LAB 1

Operating system overview

Instructor info:

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Lab Guidelines

- Be attentive in class. (Attentiveness in lab will get you bonus absolutes #Cheers)
- Always expect a quiz. (Grand Quizzes will be announced.)
- There will be a strict no retake policy.
- Strictly follow the deadlines. (Submit properly formatted documents)
- At the end of lab there may be a surprise viva of the lab work.
- Daily check Classroom for Lab updates.
- You can report your query within a week after marks are uploaded.
- Please refer to University policy of minimum attendance requirement.

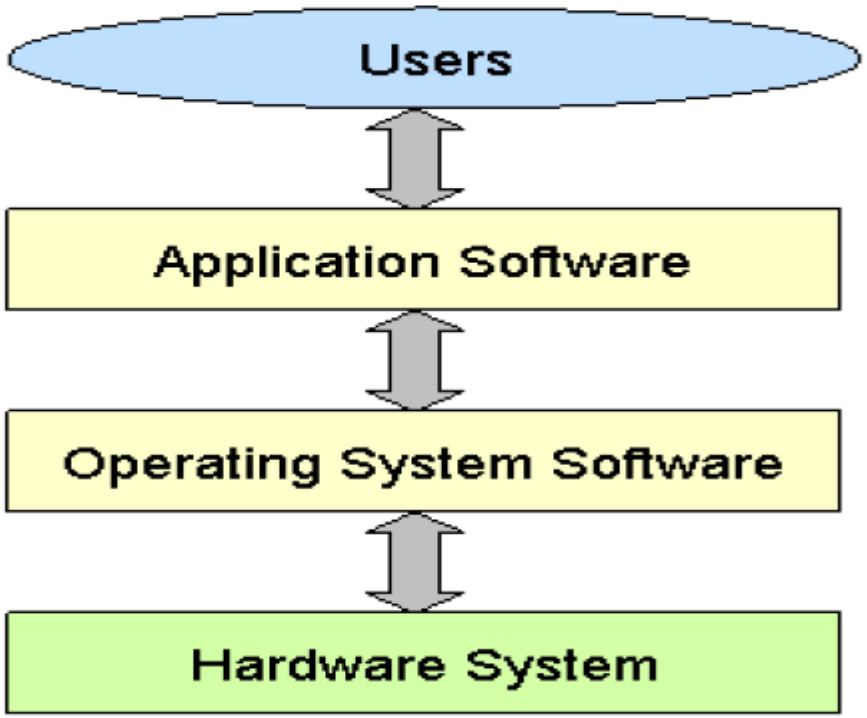
What is operating system?

Definition:

- An **operating system** (**OS**) is a collection of software that manages computer hardware resources .

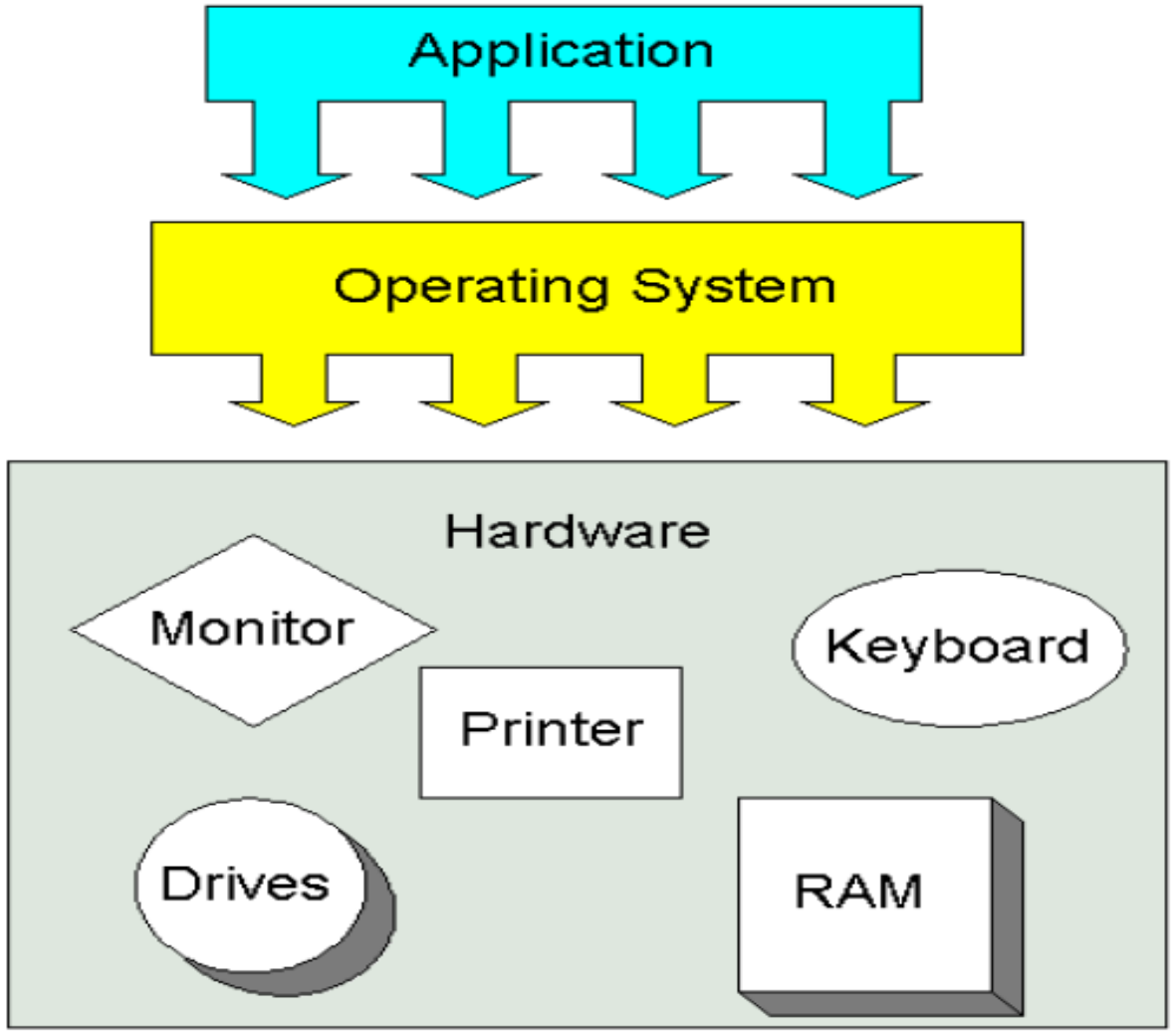
Without a computer operating system, a computer would be useless

