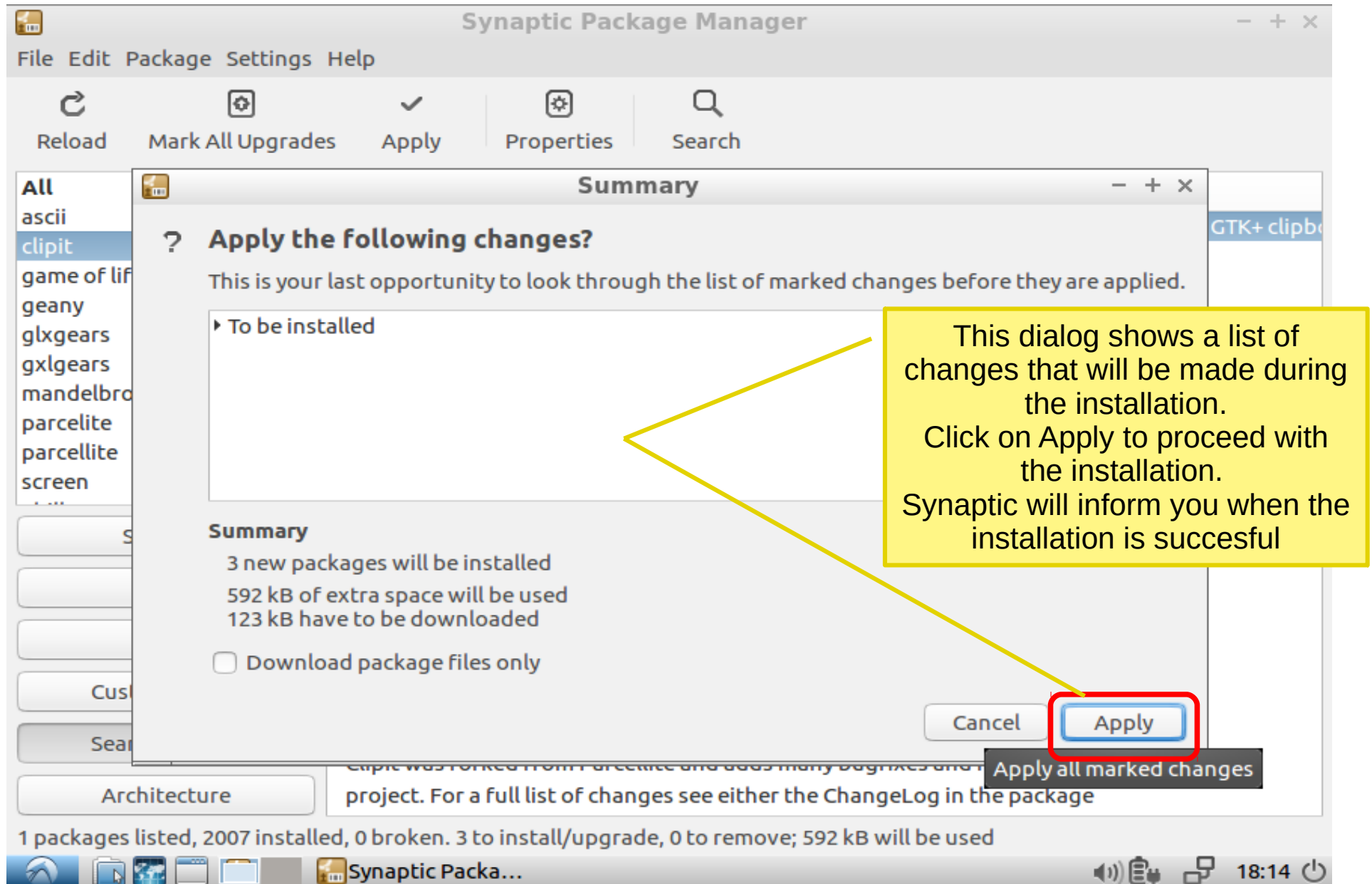
3.6.6. Installing software from repositories: select software to install



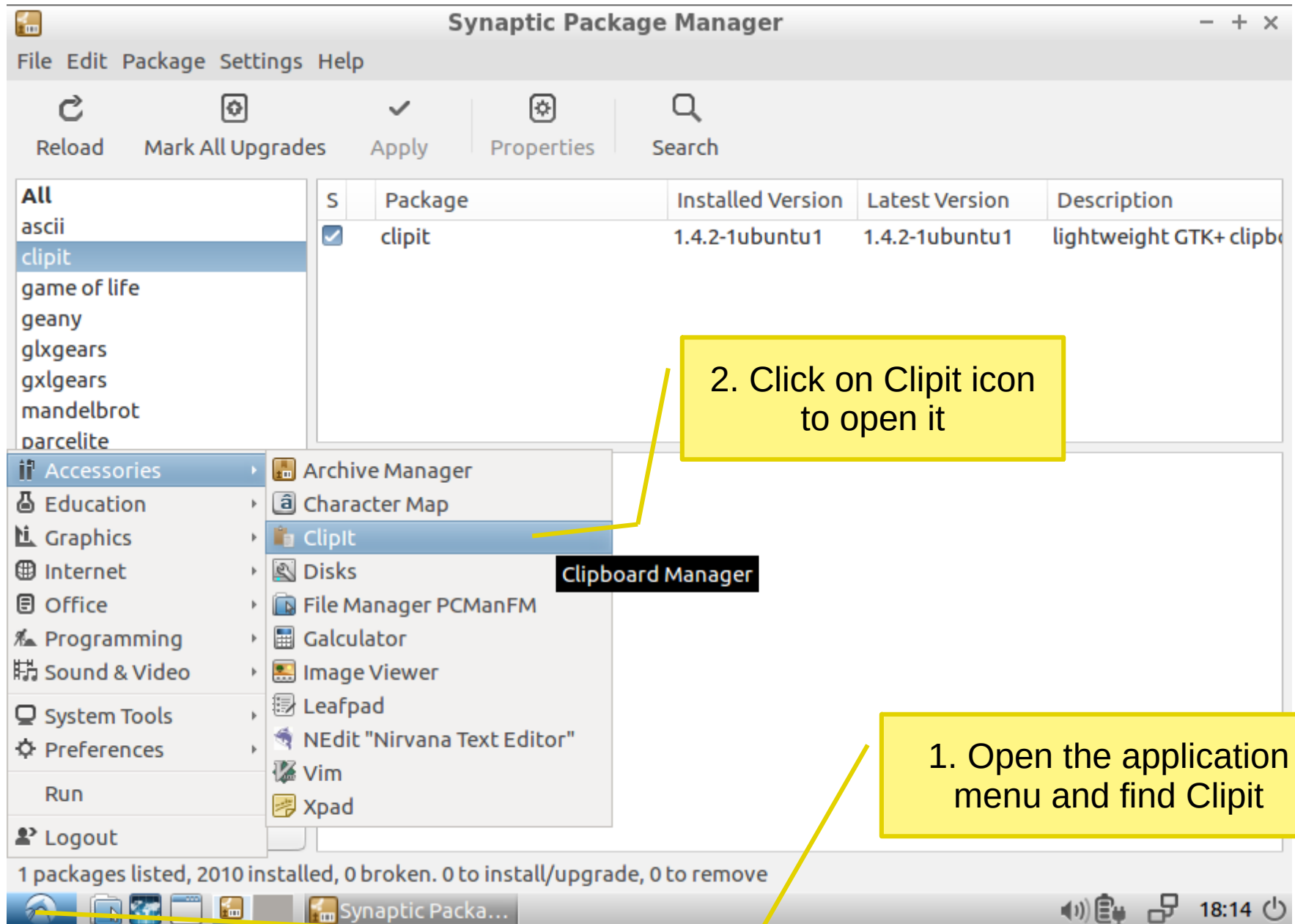
3.6.7. Installing software from repositories: dependencies, additional sw required by the selected one to work



