ELSEWEDY UNIVERSITY OF TECHNOLOGY
- POLYTECHNIC OF EGYPT -

Operating System

Lab 4: Introduction to linux

© Fall 2023 - **Eng. Taghreed Salem – Eng.Nahla Hafez**
Building, office No.
Taghreed.salem@sut.edu.eg

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History of UNIX

- UNIX was the first system designed from the ground up for networking, security, multitasking, and multiple users. It was developed in the laboratories of the American telephone company Bell by Ken Thompson in the early 1970s, but he used a bad programming language. Then Dennis Rinci and Brian Gear Negan invented the C programming language, and UNIX was rewritten in C.

- The features of the C language helped in easy porting of UNIX to different computers. UNIX has proven to be the undisputed best. UNIX is widely used in universities, and there are thousands of students who are proficient in using the C programming language and the UNIX system. Many improvements have been made to it.

- Suddenly, Bell Corporation (which later became AT&T) began threatening everyone and demanding that they pay money for using the UNIX system and modifying its code. Many people, especially those working in universities, were angry because they spent a lot of time and effort developing UNIX and now Bell Asking them to pay money so they can use the system they are tired of

Free Software Foundation FSF

- One of those people who was angry about Bell's behavior was Richard Stallman, who decided to start a project to write a new operating system similar to Unix in 1984. The only condition was that the code be open source (open source code) so that anyone could study the program and modify it. He can sell the program at any price, provided that he allows others to see these modifications, made an organization named "free sw foundation"

GNU’S NOT UNIX - GNU

- This group gained the support of many people, and they began writing a new operating system called GNU's Not Unix, for short .GNU. The GNU project has accomplished many important programs, but one of its most important achievements is not a program but a license. A new license was created to ensure that open source software would remain free without fear of being acquired by computer companies. The name of this license is the GNU General Public License (GNU GPL for short).

GNU'S NOT UNIX - GNU

- A recursive acronym is an abbreviation which refers to itself in the expression for which it stands.

Visa= ?
Visa International
Service Association.

- Wine — Wine Is Not an Emulator
- Xinha — Xinha is not htmlarea
- XINU — Xinu Is Not Unix
- XNA — XNA's Not Acronymed, a Microsoft game development framework
- YAML — YAML Ain't Markup Language (initially "Yet Another Markup Language")
- ZINC — ZINC is not commercial, a free database for virtual screening
- Zinf — Zinf Is Not FreeAmp
- Zombie — Zombie-Oriented Machine-Being Interface Engine

GNU cont.

An operating system is not a single program, but rather made up of many programs, just as a car is made up of many parts. The most important part of a car is the engine.

In any operating system, the most important program is the kernel, whether it is for Linux, UNIX, Windows, or another. The kernel deals with memory, central processing unit, hard disk, etc.

A kernel is a program written in the C programming language, and the computer only understands machine language. So we need a program that translates the kernel into machine language, and the name of this program is Compiler.

GNU cont.

The kernel is a huge program and must be divided into small parts so that you can develop each part easily. In the end, these parts must be brought together to implement the program that does it all, which is the Assembler.

While developing the kernel, you will find that there is some code that needs to be used in multiple places within the kernel. Instead of writing the same code many times, write it once. Then, if you need to use the same code again, add a pointer to it. Only the frequently used code is stored in one place, called libraries.

This group, the Free Software Foundation, quickly realized that before they could start writing the kernel, they would have to write the compiler, simplifier, library, and other things. Writing these programs took a few years. When they started writing the kernel that they called Hard, they faced difficulties and it took a long time until they became in 1991

LINUX Creation

- This year, my dear friends, in a cold country located in northern Europe called Finland specifically, there was a grain student named Linus Torvalds. Linus had one wish, which was to use the UNIX system on his personal computer (PC), like the UNIX systems at his university. But at that time, UNIX systems were running on supercomputers called Mainframe or on computers for scientists' use called Workstation. The difference between a PC and a Workstation computer was like the difference between a Mercedes and a Hyundai in price, quality, and ability. Of course, a broke university student like Linus cannot afford expensive devices. He has a computer but it lacks an operating system. So he decided to write a new operating system to run on his own computer.

LINUX Creation cont.

Linus did not immediately start writing a new operating system. Rather, he saw that another group had written the basic programs, and only the kernel remained.

