Created with the support of:

This project has received funding from the European Union's Seventh Framework Programme for research, technological development and demonstration under grant agreement n° 289592

Upgraded with the support of:

Installing Zanardi over a virtual machine (FOR WINDOWS USERS)

Latest update: July 4th, 2016

Index

Introduction

If the word “Linux” gives you the shivers, don’t worry. We’ll guide you step by step, and you’ll see it is not as ugly as it seems (well it is, but it is not THAT difficult).

There are several options to make a Linux operative system (OS) work on a non-Linux OS, We’ll follow the one we think is the best as: i) it is free; ii) it is multi-platform; iii) it is *relatively* easy to install (and uninstall if you want to get rid of it!), and; iv) Works like a charm… ☺

Essentially, we’ll guide you installing: A) a “Virtual Machine” (something like a scheleton for operative systems); B) the Linux OS on top of your virtual machine; C) Zanardi software

IMPORTANT WARNING: If your computer is an old 32-bit computer, don’t try following this procedure. This is a procedure for 64-bit computers.

Overview

The names here might frighten you a little bit, again, don't worry. It's easier than it seems.
In this manual we'll see how to:

i) Install a Virtual Machine: **VirtualBox 5.0**
ii) Install your host OS (e.g. Linux) on the Virtual Machine: **Ubuntu desktop 14.04.3 LTS**
iii) Set up your virtual machine for a better experience
iv) Installing software in your host (e.g. Linux) OS:
    a. **R 3.2+**

Downloading the Virtual Machine (Windows)

There a number of virtualizers available on the market. Some of them are free for any OS (e.g. VirtualBox), some of them only free for one OS (e.g. VMware is free for windows users, but not for Mac users), some other are not free at all. Of course, we'll go for the "free for everybody" option.

Technically, VirtualBox is a "*general-purpose full virtualizer for x86 hardware, targeted at server, desktop and embedded use*". In human words, it means this is exactly what we need. VirtualBox will be our "scheleton" on top of which we'll install the Linux operative system.

First, we need to download VirtualBox on your computer. The latest VirtualBox version can be installed on the following OS:

- **Windows**:
    - (might work) Windows XP
    - Windows Vista SP1 and later (32-bit and 64-bit).
    - Windows Server 2008 (64-bit)
    - Windows Server 2008 R2 (64-bit)
    - Windows 7 (32-bit and 64-bit)
    - Windows 8 (32-bit and 64-bit)
    - Windows 8.1 (32-bit and 64-bit)
    - Windows Server 2012 (64-bit)
    - Windows Server 2012 R2 (64-bit)

If you don't know what OS you're working on, don't worry. Just try to install it and if it works, your safe.

- Go to VirtualBox website: https://www.virtualbox.org
- Click on the big blue square with "Download VirtualBox" written in it (latest version is ok)

… or go the “Downloads” menu

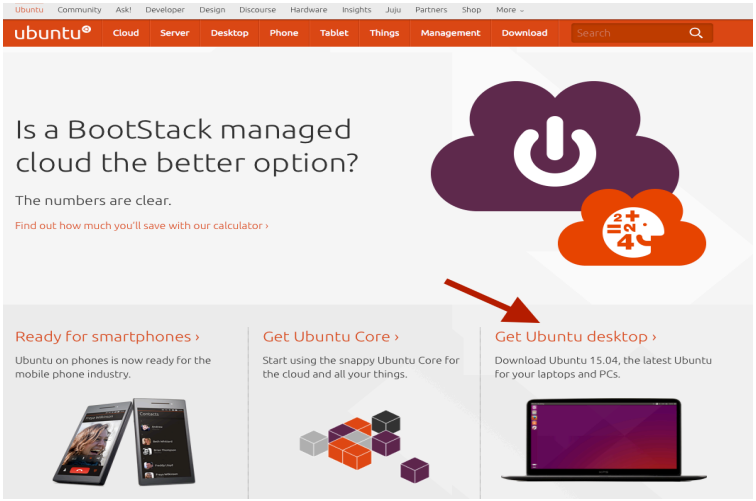
- Download the latest VirtualBox for Windows host (click on the x86/amd64 link).
-

- The file should be ~90MB. Do not open it yet!

