بسم الله الرحمن الرحيم

Introduction to Linux Operating System

Lab 01

اللهم علمنا ما ينفعنا ،،،   وانفعنا بما علمتنا ،،،   وزدنا علماً

Lab Objective

- To introduce some of the common Linux commands

Introduction

- *Linux* is a clone of the *Unix* operating system.
- Unix was developed in 1969 by Dennis Ritchie and Kevin Thompson at Bell Laboratories.
- Most of the Unix operating system is written in the high-level programming language C.
- A Unix operating system consists of a kernel and a set of common utility programs.
- The kernel is the core of the operating system, which manages the computer hardware, controls program executions, manages memory, etc.
- The utility programs provide user level commands, such as those to create and edit files.

Why Linux?

- Free, open source.
- Ubuntu is a complete Linux operating system
- At Ubuntu's heart is the Linux kernel
- Ubuntu has a graphical user interface (GUI), making it similar to other popular operating systems like Windows and Mac OS
- The OS represents applications as icons or menu choices that you can select using keyboard commands or a mouse

How to Use Ubuntu?

- Requirements:

  1- VirtualBox (on your Windows or Mac computer)
  https://www.wikihow.com/Install-VirtualBox

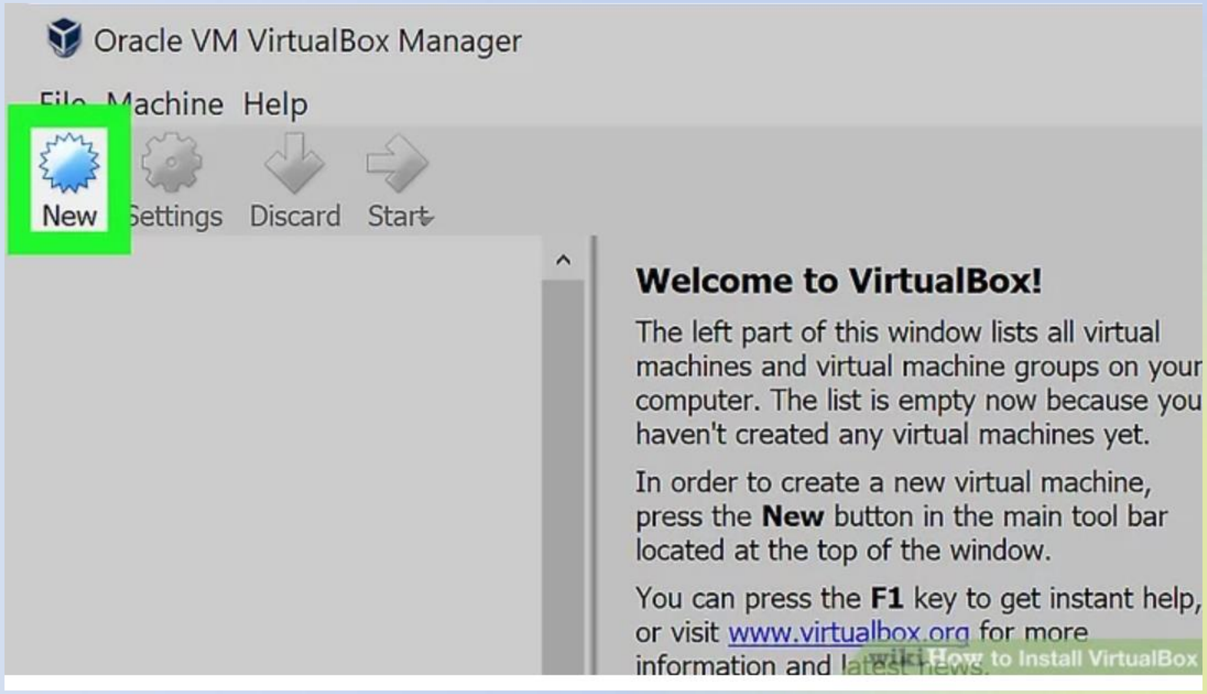
  2- Ubuntu disk image (ISO File)
  https://ubuntu.com/download/desktop

How to Use Ubuntu?

- Once you have download the VirtualBox:

  1- Install the Ubuntu operating system by using its ISO file on the Virtual Machine.

  2- Open VirtualBox and click on New tab.



Welcome to VirtualBox!

