OS

UNIT 6

LINUX

Linux, computer operating system **created in the early 1990s by Finnish software engineer Linus Torvalds and the Free Software Foundation (FSF)**. While still a student at the University of Helsinki, Torvalds started developing Linux to create a system similar to MINIX, a UNIX operating system.

**In 1991 Linus Torvalds began developing an operating system kernel, which he named “Linux”** [Torvalds 1999]. This kernel could be combined with the FSF material and other components (in particular some of the BSD components and MIT's X-windows software) to produce a freely-modifiable and very useful operating system

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Main design goals of Linux are

**speed, efficiency, and standardization**.

Documents ; at least two Linux distributions have achieved official POSIX certification. The Linux programming interface adheres to the SVR4 UNIX semantics, rather than to BSD behaviour

Primary Goal: The primary goal of an Operating System is **to provide a user-friendly and convenient environment**. ... So, we make the use of an Operating System to act as an intermediate between us and the hardware. All you need to do is give commands to the Operating System and the Operating System will do the rest for you.

Interfaces to Linux

A network interface is **a software interface to networking hardware**. Linux kernel distinguishes between two types of network interfaces: physical and virtual. Physical network interface represents an actual network hardware device such as network interface controller (NIC).

The shell

The shell is the **Linux command line interpreter**. It provides an interface between the user and the kernel and executes programs called commands. For example, if a user enters ls then the shell executes the ls command.

**Different Shells in Linux**

**SHELL** is a program which provides the interface between the user and an operating system. When the user logs in OS starts a shell for user. **Kernel** controls all essential computer operations, and provides the restriction to hardware access, coordinates all executing utilities, and manages Resources between process. Using kernel only user can access utilities provided by operating system.

**Types of Shell:**

* **The C Shell –**

Denoted as **csh**

Bill Joy created it at the University of California at Berkeley. It incorporated features such as aliases and command history. It includes helpful programming features like built-in arithmetic and C-like expression syntax.

In C shell:

Command full-path name is /bin/csh,

Non-root user default prompt is hostname %,

Root user default prompt is hostname #.

* **The Bourne Shell –**

Denoted as **sh**

It was written by Steve Bourne at AT&T Bell Labs. It is the original UNIX shell. It is faster and more preferred. It lacks features for interactive use like the ability to recall previous commands. It also lacks built-in arithmetic and logical expression handling. It is default shell for Solaris OS.

For the Bourne shell the:

Command full-path name is /bin/sh and /sbin/sh,

Non-root user default prompt is $,

Root user default prompt is #.

* **The Korn Shell**

It is denoted as **ksh**

It Was written by David Korn at AT&T Bell LabsIt is a superset of the Bourne shell.So it supports everything in the Bourne shell.It has interactive features. It includes features like built-in arithmetic and C-like arrays, functions, and string-manipulation facilities.It is faster than C shell. It is compatible with script written for C shell.

For the Korn shell the:

Command full-path name is /bin/ksh,

Non-root user default prompt is $,

Root user default prompt is #.

* **GNU Bourne-Again Shell –**

Denoted as **bash**

It is compatible to the Bourne shell. It includes features from Korn and Bourne shell.

For the GNU Bourne-Again shell the:

Command full-path name is /bin/bash,

Default prompt for a non-root user is bash-g.gg$

(g.ggindicates the shell version number like bash-3.50$),

Root user default prompt is bash-g.gg#.

**Utilities For Linux Users**

Two sets of utilities—**the GNU Core Utilities and util-linux** —comprise many of the Linux system administrator's most basic and regularly used tools. ... These tools are indispensable because, without them, it is impossible to accomplish any useful work on a Unix or Linux computer

Kernel structure

The Linux kernel is one layer in the architecture of the entire Linux system. The kernel is conceptually composed of five major subsystems: **the process scheduler, the memory manager, the virtual file system, the network interface, and the inter-process communication interface**.

For example, if a new process is created in the system, a kernel data structure is created that **contains the details about the process**. Most of the kernel data structures are only accessible by the kernel and its subsystems. They may contain data as well as pointers to other data structures

Basically the kernel **virtualizes the common hardware resources of the computer to provide each process with its own virtual resources**. This makes the process seem as it is the sole process running on the machine. The kernel is also responsible for preventing and mitigating conflicts between different processes

processes in linux

In Linux, a process is **any active (running) instance of a program**. But what is a program? Well, technically, a program is any executable file held in storage on your machine. Anytime you run a program, you have created a process

There are different types of processes in a Linux system. These types include **user processes, daemon processes, and kernel processes**. Most processes in the system are user processes. A user process is one that is initiated by a regular user account and runs in user space