So Linus began writing this new kernel, which he called Linux. He noticed that the name Linux resulted from the combination of Unix and Lens (the first name). (by Lens Tovalds).

So Linux + GNU programs = complete operating system

Every operating system on Earth is made up of many programs, and all of these programs together are called the operating system.
One of these programs is called the kernel. The kernel is the program that sends and receives data to and from storage units (hard disk, diskette, floppy disk, or dual disk).

LINUX Creation cont.

The kernel is the one that deals with random memory (RAM). The kernel is what allows us to run several programs at the same time, allows several people to access the device at the same time, etc. So the kernel is the most important program in the operating system and the name of this kernel that we use is Linux.

The correct name of the operating system is GNU/ Linux Operating System. But open any computer magazine or watch computer programs on TV and you will find them saying “Nix” when talking about the operating system as a whole. This situation causes confusion for people who have recently started using Linux, because when the word “Linux” is mentioned, it sometimes means the entire operating system and sometimes it means only the kernel.

LINUX Uses

- Web Serving

Nearly 60% of all websites on the Internet are run using an Open Source program named "Apache." Most often, it's run on Linux. If you've ever surfed the web, you've (indirectly) used Linux!

- Networking

Linux is based on Unix, an operating system developed in the 1970s and which is still used heavily today, especially to run the Internet. Linux is used both to run parts of the Internet, as well as to run small and large networks in corporations, offices and homes

- Databases

Since Linux is stable, secure and robust, it's perfect for storing huge databases of information.

LINUX Uses

- Desktops

People like us use Linux on our home and work computers, because of its stability and flexibility.

- Home Computing

And, of course, people like us, and people like you, can and do use Linux on a daily basis at home and in the office!

- Scientific Computing

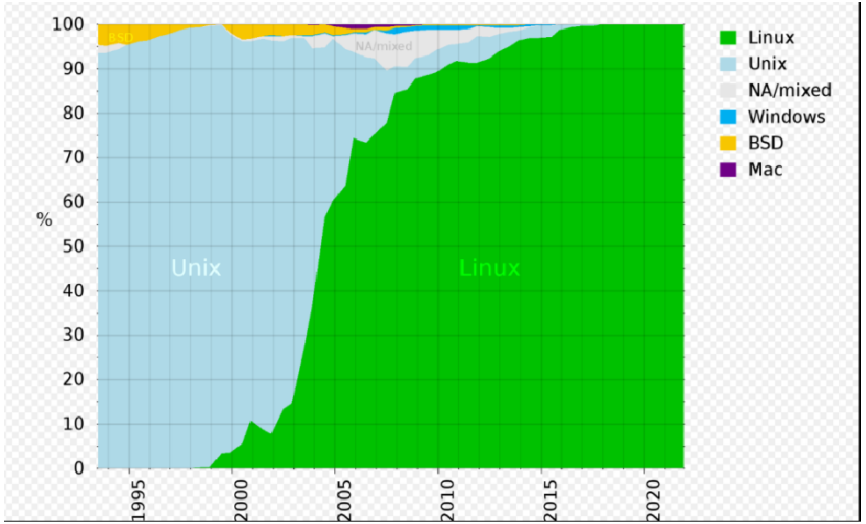
Many dozens (or even hundreds or thousands) of Linux systems can be clustered together to work on a single task (like weather forecasting, physics simulations, computer graphics rendering, etc.)A large collection of inexpensive PCs running Linux can be just as powerful as a mainframe computer, but at a tenth of the cost.

MARKET SHARE

Desktop/Laptop operating system browsing statistics

Windows	62.06%
macOS	18.96%
Unknown	12.69%
ChromeOS	3.59%
Linux (excluding ChromeOS)	2.7%
FreeBSD	0%
Other	0%

Desktop OS market share according to StatCounter as of May 2023.[92]
ChromeOS is also based on the Linux kernel.



Supercomputer OS family – 1993–2021 systems share according to TOP500[269]

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Introduction to Linux

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Linux set up in a VM (virtual machine)

How to set up Linux in a VM (virtual machine)

1) Download & Install VMWare Player.

