WHAT IS AN OPERATING SYSTEM?

- A computer, complete with all its parts – the CPU, mouse, monitor, and keyboard – will not work without a central program that will piece it all together
- In order to use a PC, you need a software inside which will take care of making the hardware work for you
- A special kind of software which is between the hardware of the PC, and the programs that you want to use and work with
- This piece of software is the Operating System, or more easily referred to as just an OS
- In short, an operating system is the software that brings together a computer's hardware and the different programs that you want to install on it
- Without it, when you booted up your PC, you would not get anything on the monitor, and neither mouse nor keyboard will work.

SOURCE: Easy Linux For Beginners book by Felix Alvaro

WHAT OPERATING SYSTEM DOES?

- **Detect hardware**
  - An OS is responsible for validating the components of a computer during boot up (hard drive, CPU, network cards, mouse, etc.) and loading the corresponding drivers and modules for the hardware to properly run
- **Manage processes**
  - Similar to the way our mind works, several processes or applications are running on a computer at the same time
  - It is the OS that is responsible for allocating CPU resources and sharing it among the processes
  - The OS also provides the user the option to start, stop, or restart a process
- **Manage memory**
  - Each application needs a specific amount of RAM and swap memory to function
  - The OS is responsible for assigning memory allocations, and for handling memory requests

SOURCE: Easy Linux For Beginners book by Felix Alvaro

WHAT OPERATING SYSTEM DOES?

- **Initiate user interfaces**
  - An OS offers users ways to access the system either via a command line or a graphical user interface (GUI) Establish file systems
  - The OS handles the management of files (access, directories, and structure), including the access to the file system

- **Manage access and user authentication**
  - An OS allows for creating user accounts with different permissions for access to files and processes

SOURCE: Easy Linux For Beginners book by Felix Alvaro

WHAT OPERATING SYSTEM DOES?

- **Provide a platform for administrative use**
  - A computer's OS provides a platform for the administrator to
    - Add users,
    - Allocate disk space,
    - Install software,
    - Perform activities to manage the computer
- **Start-up services**
  - The OS manages several processes running in the background known as daemon processes

SOURCE: Easy Linux For Beginners book by Felix Alvaro

THE NAMES YOU HEARD THE MOST

macOS®

UNIX®

Linux

SOURCE: Easy Linux For Beginners book by Felix Alvaro

LINUX

WHAT IS LINUX?

- Linux is an operating system, like the examples mentioned in the previous slide, and is often described as Unix-like
- The difference between Linux and other operating systems lies in the fact that Linux is an open-source operating system
- This means that Linux is continuously developed collaboratively
- Unlike Windows and MacOS which are both tied to the respective companies (Windows and Apple)
- Not one single company owns Linux' development and support
- Different companies sharing research, development, and the associated costs to upgrade linux operating system

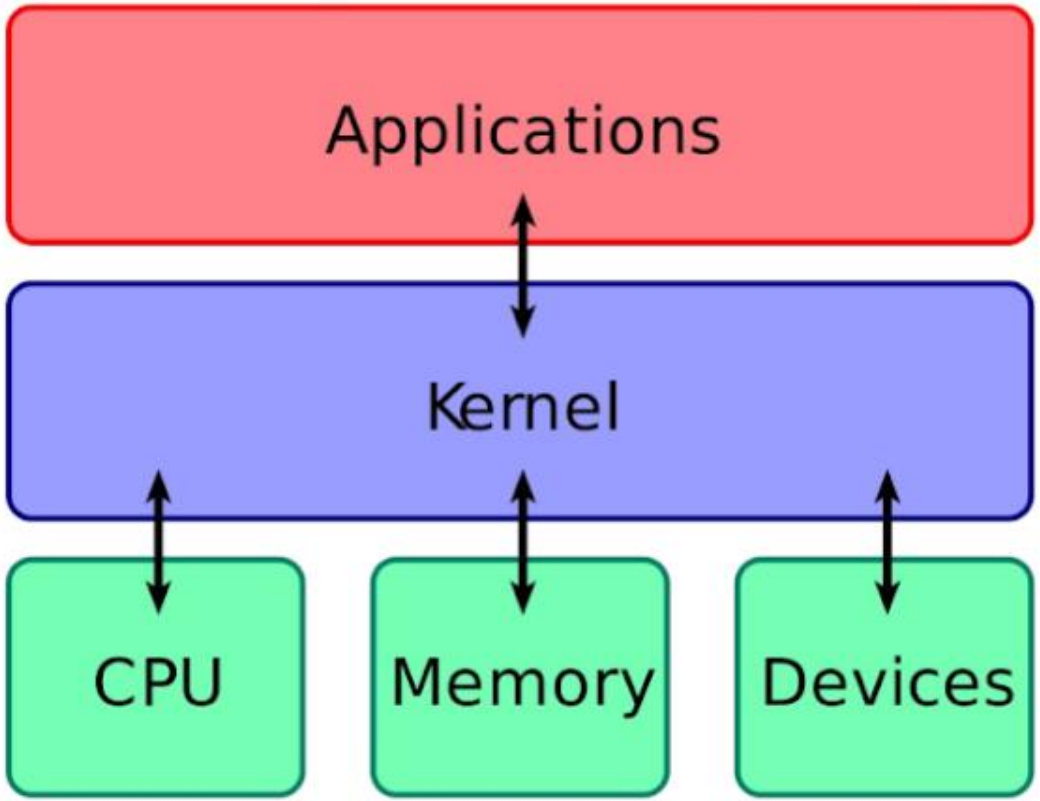
SOURCE: Easy Linux For Beginners book by Felix Alvaro

