



Operating System - Linux

Ph. D. Course Work : PHYS 601

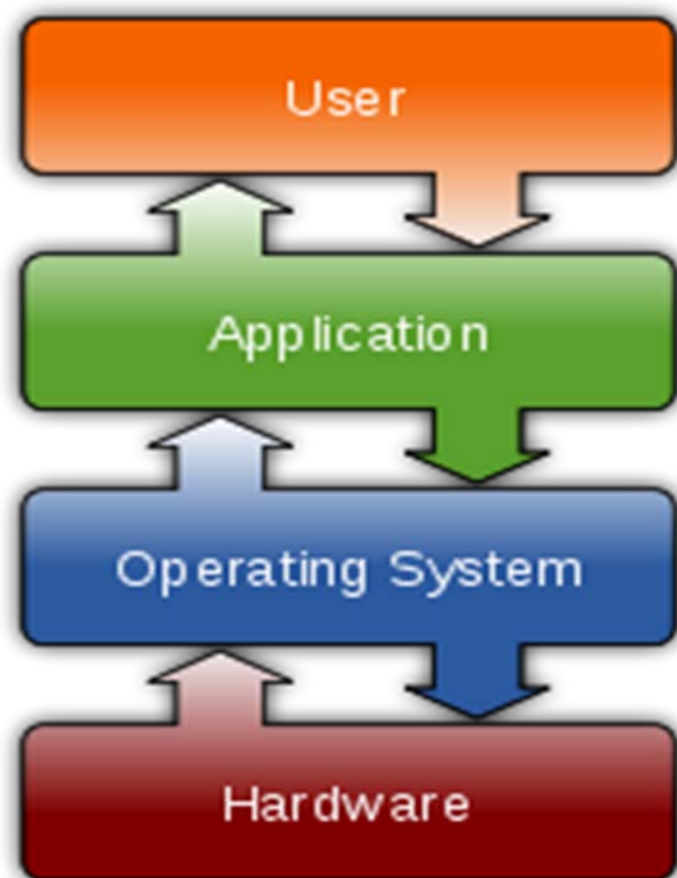
Statistics and Computer Applications

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WHAT IS AN OPERATING SYSTEM?

- Software program that manages the hardware and software resources of a computer.
- Interface between User and the Hardware
- Allocates resources for tasks
- Allocates tasks to programs
- Manages space and time
- Controls the devices



Some modern OS

- Android
- BSD
- iOS
- Linux
- Mac OS X
- Microsoft Windows
- Windows Phone

OS Objectives

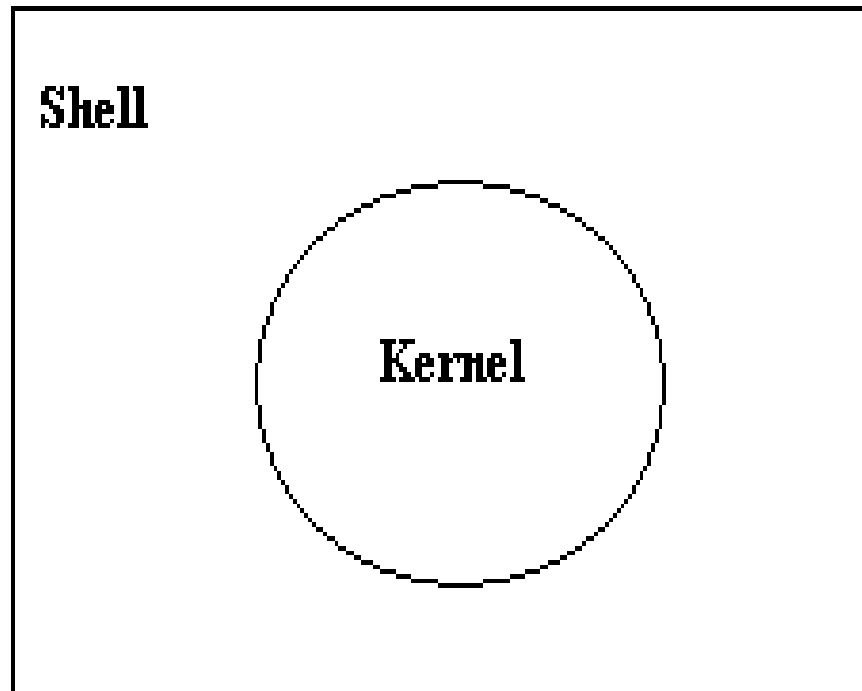
- **Convenience**
 - Makes the computer more convenient to use
- **Efficiency**
 - Allows computer system resources to be used in an efficient manner
- **Ability to evolve**
 - Permit effective development, testing, and introduction of new system functions without interfering with service

Types of Operating System

- Tasks
 - Uni tasking
 - Multi tasking
- Users
 - Single User
 - Multi User
- Processing
 - Uni processing
 - Multi processing
- Timesharing

Operating System

Operating System



Kernel

- Core or nucleus of an operating system
- Interacts with the hardware
- First program to get loaded when the system starts and runs till the session gets terminated
- Different from BIOS which is hardware dependent.
- Kernel is software dependent