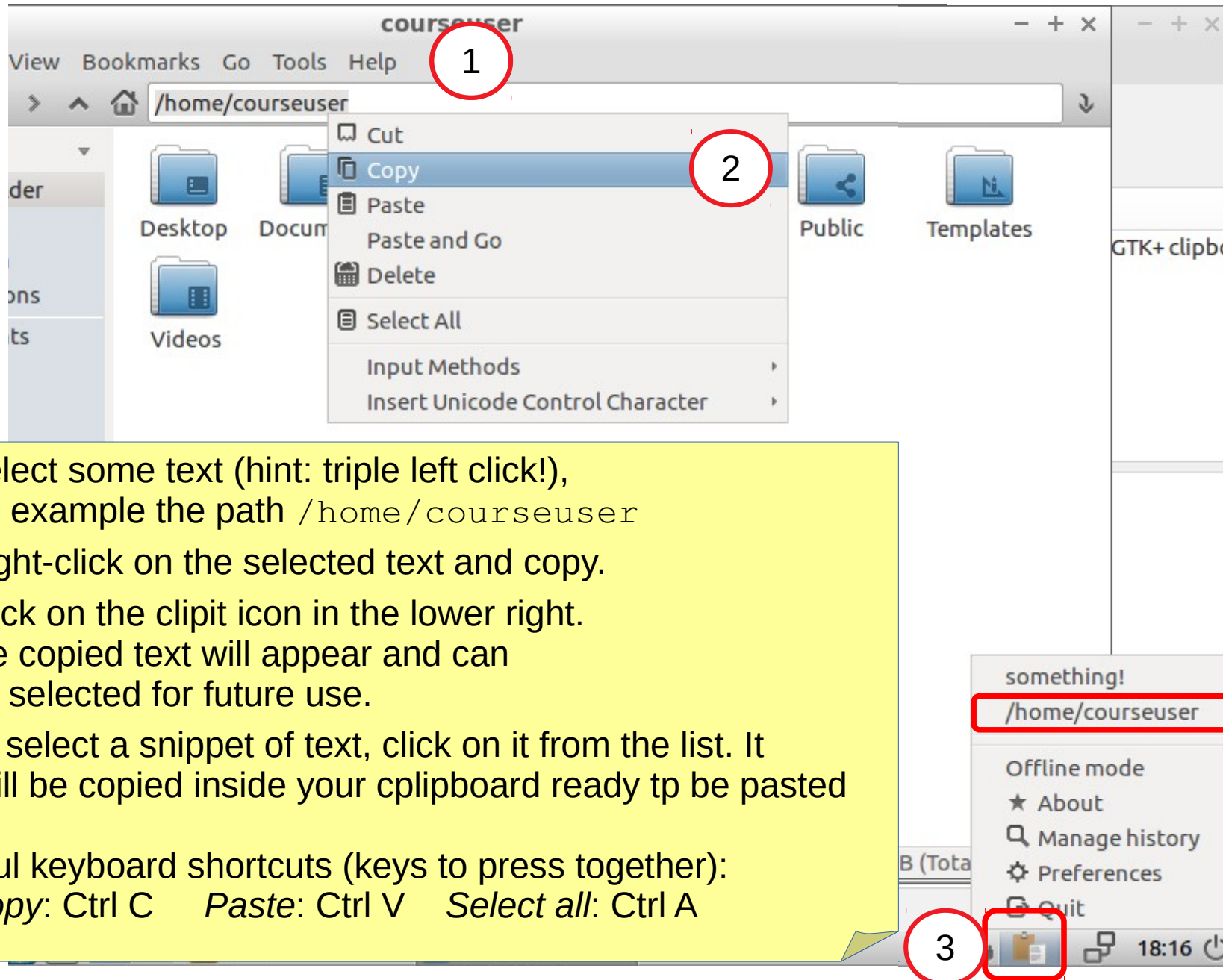
3.6.8. Installing software from repositories: start installation