WHAT IS LINUX?

- This open source cooperation among companies and developers has led to making Linux one of the best ecosystems for use from small digital wristwatches to servers and supercomputers
- Based on statistics, there are at least 100 companies and more than 1000 developers who work together for every kernel release
- Linux is composed of a kernel, the core control software, plus plenty of libraries and utilities that provide different features
- The kernel is the lowest level of the operating system
- The kernel is the main part of the operating system and is responsible for translating the command into something that can be understood by the computer

SOURCE: Easy Linux For Beginners book by Felix Alvaro

SIMPLIST OS ARCHITECTURE



SOURCE: Easy Linux For Beginners book by Felix Alvaro

WHAT IS LINUX?

- The main functions of the kernel are:
  - Memory management
  - Network management
  - Device driver
  - File management
  - Process management
- Linux is available through many distributions. These are what we can call Linux flavours
- Distributions are groups of specific kernels and programs. The most popular ones include Arch, SUSE, Ubuntu, and Red Hat
- Even Android a mobile operating system developed by Google is based on a modified version of the Linux kernel along with other open source software

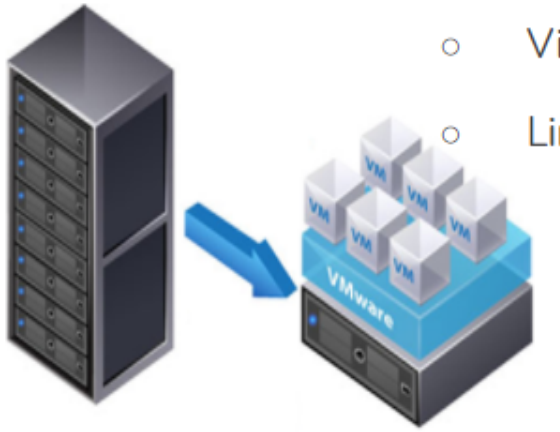
Source: https://stackoverflow.com/questions/3315730/what-is-the-difference-between-the-operating-system-and-the-kernel

SOURCE: Easy Linux For Beginners book by Felix Alvaro

ADDITIONAL CHARACTERISTICS

- In addition to the tasks performed by an operating system, Linux has the following characteristics

- **Supports clustering**
  - Multiple Linux systems can be configured to appear as one system from the outside
  - Service can be configured among clusters and still offer a seamless user experience
- **Runs virtualization**
  - Virtualization allows one computer to appear as several computers to users
  - Linux can be configured as a virtualization host
    - Where you could run other OS such as Windows, Mac OS, or other Linux systems
    - All the virtualized systems appear as separate systems to the outside world.