Types of Kernel

- **Monolithic**
 - All OS related code are stuffed in a single module
 - Available as a single file
 - Advantage : Faster functioning
- **Micro**
 - OS components are isolated and run in their own address space
 - Device drivers, programs and system services run outside kernel memory space
 - Supports modularity
 - Lesser in size

Shell

- Program that interacts with kernel
- Bridge between kernel and the user
- Command interpreter
- User can type command and the command is conveyed to the kernel and it will be executed

Development

History

- Multics – 1964
- Unics – 1969
- Minix – 1990
- Linux – 1991

FOSS

- Free Open Source Software
- Free – Means Liberty and not related to Price or cost
- Open – Source code is available and any body can contribute to the development. Organization independent

Freedom with FOSS

- Freedom to run the software anywhere
 - Freedom to study how the programs work. i.e source code will be accessible
 - Freedom to redistribute copies
 - Freedom to improve the software
-
- If a software has all these 4 freedoms, then it is a FOSS

Free Software Foundation

- Founded by Richard Stallman in 1983
- Organisation that started developing copylefted programs
- Project – GNU Project
 - GNU Not Unix
 - Recursive expansion

Multics

- Multiplexed Information and Computing Service
- Written in 1964
- Timesharing OS

Unics

- Uniplexed Information and Computing System
- Later renamed as UNIX
- Written in 1969
- Multi user, Multi tasking and timesharing

Minix

- Minimal Unix
- Tanenbaum developed this OS
- Mainly for educational purpose



Linux

- Developed in 1991 by Linus Torvalds
- Used in most of the computers, ranging from super computers to embedded system
- Multi user
- Multi tasking
- Time sharing


Linux OS

Main components of Linux operating system

GUI:
 Gnome  KDE
 X.org

LAMP:
Apache
PHP
MySQL

Net:
sshd
inetd

 gcc

GNU coreutils

bash

 **GNU C Library**

other libraries

SCI device files



Linux kernel

sockets

processes

file systems

protocols

memory management

drivers and modules

computer hardware

GNU/Linux

- Only the kernel is called by the name Linux
- The rest are the tools developed under GNU Project
- Hence the name GNU/Linux

Linux Distributions

- Redhat
- Fedora
- Debian
- Novell's SUSE Linux
- Ubuntu
- Mandrake

File Management Commands

- **mkdir** - creating directory
 - `mkdir dirname`
- **rmdir** – removing directory and its contents
 - `rmdir dirname`
- **cd** – Change directory
 - `cd dirpath`
- **cp** – Copying files
 - `cp file1 file2`
- **mv** – Moving or renaming files
 - `mv oldfile newfile`

Commands

- Help about commands
 - man, pinfo, info (man <<cmd name>>)
- Viewing file's content
 - cat <<filename>>
- Viewing users, processes
 - who – List all Users
 - who am I – List the current user
 - pstree – displays all processes running in the system in tree format
 - ps – displays processes owned by the current user
- Changing file permission/owner
 - chmod – changes file permission
 - chown – changes file owner

Listing files and Emulating Terminal

- Listing files in a directory
 - `ls` – Lists all files in a directory
 - `ls -a` – Lists all files (including hidden files)
 - `ls -l` – Lists files in a directory along with owner information, permission etc
- Terminal Emulator
 - `xterm` – Generates a terminal
 - `xterm -fg color -bg color -rightbar` : Generates a terminal with the specified background and foreground color and a scroll bar on the right side

Text editors

- Vi
- Emacs
- gEdit
- kWrite
- TextPad

Vi Editor

- Popular text editor
- Just type `vi <<filename>>` at the prompt and hit the enter key.
- A new file will be opened
- Type the contents needed and save
- To save, press the Esc Key and then press : (colon) w q and then enter
- To quit with out saving Esc + : + q and then enter

Vi contd...

- Navigation
 - Left - h
 - Down - j
 - Up - k
 - Right - l
 - Top of the screen – H (shift + h) //caps lock will not work
 - Middle of the screen – M (shift + m)
 - Bottom of the screen – L (shift + l)
 - \$ - End Key, 0 – Home Key
- Edit Commands
 - Cut – X, x
 - Copy – yy, yw
 - Paste – P, p

C++ Program in Linux

- Open a file with extension `.cpp` from the command prompt using emacs editor
 - `emacs hello.cpp`
- Type the contents and save (`Ctrl+S+X`)
- Compile the file
 - `g++ hello.cpp`
- Run the executable
 - `./a.out`
- Compile file with output option
 - `g++ hello.cpp -o hello`
- Run the executable
 - `./hello`

Browsers

- Mozilla
 - First Open source browser
 - Released from Netscape group
- Firefox
 - High performance, feature rich, standards based web browser

Conclusion

Linux OS is

- portable, multi-tasking and multi-user in a time-sharing configuration.
- Unix like open software
- Most suitable for scientific purpose
- non-proprietary, widely available and effective
- widely used in both servers and workstations



Thank You