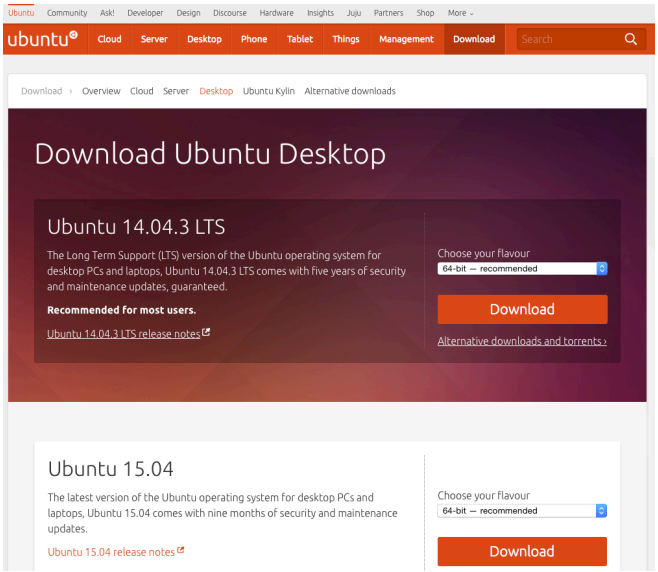
Downloading the Linux OS (Windows)

Here we will not enter into the details of what Linux is, why Linux is better (or not) from other OSs. We will just use this, as you use a screwdriver without asking yourself too many questions.
Similarly to virtual machines, there are several Linux “distro” (distributions). Actually there are many MANY more Linux distros than virtual machines available.
We will use not the best of Linux distro, but one of the most user-friendly. Its name is **Ubuntu**, and to you it will look something similar to a Windows desktop.

- Go to Ubuntu website: http://www.ubuntu.com
- Click on “**Get Ubuntu desktop**”



- Download not the latest but the more stable version:



- The file should be ~1Gb. Do not open it yet!
- **Once completely downloaded, we strongly suggest you to move this executable out from the Download folder to avoid accidental deletion.**

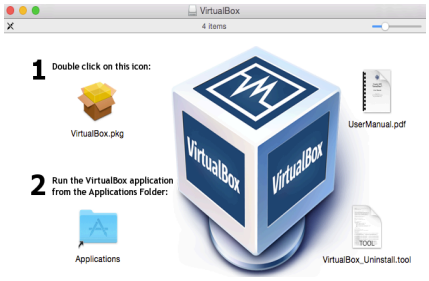
Installing VirtualBox and Linux (Windows)

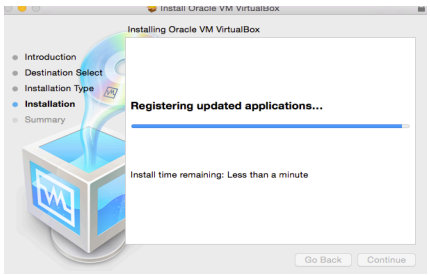
Ok, now you have all what you need. We will first install VirtualBox and use it as a virtualization environment to install and run Linux on your computer. To make an example of how this works, imagine VirtualBox is a DVD player and Linux is the CD you put in to play the music. They're related but they're *not* the same thing!

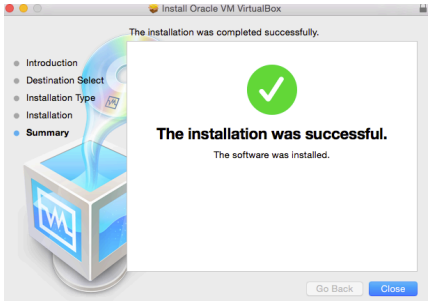
a) Installing VirtualBox

- On your Download folder (or any other place where you have downloaded your files) double click on the *VirtualBox-<YOUR_VERSION>-<DATE>-Win.exe* (WINDOWS) executable.

- Follow **the instructions to install the software** (below an example on Mac OS, but I trust you know how to install a software ☺)



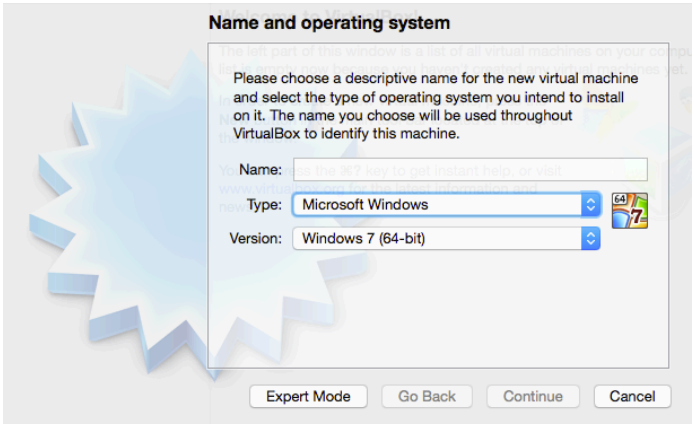


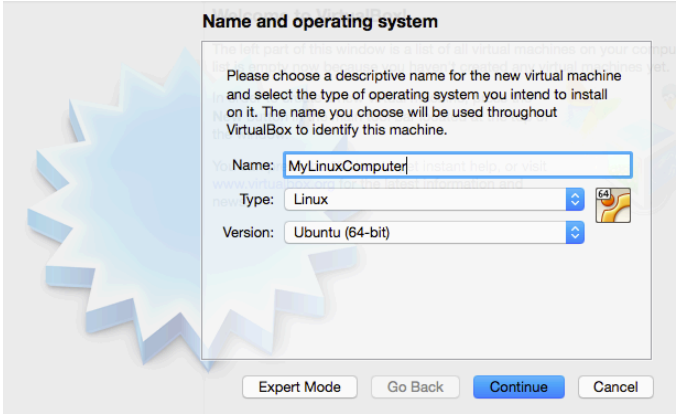


b) Setting your virtual machine and installing Linux in it.