3.7.1. Using clipit

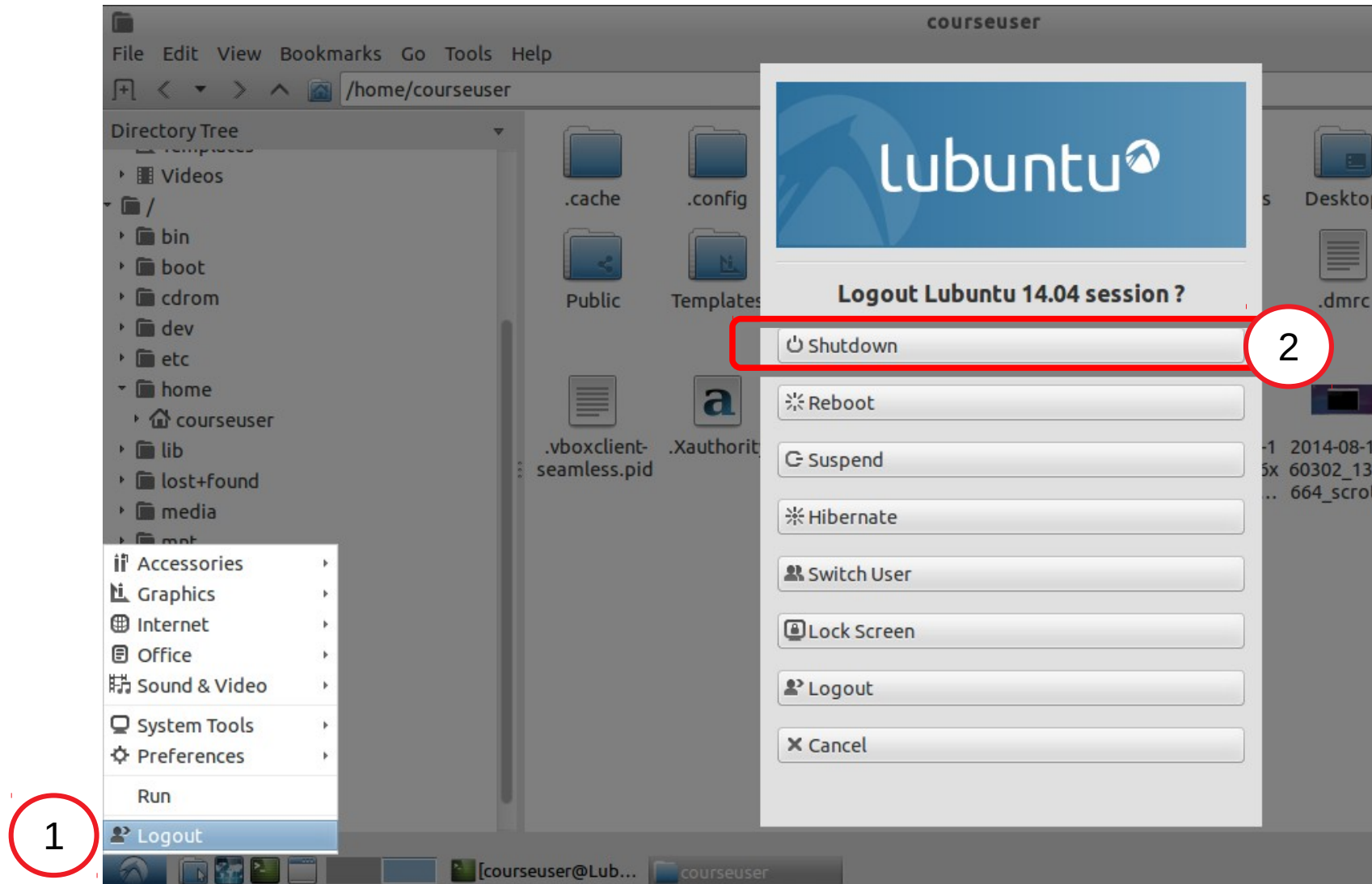


3.7.2. Using clipit



3.8. Logout dialog: System Shutdown

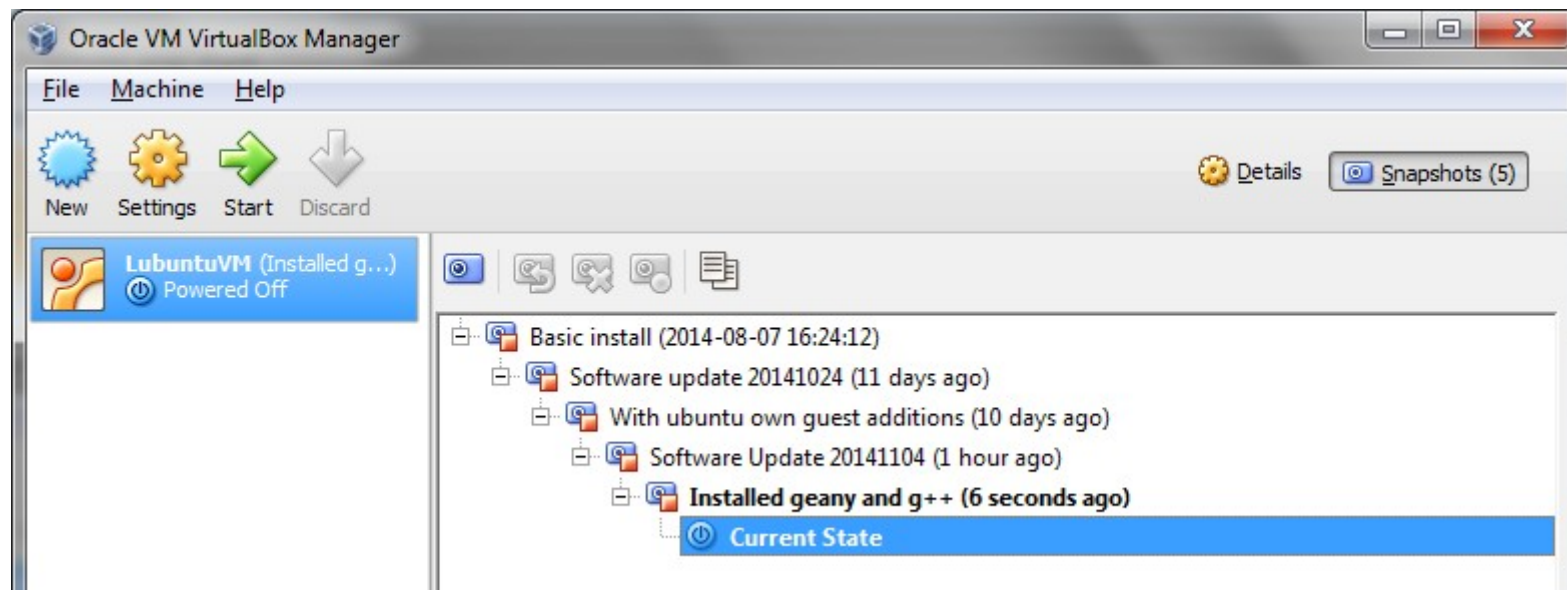
Ask the operating system to power off the machine.