"The operating system acts as a Interface Between the user and computer hardware"



What is an Operating System (OS)

- An operating system (OS) is a collection of software that manages computer hardware resources and provides common services for computer programs. The operating system is a vital component of the system software in a computer system. Application programs usually require an operating system to function.



Computer Hardware

Software Applications

Computer Hardware

Software Applications

OPERATING SYSTEM

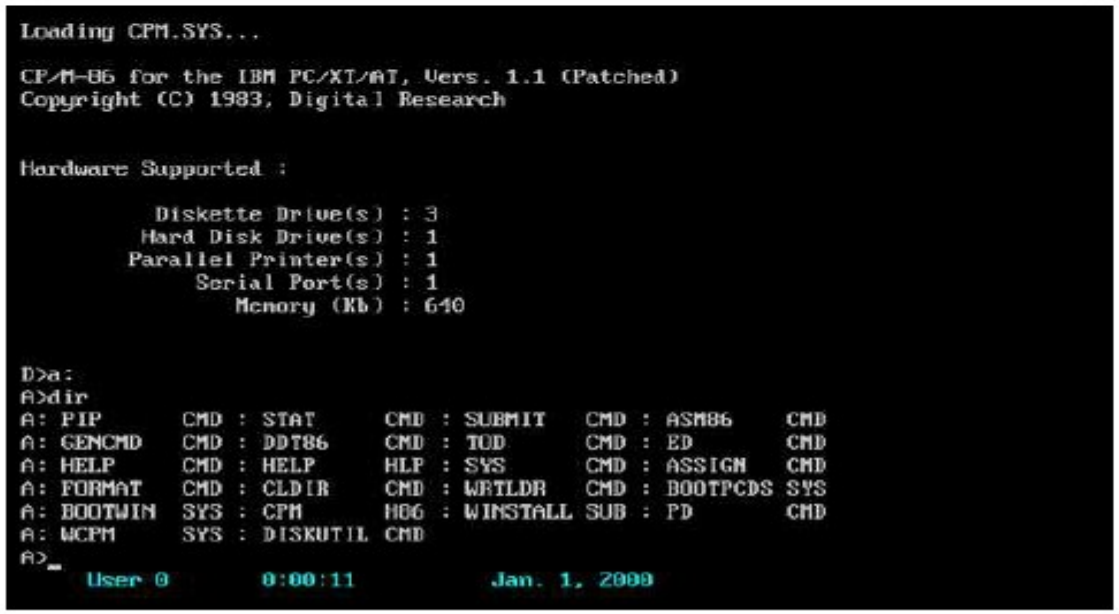
Computer Hardware

Software Applications

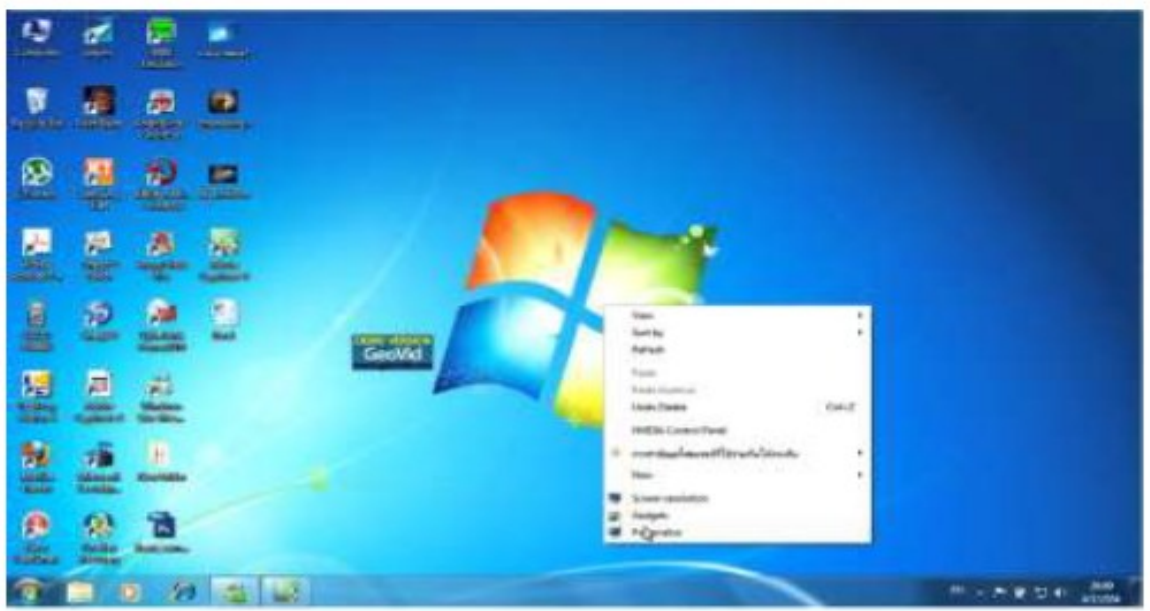
Computer Hardware

Two Types of Interfaces

CLI (Command-Line Interface)