- Once installed, run the application "VirtualBox". You should see something like this. Click on the "New" button:

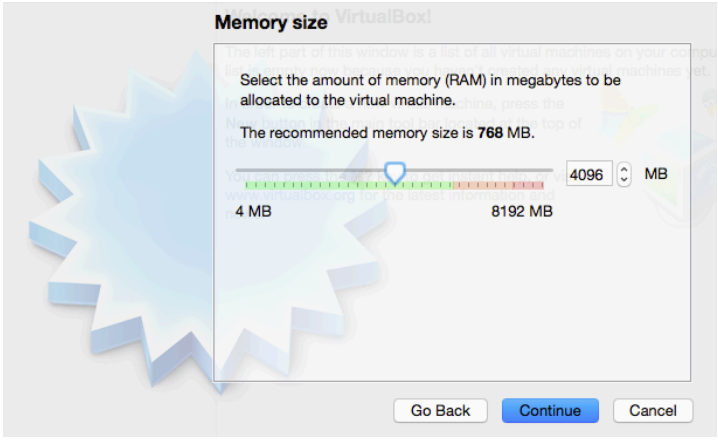
- A new menu will pop up. Clearly, you have to include a “Name” (any name you want), a “Type” (default is Windows, **you need to choose Linux**) and a “Version” (you need to choose **Ubuntu 64-bit**). **If you’re on a Windows 64bit environment, and you do not see any 64bit option, see the “2.b. Some Troubleshooting” section!!** Then click on “Continue”



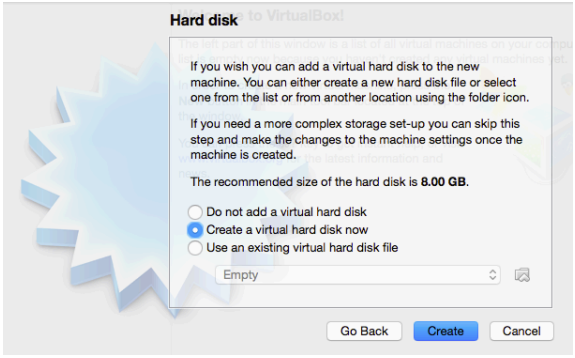


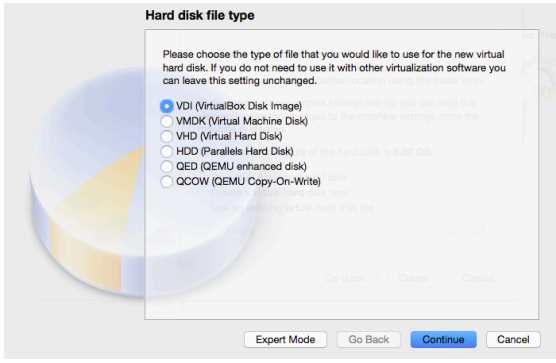
- Next step is choosing the memory (RAM) size. VirtualBox will automatically

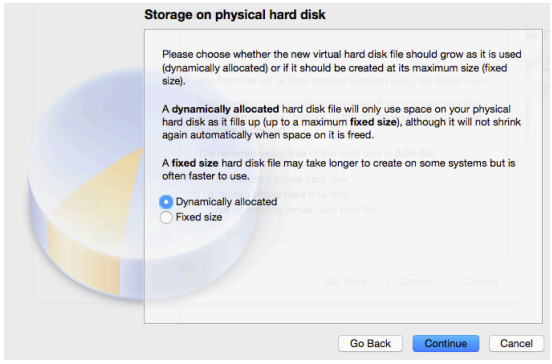
recognize the amount of RAM available on your computer. This is the total limit of RAM your computer will dedicate to the virtual machine (when running). Choose the value of your choice, remembering that you should not allocate too few (low guest computer performance) or too much (low host computer performance). If you don't know what to choose, go for the average ("*in medio stat virtus*"). I have 8Gb on my computer, so the value I chose is 4Gb. Then, hit "Continue"

