Parallel Programming

Installing Ubuntu Virtual Machine within VirtualBox

Author B. Wilkinson - Modification date Januray 3, 2016

These instructions assume you have already installed VirtualBox (See separate instructions for that.) As the image file to download can be large (approx. 1000 MB), make sure you wait for download to complete before continuing. In Windows, look at the Windows task manager /Networking.

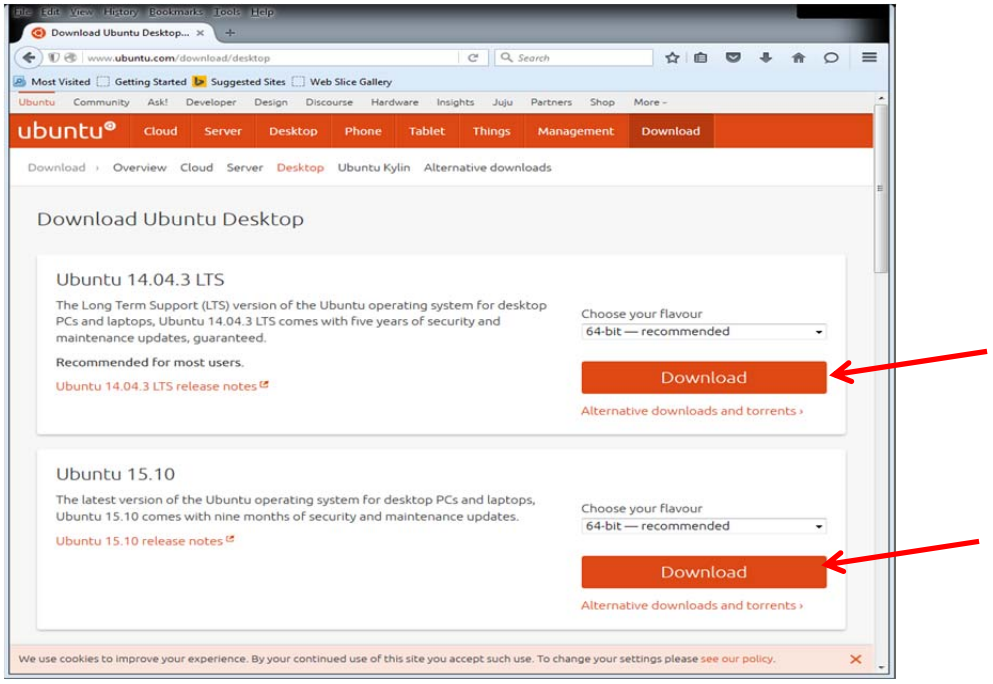
Download Operating System ISO image file

For Ubuntu:

If you intend to install Ubuntu, go to the Ubuntu site for desktops:

http://www.ubuntu.com/download/desktop/

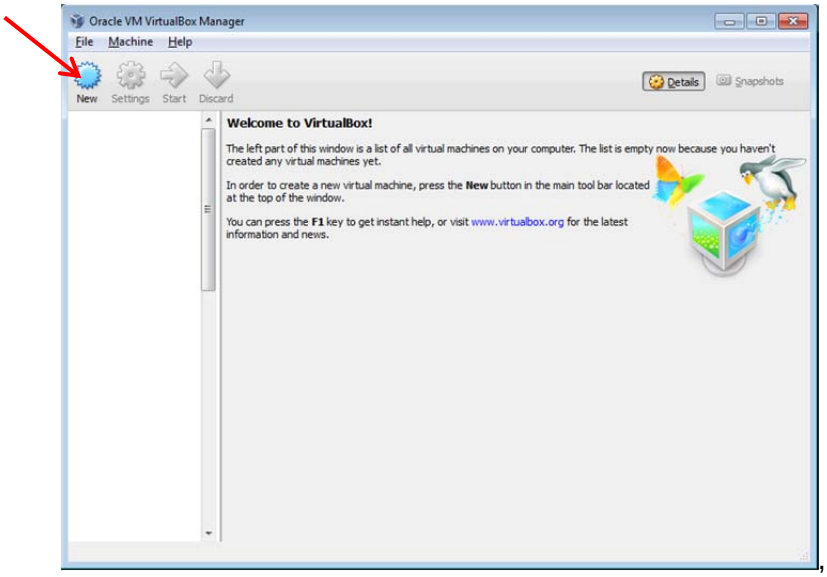
Normally one selects "64-bit" if your system will support it.[1] Download the **.iso** file (e.g. **ubuntu-14.04-desktop-amd64.iso).** Note where the file is saved (example the **Downloads** folder). You will need this file later. Our original testing and documentation was done with Ubuntu 14.04 although there may be a more recent version now available. *I recommend staying with 14.04 for now.*