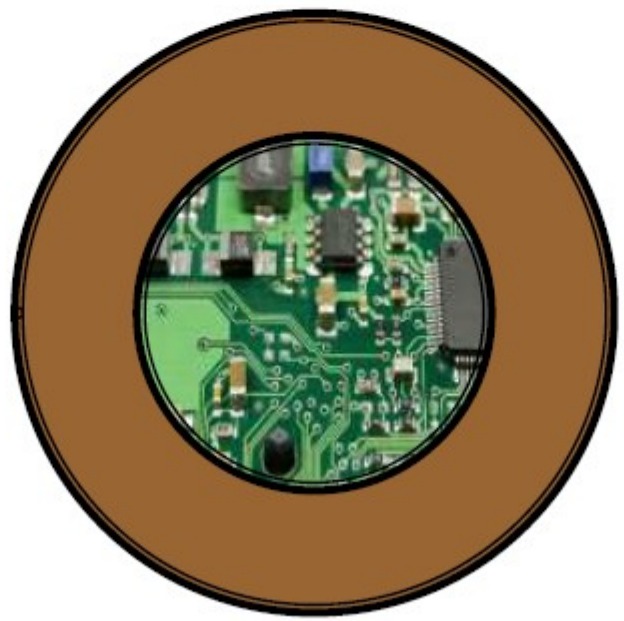
GUI (Graphical User Interface)