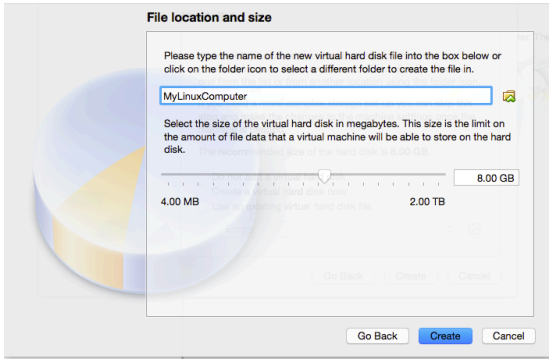


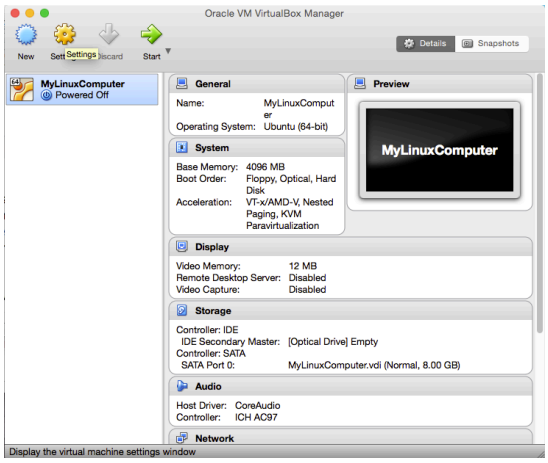
- Next step is setting up of a virtual hard disk.
    - Usually in these cases is a good idea having a virtual hard disk, in order to have all the data related to the VM in there. This makes things easier to move from one computer to the other (and clean un-install everything).
    - Choose the type of disk you wish (there are no recommendations here. I use only VirtualBox, so VDI is good for me).
    - Then choose the type of disk you desire between dynamic and fixed disk (read the explanation of each option, which are quite clear). **WARNING: Do not use a small hard disk size, as Linux may not have enough space to run. If you can, choose a value greater than 30Gb.**





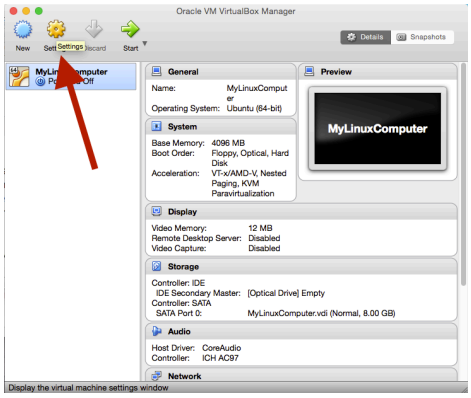




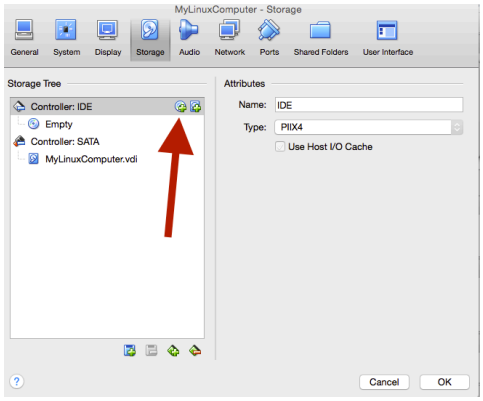


- You’re almost there. Once all these options are set, **now comes the tricky part**. Pay attention and follow EXACTLY these steps.

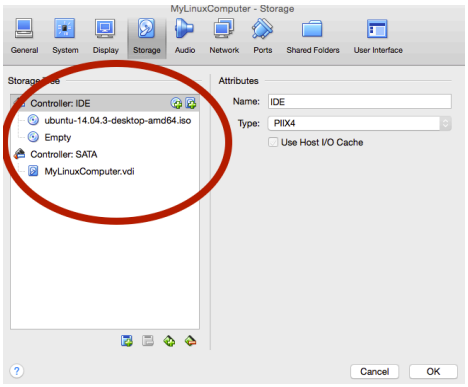
- Now the infrastructure of VirtualBox is ready to host your Linux system, but the system itself is not there yet. You just have to tell your virtual machine where the image of your Linux OS (e.g. the .iso file you downloaded) is, which means you have to play with the “Settings” menu (see image below).



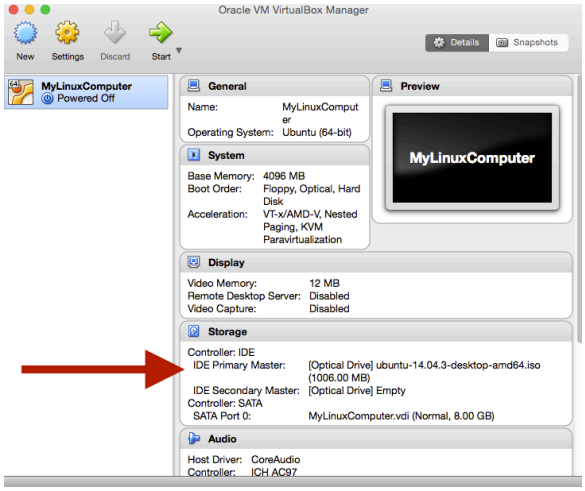
- Now, go to the “**storage**” menu. Something like the figure below will show up. On the left hand side of the screen, under “Storage tree” you’ll find “Controller: IDE” (Empty) and “Controller: SATA” (with your virtual hard drive name). You need to click on the *CD shaped icon with a green plus symbol“+”.*