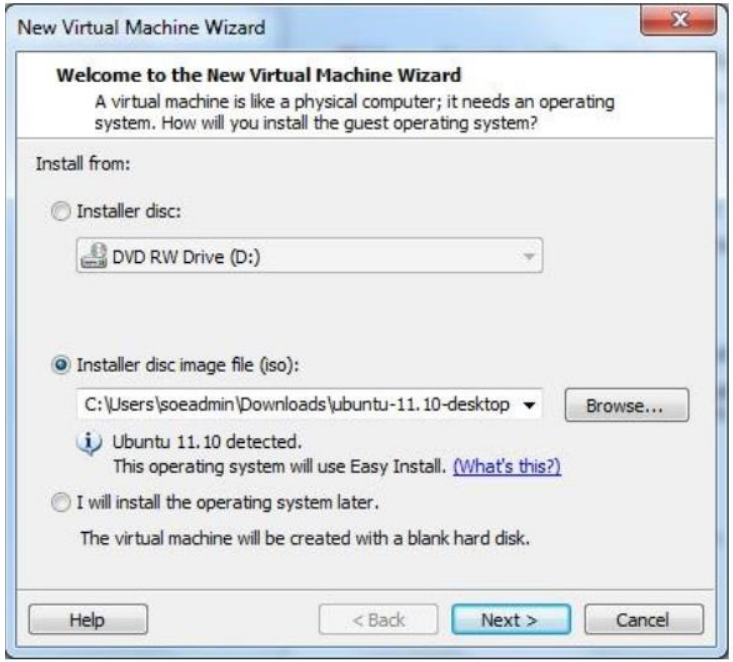
2) Download Ubuntu by choosing the option of downloading it onto a CD or USB stick. Remember to choose either 32-bit or 64-bit.
http://www.ubuntu.com/download/desktop

How to set up Linux in a VM (virtual machine) cont.

3) Open the VMWare player application. MAKE SURE TO RUN THE PROGRAM AS AN ADMINISTRATOR. Click on Create a New Virtual Machine.

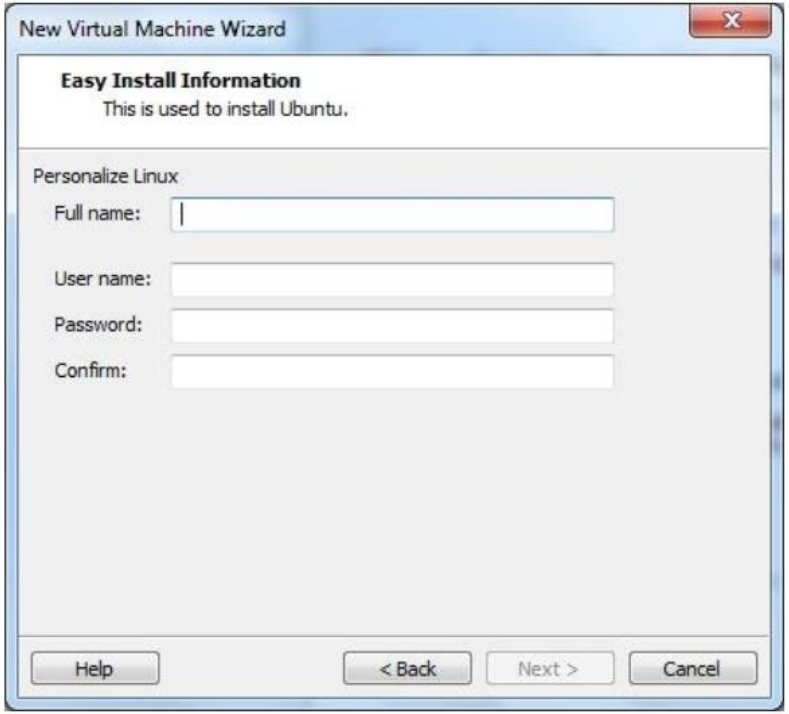
How to set up Linux in a VM (virtual machine) cont.

4) Choose install from Installer disc image file (iso) and browse for the Ubuntu .iso you just downloaded..



