% Operative System
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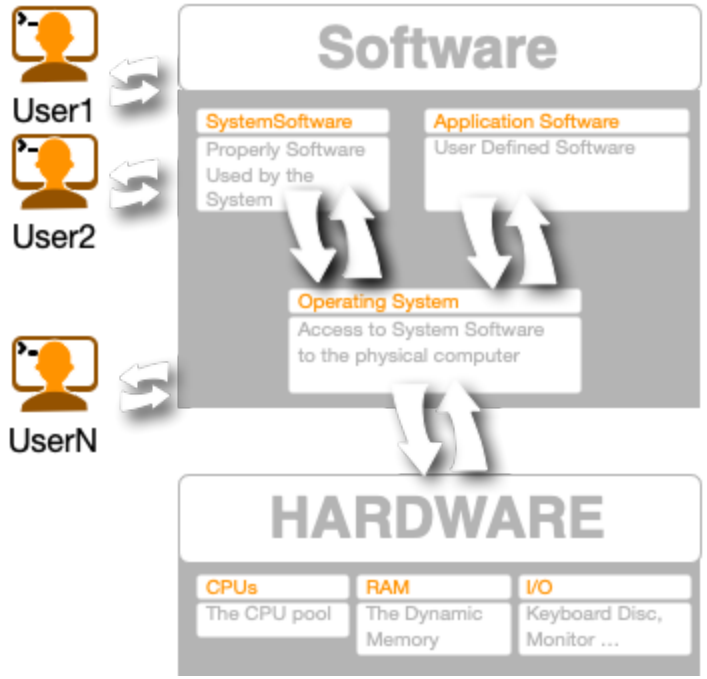
Definition

Wikipedia Definition

An operating system (OS) is system software that manages computer hardware, software resources, and provides common services for computer programs.

OS


User1
User2
UserN
Software
SystemSoftware
Properly Software Used by the System
Application Software
User Defined Software
Operating System
Access to System Software to the physical computer
HARDWARE
CPUs
The CPU pool
RAM
The Dynamic Memory
I/O
Keyboard Disc, Monitor ...

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Functions

- Memory Management
- Processor Management
- Device Management
- File Management
- Network Management
- User Management

Memory Management

Main Memory

Main memory provides a fast storage that can be accessed directly by the CPU. For a program to be executed, it must in the main memory. An Operating System does the following activities for memory management

Tasks

- Keeps tracks of primary memory, i.e., what part of it are in use by whom, what part are not in use.
- In multiprogramming, the OS decides which process will get memory when and how much.
- Allocates the memory when a process requests it to do so.
- De-allocates the memory when a process no longer needs it or has been terminated.

Processor Management

Process Scheduling.

- Keeps tracks of processor and status of process. The program responsible for this task is known as traffic controller.
- Allocates the processor (CPU) to a process.
- De-allocates processor when a process is no longer required.

Process Management

A process is program or a fraction of a program that is loaded in main memory. A process needs certain resources including CPU time, Memory, Files, and I/O devices to accomplish its task. The process management component manages the multiple processes running simultaneously on the Operating System.

> A program in running state is called a `process`.

OS is responsible for the following:

- Create, load, execute, suspend, resume, and terminate processes.
- Switch system among multiple processes in main memory.
- Provides communication mechanisms so that processes can communicate with each others
- Provides synchronization mechanisms to control concurrent access to shared data to keep shared data consistent.
- Allocate/de-allocate resources properly to prevent or avoid deadlock situation.

Device Management

I/O control

- Keeps tracks of all devices. Program responsible for this task is known as the I/O controller.
- Decides which process gets the device when and for how much time.
- Allocates the device in the efficient way.
- De-allocates devices.

Abstraction Layer

I/O Device Management provides an abstract level of H/W devices and keep the details from applications to ensure proper use of devices, to prevent errors, and to provide users with convenient and efficient programming environment.

I/O Tasks

- Hide the details of H/W devices
- Manage main memory for the devices using cache, buffer, and spooling
- Maintain and provide custom drivers for each device.

File Management

File System

A file system is normally organized into directories for easy navigation and usage. These directories may contain files and other directions.

A File

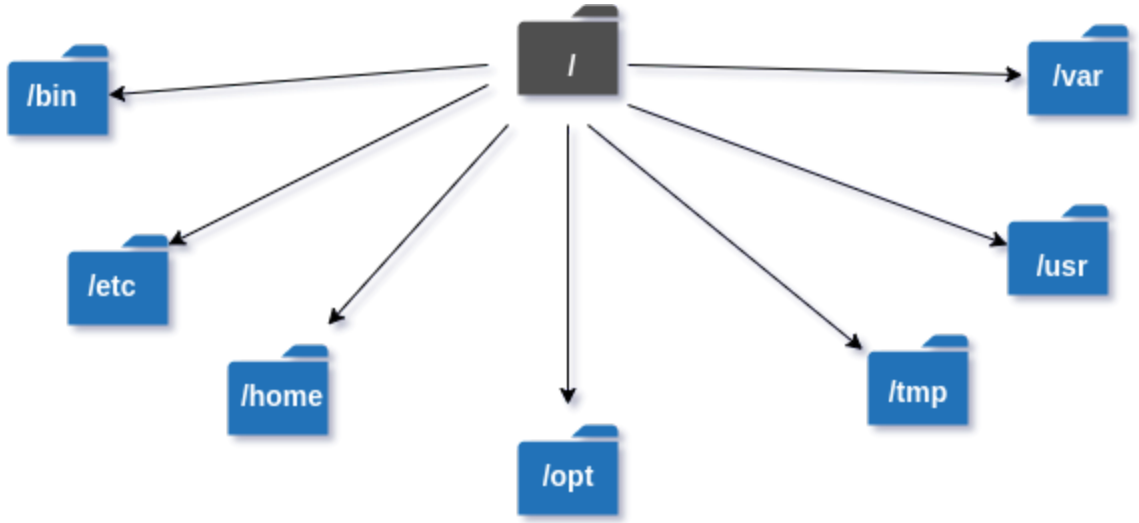
> A files is a sequence of bits, bytes, lines or records whose meaning is defined by its creator and user.

File System Task

- Keeps track of information, location, uses, status etc. The collective facilities are often known as `file system`.
- Decides who gets the resources.
- Allocates the resources.
- De-allocates the resources.

Directories

Files are organized by the File System in a directory Tree



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Main Linux Dir

- `/bin` – binary or executable programs.
- `/etc` – system configuration files.
- `/home` – Users home directory. It is the default current directory.
- `/opt` – optional or third-party software.
- `/tmp` – temporary space, typically cleared on reboot.
- `/usr` – User related programs.
- `/var` – log files.

FS functions

- File creation and deletion
- Directory creation and deletion
- The support of primitives for manipulating files and directories
- Mapping files onto secondary storage

Network

Network management

Is the process of managing and administering a computer network. A computer network is a collection of various types of computers connected with each other.

> Network management is the process of keeping your network healthy for an efficient communication between different computers.

Functions

- Network administration
- Network maintenance
- Network operation
- Network provisioning
- Network security

Command Interpreter System

Shell

The command interpreter is the primary interface between the user and the rest of the system.
Command Interpreter System executes a user command by calling one or more number of underlying system programs or system calls.

> Command Interpreter System allows human users to interact with the Operating System and provides convenient programming environment to the users.