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TUTORIAL

Linux Features and Architecture

Topics

Linux Components

Linux OS also has the following components parts:

- **Bootloader**. Your computer needs to go through a start-up sequence called booting. This boot process needs guidance, and your OS is the software in control throughout the boot process. When you start your computer the bootloader for your operating system kickstarts the process.
- **OS Kernel**. You can call the kernel the part of the operating system which is the “closest” to your computing hardware as it is the part which controls the CPU, access to memory and any peripheral devices. It is the “lowest” level at which your operating system works.
- **Background services**. Called “daemons” in Linux, these small applications act as servants in the background, ensuring that key functions such as scheduling, printing, and multimedia function correctly. They load after you have booted up, or when you have logged into your computer.
- **OS Shell.** You need to be able to tell our operating system what to do, and this is the goal of the shell. Also known as the command line, it is a facility which lets you instruct your OS using text. However few people nowadays are familiar with command line code, and it once used to put people off using Linux. This changed

because a modern distribution of Linux will use a desktop shell just like Windows.

- **Graphics server**. This provides a graphical sub-system that renders images and shapes on your computer monitor. Linux uses a graphical server called “X” or “X-server”.
- **Desktop environment**. You can’t interact with the graphical server directly. Instead you need software that can drive the server. This is called a desktop environment in Linux and there are plenty of options including KDE, Unity and Cinnamon. A desktop environment is usually bundled with a number of applications including file and web browsers plus a couple of games.
- **Applications**. Obviously, the desktop environment which is bundled with your Linux OS or which you choose to install cannot cater for every application need, there are too many. Individual applications, however, can and there are thousands for Linux just like Windows and Apple’s OS X has thousands of applications. Most Linux distros have app stores which help you find and install apps, for example Ubuntu Software which comes with Ubuntu.

Linux Features

1. Portable Environment

Linux software operates flawlessly on a variety of hardware platforms. Without the worry of incompatibility, individuals can use Linux operating system on any device. It runs the same way on both high-end and low-end hardware.

2. Free and Open-Source

Its source code is available for anybody to use and alter. Many developers collaborate in organizations to improve and strengthen Linux, and lots of developers constantly work on updating the Linux system.

3. Shell/ Command-line Interface

The Linux system includes essential programs that users can utilize in order to issue commands to the operating system for executing the design flawlessly. You may also direct it to carry out various forms of Linux commands for effectively carrying out the applications.

4. End-to-end encryption

Authentication can help you keep your data protected. Before you may access some critical files, the Linux Operating System requires you to enter a password. Furthermore, the Linux environment allows users to encrypt their data.

5. Graphical User Interface (GUI)

Linux Operating System comes with Graphical User Interface (GUI) abilities in the same way you can with Windows. Similarly, users can install the programs, and the computer graphics will begin to work in the same way that Windows does.

6. Configure Keyboards into Different Languages

Because Linux is available in various languages, it is simple to use it worldwide. As a result, you can change the language on your keyboard as per your preference.

7. Frequent New Updates

Software updates are controlled by the users in Linux. Individuals have the option to pick and choose which updates are required, and there are a plethora of system updates accessible. These upgrades happen considerably more quickly than on other operating systems. Therefore, system upgrades can be deployed without difficulty.

8. Lightweight Infrastructure

Linux is a highly lightweight operating system. Linux has far fewer prerequisites than any other operating system, has a smaller memory footprint, and uses less storage space. Typically, you'll find a Linux Distro with only 128MB of RAM and around the same amount of disc space.