4. Snapshots, or how to save changes to the machine and travel in time (more useful for laptop users)

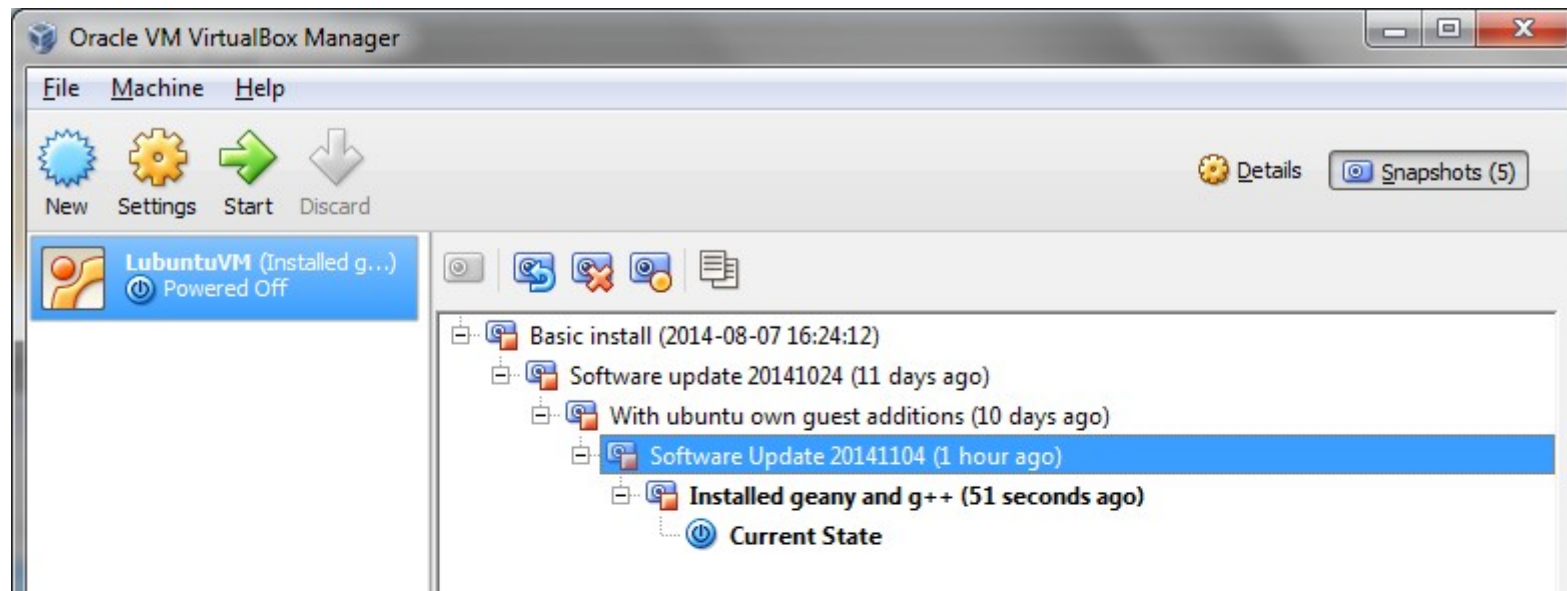
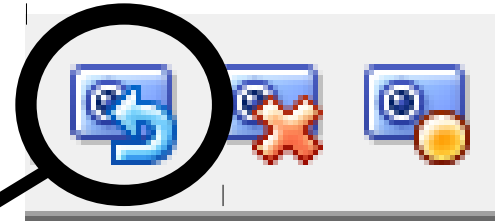
4.1. Snapshots in the custom VM

- A **snapshot** is the state of the virtual machine in a defined point in time.
(See [slide about states](#))
- Snapshots can be created, activated, or deleted by using the Snapshots interface. You can access it by clicking the snapshots button as shown below. (may be different depending on Virtualbox versions)
- Once a snapshot is set as starting point, the machine execution will start from that point.
- Try to save the current state by pressing the "take a snapshot" button! 
- For various technical reasons, the best is to snapshot when the VM is shutdown, but you may as well do it as it's running.



4.2. Snapshots in the custom VM

- Using the buttons, one can move the machine back and forth in time.
- Let's try to restore a state!
 - Select a snapshot
 - Press the restore snapshot button



5. Advanced Topics

CLI software installation methods

- **CLI** (Command Line Interface)

Here's a list of common commands to manage software via command line in Ubuntu:

- Search for a package:
`apt-cache search <something>`
- Install a package:
`sudo apt-get install <packagename>`
- Remove a package:
`sudo apt-get remove <packagename>`
- Update package list:
`sudo apt-get update`
- Software update:
`sudo apt-get upgrade`