Typical OS Architecture

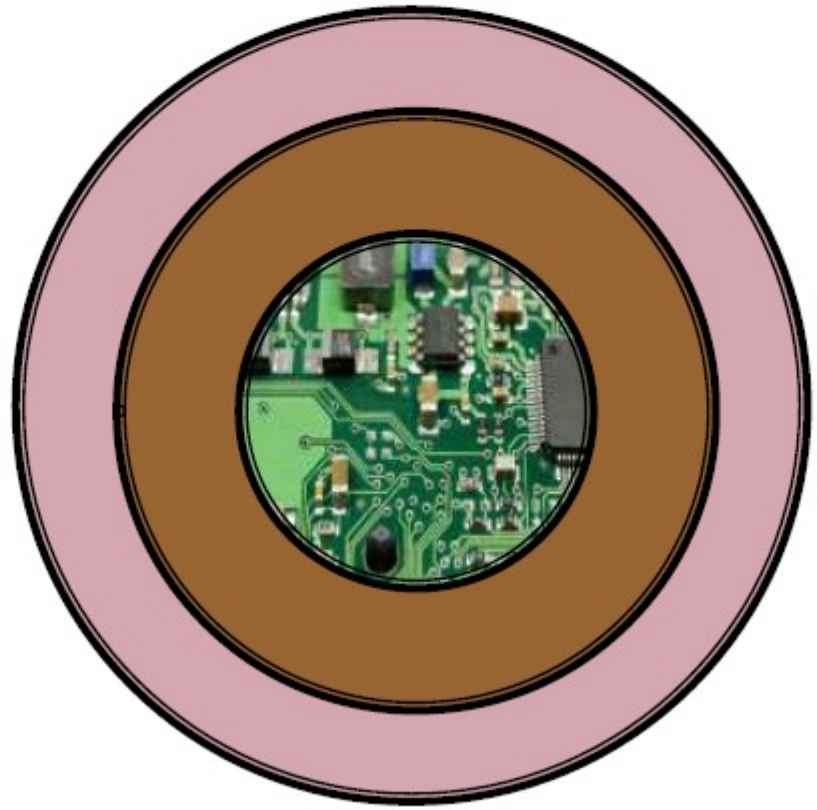
Hardware

Typical OS Architecture



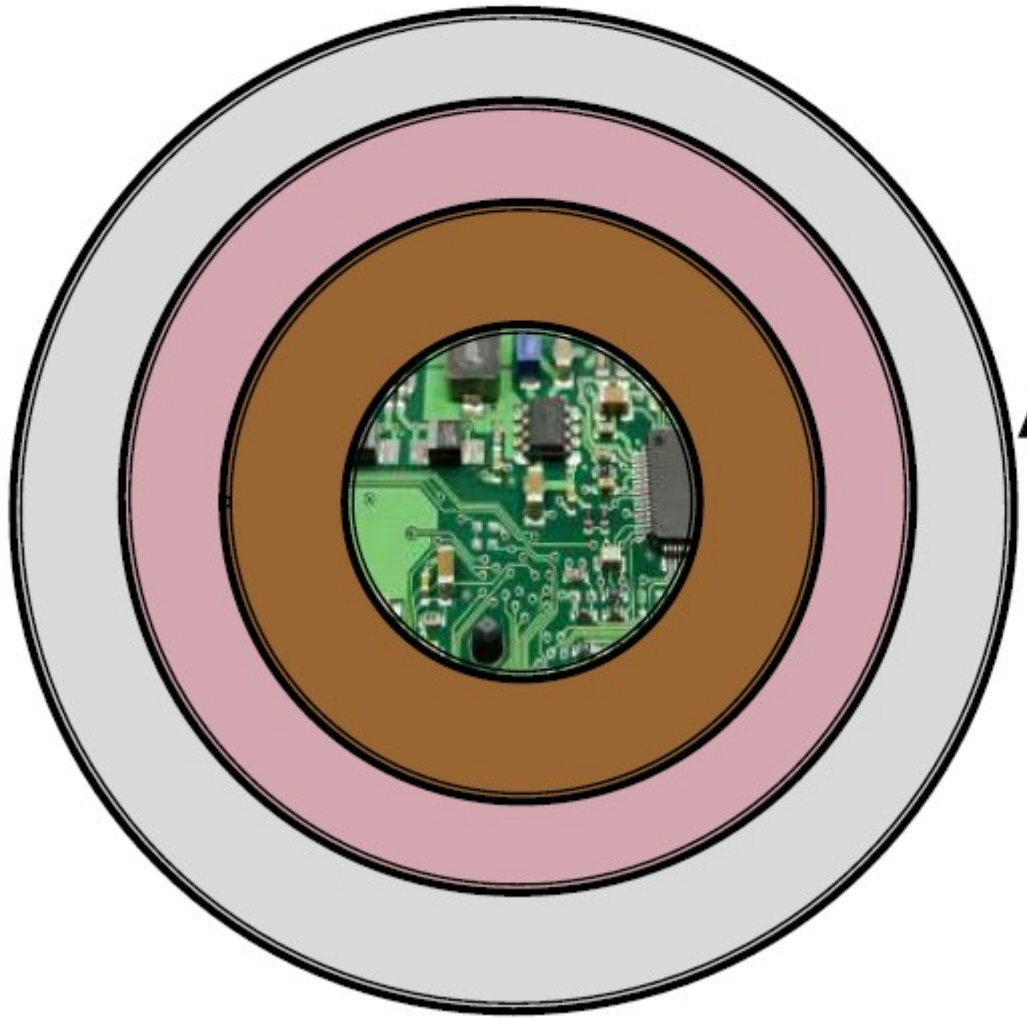
Kernel

Typical OS Architecture



Shell

Typical OS Architecture

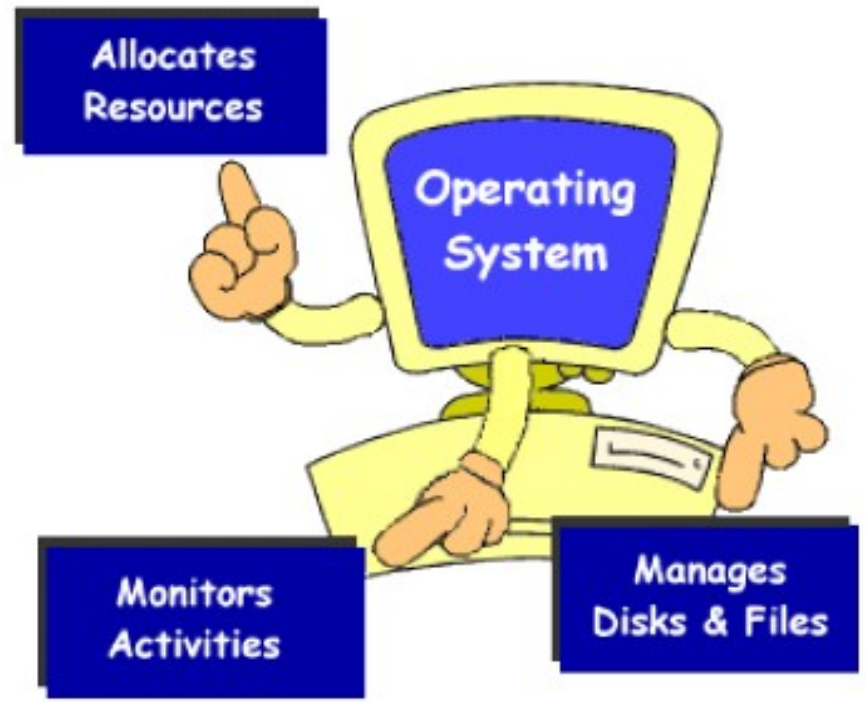


User Applications

Terminology

- Hardware is the physical elements of a computer system. It is the physical parts of a computer, such as the monitor, mouse, keyboard, computer data storage, hard disk drive (HDD), graphic cards, sound cards, memory, motherboard, and so on.
- The Kernel is a computer program that manages input/output requests from software, and translates them into data processing instructions for the central processing unit and other electronic components of a computer.
- The Shell is an interface for access to an operating system's services. In general, operating system shells use either a command-line interface (CLI) or graphical user interface (GUI).
- User Applications are computers program designed to perform a group of coordinated functions, tasks, or activities for the benefit of the user.

- Providing a user interface
- Running applications
- Support for built in utility programs.
- Control to the computer hardware

