Exercise # 1

To a comprehensive, system where the participants can manage, maintain, and process their spatial data we have decided to introduce OG Geo Live. One of the main reasons for doing so, is the cost effective yet versatile nature of Open-Source Software. These are popularly known as Geo FOSS (Free and Open-Source Software).

The OS Geo platform comes as a free resource online and is complete with the following software readily installed and available for use.

1. Desktop GIS solutions
2. Browser facing GIS.
3. Web Services
4. Data stores
5. Navigation and maps
6. Spatial tools
7. Domain specific GIS
8. Spatial data samples
9. Geospatial libraries
10. Geospatial standards

We will explore each of these components in due details once, we have properly configured out systems and installed these resources.

Software environment

You can download OSGeoLive from the website
https://live.osgeo.org/en/overview/overview.html

Once, you are on the page, you can check the following pages, before heading to download the resources.

From the homepage, you can click on the contents tab and check the contents of the OSGeoLive suite.

From there next click on the downloads tab and you shall be directed to the downloads section, where you can access the download link. The current version available at the time of writing of this tutorial is 15.0. You might also want to download and earlier version for your ease in case it works well for you.

OSGeoLive

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Download

The latest stable release is OSGeoLive 15.0 and can be downloaded from:

https://sourceforge.net/projects/osgeo-live/files/15.0/

Picking the right image for you:

osgeolive iso: 4.0 GB

A Lubuntu based bootable image, which can be copied to an 8 Gig USB thumb drive (faster and recommended) or DVD (cheaper). It can also be used to build a virtual machine from scratch.

osgeolive-vm: 3.1 GB

This is a pre-made virtual machine (.vmdk), based on osgeolive, suitable for use in VirtualBox, VMWare, KVM and other virtual machine applications. It has been compressed using 7-Zip.

amd64 or i386 architecture

ISO images are available for recent amd64 hardware (recommended) as well as older i386 hardware.

md5 checksum

You can use the md5 checksum to verify the image downloaded successfully.

System Requirements

Minimum suggested system resources: 1 GB RAM (2 GB are better for trying Java based applications), 1GHz i386 or amd64 compatible CPU. No hard drive required. Mac users will benefit from a 3-button USB mouse.

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You will be led to a source forge page, where you can select a version of your choice. The files can be downloaded from this page.
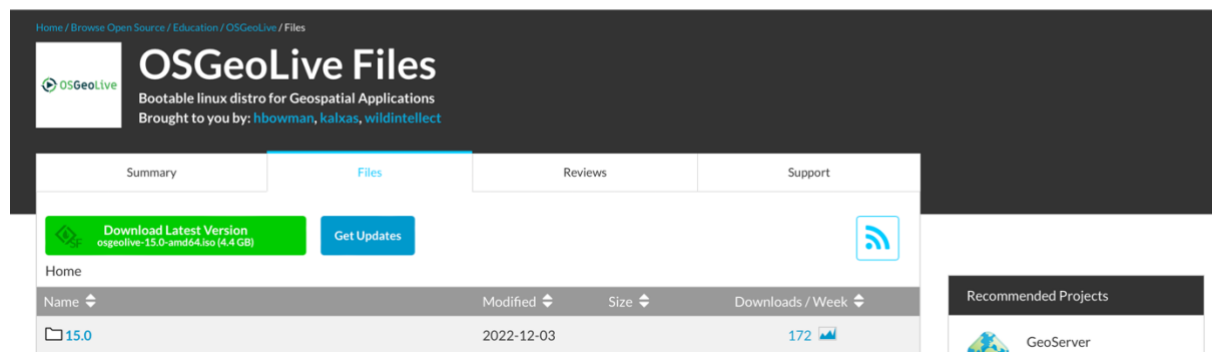
The file format is *.iso, and hence it can be used to either create a bootable USB for your computers, or alternatively create a virtual machine on your computer or on a computer node, or hosting space on a web server.

Here we will be using VirtualBox for the purpose of our workshop. VirtualBox is a free software from ORACLE, and can be installed on any computer running, windows, Linux, or Mac OSX. The software works as a virtual layer over our windows installation and provides us a system within a system to run our operating systems of choice, with the required bundle of software. A virtual machine interacts the least with your main installation, and whenever you feel like removing this from your computer, you simply have deleted the virtual files, and the systems will then be back at its original state. This is good for several reasons.

1. You can install any operating system, not native for most of your work and test your programs, or tasks.

2. You can create a server like setup withing your host system and access the remote resources from your host and vice versa. Hence giving you a near real like flavour of deployment environment
3. You can optimise system resources,
4. You can port the entire system to a hosting space, and do not have to worry about recreating the files on a hosting server etc.

The VirtualBox website, can be accessed, using the link www.virtualbox.org

From there you can download the VirtualBox software, as well as the virtual box software extension. But this late can only be run once, you have virtual box installed.

The virtual box extension is platform independent, and you only need to choose the OS platform initially. The extension is on the same page as the download page for the VirtualBox software. https://www.virtualbox.org/wiki/Downloads

Do remember, that for some operating systems and architectures, like the new M1 and M2 from Apple, VirtualBox can be buggy and there are alternatives like VMware and utm available for use. These two can work seamlessly on macOS however, VMware is not free to use for developer features. While the other two solutions remain free for use.

In case you feel like you need to pick the alternative, VMware or utm you can use the following links to access the download pages.

https://www.vmware.com/
https://getutm.app/
As of now the following screen appears when you click the download link on VirtualBox website. You can download both the software and the extension pack from here.

Download VirtualBox

Here you will find links to VirtualBox binaries and its source code.

VirtualBox binaries

By downloading, you agree to the terms and conditions of the respective license.