Advanced software installation methods

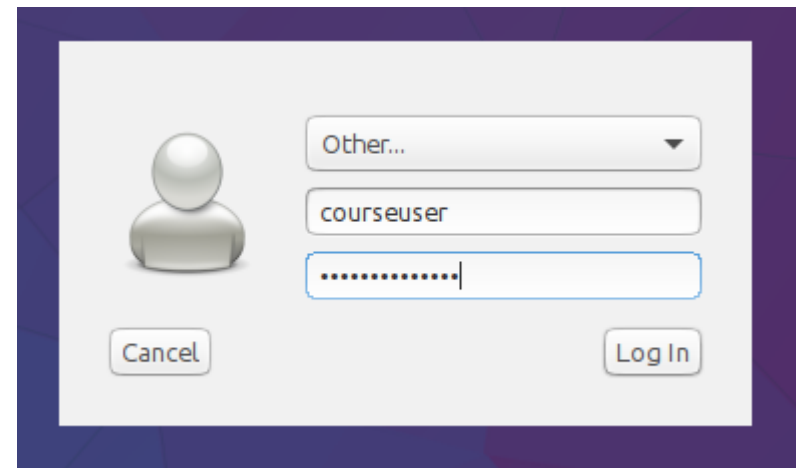
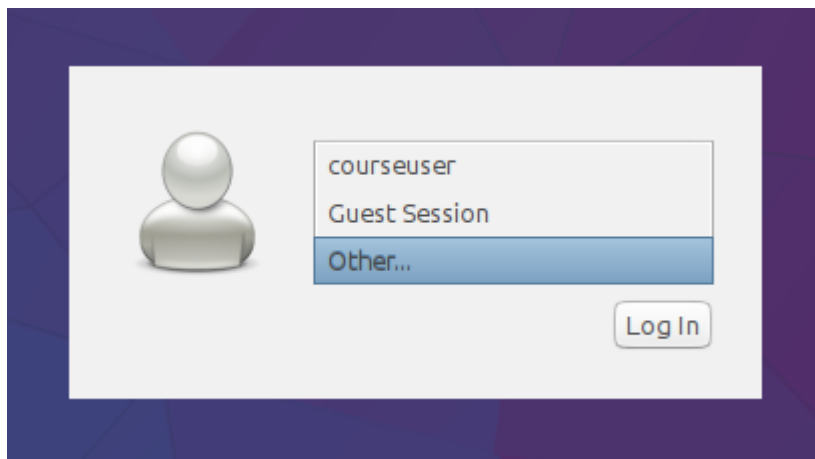
- **Compile** and **install** your own software.
 - **Compile:** You will see this during the course.
 - **Install:** copy files somewhere
- It **does not require administrative privileges**, so you can do everywhere!
- It's the typical way of installing your own software on a computer cluster.

Appendix A

Known problems

Can't login after screen lock

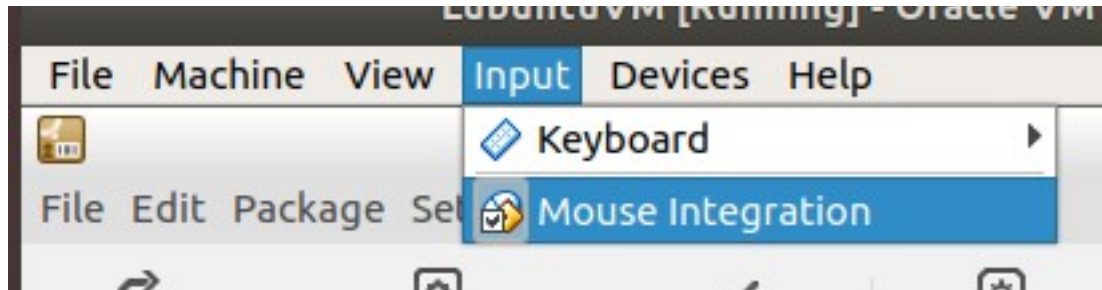
- Sometimes you are presented the login dialog but you can't login even if the password is correct. It is a bug. Do the following:
 1. Click on the username.
 2. Select "Other"
 3. Type `courseuser` and press Enter
 4. Type `coursepassword` and press Enter



Mouse pointer disappears

- Sometime the mouse pointer disappears or looks strange or garbaged. It's a video driver bug. To solve it, search and click the Virtualbox machine menu

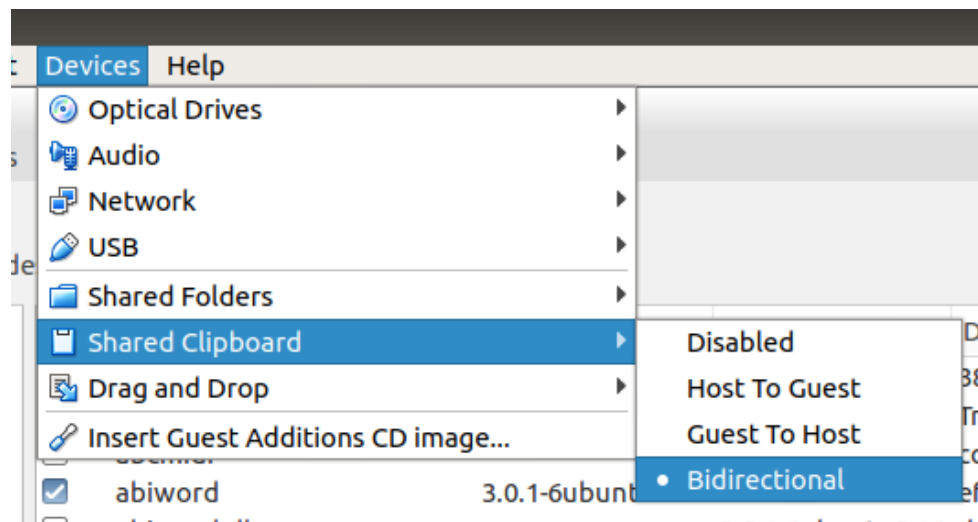
Input → "Mouse Integration"



- Note: this will force you to press Right Ctrl to escape the virtual machine focus with the mouse. Also the mouse might feel like too fast. You can restore mouse integration when the mouse reappears.
- Mouse integration allows the host mouse to be shared with the virtual machine mouse.

Copy paste from host to guest

- It is possible to copy paste text or other objects from the host machine to the guest (VM). But you need to explicitly enable it.
- Find the VM menu
Devices → Shared Clipboard
 - And select "bidirectional"
 - The changes might be effective only after restarting the virtual machine.