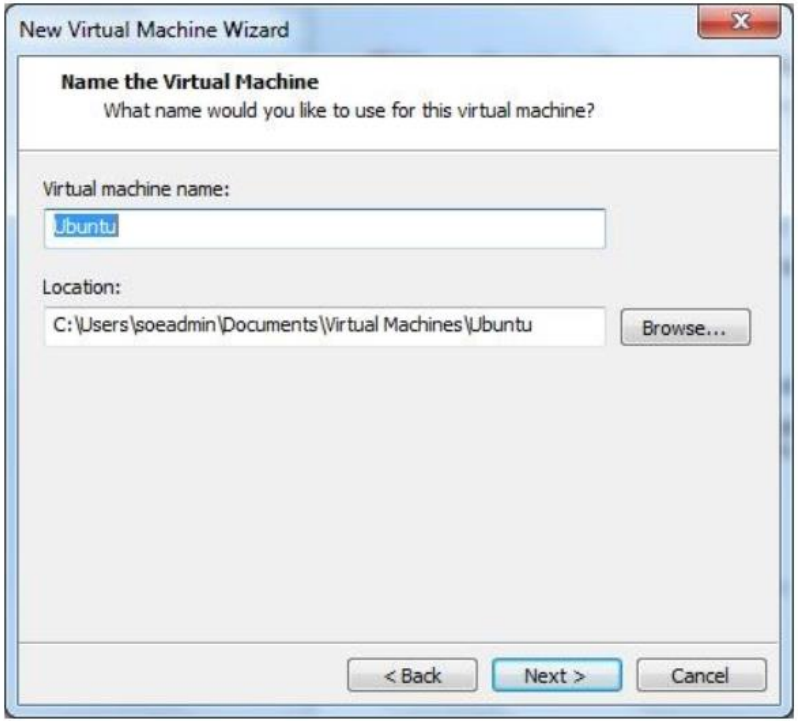
How to set up Linux in a VM (virtual machine) cont.

5) Enter the required information then click Next.

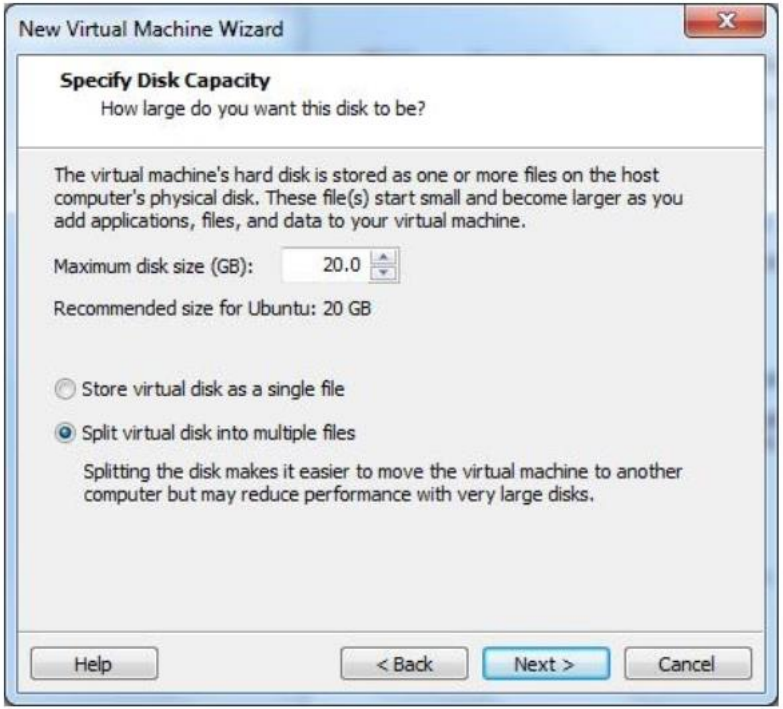


How to set up Linux in a VM (virtual machine) cont.