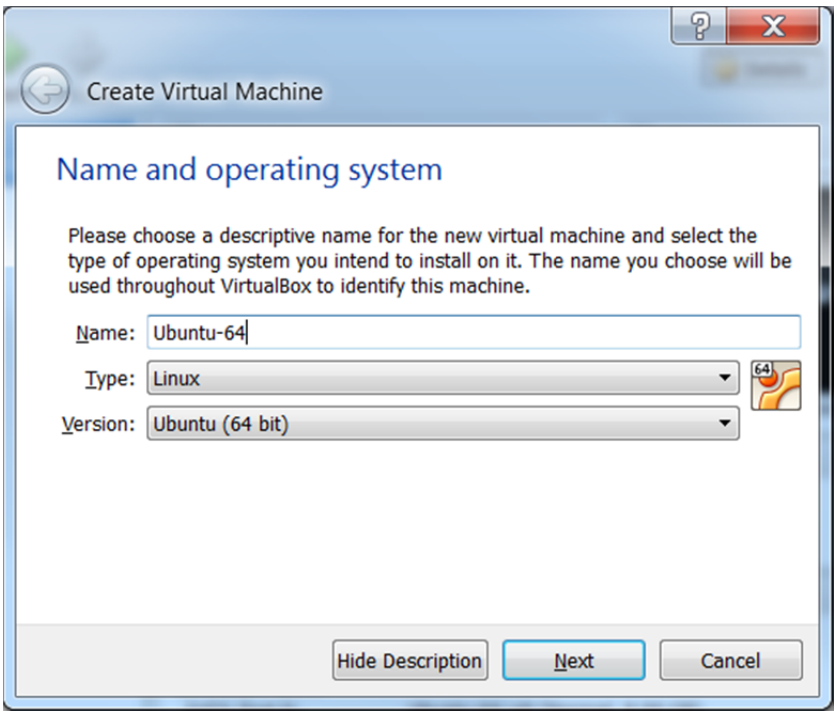
[1] Because some students have had difficulty getting the 64-bit version operating on their computer our provided VM is 32-bits. For issues during the installation check course FAQ under "VirtualBox and Course Virtual Machine."

Create a Virtual machine within VirtualBox

Start VirtualBox. Click on “New” at the top left corner of the VirtualBox manager window:

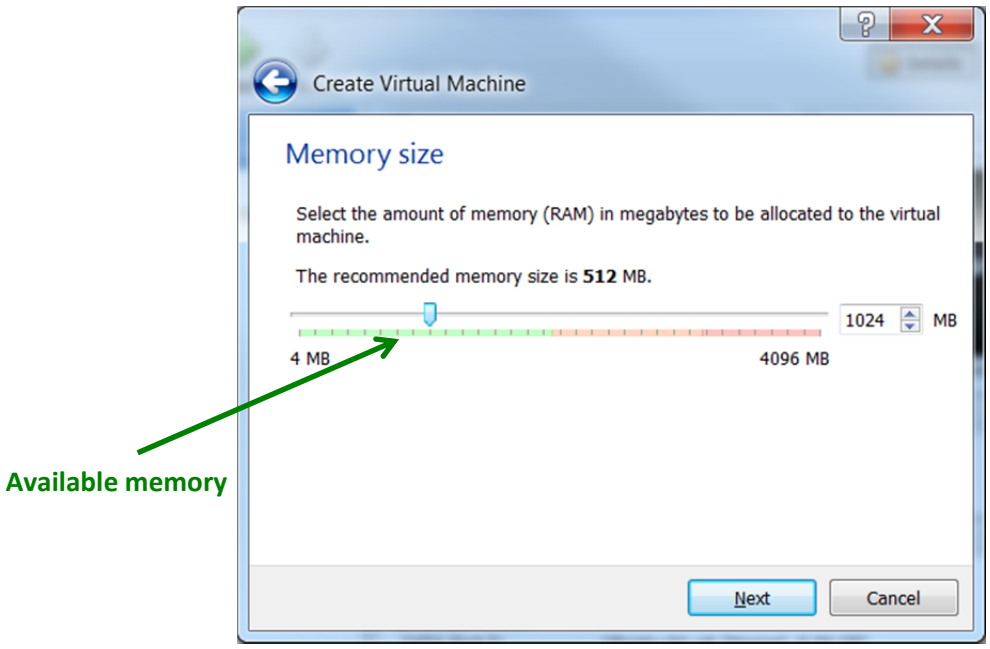


enter a name for the OS, e.g. “Ubuntu-64” (Type and version should auto-enter after such a name.)



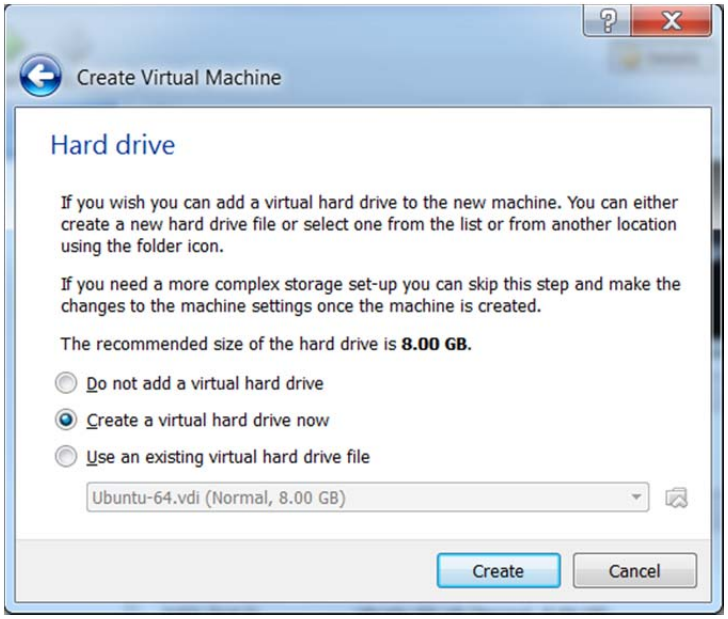
In the Create Virtual Machine, the memory size gives available space (green bar):

IMPORTANT: It is highly recommended to select the largest size for memory allocation that you can live, at least 1024 MB:



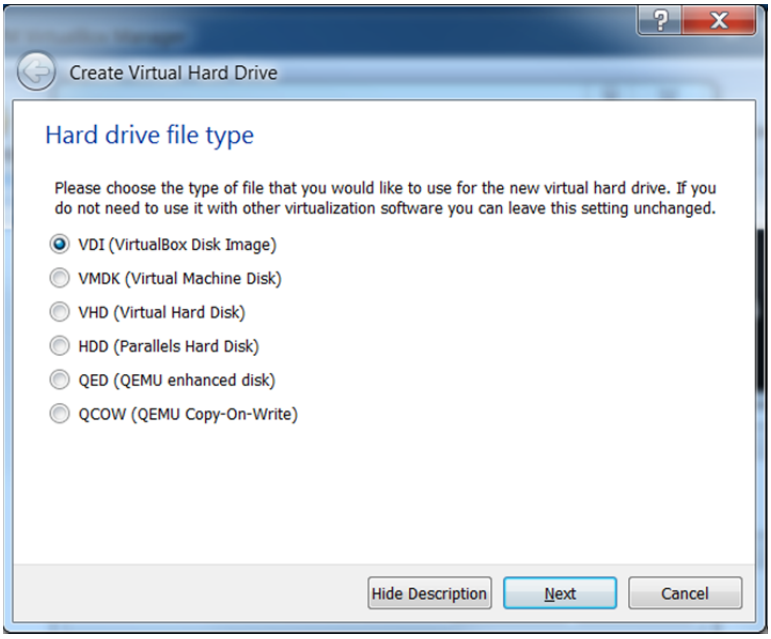
Note increasing the memory allocation will limit other activities and having other simultaneous virtual machines but may increase the speed significantly.[2]