If you're looking for the latest VirtualBox 6.1 packages, see VirtualBox 6.1 builds. Version 6.1 will remain supported until December 2023.

VirtualBox 7.0.10 platform packages
- Windows hosts
- macOS / Intel hosts
- Linux distributions
- Solaris hosts
- Solaris 11 IPS hosts

The binaries are released under the terms of the GPL version 3.

See the changelog for what has changed.

You might want to compare the checksums to verify the integrity of downloaded packages. *The SHA256 checksums should be favored as the MD5 algorithm must be treated as insecure!*

- SHA256 checksums, MD5 checksums

**Note:** After upgrading VirtualBox it is recommended to upgrade the guest additions as well.

**VirtualBox 7.0.10 Oracle VM VirtualBox Extension Pack**
- All supported platforms

Support VirtualBox RDP, disk encryption, NVMe and PXE boot for Intel cards. See this chapter from the User Manual for an introduction to this Extension Pack. The Extension Pack binaries are released under the VirtualBox Personal Use and Evaluation License (PUEL). *Please install the same version extension pack as your installed version of VirtualBox.*

**VirtualBox 7.0.10 Software Developer Kit (SDK)**

Once you have your VirtualBox installed. The following window will appear on your screen, where you can now select the downloaded iso of OSGeoLive and start the installation process. But before that you can need to do some configuration of how you new machine should be.
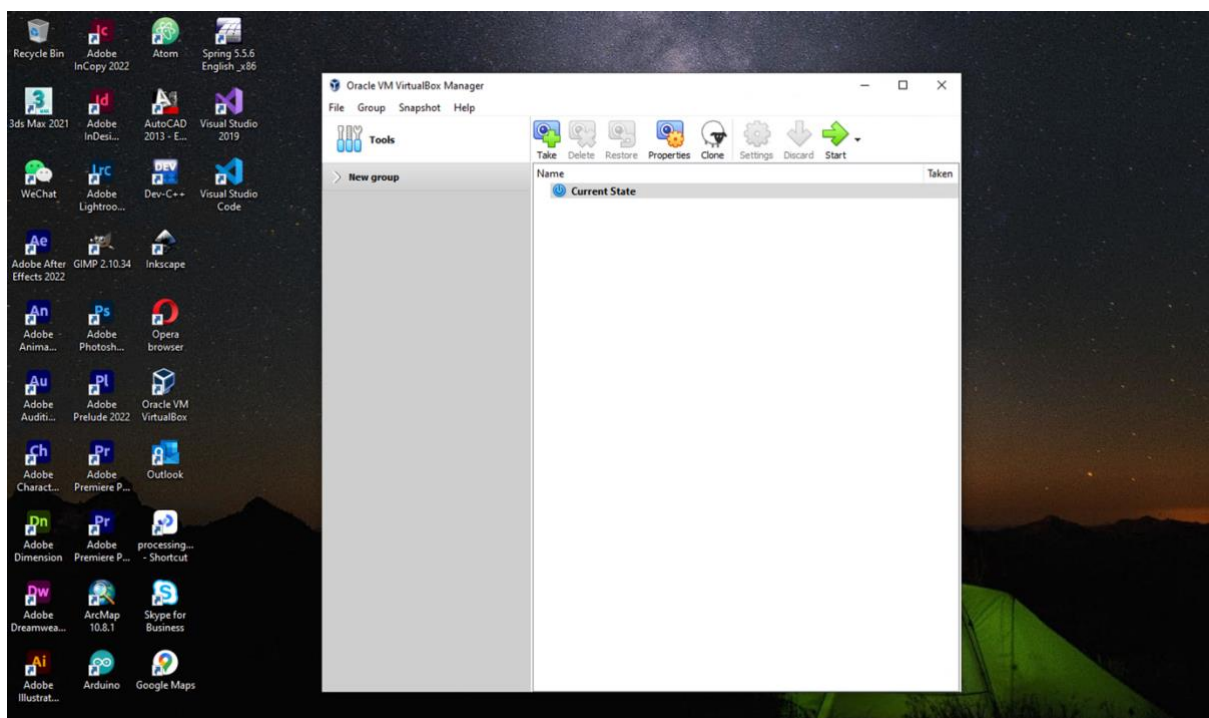
From this window click on the **Group** menu on the top and then click on **New Machine.**
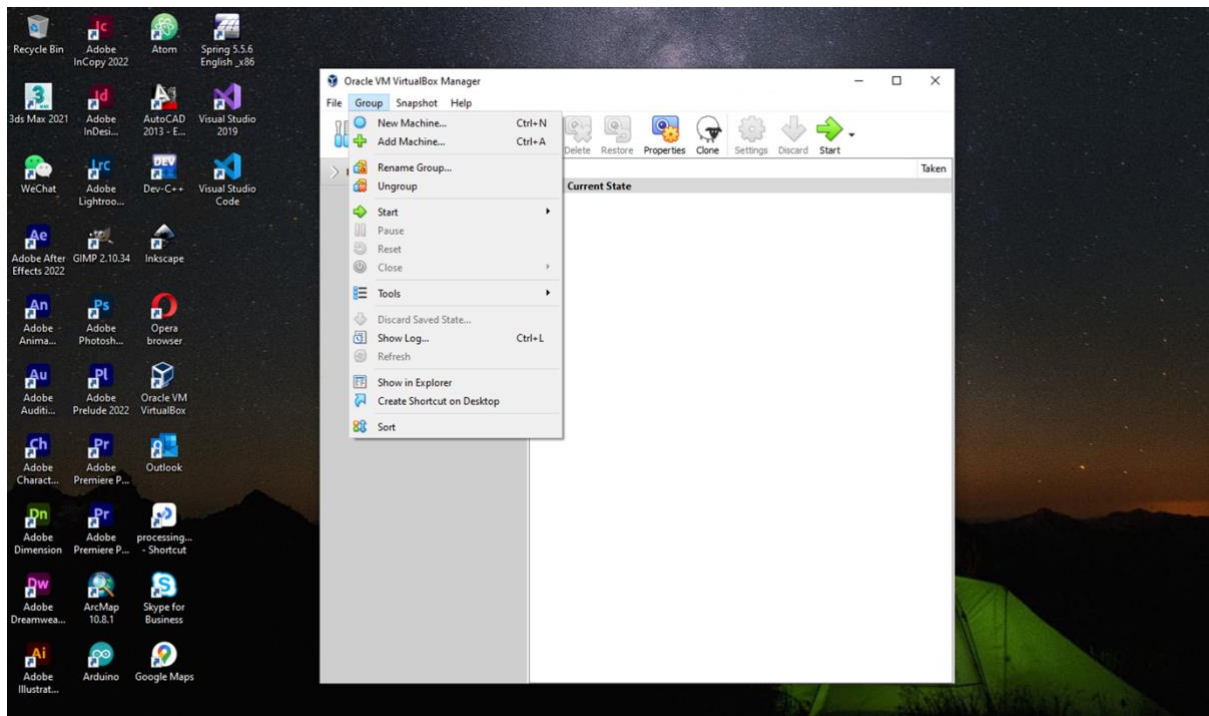
You will see window as below from where you can add the new machine, name and select where it will be created and then also choose from the drop-down menu, the kind of operating system it is etc.
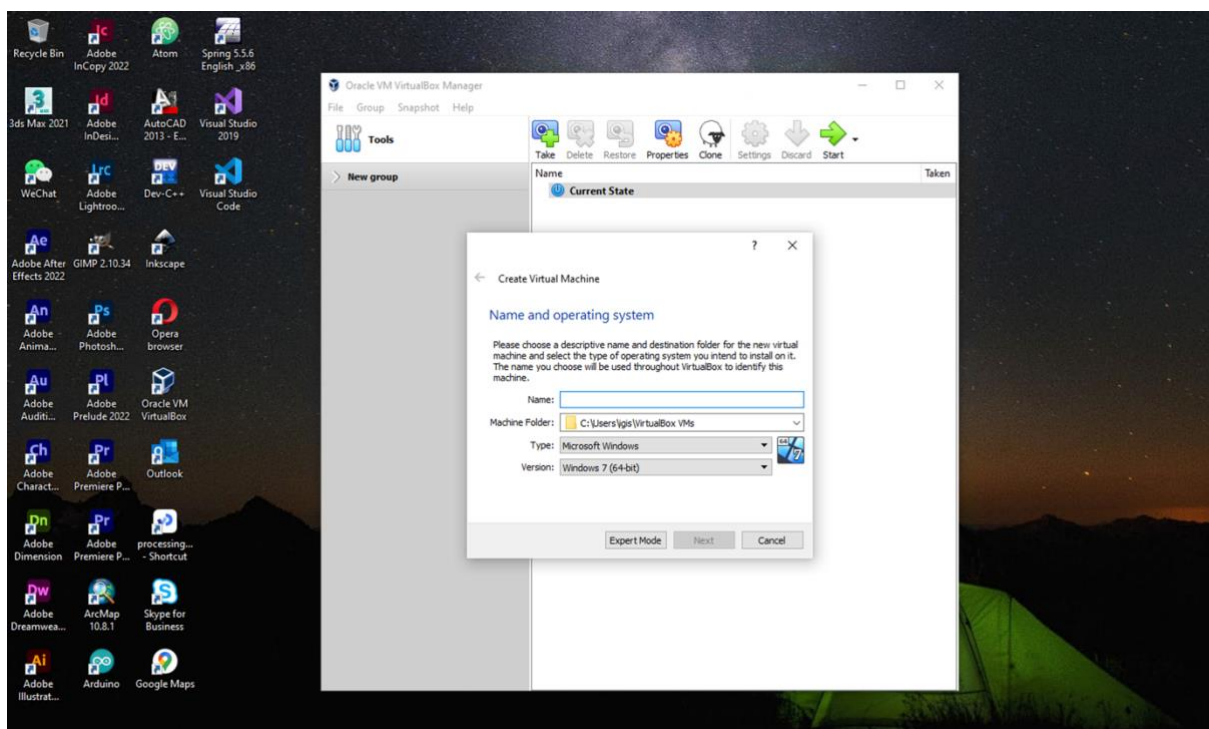