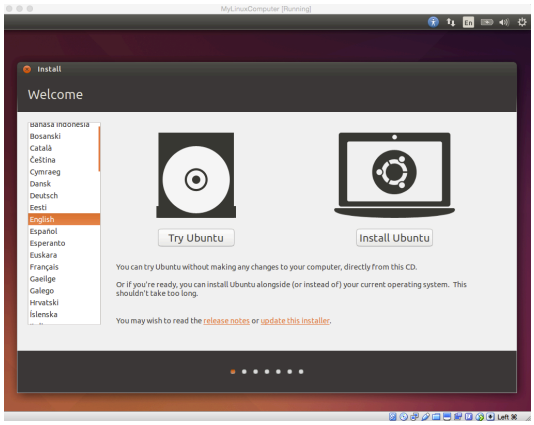
- A menu asking if you *really* want to select a new IDE pops up. Select the “Choose Disk” option and then browse your disk to find the downloaded Linux OS file (*ubuntu-<YOUR_VERSION>-desktop-amd64.iso*). Once found, the above screen should look something like this:



- Now click on OK, and your Virtual Machine Manager page will include this information in your Virtual Machine:



- Now you ARE good to go. Your virtual machine is fully set up, you just have to start it, and follow the installation package of Ubuntu, once the VM starts. Click on the green arrow with the “Start” text below (next to New, Settings, Discard.. there’s Start!)



- Click on “Install Ubuntu”. When the “Erase disk” option appears, don’t panic. It will erase a non-existing (well, actually a free) virtual disk, so you’re asking Ubuntu to erase a void virtual hard drive! When asked to choose a username and a password, **please remind your choice**. **Your username and password will be asked each time you install a software!!!!**
- The installation process will take some time and it will require the restart of your virtual machine.. (press enter when the screen displays a bunch of ugly looking messages, it will automatically restart your –guest- computer).
- You made it! Now, please see the essential settings section below. If you have problems running your VM, see the *troubleshoot* section.

b.2) Some troubleshooting (Windows)

1) **"low-graphics mode" message after restarting Ubuntu**
   On VirtualBox menu bar, menu "Devices" and click on "**Insert Guest Additions CD device…**". This will install Guest additions that will solve your problem.

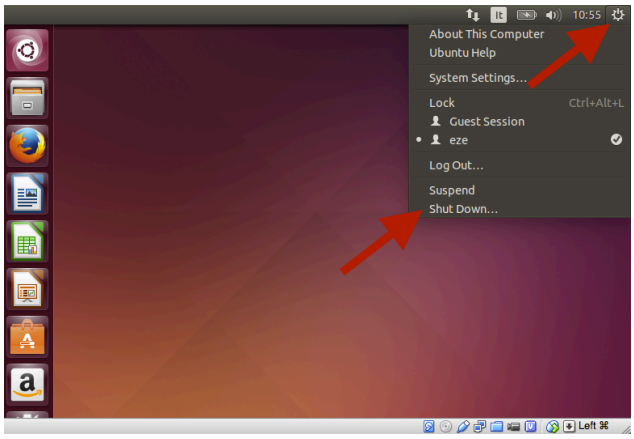
2) **Only a tiny (small) screen is displayed**
   On VirtualBox menu bar, menu "Devices" and click on "**Insert Guest Additions CD device…**". This will install Guest additions that will solve your problem (after restart of the guest OS).

3) **VirtualBox in a Windows 64bit computer does not show any 64bit OS.**
   Several Windows users have faced this problem, but there is not a consensus solution to it. Below 3 possible solutions that go from the easiest to run to the most tricky:
   a) VirtualBox repair file: https://www.youtube.com/watch?v=BFbDAcJ8bAk
   b) Hyper-V disconnection (see ONLY the Hyper-V part!): http://www.fixedbyvonnie.com/2014/11/virtualbox-showing-32-bit-guest-versions-64-bit-host-os/
   c) BIOS virtualization turned off: BIOS: https://www.youtube.com/watch?v=1wc3fjGtPHU
   If nothing of the above works, please contact me!

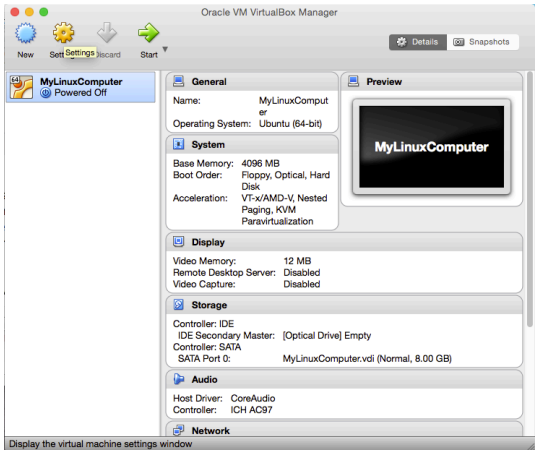
c) Essential settings for a good VM experience

Now that you have your VM installed, and Linux installed in your VM, you need to play a bit your settings in order to have a more pleasant experience. This section will guide you through: 1) Allowing to copy_&_paste **text** from/to your host (e.g. your WINDOWS) and guest (your newly installed LINUX); 2) Allowing you to share **files** between your host and guest, and; 3) finding and accessing the shared folder in your virtualized Linux.