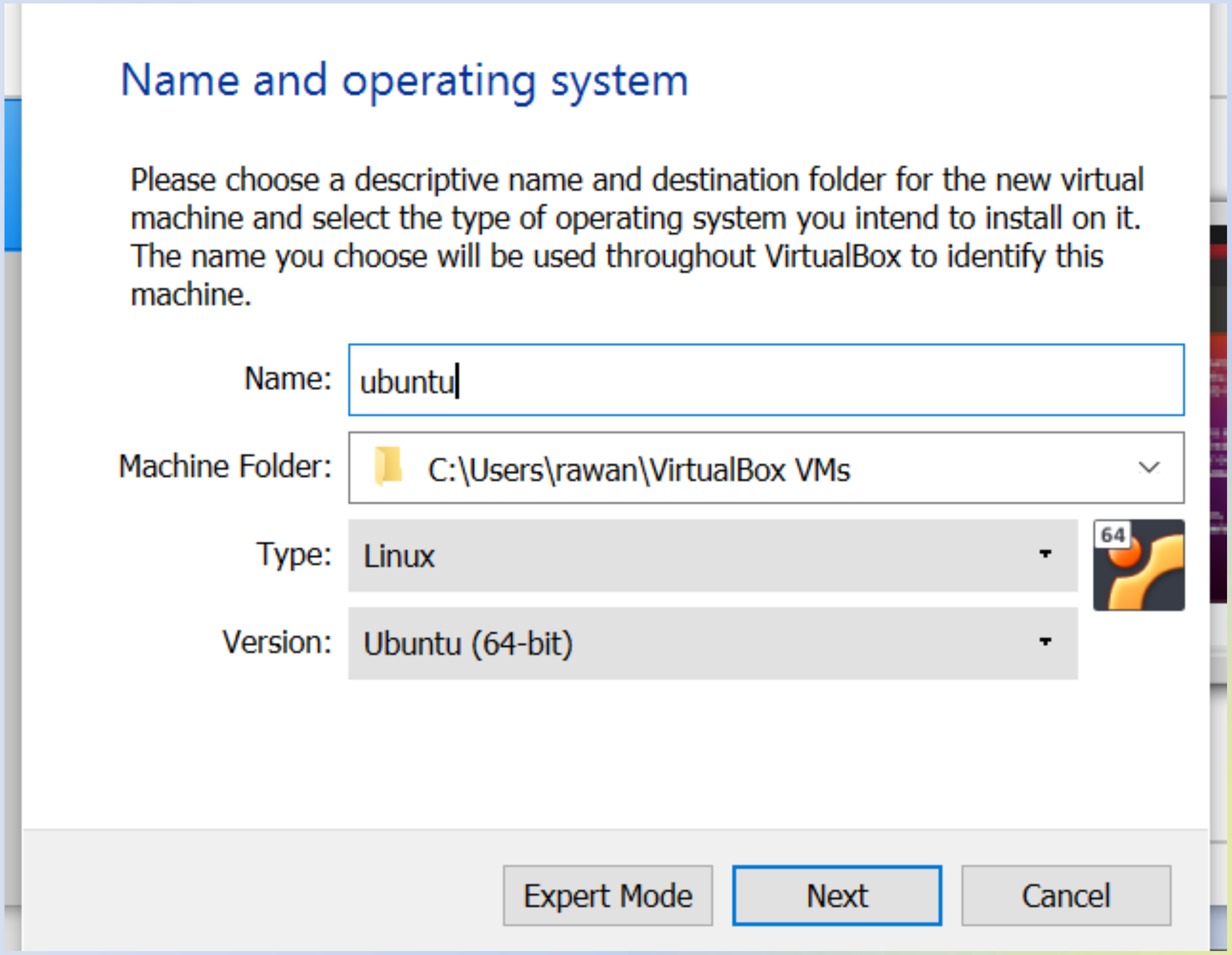
The left part of this window lists all virtual machines and virtual machine groups on your computer. The list is empty now because you haven't created any virtual machines yet.

In order to create a new virtual machine, press the **New** button in the main tool bar located at the top of the window.

You can press the **F1** key to get instant help, or visit www.virtualbox.org for more information and latest news.

How to Use Ubuntu?

3- Identify the operating system as following:



Name and operating system

Please choose a descriptive name and destination folder 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: ubuntu

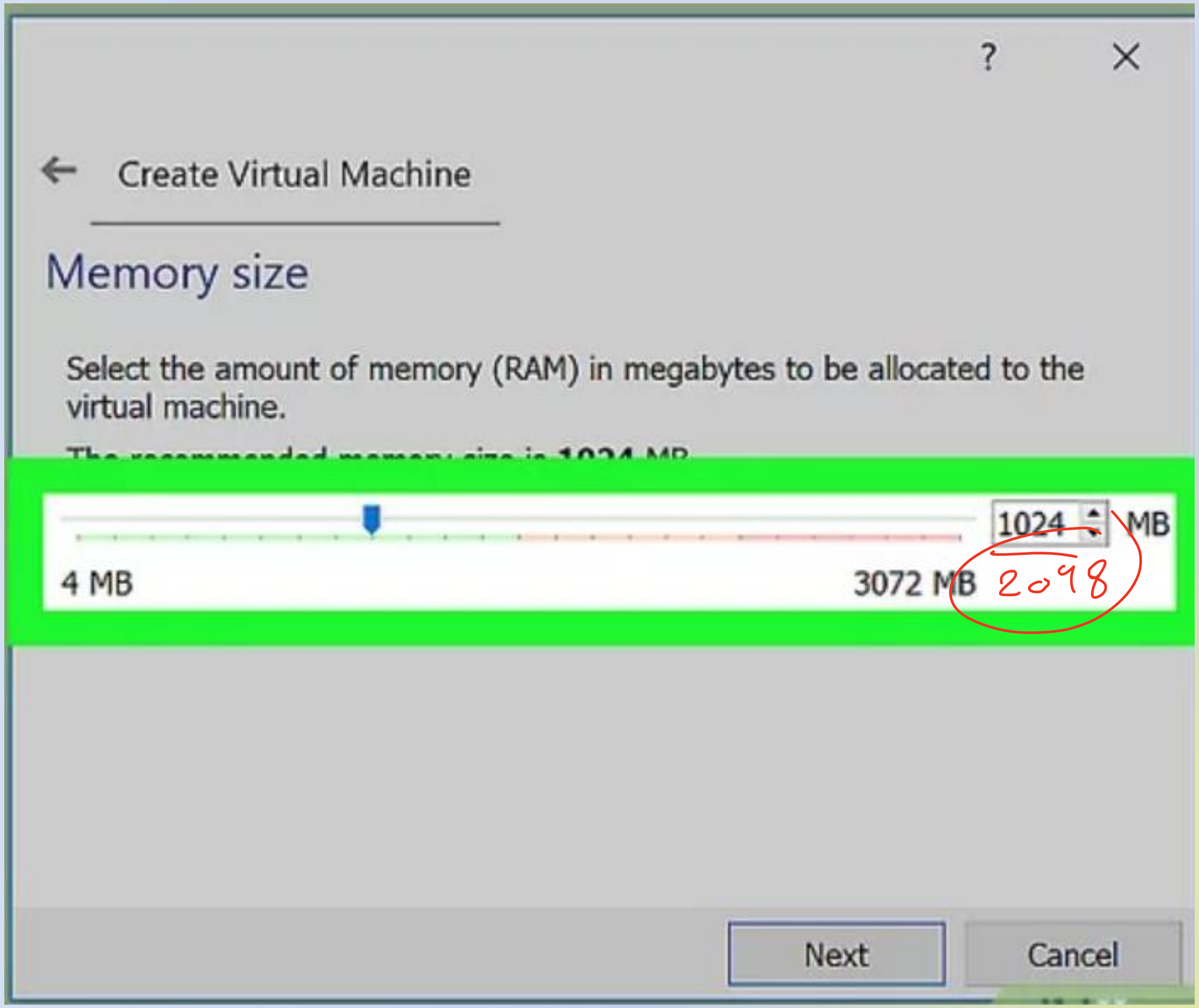
Machine Folder: C:\Users\rawan\VirtualBox VMs

Type: Linux

Version: Ubuntu (64-bit)

How to Use Ubuntu?