For this exercise, you can do the following.

1. **Name:** PostgreSQL Intermediate Training

2. **Machine Folder**: C:\Users\igis\VirtualBox VMs (if the folder is not present on your machine, you can create this folder
3. **Type:** Linux
4. **Version:** Ubuntu (64-bit)

The click next at the bottom of the screen, and it will take you the following screen, where you can choose the amount of RAM to assign to your new machine. By default, the machines, share the ram with your host computer, and in this case even if you assign as low as 2GB the machine will run just fine. Since I have more RAM available so I will therefore assign a slightly higher portion of it. I have chosen 4 GB (4096 MB) of RAM for this purpose here.
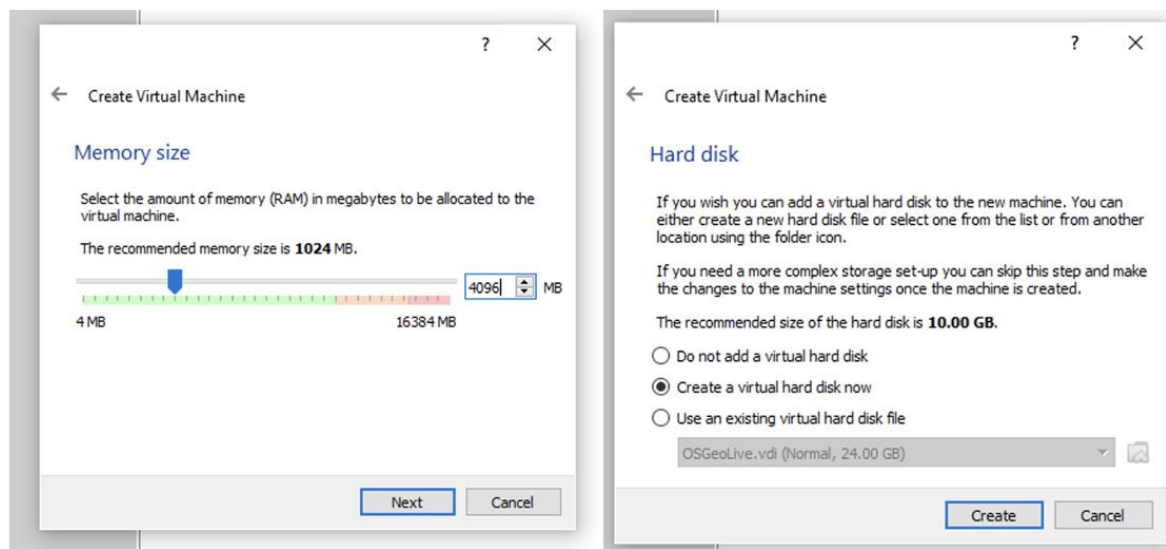

After this you will be taken to the next screen which you can see on the right above. Here you can choose to create a VIRTUAL hard disk drive. This drive exists on your system, more like a media file does and can just be deleted when you are done with your work. This can also be copied and used on other machine and can carry all your data processed on it as a packaged resource. The recommended size by default is, 10.00 GB here, I will rather go for 35 GB at this stage. Which we will set in the next window.

You will then have a choice of the type of disk you want to create. Here I must mention that this choice, really matters to how you plan to use this machine in the future. In our case we will go for the disk type VDI.

To educate you on the advantages and disadvantages of these disk types is beyond the scope of this tutorial. However, I invite you to read for addition information on the following link https://www.parallels.com/blogs/ras/vdi-vs-vhd-vs-vmdk/.

As of now we are going with VDI, which is easiest to manage, and our reason for choice being VDI is the native format of VirtualBox. Other virtualization software generally doesn't support VDI, but it's easy to convert from VDI to another format, especially with qemu-img convert.
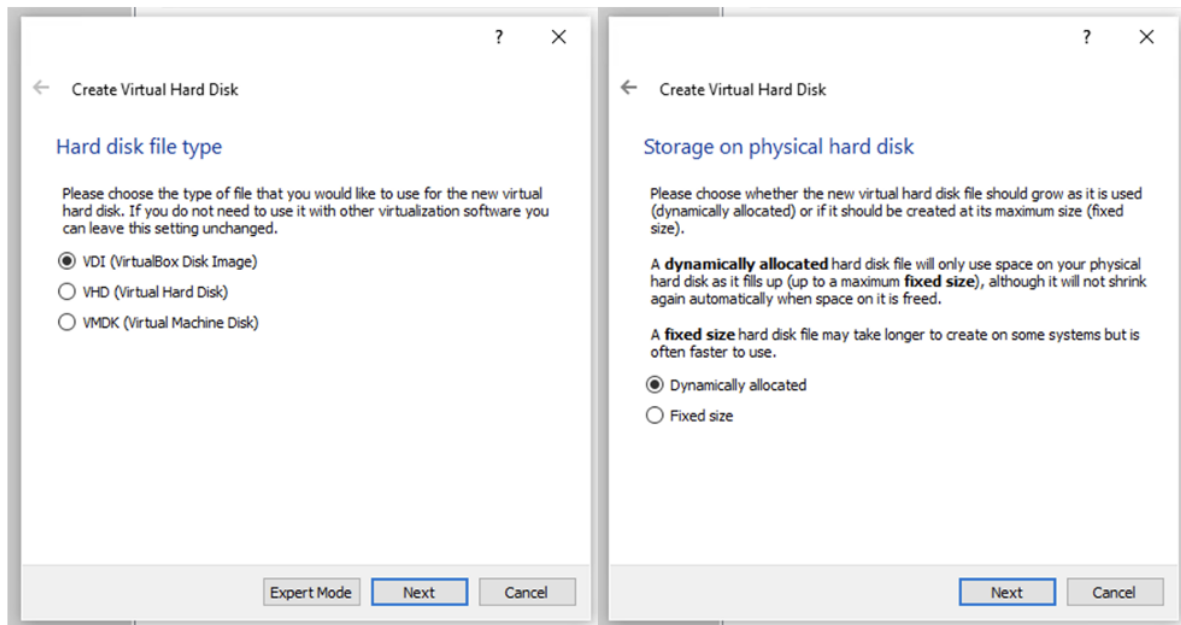
You will the move the next window, where you can select, the dynamically allocated space option. This means that as the data on the folder carrying your virtual operating system increases, it will only swell to occupy more space. This also means that the system if allocated 35 GB initially will only occupy this space when as much data is added or processed.
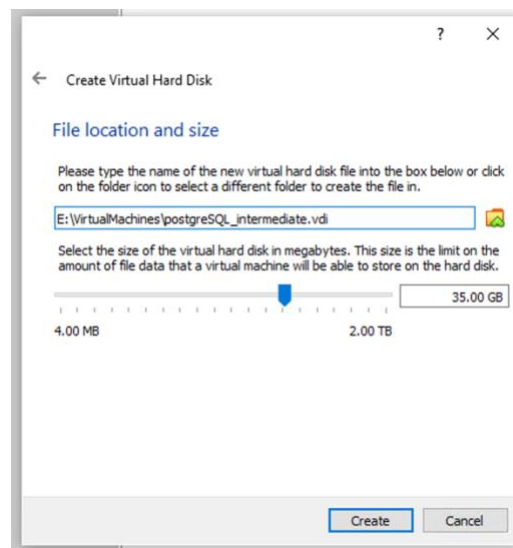

Once, you have clicked next, you will then be taken to above window, from where you can manually type the space, you want to allocate your virtual machine on your host machine. The space allocated will have to be a below a maximum of 2TB. However, there is a possibility, where you can create multiple disks, and attach them to the same virtual machine, hence offering a far greater storage possibility on scaled up machines for big spatial data and enterprise systems.