First of all, if your linux computer is on, turn it off (see graph below). All the changes in the settings of the virtual machine must be done while the virtualized Linux is turned off.

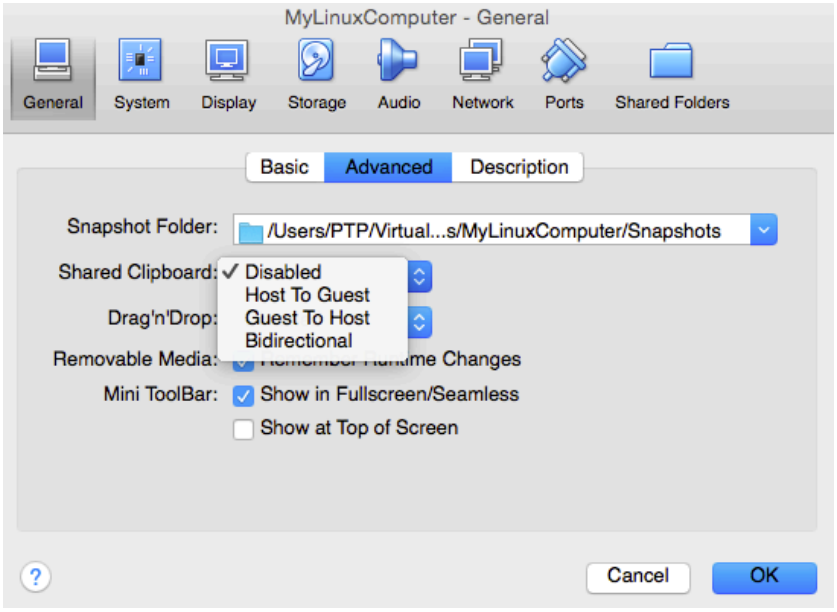


Now, from your VirtualBox Manager screen, click on the “Settings” section:



1) Allowing you to copy/paste text and share documents from/to your host and guest:

This is an easy one. In the “General” menu, click on the “Advanced” sub-menu. Click on the “Shared Clipboard” option and select one of the 4 options there: Disabled (default state), Host to Guest (allows you to copy and past from the host to the guest only), Guest to Host, or Bidirectional (**highly recommended**). Do the same for “Dran’n’Drop”.

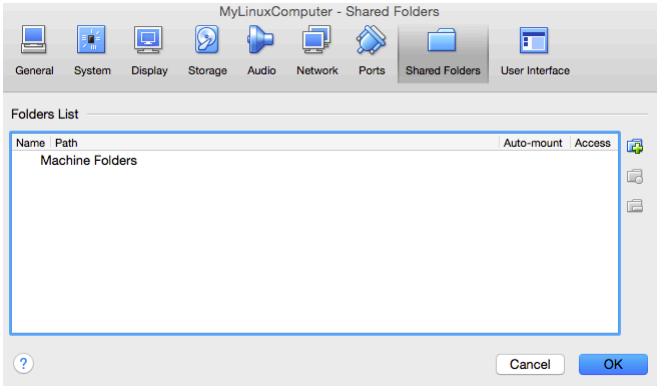


2) Shareing folders from/to your host and guest

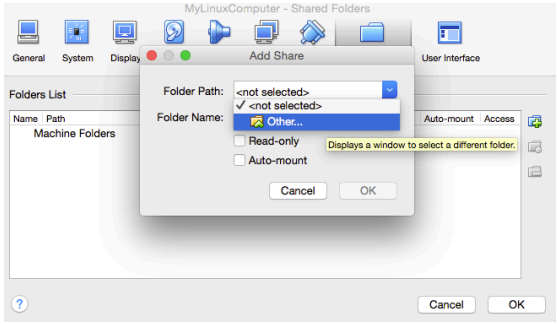
Although the drag and drop option has been activated, it is always a good idea having one shared folder. Now we'll do something as useful as setting your virtual machine: creating a folder in your host (e.g. WINDOWS) that can be "seen" by the guest (e.g. LINUX). This is useful to exchange files between your computers.

This is a bit more complex than previous option, but not too much.