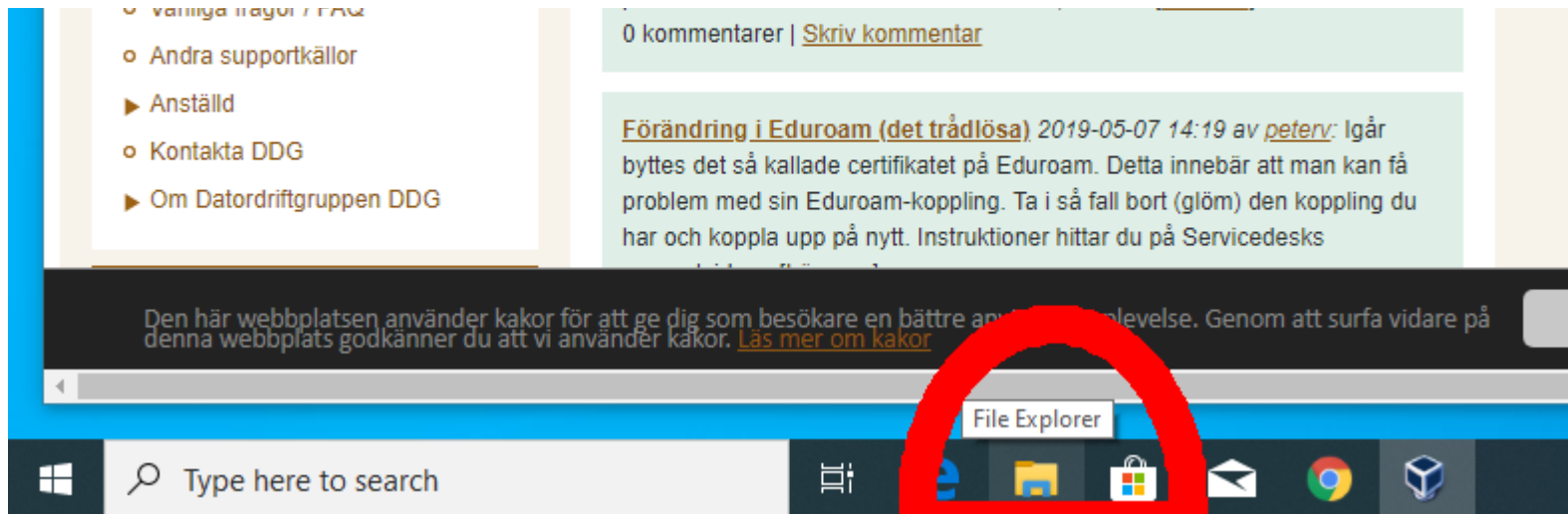
Appendix B

Windows 10 Lab

Copying the virtual machine step-by-step

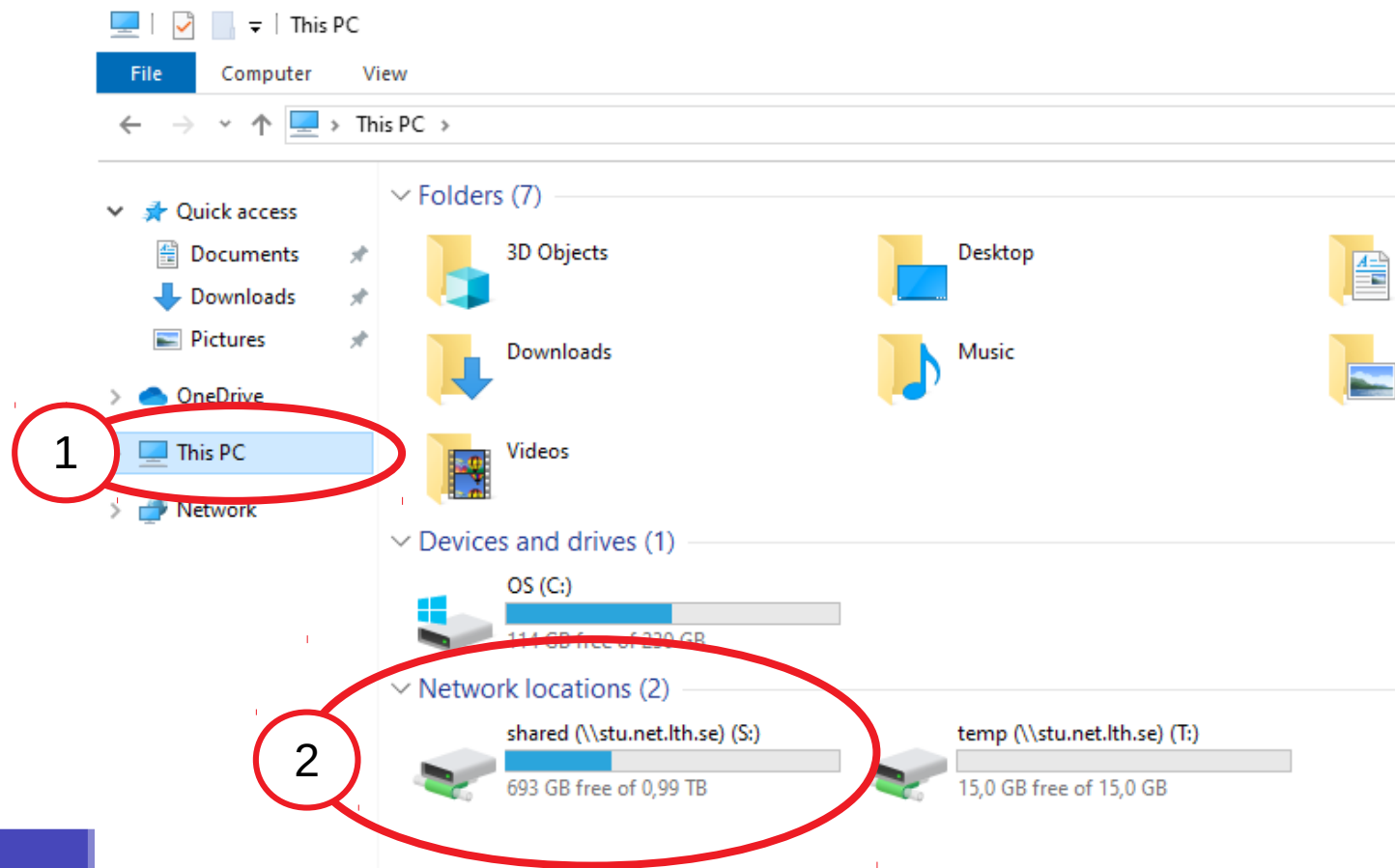
Preparing the course VM in the lab

1. Open the Windows File explorer. It's located in the favorites bar at the bottom of the desktop:



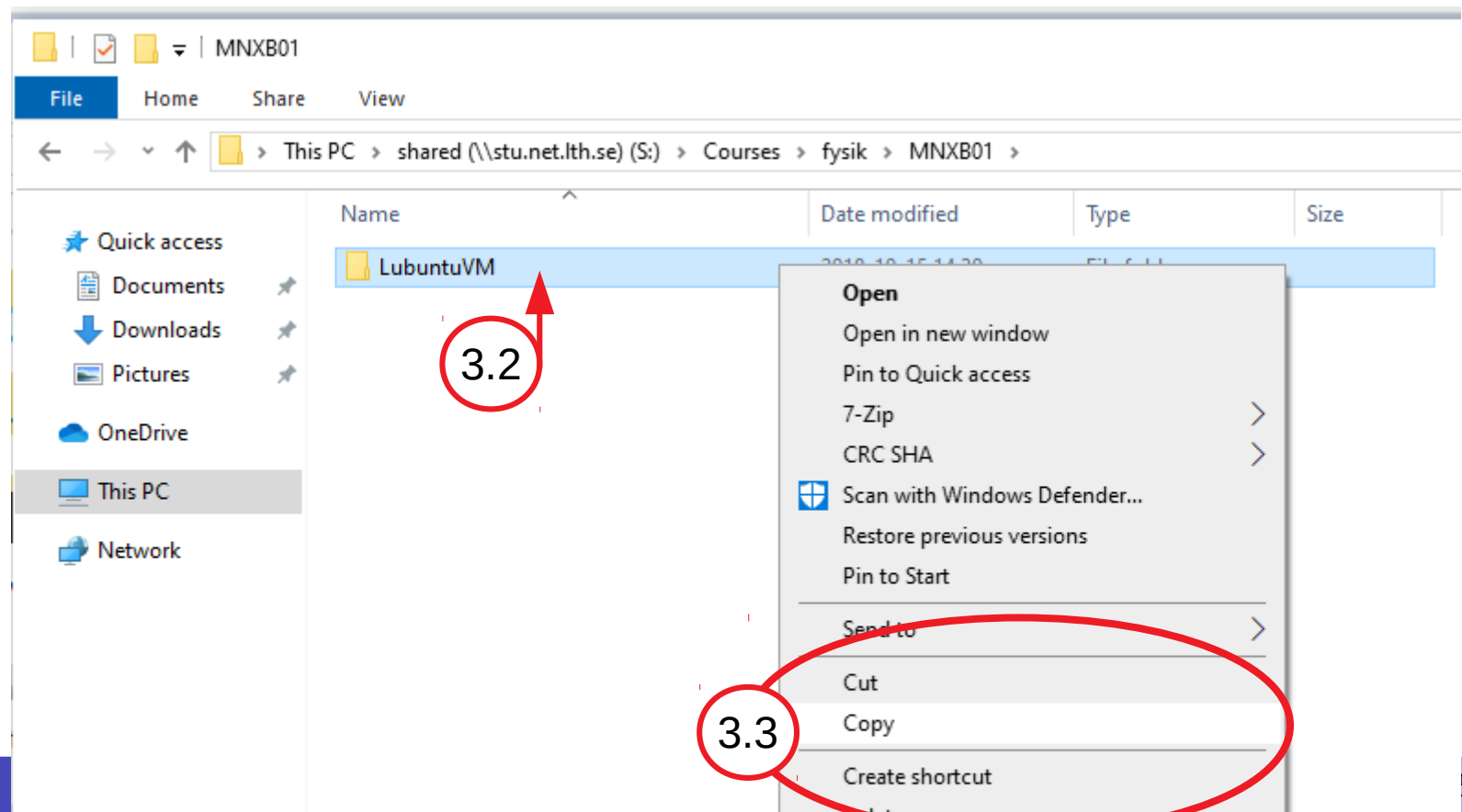
Preparing the course VM in the lab

2. Double click on the **S:** network located storage (2). You can see the storages by clicking on "This PC"(1) in the left column of the File Explorer.