4- Set the amount of RAM as following:



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

1024 MB

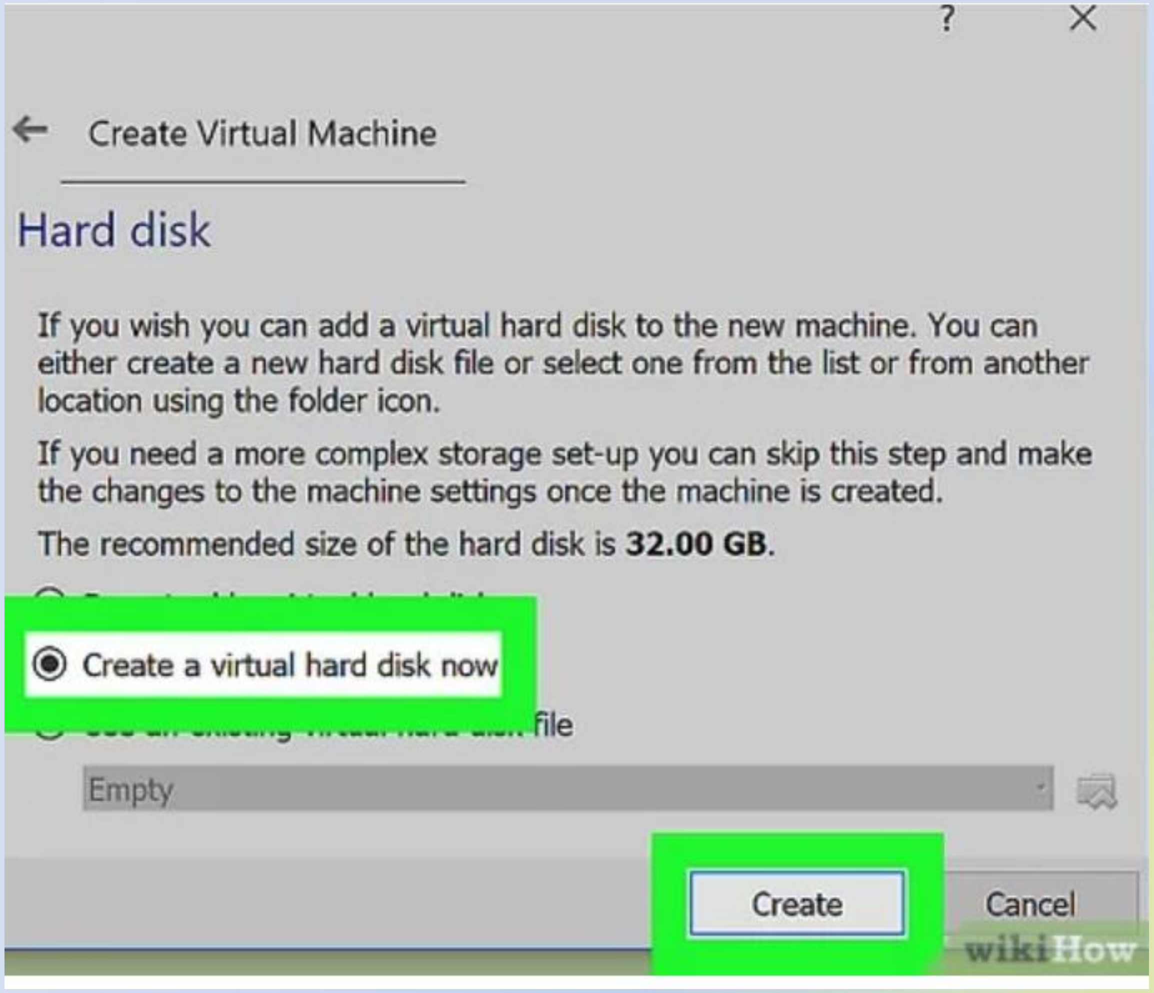
4 MB

3072 MB

2048

How to Use Ubuntu?

5- Create a virtual hard drive as following:



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 **32.00 GB**.