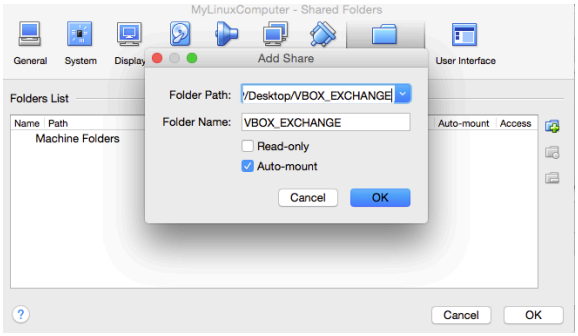
- Go, again, in the "Settings" section
- Go to the "Shared Folders" menu:

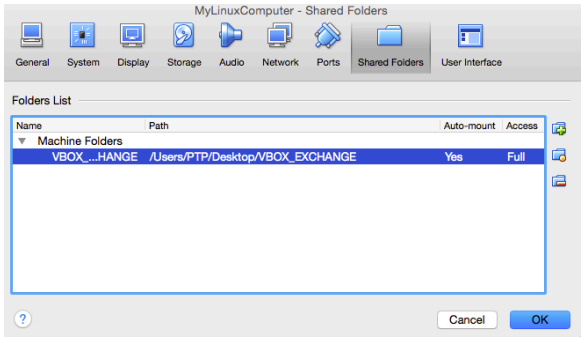


- Click on the folder with the "+" symbol. You'll see it on the right hand side. Something like this will show up:

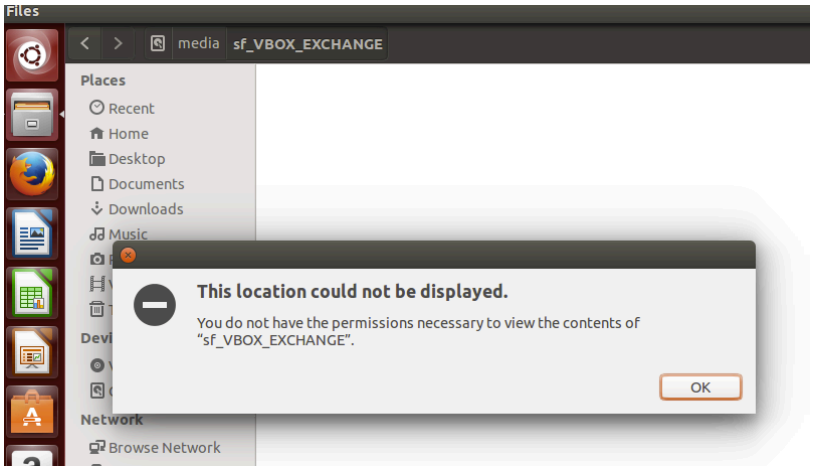


- … and browse your disk identifying a folder of your choice (or create a new one). I created a folder named: **VBOX_EXCHANGE** on my Desktop, but you're free to call it and place it where you want. PLEASE REMEMBER to click on the "Auto-mount" option, that will automatically mount the exchange folder when starting your guest OS (see below).



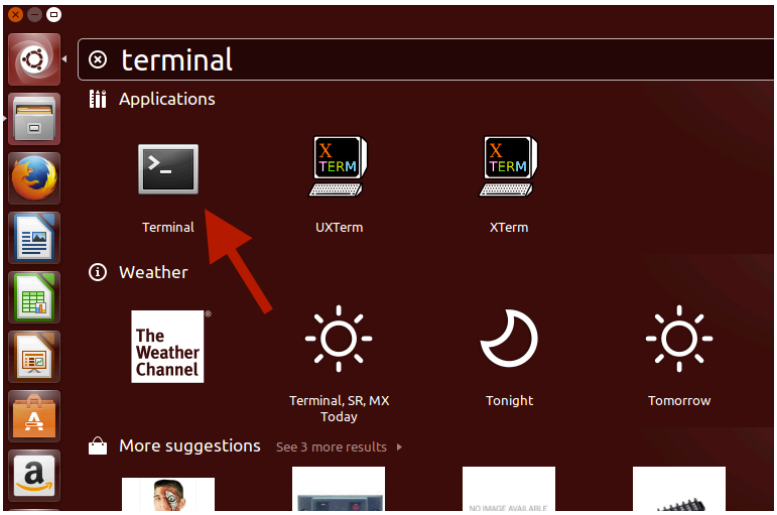


3) Finding and accessing the shared folder in your virtualized Linux.
Ok, now turn your guest all the settings of the VirtualBox are over. Now you only have to make your guest (e.g. Linux) OS communicate with your host (e.g. Windows). By default, Linux is quite strict in terms of security protocols. In fact, even if you manage to find the shared folder by yourself, you won't be able to access it (see below the error message you would get). Don't worry, we have a simplified solution for you. You just need to



To solve this you just need to go to the Terminal and copy and paste a command, restart your virtual machine, and that's it. But let's go step by step:

1) Go to the terminal. The first icon on your right (the sort of extra-terrestrial wheel) is a "Finder". Click on it and type: "terminal". Something like this will show up. Now click on the "Terminal" icon



2) Now copy and paste the following command (exactly like that):

```
sudo usermod -aG vboxsf $(whoami)
```