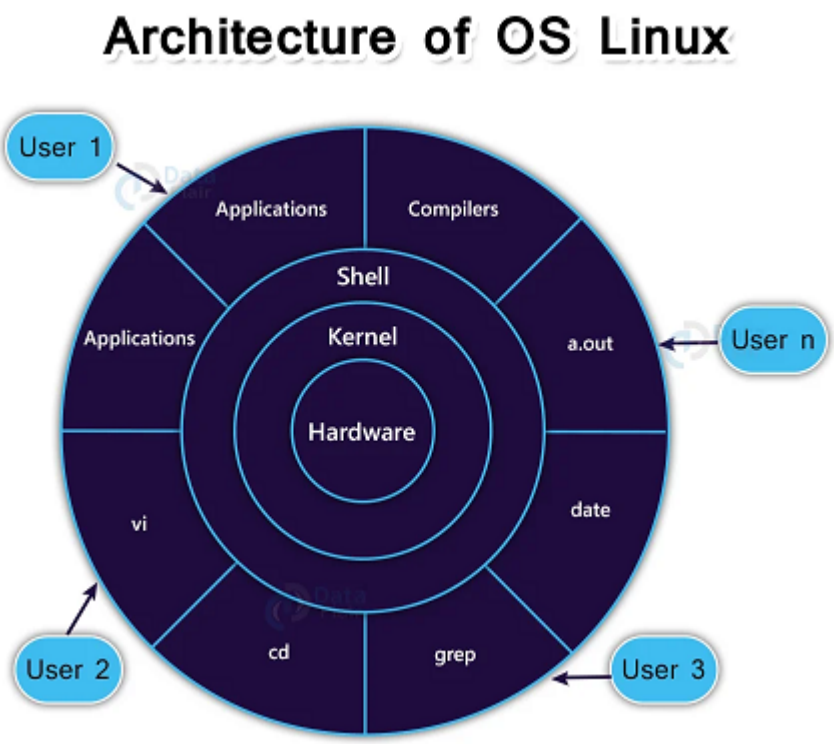
9. Extremely Flexible

Linux is highly flexible, and a variety of desktop applications, embedded systems, and server applications can benefit from the same. It also offers a number of computer-specific limitation settings for admins to allow only essential components to get installed.

10. Best For Developers

Linux supports nearly every popular programming language, including C/C++, Java, Python, Ruby, etc. Furthermore, it provides a wide range of development-related applications.

Linux Architecture



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The architecture of a Linux System consists of the following layers –

1 Hardware layer – Hardware consists of all peripheral devices (RAM/ HDD/ CPU etc).

2 Kernel – The kernel is one of the core section of an operating system. It is responsible for each of the major actions of the Linux OS. This operating system

contains distinct types of modules and cooperates with underlying hardware directly.

Types of Kernel

Monolithic Kernel: It is one of types of kernel where all operating system services operate in kernel space. It has dependencies between systems components. It

has huge lines of code which is complex.eg Unix, Linux, Open VMS, XTS-400 etc

Micro Kernel: It is kernel types which has minimalist approach. It has virtual memory and thread scheduling. It is more stable with less services in kernel space. It

puts rest in user space. E.g. Mach, L4, AmigaOS, Minix, K42 etc

Hybrid Kernel: It is the combination of both monolithic kernel and microkernel. It has speed and design of monolithic kernel and modularity and stability of

microkernel.eg Windows NT, Netware, BeOS etc.

Exo Kernel: It is the type of kernel which follows end-to-end principle. It has fewest hardware abstractions as possible. It allocates physical resources to

applications.eg Nemesis, ExOS etc

3. **Shell:** An interface to kernel, hiding complexity of kernel's functions from users. The shell takes commands from the user and executes kernel's functions.

4. **Utilities:** – Utility programs that provide the user most of the functionalities of an operating systems.

Linux Vs Windows

1 Linux is an open-source operating system while Windows is Copyrighted by Microsoft

2 Linux is free of cost while Windows is costly.

3 Linux file name case-sensitive but not in Windows.

4 In Linux, monolithic kernel is used while in Windows, micro kernel is used.

5 Linux is more efficient in comparison of windows.

6 There is forward slash is used for Separating the directories while in Windows back slash is used for Separating the directories.

7 Linux provides more security than windows while Windows provides less security than Linux.

8 Linux is widely used in hacking purpose-based systems while windows does not provide much efficiency in hacking.

9 Root user is the super user and has all administrative privileges. In Windows Administrator user has all administrative privileges of computers.

Skill Test

Q1: Login on your Linux System with at least 7 different users on 7 virtual terminals and prove that Linux is a multi-user Operating System.

Q2: Analyse various Linux flavours and list their unique features and usages.