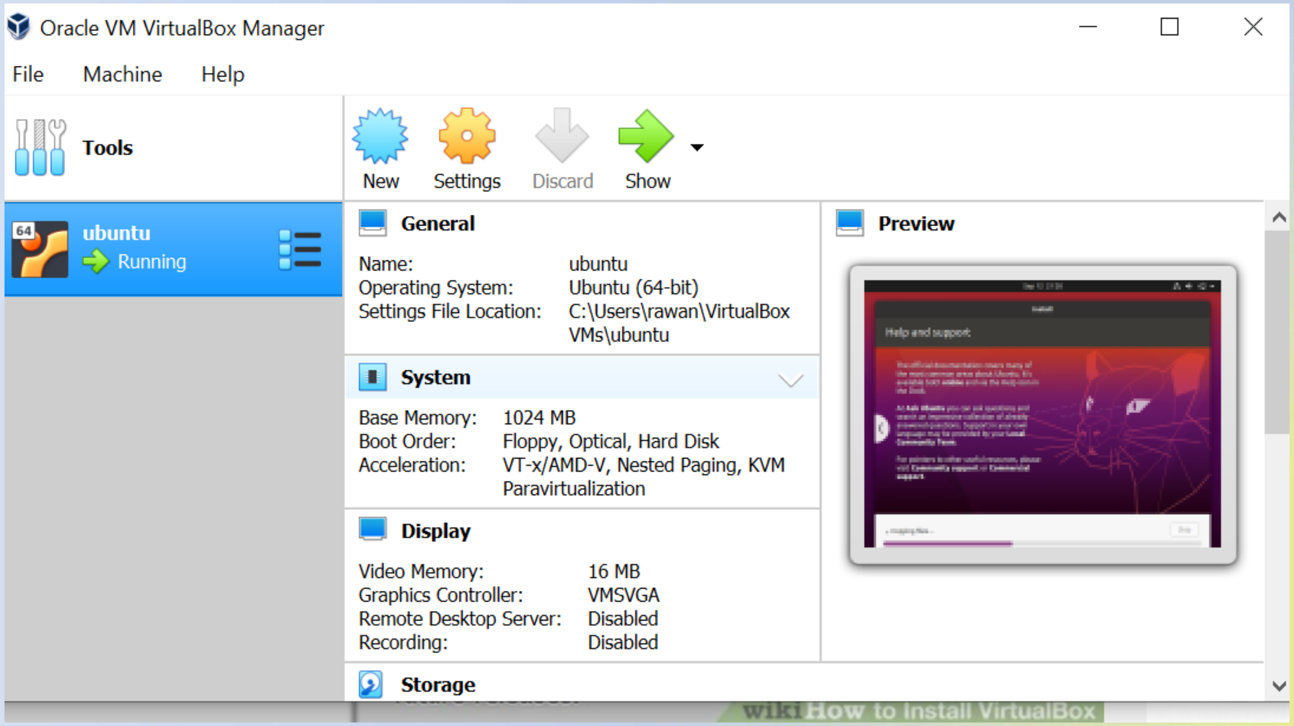
[✓ Create a virtual hard disk now]

file

Empty

How to Use Ubuntu?

6- Once the virtual machine has been configured, Start the operating system installation. Double-click your new machine (ubuntu) in the left menu, then browse through your computer for the installation image file



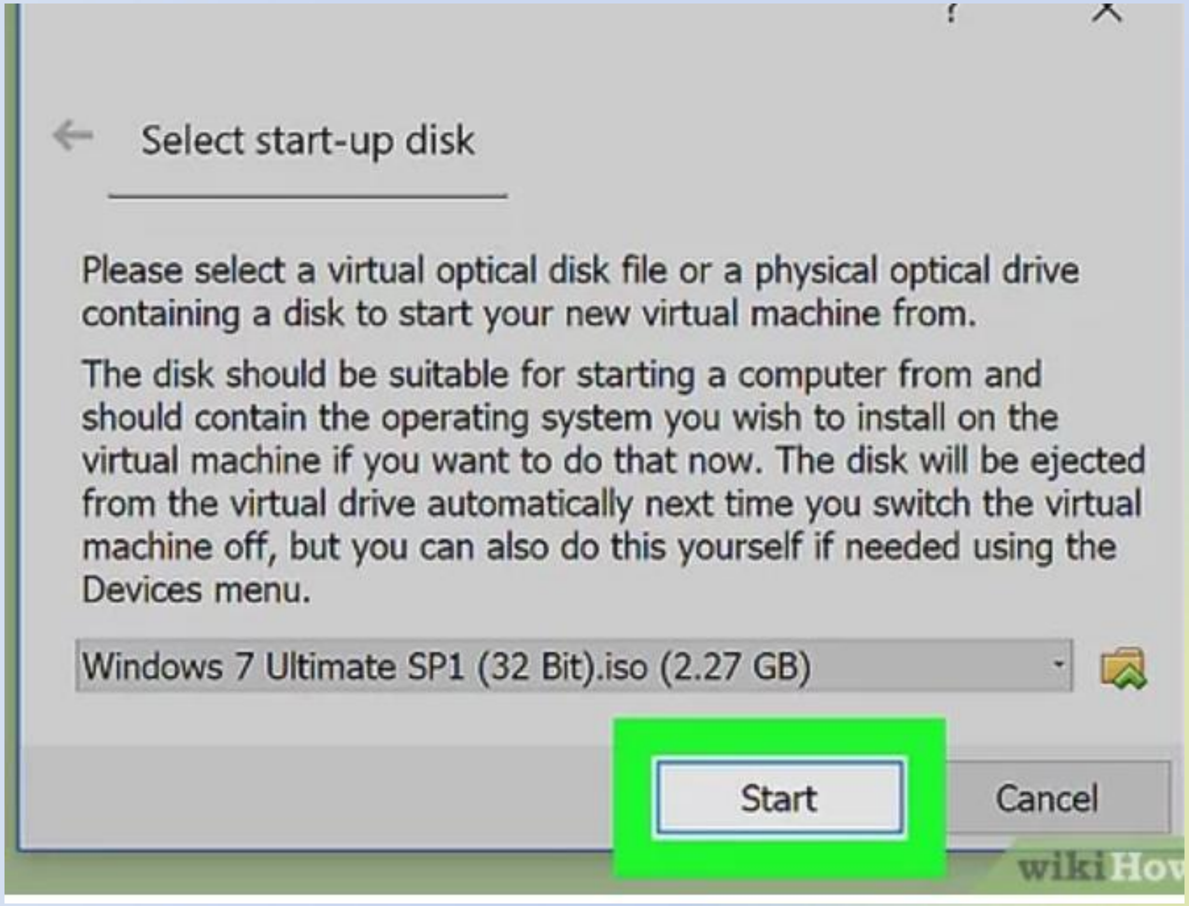
Name: ubuntu
Operating System: Ubuntu (64-bit)
Settings File Location: C:\Users\rawan\VirtualBox VMs\ubuntu

Base Memory: 1024 MB
Boot Order: Floppy, Optical, Hard Disk
Acceleration: VT-x/AMD-V, Nested Paging, KVM Paravirtualization

Video Memory: 16 MB
Graphics Controller: VMSVGA
Remote Desktop Server: Disabled
Recording: Disabled

How to Use Ubuntu?