You will now be greeted with the following screen, where your virtual machine is created, and you can now easily proceed to running this virtual machine. However, we are yet to configure,

the boot medium and then install our operating system on the newly created virtual disk, which as of now is totally empty.
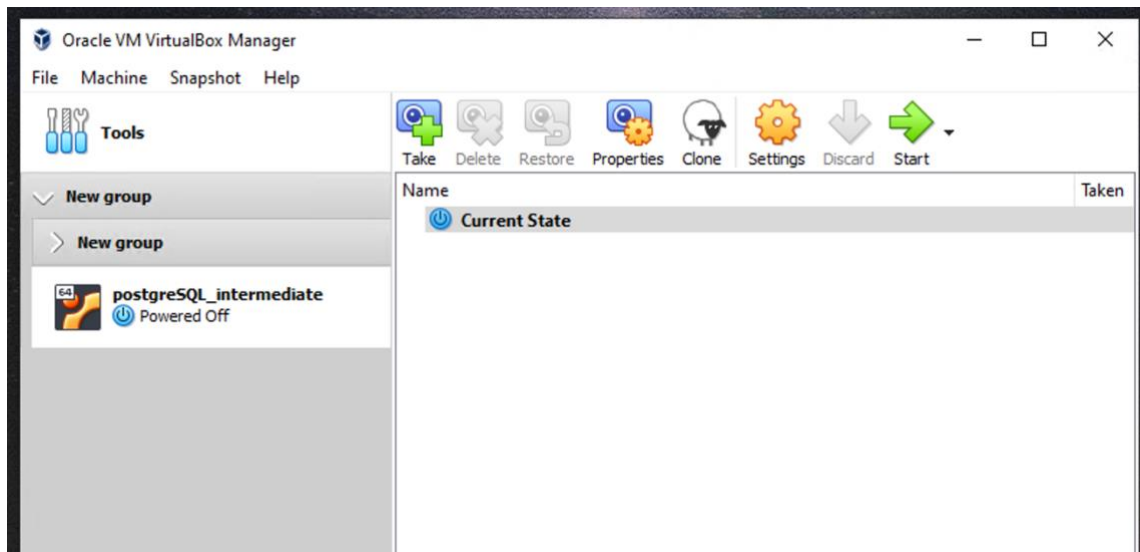

Select your virtual machines in the table of contents to the left and right click or directly select the settings wheel from the menu at the top.
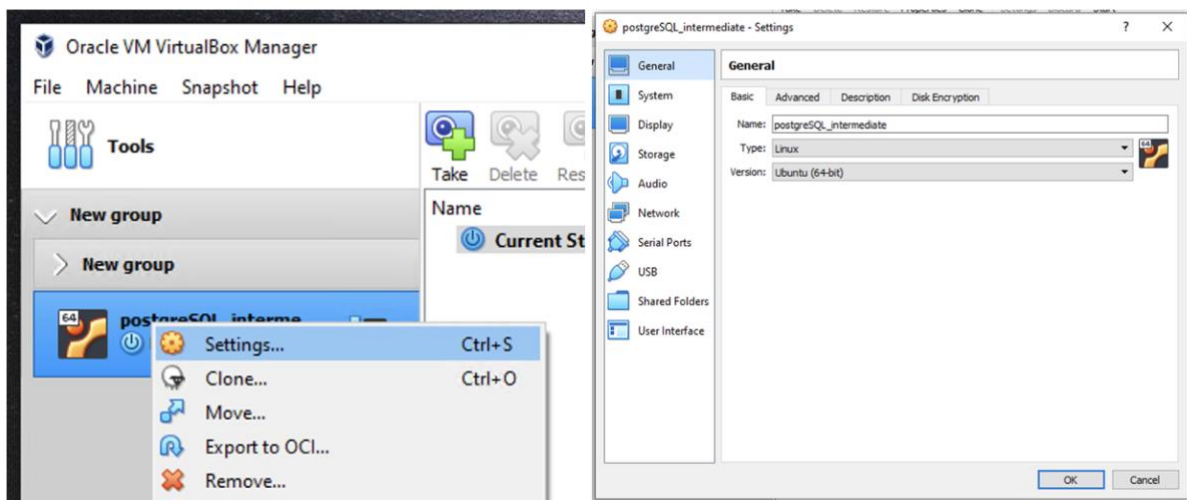

You will be presented with the machine, settings window. Here you change the following.

1. The RAM (memory allocated)
2. The system processors, allocated to the machine.
3. The storage resources, that are in use or can be attached or created etc.
4. You can also change general settings like
    a. Sound
    b. Network
    c. Serial ports
    d. USB connections and
    e. Shared folders with your host. This can come handy if you plan to process your data stored on the local system.