Then, create a virtual hard drive:

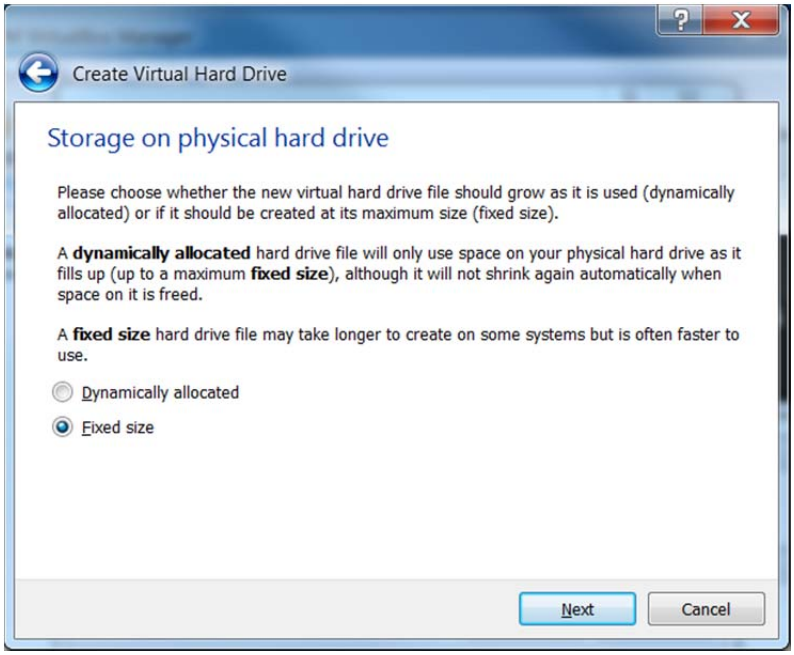


Select VDI (VirtualBox Disk Image):

[2] The setting can altered after the OS is installed from **Machine > Settings > System > MotherBoard** if desired. The number of processor cores that is used can also be altered at **Machine > Settings > System > Processor**. It might default to 1.

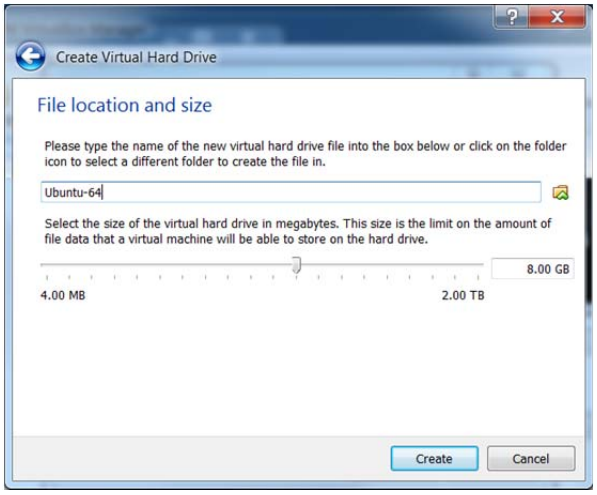


On can select either **Fixed allocated** or **Dynamically allocated** hard drive next. (**Fixed allocation** gives faster speed in use initially.[3])

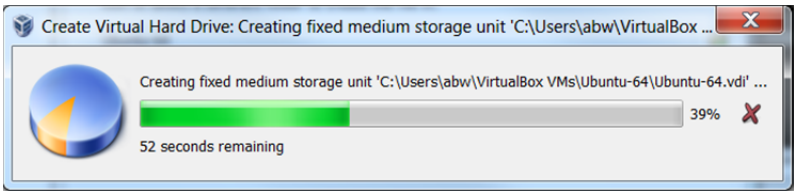


Choose a size for the hard drive file (8 GB default here). It is recommended to increase this size to at least 16 GB if you can live with that taken from the host system.