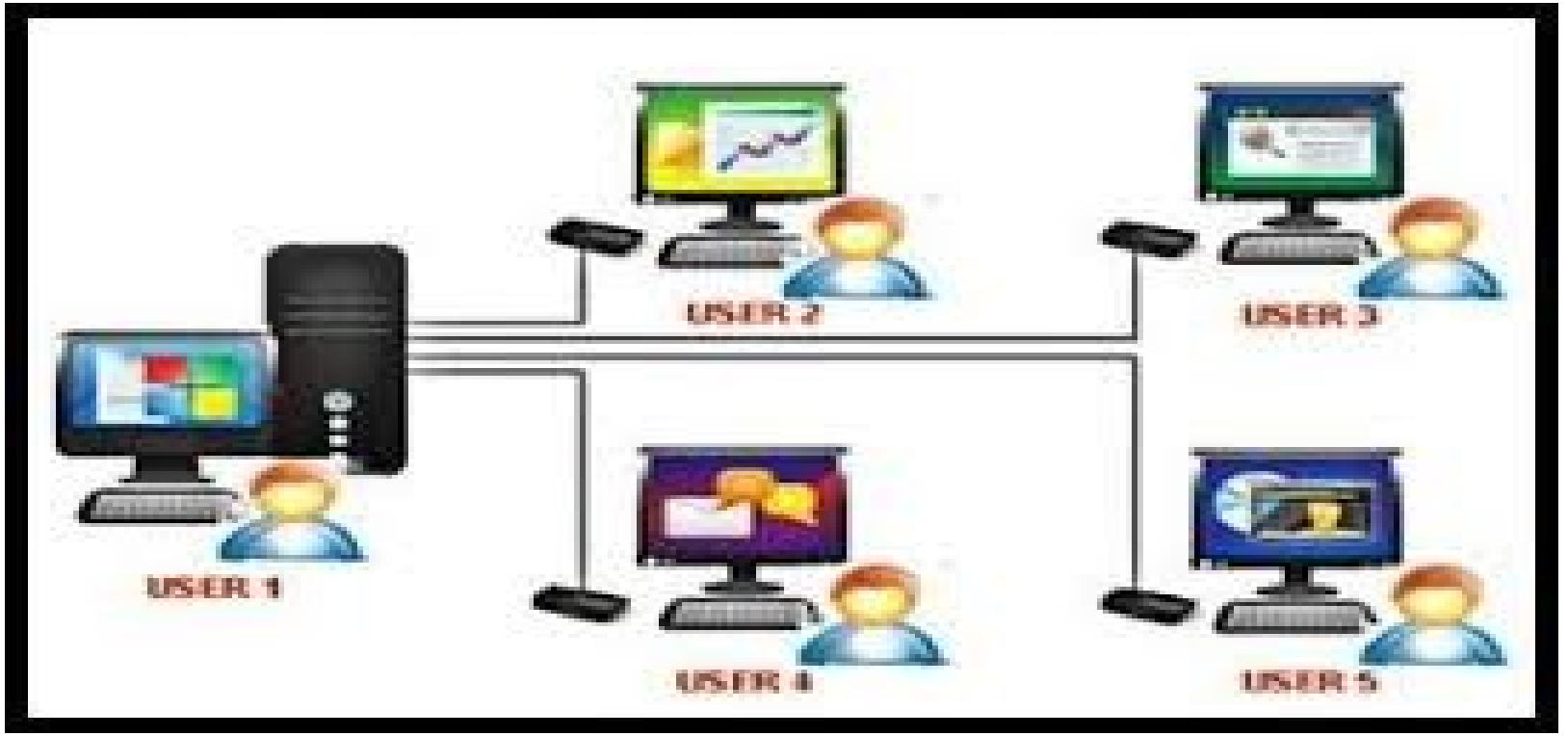


GUI

- **GUI** - Short for **Graphical User Interface**, a GUI Operating System contains graphics and icons and is commonly navigated by using a computer mouse.

• Multi-user

- **Multi-user** - A multi-user operating system allows for multiple users to use the same computer at the same time and/or different times example (LINUX)

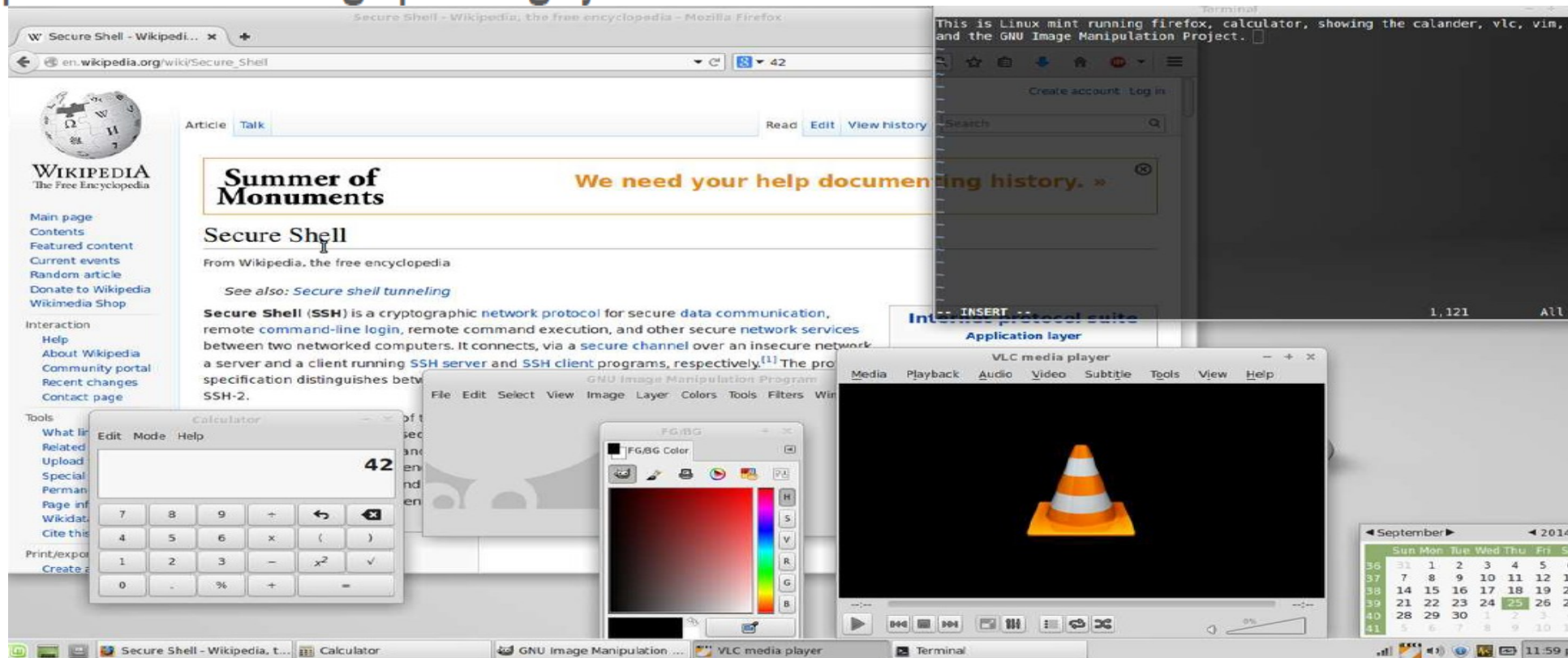


Multi Tasking

- An operating system that is capable of allowing multiple software processes to run at the same time.

Below are some examples of multitasking operating systems.