7- Click Start to prompt VirtualBox to begin reading your ISO file.


Select start-up disk

Please select a virtual optical disk file or a physical optical drive containing a disk to start your new virtual machine from.

The disk should be suitable for starting a computer from and should contain the operating system you wish to install on the virtual machine if you want to do that now. The disk will be ejected from the virtual drive automatically next time you switch the virtual machine off, but you can also do this yourself if needed using the Devices menu.

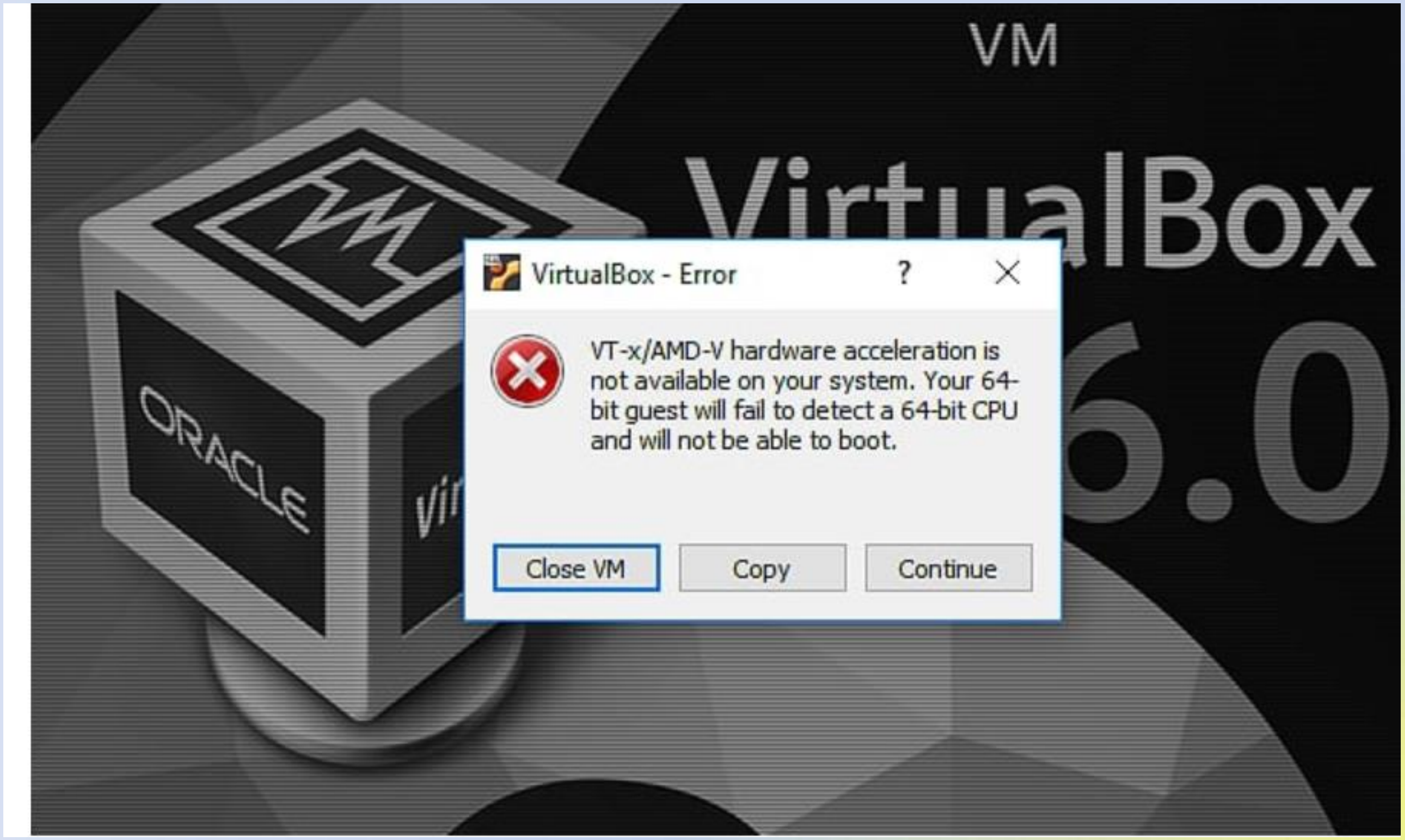
Windows 7 Ultimate SP1 (32 Bit).iso (2.27 GB)

How to Use Ubuntu?

8- Boot up your virtual machine. Once the operating system is installed, your virtual machine is ready to go. Simply double-click the name of your virtual machine in the left menu of the VirtualBox main page to start it up.

How to Use Ubuntu?

You may encounter an ERROR when you try to start up Ubuntu as this message shows:



VT-x/AMD-V hardware acceleration is not available on your system. Your 64-bit guest will fail to detect a 64-bit CPU and will not be able to boot.

How to Use Ubuntu?

To solve that problem, you have to enable Virtualization by Restarting your computer and booting. HOW?