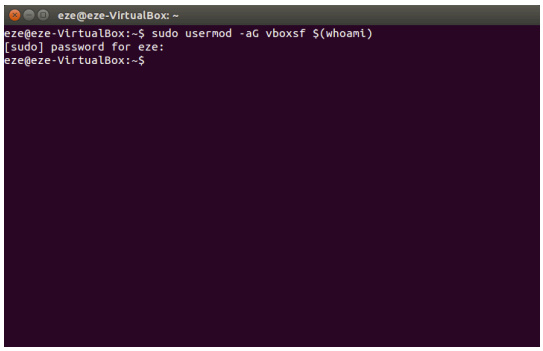
This command means:

- sudo: **do** as a **s**uper-**u**ser (administrator rights)
- usermod: **mod**ify privileges of **user**, with the following options:
  - "a" means "append" (add)
  - "G" is for group
- vboxsf: name of the group that has access to all

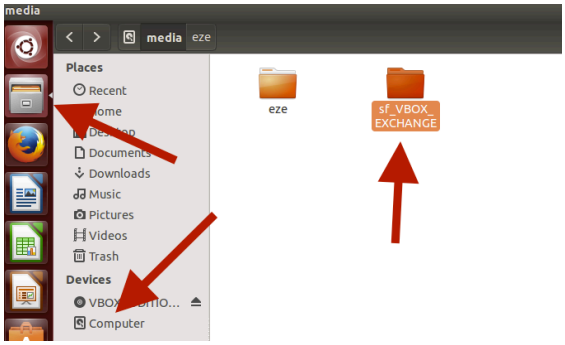
VirtualBox folders.

- $(whoami): prints your username (means “who am I”)

… and type your password (the one you should have kept when installing the Linux system). Your password is asked because “sudo” is like telling the OS that you’re the admin of the whole computer, so he needs to know this is you doing things. You should use this command **only if you know exactly what you’re doing.**



3) You can close the terminal now.
4) Restart your guest OS (e.g. Linux)
5) Your shared folder will be in **/media/sf_**<name_of_the_shared_folder>
   You can find it clicking on the second icon on your right (the one that looks like a drawer), then clicking on “Computer” (under “Devices”), then on the folder named “media”, and there you’ll find your sf_<name_of_the_shared_folder> (following the previous examples, in my computer it is called: sf_**VBOX_EXCHANGE,** see below). Now it will open.



Optional:
You might find useful to have a link of this folder in your Desktop. For some reason you (I) can’t do it manually (e.g. graphically). You need to do it using the terminal. Again, click on the first icon from the top, write “terminal”, and then click on the terminal icon.
Type the following:

```
ln -s /media/sf_<name_of_the_shared_folder> ~/Desktop
```

In my example before, my command would be:

```
ln -s /media/sf_VBOX_EXCHANGE ~/Desktop
```

the “ln” command means “link” and the “-s” option means “soft”. This command creates a soft-link (something similar to a pointer to the folder).

Installing required software on Linux

Linux has a quite useful way of installing stuff you need. Ubuntu has also a graphical interface that can help you doing this avoiding you the command line. Since we'll be using some command line during the winter school, it's a good idea you loose fear of command line. Therefore, we'll be installing all the necessary software on the terminal.
We'll be installing R3.2+ and git.

Open the terminal (at this stage, you should be able to do it without assistance, right?)

Installing R 3.2+ on your Linux machine

By default, your Linux version will try to install and already outdated R version, so the process to install R will be a bit more painful than usual. To start, you'll have to edit a configuration file. Don't worry, I'll guide you through it. From the terminal, type:

```
sudo gedit /etc/apt/sources.list
```

a window will open with a bunch of stuff written. Go to the end of the file and copy/paste the following string:

```
deb http://cran.es.r-project.org/bin/linux/ubuntu trusty/
```

save and close the window (there is a "Save" icon, and to close you can just click on the red "x" on top of the window. If you don't see the 'x', pass the mouse above the gray bar on the top).
Once back to the terminal, you'll need to update and upgrade your system. Copy the following on your terminal, line by line and answer "Y" each time you're asked to.

```
sudo apt-key adv --keyserver keyserver.ubuntu.com --recv-keys E084DAB9
sudo apt-get update
sudo apt-get upgrade
sudo apt-get install r-base
```

This will update, upgrade your system and install R v.3.2+ on your computer.

Now that you have all installed, we need to install a small R package. To do it, run R (type "R" – without the ""). Now, *from the R console that has opened (following the R command on the console),* type:

```
install.packages("ggplot2")
```

Just reply "y" when asked and choose a country. Your computer will do the rest.
Once the installation process is over, type:

```
library("ggplot2")
```

If no error message is promted, the installation worked ok. Quit R typing: `quit()`

Installing git on your Linux machine

Git is a version control software that we'll use only to download useful (and very nice ☺) software. To install git, type

```
sudo apt-get install git
```

This is all for now. We will install the software in class.

You're good to go now.
Follow the specifics of the wiki page to download Zanardi from the git repository and its usage.