- Unix
- Windows XP
- Windows Vista



• Multi Processing

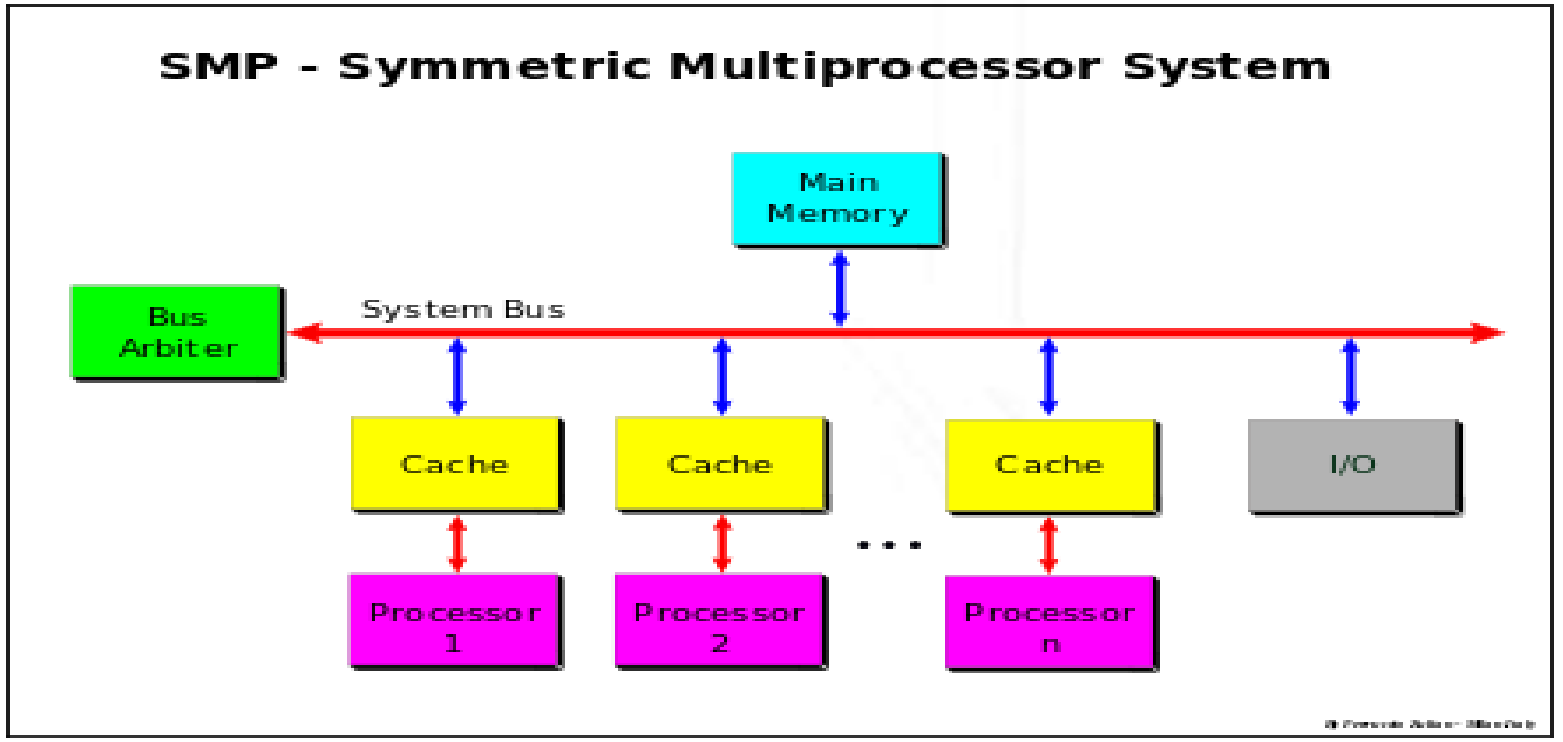
- An operating system capable of supporting and utilizing more than one computer processor.

More than one CPUs that can be shared

Below are some examples of multiprocessing operating systems.