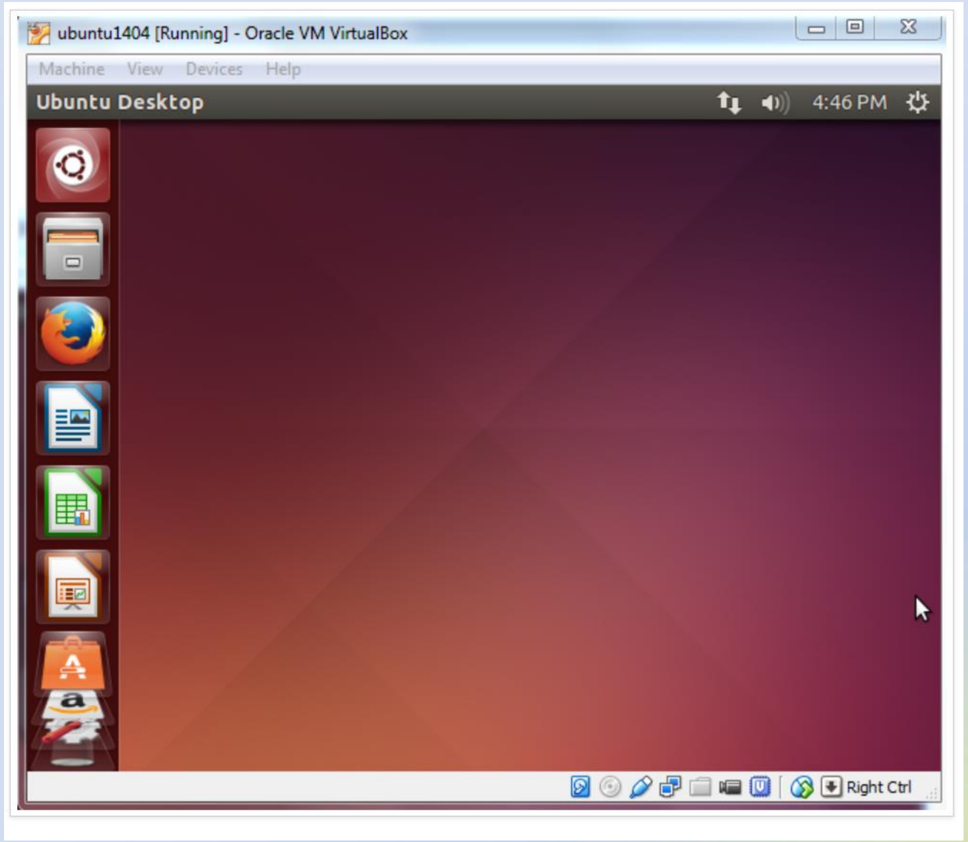
- By pressing F12 or F2 while starting the system to get the booting menu, then choose advanced setting and enable Virtualization or choose (VT-X / AMD V) from Virtualization menu.
- Save the changes and exit.

How to Use Ubuntu?

Once there is no problem, Install Ubuntu as described in the following link.

https://brb.nci.nih.gov/seqtools/installUbuntu.html#install

Ubuntu

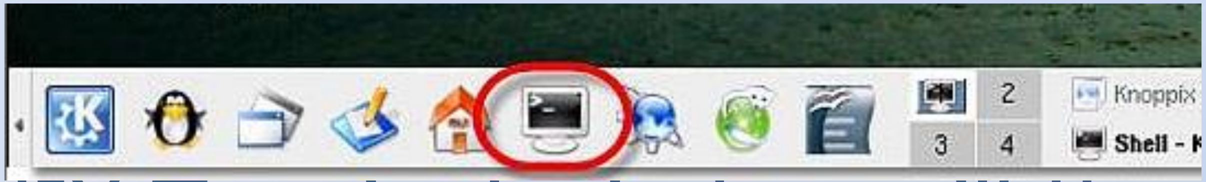


- This screenshot shows the Ubuntu desktop. A Web browser opens by default. You can minimize or close it to get it out of the way.

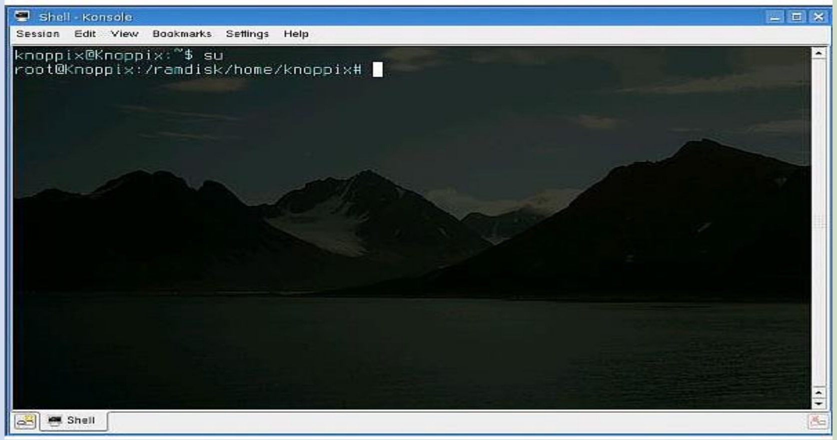
LINUX COMMANDS OVERVIEW

Starting an UNIX Terminal

- To open an UNIX terminal window, click on the "Terminal" icon in the lunch bar.



- An UNIX Terminal window will then appear with a **$** prompt, waiting for you to start entering commands.
- Unix Terminal is like Windows DOS



```
knoppix@Knoppix:~$ su
root@Knoppix:/ramdisk/home/knoppix# 
```

General Linux Command Format

- A little like DOS commands on windows with some differences

The Command

One or more the directory/file to apply the command to

```
$ cmd -[option(s)] [argument(s)]
```

One or more options to change the behavior of the command

- Notes:
  - Parts between [] packets are optional
  - Linux is CASE SENSITIVE

Getting Help

- In Linux, there are on-line manuals which gives information about most commands.
- `man` is used to read the manual page for a particular command one page at a time:

```
$ man cmd
```