For now, we will select the installation medium (which is the iso, file we downloaded). For that click on the blue ring, representing a disk on the top right in the attributes section of the storage menu. The two steps have been shown below together.
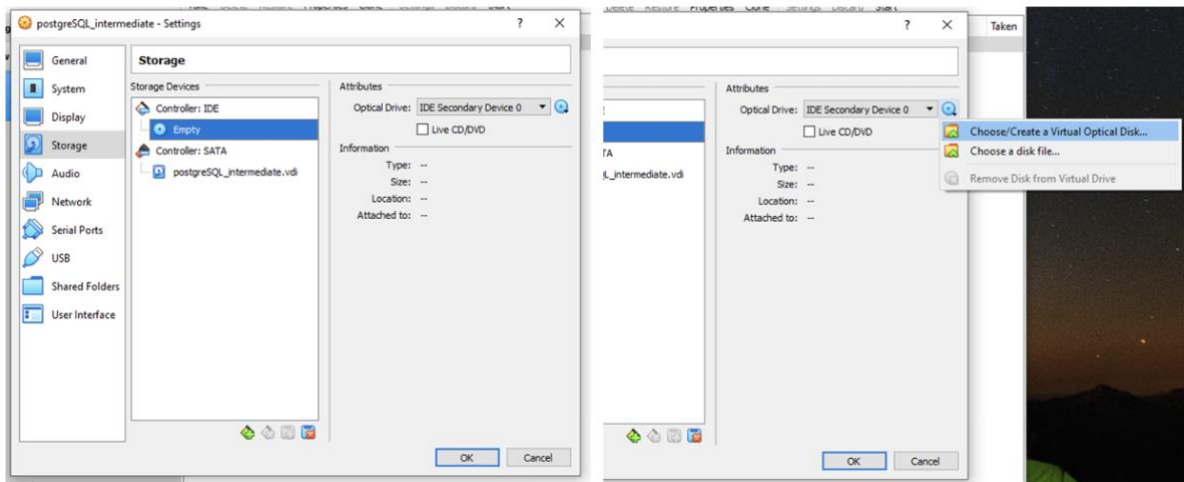
Once the window is open you will have the option to add an iso file, to the system boot menu. Select the OSGeoLive iso and click choose.
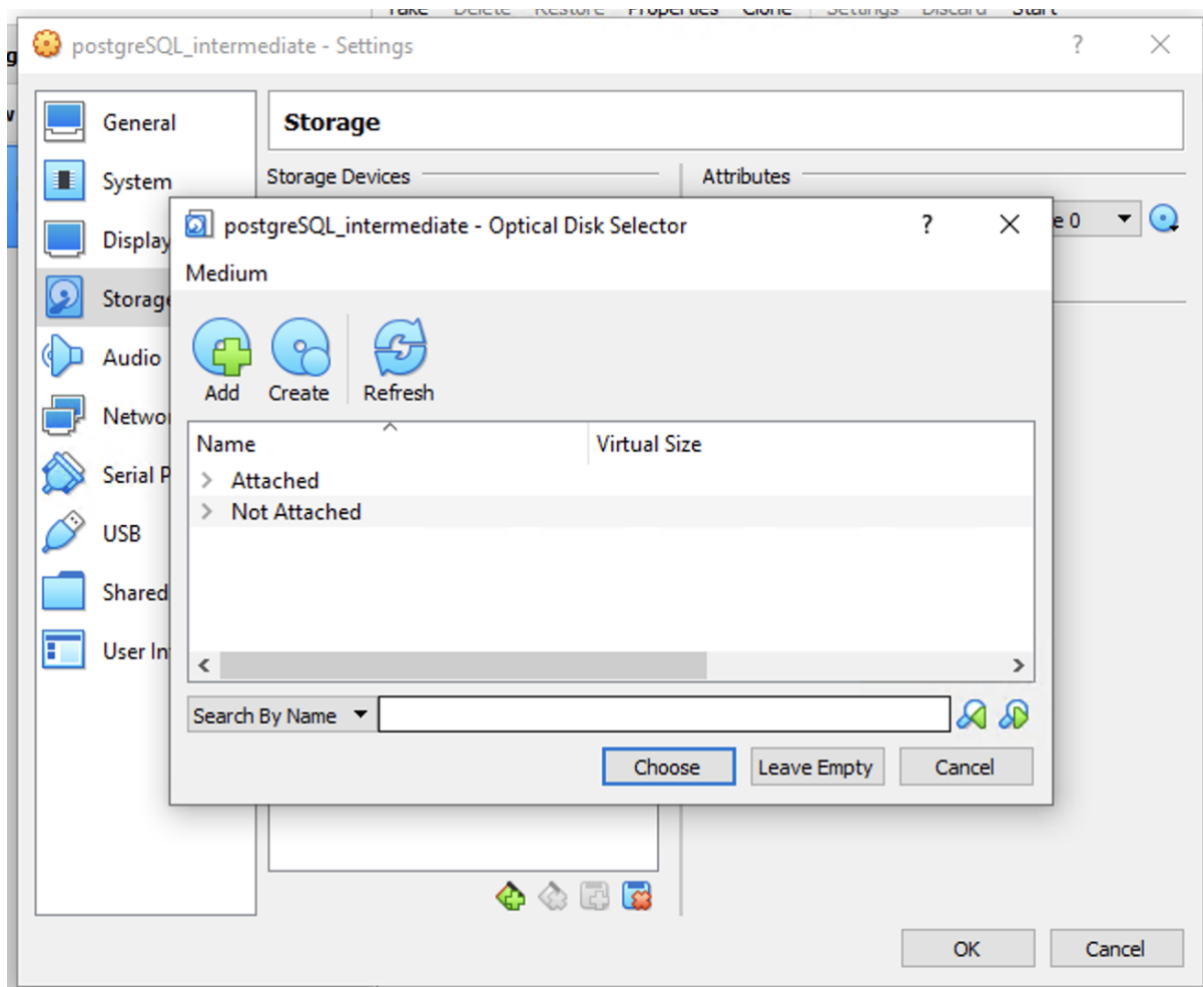
This should be your setup before you launch your virtual machine. Click ok at the bottom and your new settings will be saved. This might take a few seconds, but not more than that.
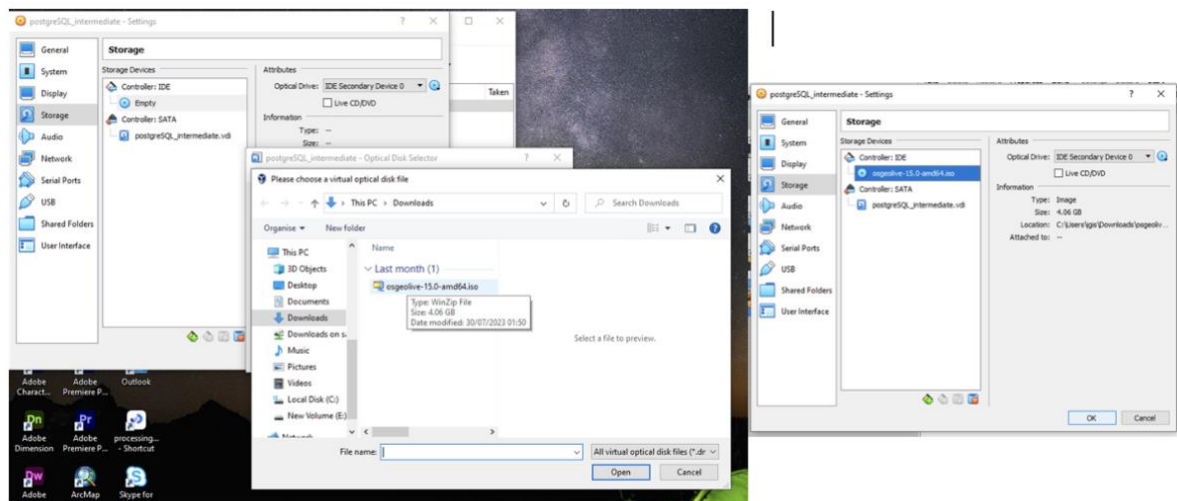
Once, your machine is setup click on the green start button on the menu and you will be presented with a window with the following options.