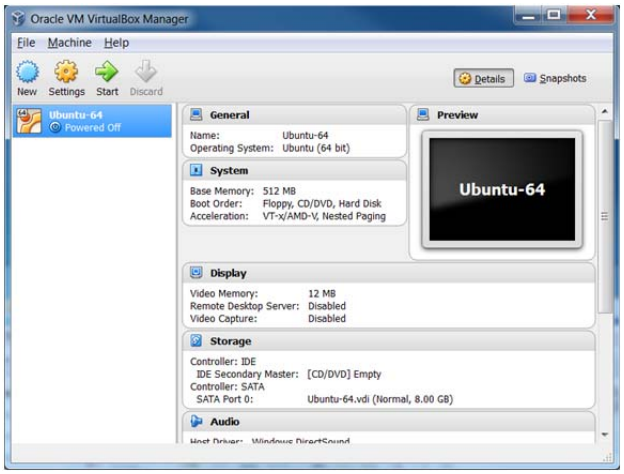
[3] VirtualBox documentation (https://www.virtualbox.org/manual/ch05.html#vdidetails) suggests that over time the size stabilizes, and the speed difference between fixed allocated and dynamically allocated hard drive is negligible.



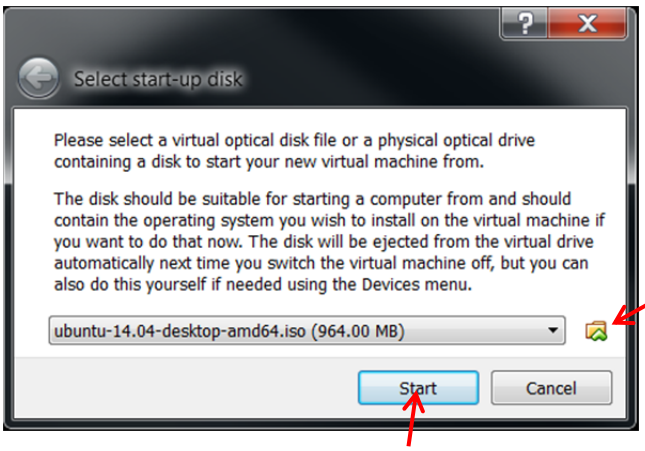
At this point, you will see something like:



When completed:

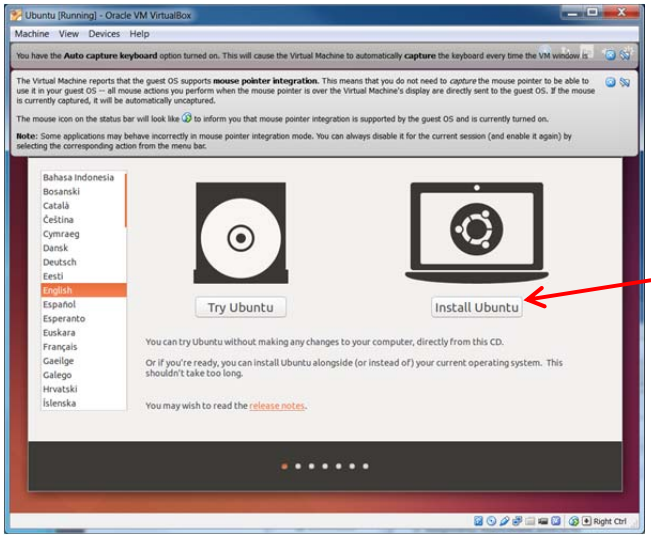


Now you have to install the operating system within the created virtual hard drive. Double click on virtual machine icon (Ubuntu-64 in previous image). On the Select startup disk window, click on the icon on right side to navigate through your file system and select the **.iso** Ubuntu file previously downloaded (e.g. **ubuntu-14.04-desktop-amd64.iso)**, and click “Start”.