- **Examples,**

```
$ man ls
```

→ Displays the manual pages of the command **ls**

```
$ man man
```

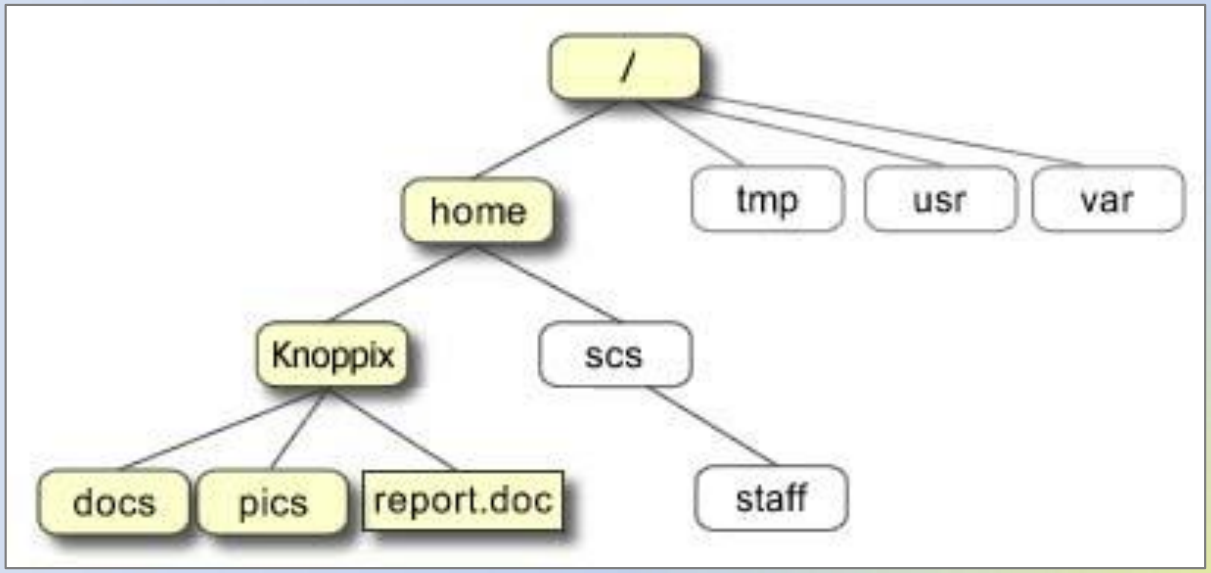
→ Displays the manual pages of the command **man**

- Use the following keys to go through the manual
  - Enter → one line forward
  - F → Forward one window OR
  - B → Backward one window OR screen
  - Q → Quits the manual

DIRECTORY COMMANDS

What is a Directory?

- In Linux, all the files are grouped together in the directory structure.
- The file-system is arranged in a hierarchical structure, like an inverted tree.
- The top of the hierarchy is called **root** (written as a slash **/**)



- In the diagram above, the full path to the file **report.doc** is:

/home/knoppix/report.doc

Pathnames

- **pwd** (print working directory) is used to prints the current directory, type:

```
$ pwd
```

The full pathname will look something like this:
/home/rawan

Making and Removing Directories

- `mkdir` and `rmdir` are used for making and removing directories.

```
$ mkdir dirname
```

→ Creates a new directory with name ***dirname*** in the current directory

```
$ rmdir dirname
```

→ Deletes the directory ***dirname*** from the current directory

  – **Note:** A directory must not contain any files when it is deleted, otherwise an error message is displayed.

- Examples:

```
$ mkdir dir1
```

→ Creates a new directory called **dir1**

```
$ rmdir dir3
```

→ Removes the directory **dir3** (if it exists)

Changing to a Different Directory

- `cd` (Change Directory) is used to change the working directory.

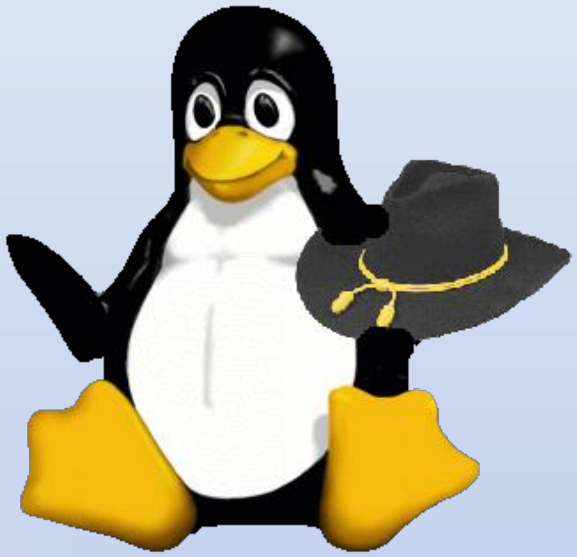
`$ cd dirpath`	Changes the current directory to the relative or absolute pathname of the directory ***dirpath***.
`$ cd`	If no directory is given, the command changes the current directory to the home directory.
`$ cd ..`	Changes to the parent directory.

- Examples:

`$ cd`	Change to home-directory
`$ cd dir1`	Change to directory **dir1**
`$ cd dir2`	Error because **dir2** is not in **dir1**
`$ cd ..`	Change to parent directory **dir1**
`$ cd dir2`	Change to directory **dir2**
`$ cd /home/knoppix/dir1`	Change to directory **dir1**

Directory Commands Summary

Command	Meaning
`pwd`	display the path of the current directory
`mkdir` *`dirname`*	make a directory
`rmdir` *`dirname`*	remove a directory
`cd` *`directory`*	change to named directory
`cd`	change to home-directory
`cd ..`	change to parent directory



FILE COMMANDS

What is a file?

- A file is a collection of data.
- They are created by users using text editors, running compilers etc.
- Examples of files:
  - a document (report, essay etc.)
  - the text of a program written in some high-level programming language (like C or C++)

Listing files and directories

- `ls` (list) is used to list information about files and directories.

```
$ ls dirpath
```

If the command has a directory name as argument (i.e., dirpath), then the command lists the files in that directory.

```
$ ls
```

If no directory is given, then the command lists the files in the current directory.

```
$ ls -l
```

Includes extensive information on each file.

- Note: The `ls` command has several options. The most important is `ls -l`, which includes extensive information on each file, including, the access permissions, owner, file size, and the time when the file was last modified.