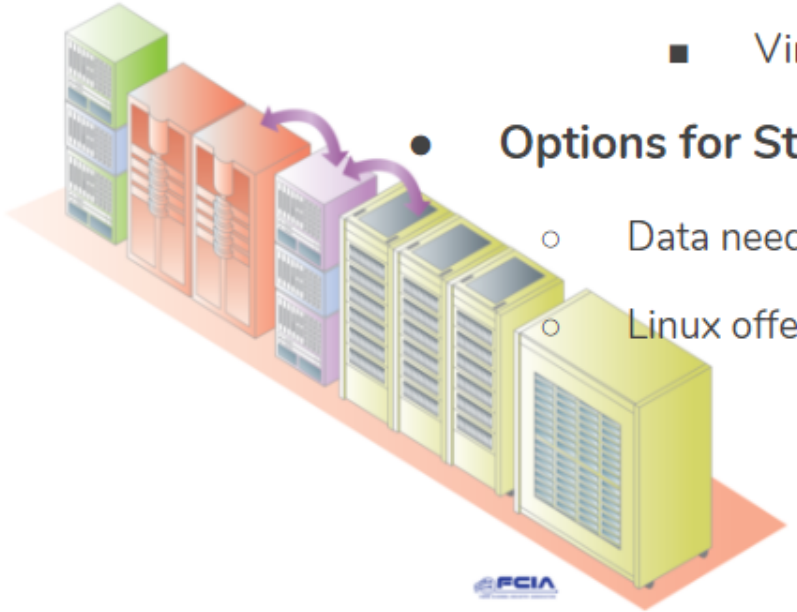
Server Virtualization

SOURCE: Easy Linux For Beginners book by Felix Alvaro

ADDITIONAL CHARACTERISTICS

- **Cloud Computing**
  - Linux can handle complex, large-scale virtualization needs including
    - Virtual networking: a technology that facilitates data communication between two or more virtual machines (VM),
    - Networked storage,
    - Virtual guests (supports guest operating system using VM)

- **Options for Storage**
  - Data need not always be stored in your computer's hard disk
  - Linux offers different local and networked storage options



SOURCE: Easy Linux For Beginners book by Felix Alvaro

HISTORY

- In 1992, Linux was licensed under GNU - General Public License (GPL) and the first Linux distributions (also called distro) were created
- Several distributions have been created over time:
  - Slackware - the oldest existing distro,
  - Debian - the largest community distribution,
  - Red Hat and SUSE - commercial distributions

SOURCE: Easy Linux For Beginners book by Felix Alvaro

Through collaborative works, Linux is now one of the most powerful operating systems. Data shows that 98.8% of the world's fastest systems use the Linux kernel

LINUX VS OTHERS

LINUX VS OTHER OS

- Cost
  - Other than Linux commercial distributions all other linux flavours are free
- Viruses
  - Linux hardly gets any viruses
  - With many developers working on Linux, there are more eyes focused on seeing security flaws
- System Stability
  - Linux is used in servers and supercomputers which cannot afford server restarts
  - Large-scale systems can go on for years without restarting the server
- Installation
  - Linux flavours comes with text editor, spreadsheet, presentation program, photo editor, web browser, movie player, PDF reader, and the like
  - In other OS like windows etc we have to install all the other software that you need one-by-one
- Support
  - Linux has a large community online where new users can get information, read FAQs, and ask questions if there are programs or features that you think are not working right

SOURCE: Easy Linux For Beginners book by Felix Alvaro

LINUX ARCHITECTURE

LINUX ARCHITECTURE

- Linux architecture can be divided into two spaces
  - The User Space,
  - the Kernel Space
- **User Space**
  - This is where the applications are used.
  - The GNU C library, in the User space, is the interface that connects to the kernel and transitions between User and Kernel space
  - This uses all the available memory
- **Kernel Space**
  - All Kernel services are processed here. The Kernel space is further divided into 3

SOURCE: Easy Linux For Beginners book by Felix Alvaro

LINUX DISTRIBUTIONS

LINUX DISTRIBUTIONS

- Each Linux distribution consists of a Linux kernel plus utilities and configuration files
- Most Linux distributions can be downloaded from their websites
- Several of the popular Linux distributions, or flavours, differ from each other based on the following criteria
    - **Availability**
        - Linux is a free software, but companies offering a support contract and proprietary components offer it for a fee
    - **Package Format**
        - Linux distributions come in packages
        - Packages are files grouped into one single file. RPM is the most commonly used

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LINUX DISTRIBUTIONS

- Release Cycle

Distribution	Availability	Package Format	Release Cycle
Arch	Free	Pacman	Rolling
CentOS	Free	RPM	Approx. 2-yr
Debian	Free	Debian	2-yr
Fedora	Free	RPM	Approx. 6-mo
Gentoo	Free	Ebuild	Rolling
Mint	Free	Debian	6-month
openSUSE	Free	RPM	8-month
Red Hat Enterprise	Commercial	RPM	Approx. 2-yr.
Scientific	Free	RPM	Approx. 6-mo
Slackware	Free	Tarballs	Irregular
SUSE Enterprise	Commercial	RPM	2-3 years
Ubuntu	Free	Debian	6-month

SOURCE: Easy Linux For Beginners book by Felix Alvaro

WHICH LINUX TO CHOOSE

WHICH LINUX TO CHOOSE

- Few thing can be considered before choosing any Linux flavour
- **Desktop environment**
  - Do your research and find out if the particular distribution that you're eyeing has a basic look and feel that you like, please check how customizable it is
- **Hardware Compatibility**
  - Check hardware compatibility, some drivers might not be available yet by the time you install your distro
  - We can check from online resources first to know which ones can be supported out-of-the-box.
- **Community Support**
  - Find the one with a large online community.
  - The bigger the community is, the easier it will be to find documentation and get support

SOURCE: Easy Linux For Beginners book by Felix Alvaro