1. Try or install Lubuntu
2. Ubuntu (safe graphics)
3. Test memory

Select the **first option from the window** by pressing **enter**, in case you seem to have lost control of your mouse and want to regain it you can press the right ctrl key on your keyboard. Once, you have selected the desired option, you will be presented with the following window.

You will now select, the Install OSGeoLive 15.0 option and the installation process will begin. Depending on the chose system configuration and internet connection, this can take from about 1 hour to 3 hours. But since, this is a one-time process this can be easily managed.

By default, you are supposed to move forward and select the most appropriate options. An option that is confusing for many is the Erase disk option that comes at the third window. Since it is a reference to your virtual disk you can safely select it and create your virtual machine.
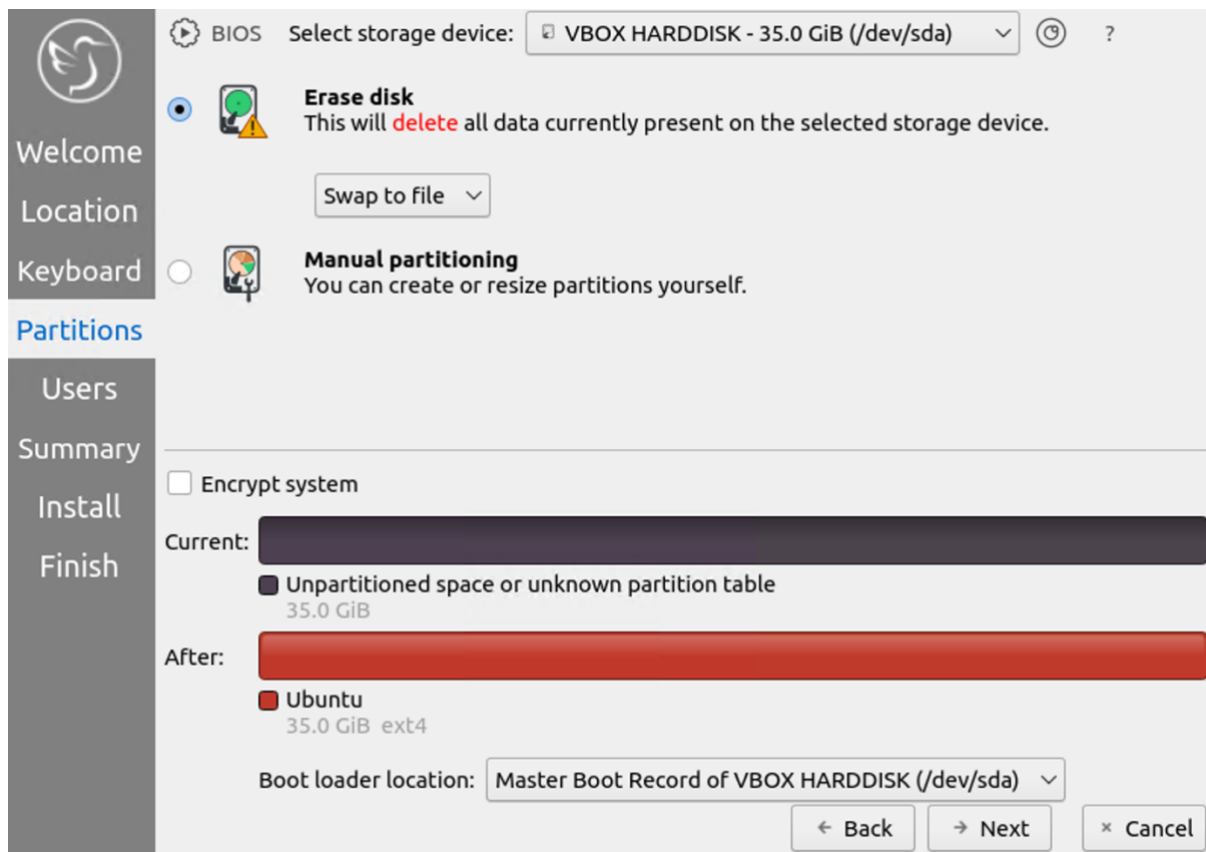