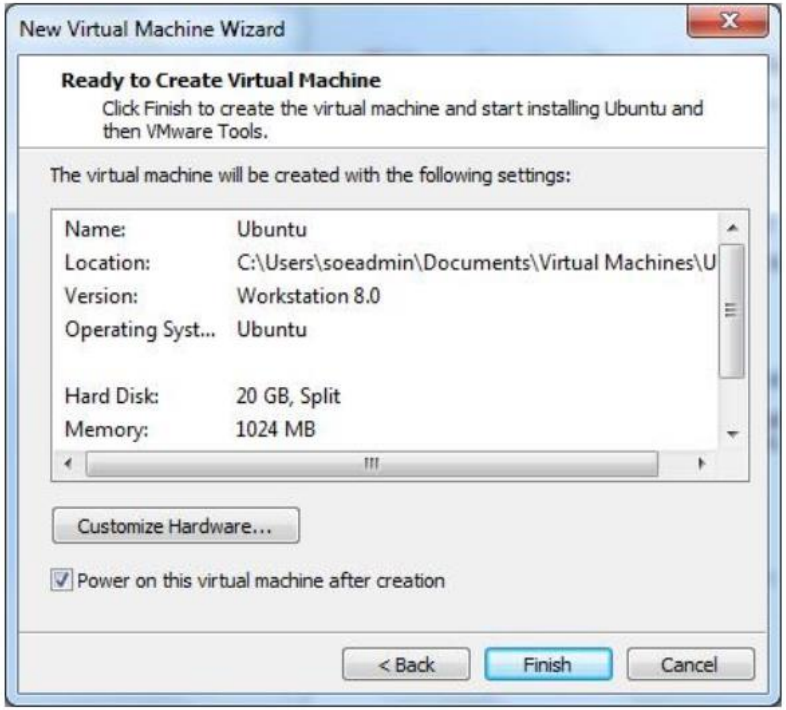
6) Enter a name you wish to use for the virtual machine, or you may leave it as is.



7) Leave the next box as is and click Next.

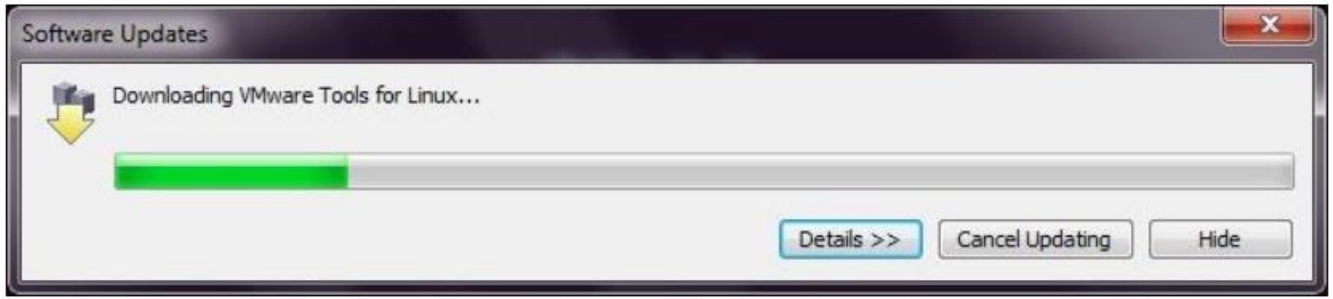


8) Click Finish to finalize your virtual machine.