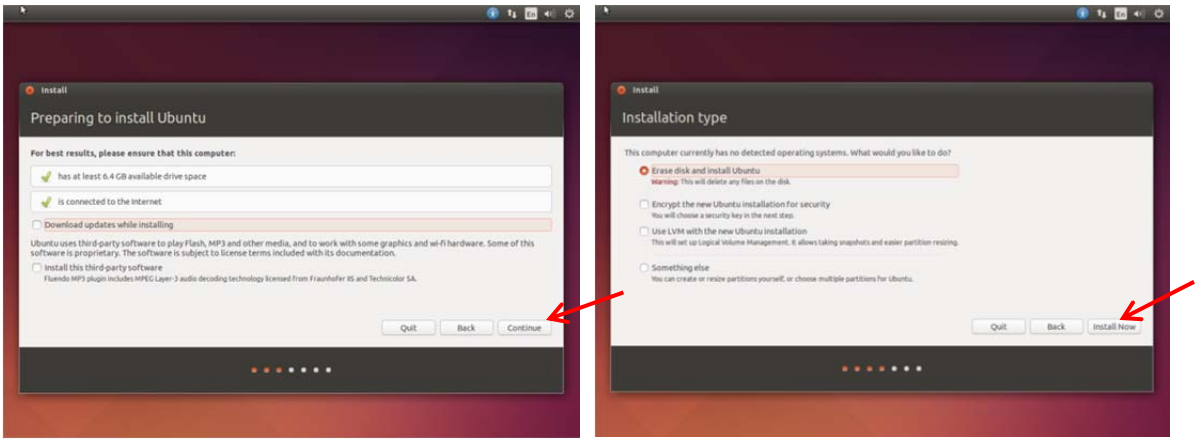


Navigate through file system to find .iso file

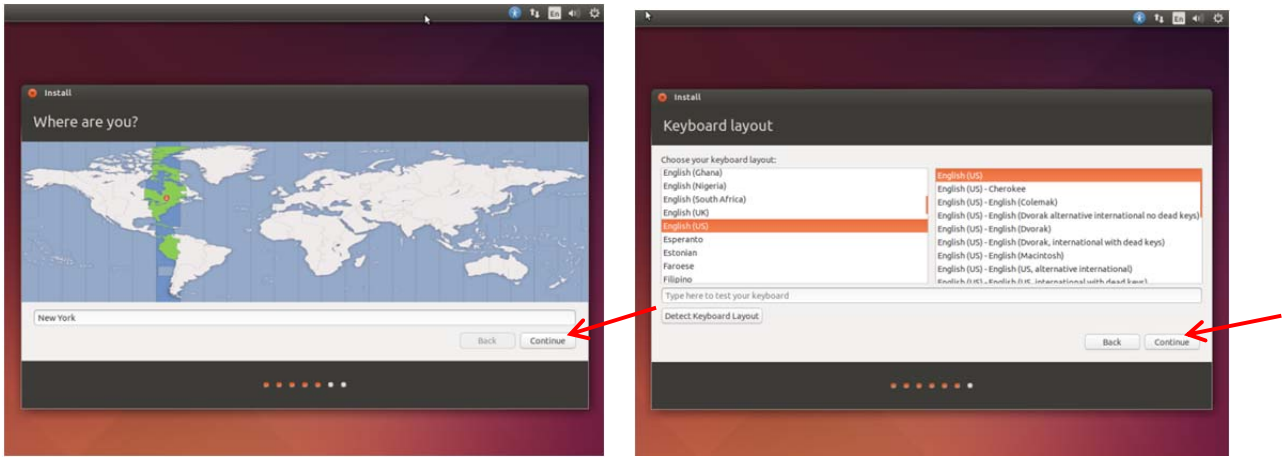
Wait for the OS to be installed.[4]