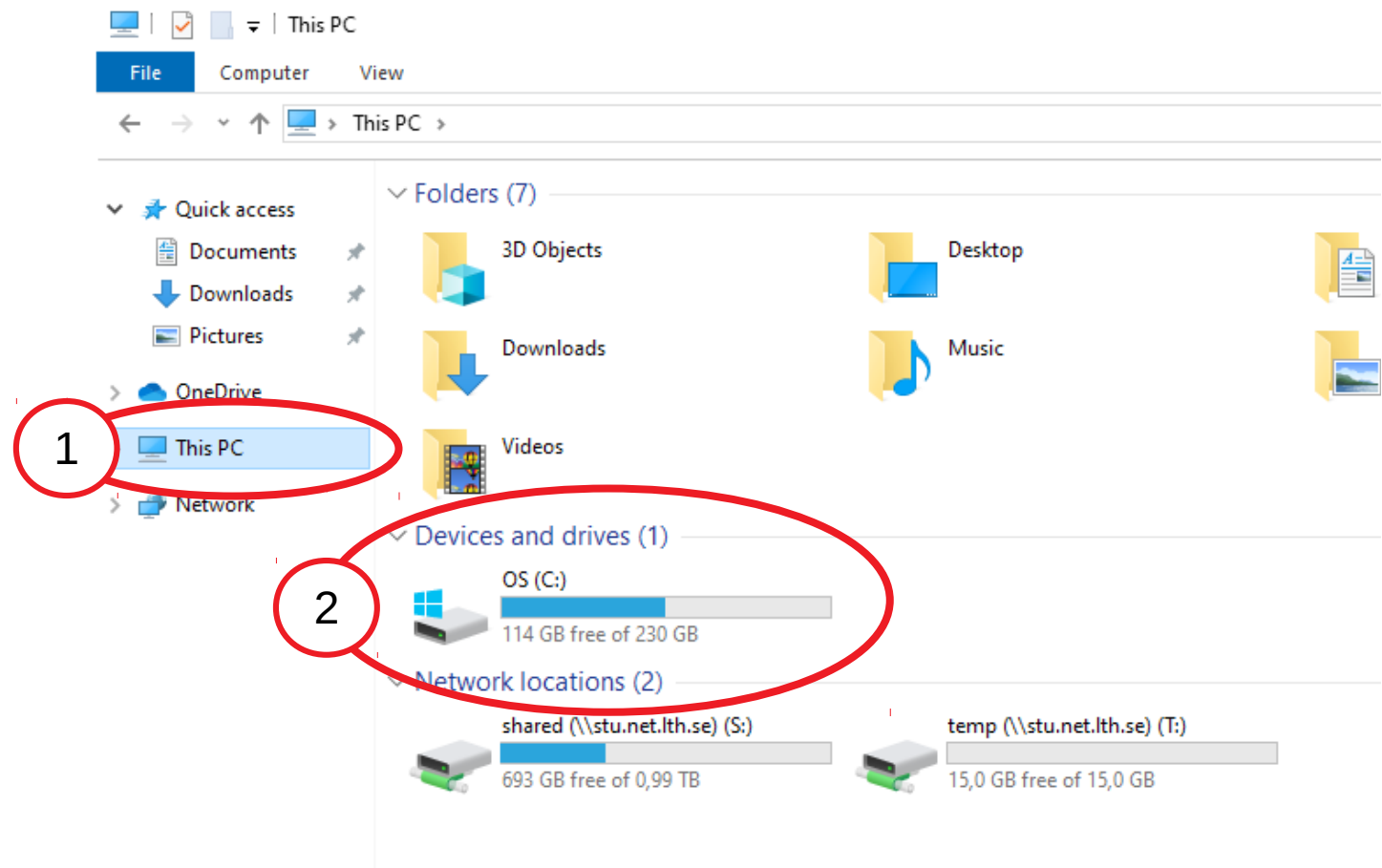
Preparing the course VM in the lab

- 3.1. In this order, double click on the folders:
"Courses", "fysik", "MNXB01"
- 3.2. Select (left click) the folder LubuntuVM
- 3.3. Right click on the folder, select and click "copy"



Preparing the course VM in the lab

4. From "This PC" (1) double click on the storage unit
OS (C:) (2)

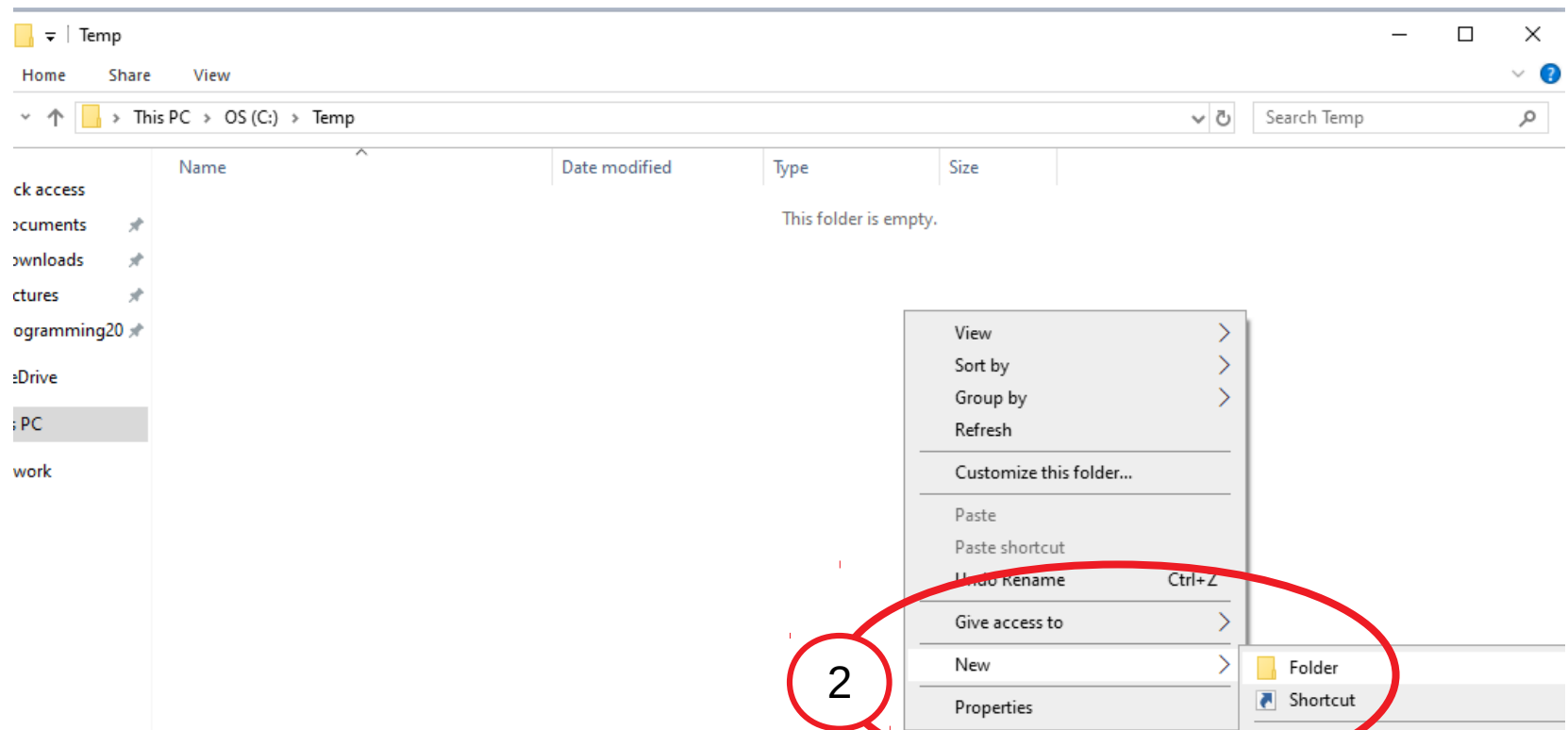


Preparing the course VM in the lab

5.1 Click on the folder TEMP

5.2 Right click on the white space in the TEMP folder, a menu will appear. Select "New" and then click on "Folder"

5.3 Type the folder name **MNXB01** and press ENTER



Preparing the course VM in the lab

6.1 Double click on the newly created folder MNXB01.

6.2 Right click in the white space in the folder MNXB01, select and click on "Paste"

The virtual machine files are now being copied. Once the copy is done, you're ready to go back to slide 6