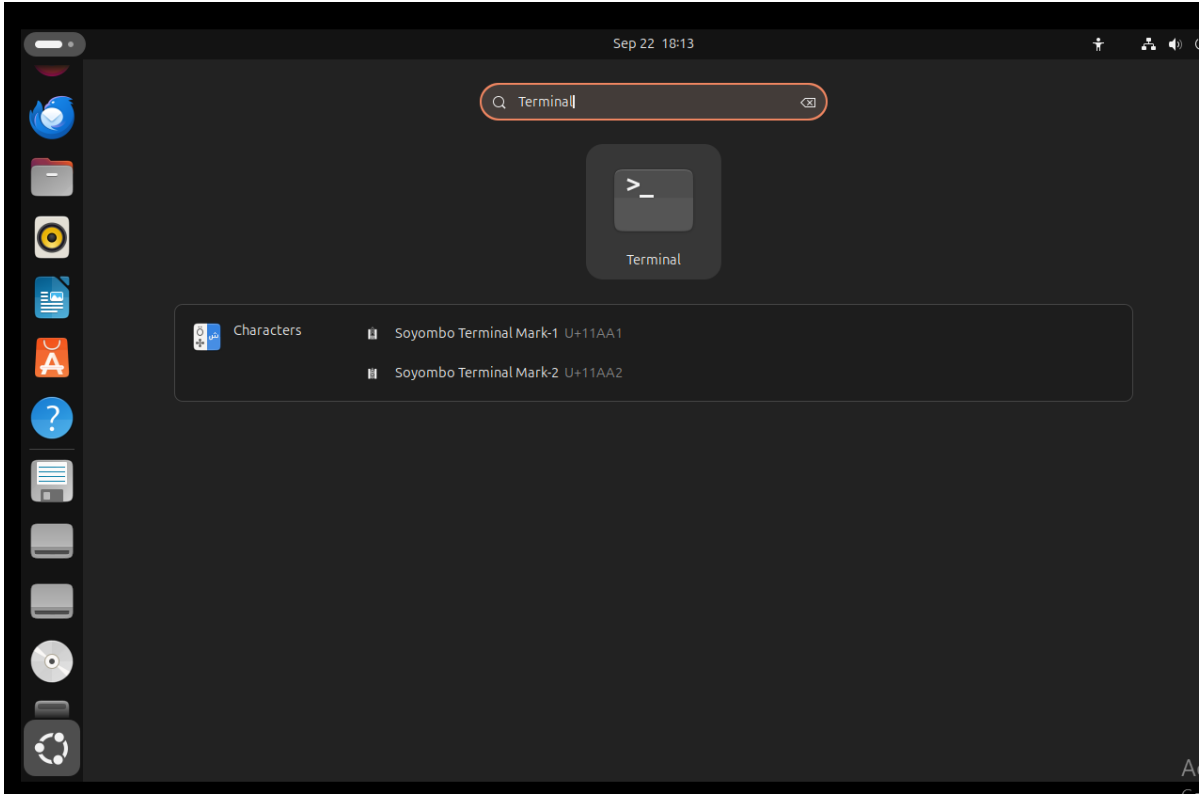


9) If you are prompted to install VMWare tools, then go ahead and do so.

Installing VMWare tools will support faster graphics performance along with additional benefits.

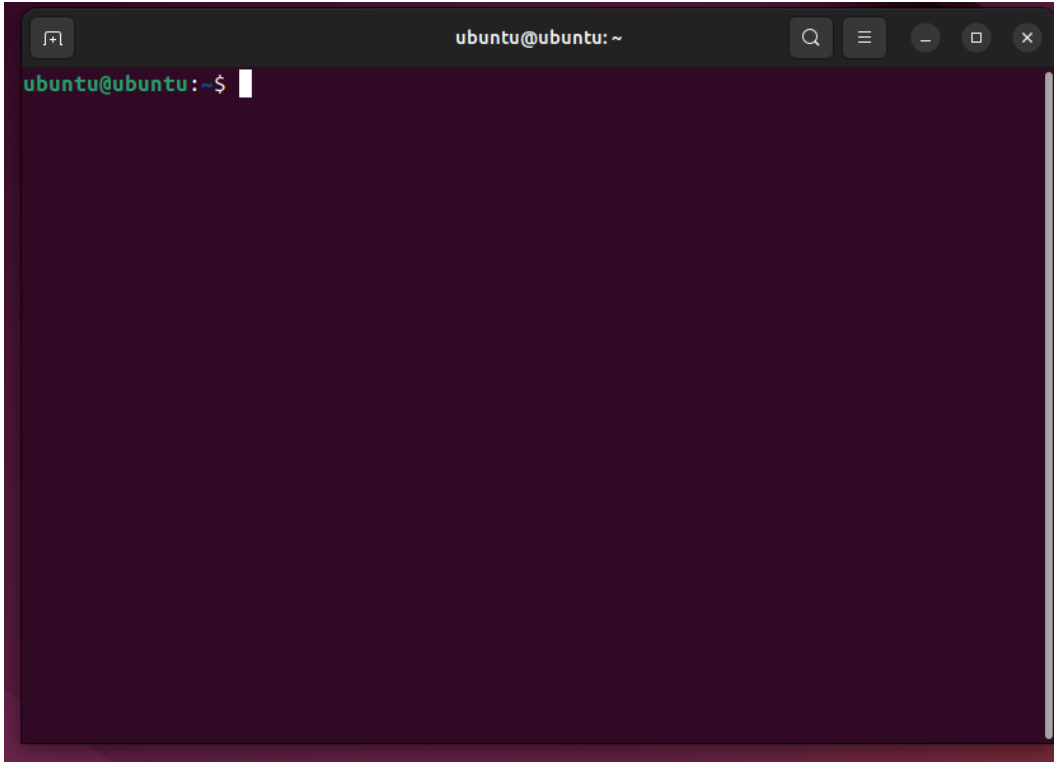


Open the Terminal in Ubuntu.



Testing our VM

Open the Terminal in Ubuntu.



What is a command shell?