Click on “Install Ubuntu” and continue, and erase disk, ... etc as shown below/overleaf:

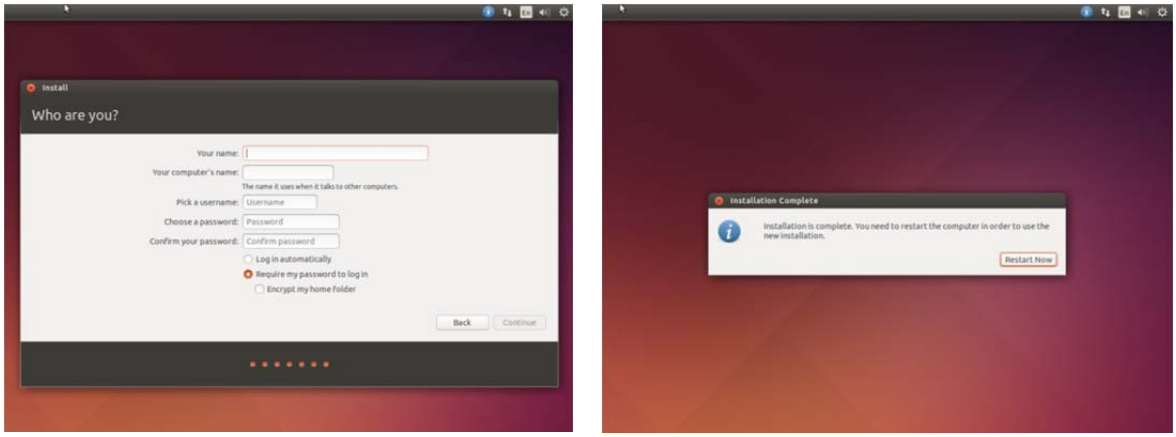


[4] Possible issue here is mouse integration that stops the cursor moving across VirtualBox window, see VirtualBox documentation.



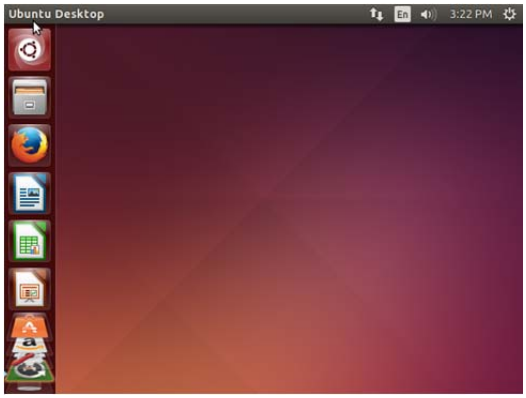
At the following screen you need to enter details including the computer name used to communicate with other computers. If you want to use the actual computer name, it can be found by issuing the command “hostname” from the command line console. The Windows console **cmd.exe** can found by searching on “cmd” at “Start” (Lower left corner of Windows).

“Log in automatically” can be selected if desired. A password is required and will be needed on occasion. This password is the password associated with the username (user’s account on the installed Ubuntu). For access with root privileges, you have to use **sudo** even as the installer, see later.



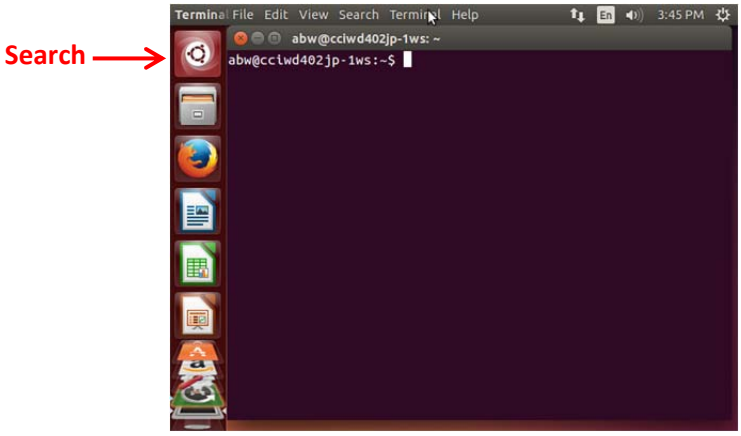
Wait for the installation to complete. Then success!