For Example

- Linux
- Unix
- Windows 2000



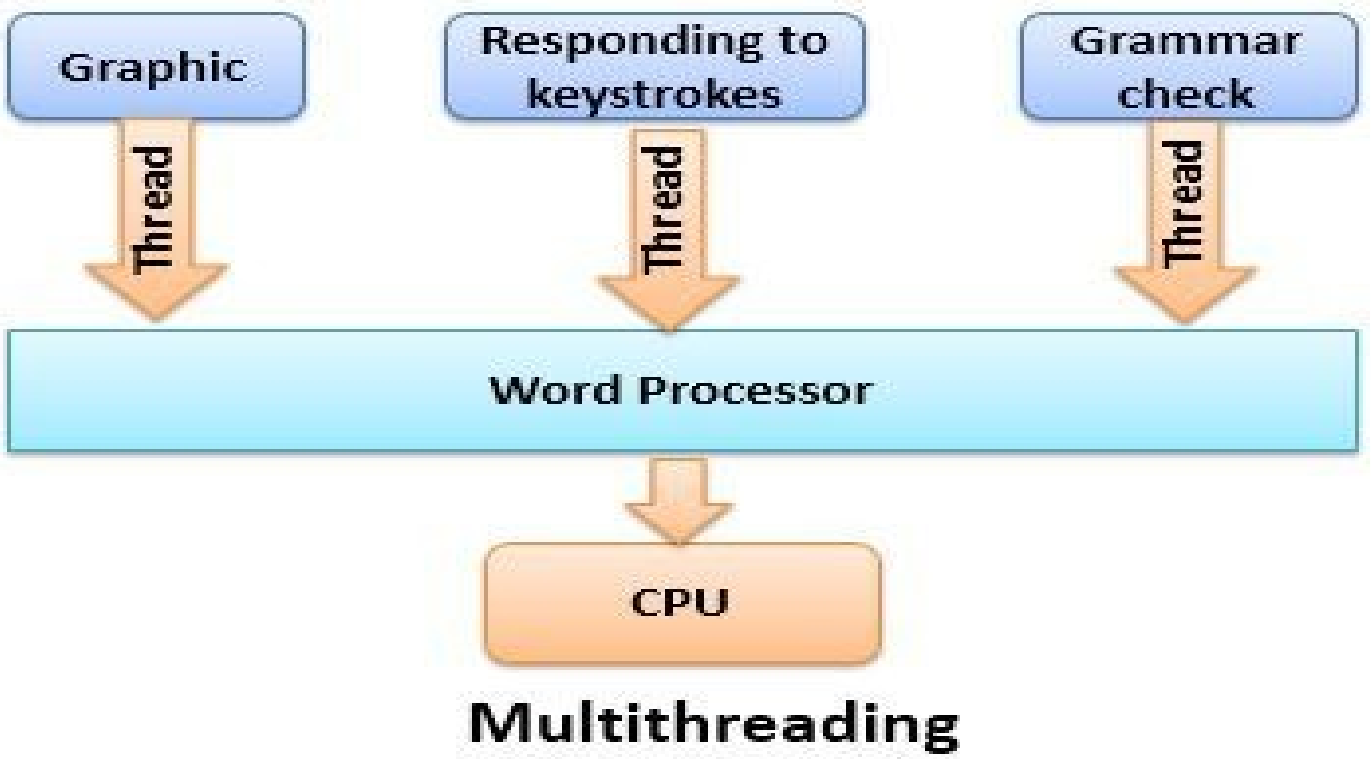
Multi Threading

- Smaller parts of a program are loaded when needed by OS
- Operating systems that allow different parts of a software program to run concurrently

Operating systems that would fall into this category are:

For example

- Linux
- Unix
- Windows 2000



Multithreading

Single User Multi-tasking

Single User Multi-tasking

Single user multi-tasking os allows user to perform one or more than one task at same time
Commonly os are
MS windows
Apples macintosh

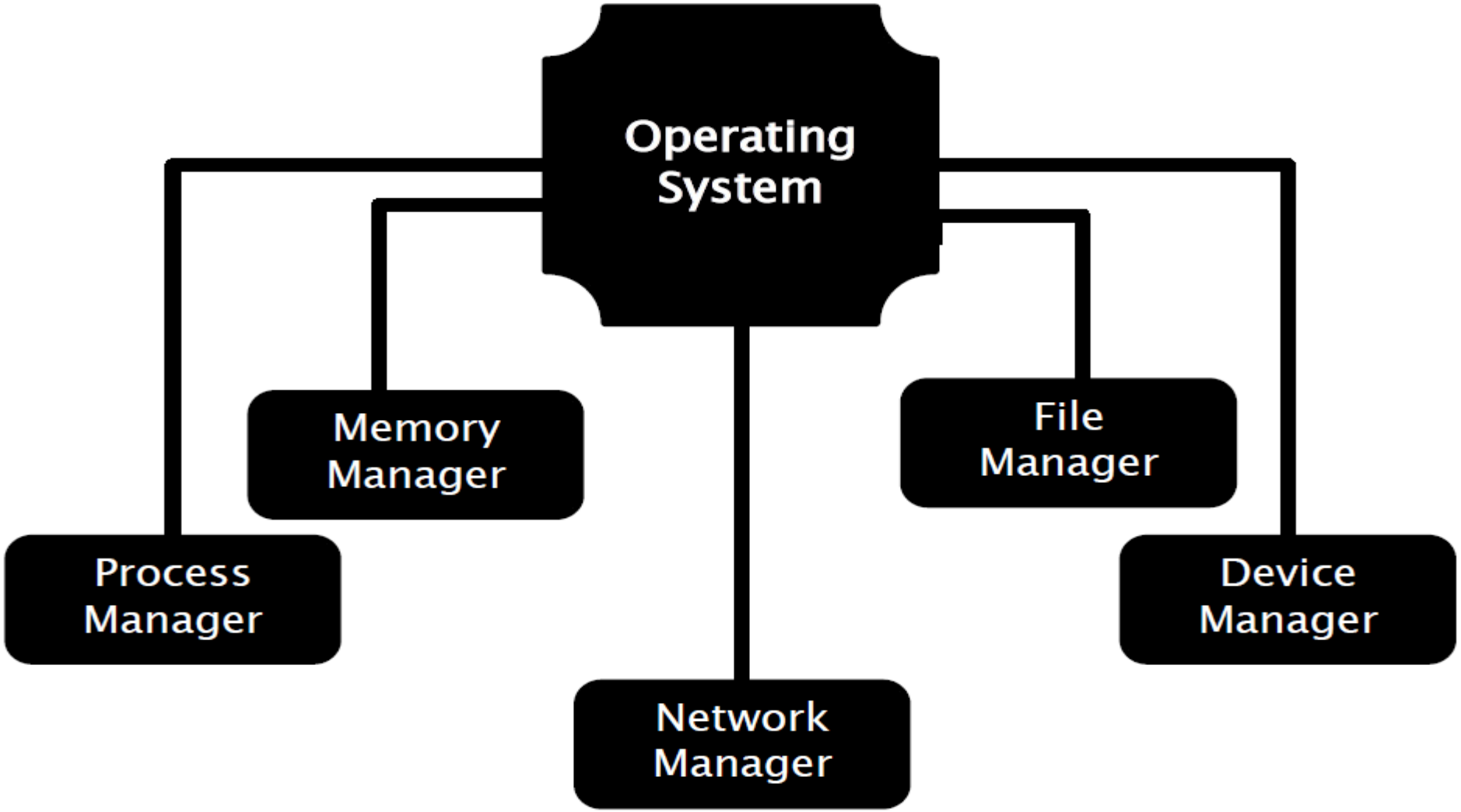
Single user Single tasking

- This type of operating system only has to deal with one person at a time, running one user application at a time.\

Functions like printing a document, downloading images, etc., can be performed only one at a time.

Examples include MS-DOS, Palm OS, etc.

Components of OS



Process Manager

Process Manager

- The OS must allocate resources to processes, enable processes to share and exchange information, protect the resources of each process from other processes and enable synchronisation among processes. To meet these requirements, the OS must maintain a data structure for each process, which describes the state and resource ownership of that process, and which enables the OS to exert control over each process.