- A program that interprets commands
- Allows a user to execute commands by typing them manually at a terminal, or automatically in programs called shell scripts.
- A shell is not an operating system. It is a way to interface with the operating system and run commands.

What is BASH?

- **BASH = Bourne Again Shell**
- **Bash** is a shell written as a free replacement to the standard Bourne Shell (/bin/sh) originally written by Steve Bourne for UNIX systems.
- It has all of the features of the original Bourne Shell, plus additions that make it easier to program with and use from the command line.
- Since it is Free Software, it has been adopted as the default shell on most Linux systems.

How is BASH different from the DOS command prompt?

- **Case Sensitivity:** In **Linux/UNIX**, commands and filenames are case sensitive, meaning that typing “EXIT” instead of the proper “exit” is a mistake.

- **“\” vs. “/”:** In **DOS**, the forward-slash “/” is the command argument delimiter, while the backslash “\” is a directory separator. In Linux/UNIX, the “/” is the directory separator, and the “\” is an escape character. More about these special characters in a minute!

- **Filenames:** The **DOS** world uses the “eight dot three” filename convention, meaning that all files followed a format that allowed up to 8 characters in the filename, followed by a period (“dot”), followed by an option extension, up to 3 characters long (e.g. FILENAME.TXT). In **UNIX/Linux**, there is no such thing as a file extension. Periods can be placed at any part of the filename, and “extensions” may be interpreted differently by all programs, or not at all.

Command Syntax

- Commands can be run by themselves, or you can pass in additional arguments to make them do
- different things. Typical command syntax can look something like this:
- command [-argument] [-argument] [--argument] [file]

Examples:

ls List files in current directory
ls -l Lists files in “long” format
ls -l --color As above, with colorized output
cat filename Show contents of a file
cat -n filename Show contents of a file, with line numbers

Navigating the Linux Filesystem

- The Linux filesystem is a tree-like hierarchy of directories and files. At the base of the filesystem is the “/” directory, otherwise known as the “root” (not to be confused with the root user). Unlike DOS or Windows filesystems that have multiple “roots”, one for each disk drive, the Linux filesystem mounts all disks somewhere underneath the / filesystem. The following table describes many of the most common Linux directories.

Commands for Navigating the Linux Filesystems

Linux Command	DOS Command	Description
pwd	cd	“Print Working Directory”. Shows the current location in the directory tree.
cd	cd, chdir	“Change Directory”. When typed all by itself, it returns you to your home directory.
cd directory	cd directory	Change into the specified directory name. Example: cd /usr/src/linux
cd ~		“~” is an alias for your home directory. It can be used as a shortcut to your “home”, or other directories relative to your home.
ls	dir /w	List all files in the current directory, in column format.
ls directory	dir directory	List the files in the specified directory. Example: ls /var/log
ls -l	dir	List files in “long” format, one file per line. This also shows you additional info about the file, such as ownership, permissions, date, and size.

Commands for Navigating the Linux Filesystems cont.

Linux Command	DOS Command	Description
ls -a	dir /a	List all files, including “hidden” files. Hidden files are those files that begin with a “.”, e.g. The .bash_history file in your home directory.
ls -ld directory		A “long” list of “directory”, but instead of showing the directory contents, show the directory's detailed information. For example, compare the output of the following two commands: ls -l /usr/bin ls -ld /usr/bin
ls /usr/bin/d*	dir d*.*	List all files whose names begin with the letter “d” in the /usr/bin directory.

Shortcuts to Make it all Easier!

Shortcut	Description
Up/Down Arrow Keys	Scroll through your most recent commands. You can scroll back to an old command, hit ENTER, and execute the command without having to re-type it.
“history” command	Show your complete command history.
TABCompletion	If you type a partial command or filename that the shell recognizes, you can have it automatically completed for you if you press the TAB key. Try typing the first few characters of your favourite Linux command, then hit TABa couple of times to see what happens.
Complete recent commands with “!”	Try this: Type “!” followed by the first couple of letters of a recent command and press ENTER! For example, type: find /usr/bin -type f -name m* ...and now type: !fi
Search your command history with CTRL-R	Press CTRL-R and then type any portion of a recent command. It will search the commands for you, and once you find the command you want, just press ENTER.
Scrolling the screen with Shift-PageUpand Page Down	Scroll back and forward through your terminal.