Restart and press “Enter” key and wait for Ubuntu to start. (Disable encryption if asked. If any errors at this point try reboot without saving the machine state.):



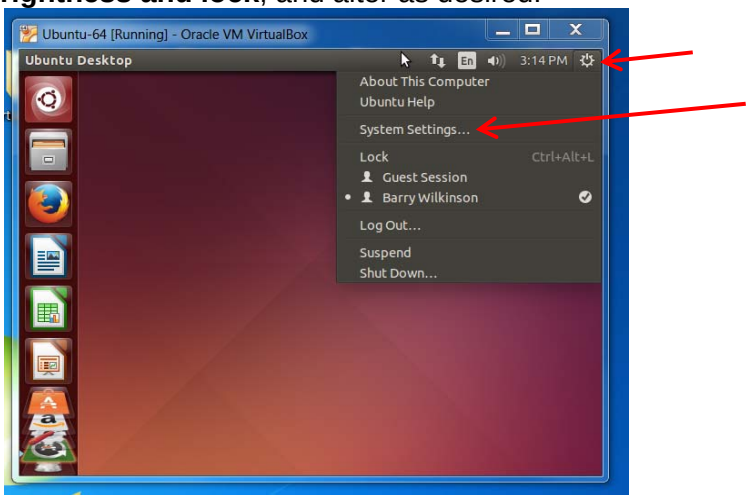
It can take some time to get to this point so be patient.

Terminal window: Click the search icon (to left on icon ribbon) to search on “Term” and start a terminal:



You will need this subsequently to enter commands to install software, so lock terminal to left side launcher (click on terminal icon on left side ribbon).

Screen locking. For convenience on a private computer, you may wish to change the setting for locking the screen after user inactivity (5 minutes). Go to right side upper corner icon **> Systems Settings > Brightness and lock**, and alter as desired.



Installation of software using the Ubuntu Package Repository

The easiest way to install software in the Ubuntu OS is from the Ubuntu package repository (https://help.ubuntu.com/community/Repositories/Ubuntu) using the **apt-get** command.[5] This may not get the most recently available versions but is much easier than installing the software directly from the source. Packages can be searched from: http://packages.ubuntu.com/

In Ubuntu, you cannot login as root, so for commands that require root privileges you will need to switch user to root with the command **sudu su** or prefix each command with **sudo.**

Generally before installing any packages with **apt-get**, check the package repository is up-to-date with the command:

sudo apt-get update

The command to check if installed software needs updating to a newer version (e.g. a security update) is:

sudo apt-get upgrade

VirtualBox Guest Additions

It is highly recommended to add so-called VirtualBox guest additions that enable a number of important features such as copy-and-paste across host and guest OS and desktop scaling. This makes your life much easier.

To install guest additions, issue the command:

sudo apt-get install virtualbox-guest-x11

on a terminal window. [6]

Copy-and-Paste across Host and Guest OS.

After guest additions are installed, copy-and-paste across host and guest OS is then enabled by first selecting the machine icon (e.g. "Ubuntu-64") and then setting from **Machine > Settings > Advanced > Shared Clipboard "Bidirectional" and Drag 'n' Drop "Bidirectional"**. Note this only applies to a particular machine. If you have multiple virtual machines installed, you would need to do it for each machine.

Closing the Machine. Note: when you close a virtual machine you have the option of "*Save the machine state"* or *"Power off the machine"*. *"Power off the machine"* is necessary if you intend to reboot, reading the **~/.profile** file (see software installations)

For more information on VirtualBox see https://www.virtualbox.org/manual/ch04.html

[5] See https://help.ubuntu.com/12.04/serverguide/apt-get.html for more information on the **apt** tool.

[6] An alternative probably more extensive way is to go to **Devices > Insert Guest addition CD image ...**