For the username option is highly recommended to pick one and pick a password that is strong. For this exercise, you might want to use a simple password such as user or postgres, that you won't forget easily and can conveniently share.

You will now be prompted in the next window to install. You should select that option and your install will start. On my system it took me 13 minutes to run the full installation.

Once the installation is complete, you will be prompted to eject the installation medium, and press enter. This can be a little buggy a procedure and does not appear to work smoothly. However, it is a critical step and must be followed.

For this you need to click on the top menu and select remote disk from virtual drive. In case this option is not visible. You can safely press ENTER.
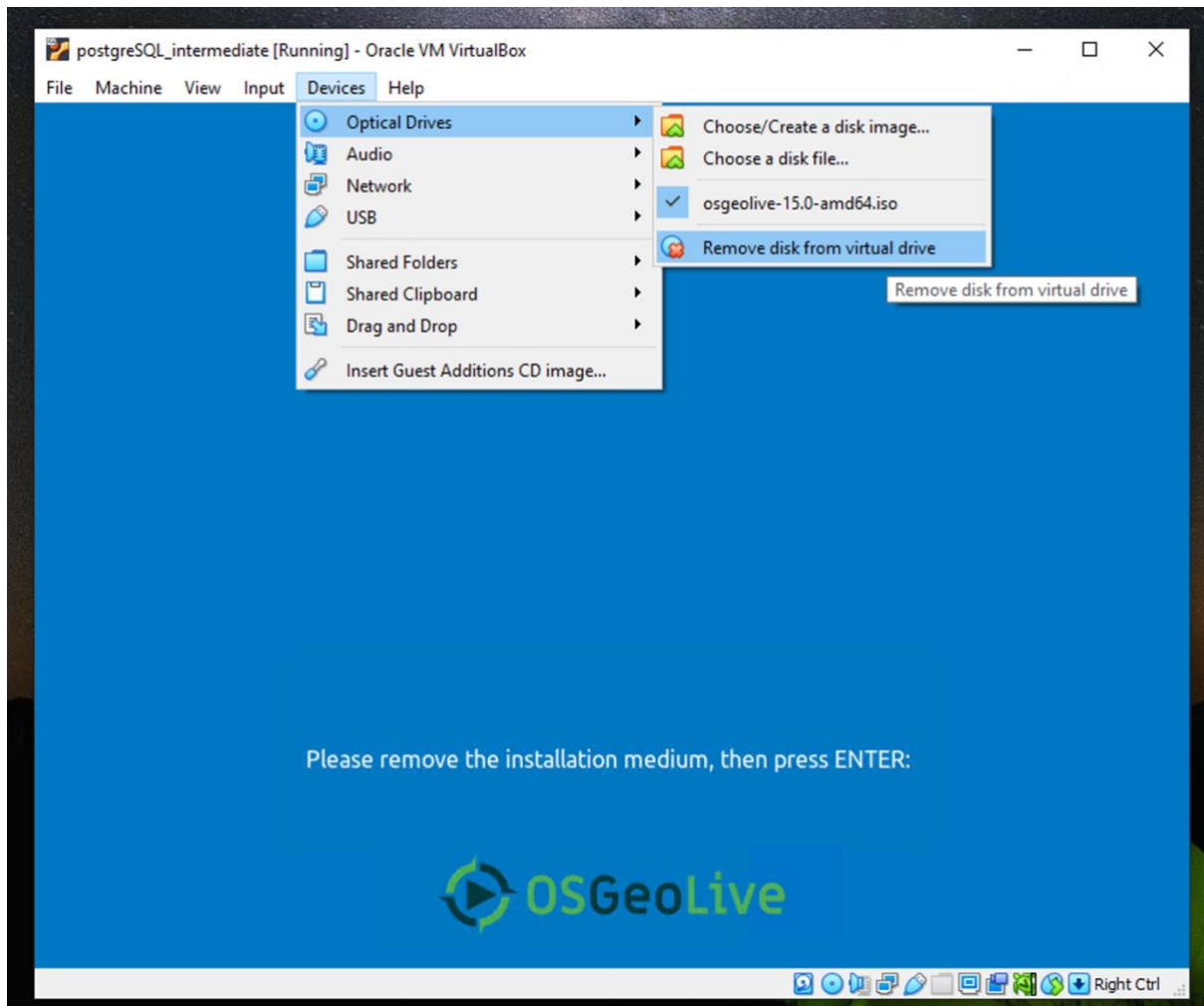
Once, you have done so you might get a force unmount prompt. It is perfectly safe to do that, and head on with the reboot. On the reboot, you will be presented with the login screen, however, it is imperative to check from the settings menu (for a new user) in the storge tab if the disk is still mounted or not. If it is still mounted, it can be trouble and might continue booting from the iso and lead to temporary sessions.

Things to do.

1. Please on the paper provided, highlight the steps that you have done.
2. Also, list the software that come bundled in the packages and their utility if you know of any. Since many of these software might be new to all the participants.