Moving and renaming Files

- **mv** is used to rename or move a file or a directory.

```
$ mv fname newfile
```

→ The file or directory ***fname*** is renamed as ***newfile***. If the destination file (***newfile***) exists, then the content of the file is overwritten, and the old content of ***newfile*** is lost.

```
$ mv fname dirname
```

→ If the first argument is a file name and the second argument is a directory name (*dirname*), the file is moved to the specified directory.

- Examples:

```
$ mv dir2 dir5
$ mv dir5 dir1
$ mv file2 dir1
```

→ Renames **dir2** to **dir5**

→ Moves **dir5** to **dir1**

→ Moves **file1.txt** to **dir1**

Copying and Removing Files

- **cp** (copy) and **rm** (remove) are used to copy and remove files:

```
$ cp fname newfile
```

Copies the content of file *fname* to *newfile*. If a file with name *newfile* exists the content of that file is overwritten.

```
$ cp fname dirname
```

If the second argument is a directory, then a copy of *fname* is created in directory *dirname*.

```
$ rm fname
```

Removes the file *fname* from the current directory

- Examples:

```
$ cp file1 dir1
$ cd dir1
$ cp file1 file2
$ rm file1
```

Copy **file1** to **dir1**

Copy to **file1** to **file2** overwriting its content

Removes **file1**

View and Modify Text Files

- `more` and `cat` are used to view and modify text files.

```
$ more fname
```

→ Displays the contents of file ***fname***, one page at a time.

```
$ cat fname
```

→ Similar to the more command, but the file is displayed without stopping at the end of each page

- Examples:

```
$ more file1
$ cat file1
```

→ Displays the contents of **file1**

→ Displays the contents of **file1**

File Commands Summary

Command	Meaning
`ls`	list files and directories in the current directory
`ls` *`dirpath`*	List files and directories in *dirpath*
`ls -l`	Includes extensive information on each file
`mv` *`file1 file2`*	rename *file1* to *file2*
`mv` *`file1 dirpath`*	move *file1* to *dirpath*
`cp` *`file1 file2`*	copy *file1* and call it *file2*
`cp` *`file1 dirpath`*	copy *file1* to *dirpath*
`rm` *`file`*	remove a file
`more` *`file`*	display a file
`cat` *`file`*	display a file

Redirecting Programs Output

- > and >> are used to redirect program output

```
$ cmd > fname
```

The output of ***cmd*** is written to file ***fname***. The file is created if it doesn't already exist, and the contents is overwritten if the file exists.

```
$ cmd >> fname
```

Appends the output of command ***cmd*** to the end of file ***fname***.

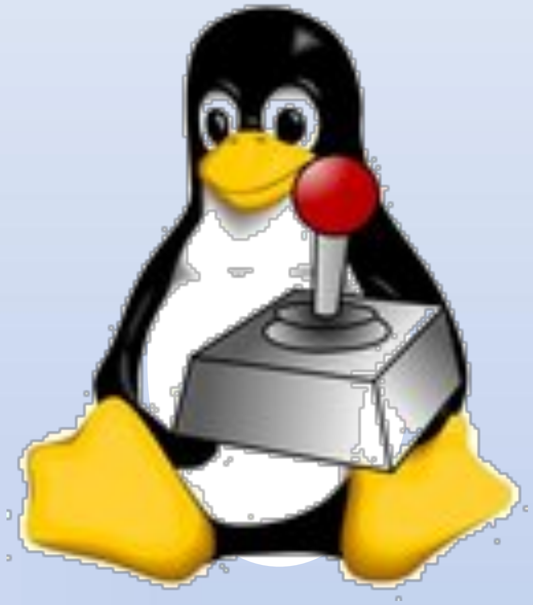
- Examples:

```
$ ls > mylist
```

Writes a listing of the current directory in file ***mylist***

```
$ ls >> mylist
```

Appends a listing of the current directory to file ***mylist***



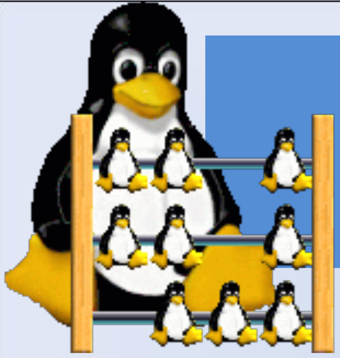
PROCESSES AND JOBS COMMANDS

Foreground and Background Processes

- A *process* is an executing program identified by a unique PID (process identifier).
- In Linux, each terminal window can run multiple commands at the same time.
- It is possible to stop a command temporarily and resume it at a later time.
- In each terminal window, one command can be run as a *foreground* process and multiple command can be run as *background* processes.

Processes and Jobs Commands

Command	Meaning
`Ctrl+C`	Terminates the command running in the foreground
`Ctrl+Z`	Stops (suspend) the commands in the foreground.
`cmd&`	Executes the command *cmd* in the background
`bg`	background the suspended job
`jobs`	Lists all background and stopped commands of the current user, and assigns a number to each command.
`fg %n`	Resume suspended job number **n** in the foreground, and make it the current job. The numbers are as displayed by the jobs command.
`bg %n`	Resumes suspended job number n in the background, as if it had been started with &.
`ps -all`	Lists all current processes and their assigned ID (pid)
`kill` *`pid`*	Terminates the process with the specified ID: ***pid***, where ***pid*** is as displayed by the command ***ps***



Exercise

- List all the content of the home directory then remove any subdirectory in it
- Go to the home directory then make 3 new subdirectory called (pics, docs, backup)
- Make a subdirectory in (pics), call it (babies)
- Rename the (backup) directory to (bup) then move it to the (docs) directory
- Write a listing of the current directory in a file called (*list_a*)
- Copy the file (*list_a*) to the (docs) directory
- Make a copy of (*list_a*) and call it (*list_b*) then move (*list_b*) to (bup) directory
- Run the command that displays the manual of the (passwd) command in the background
- Terminate all the background process

??? ANY QUESTIONS ???

☺