Memory Manager

Memory Manager

- The memory management function keeps track of the status of each memory location, either allocated or free. It determines how memory is allocated among competing processes, deciding which gets memory, when they receive it, and how much they are allowed. When memory is allocated it determines which memory locations will be assigned. It tracks when memory is freed or unallocated and updates the status.

File Manager

File Manager

- A file manager or file browser is a computer program that provides a user interface to manage files and folders. The most common operations performed on files or groups of files include creating, opening (e.g. viewing, playing, editing or printing), renaming, moving or copying, deleting and searching for files, as well as modifying file attributes, properties and file permissions. Folders and files may be displayed in a hierarchical tree based on their directory structure.

Device Manager

Device Manager

- The device manager is responsible for detecting and managing devices, performing power management, and exposing devices to userspace. Device drivers allow user applications to communicate with a system's devices. They provide a high-level abstraction of the hardware to user applications while handling the low-level device-specific I/O and interrupts.

Network Manager

- The network manager manages the relationship between the operating system and the network(s) that it is connected to. This means that the user can be unaware of issues like connectivity, and network speed.

Popular Linux distributions:

Red Hat Enterprise Linux
Fedora
SUSE Linux Enterprise
Ubuntu
Mandriva Linux
Centos
Parrot etc..

Run C++ code on Ubuntu.

Open the terminal

Create .cpp file and write code init.

Run following command for object code

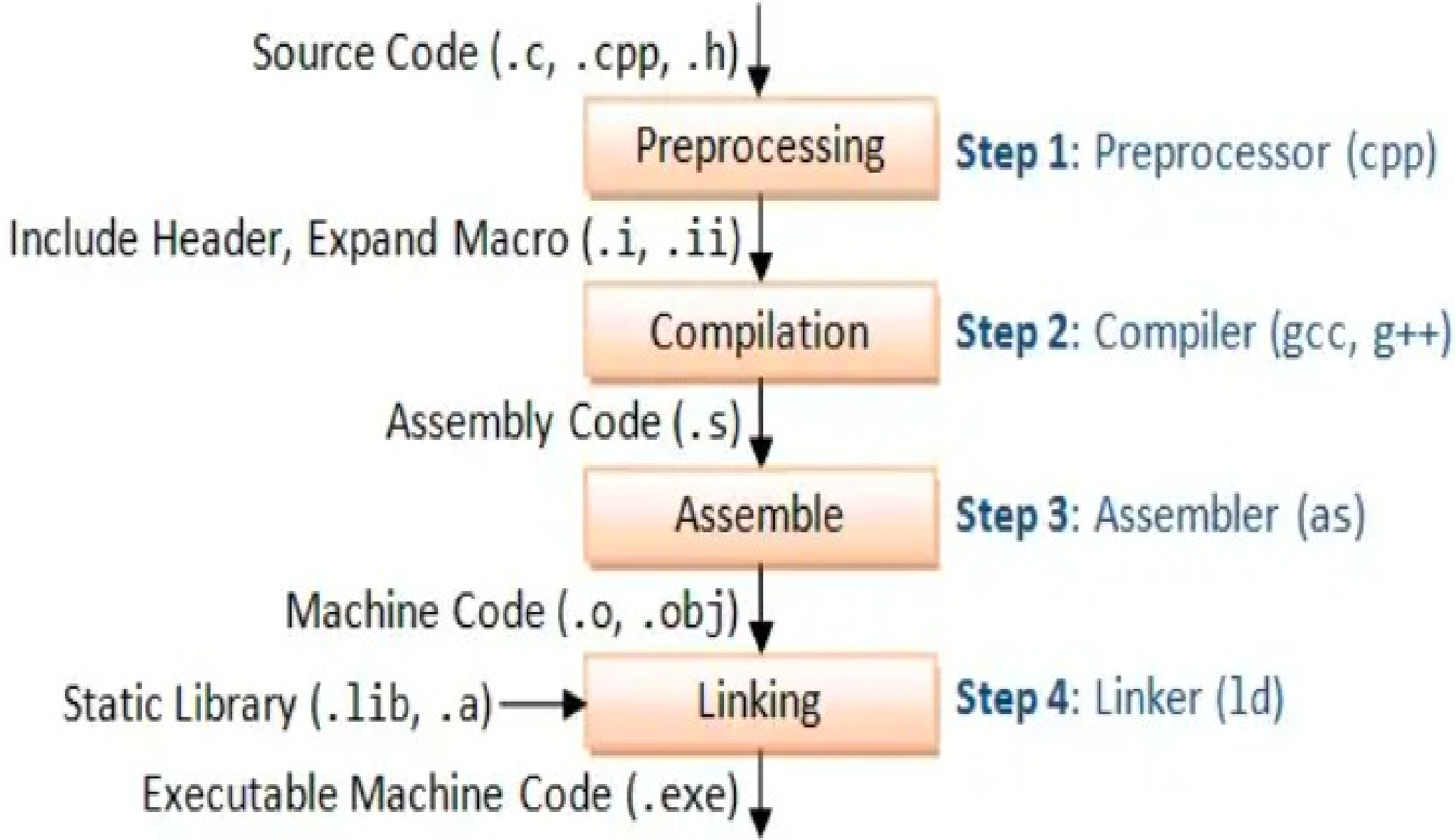
1. g++ fileName.cpp -o objectcodefile
2. ./objectcodefile

Check g++ version

G++ --version

If version not found

sudo apt install build-essential


Source Code (.c, .cpp, .h)
Preprocessing
Step 1: Preprocessor (cpp)
Include Header, Expand Macro (.i, .ii)
Compilation
Step 2: Compiler (gcc, g++)
Assembly Code (.s)
Assemble
Step 3: Assembler (as)
Machine Code (.o, .obj)
Static Library (.lib, .a)
Linking
Step 4: Linker (ld)
Executable Machine Code (.exe)