

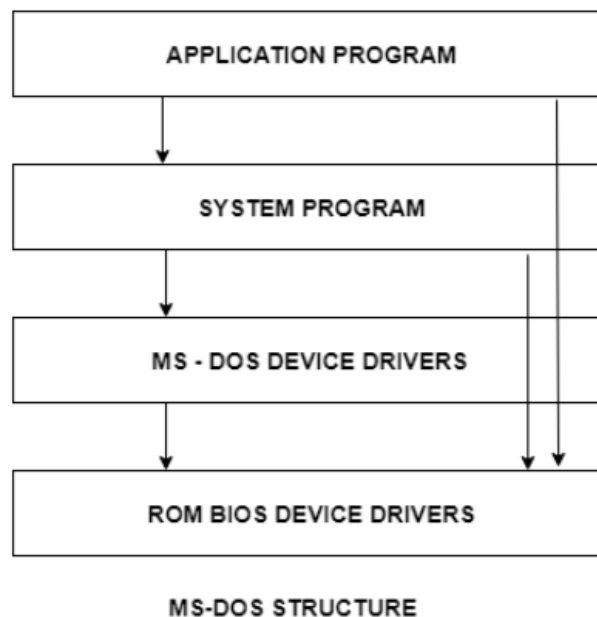
5. OPERATING SYSTEM STRUCTURE

An operating system is a construct that allows the user application programs to interact with the system hardware. Since the operating system is such a complex structure, it should be created with utmost care so it can be used and modified easily. An easy way to do this is to create the operating system in parts. Each of these parts should be well defined with clear inputs, outputs and functions

1. Simple Structure

There are many operating systems that have a rather simple structure. These started as small systems and rapidly expanded much further than their scope. A common example of this is MS-DOS. It was designed simply for a niche amount for people. There was no indication that it would become so popular.

An image to illustrate the structure of MS-DOS is as follows –



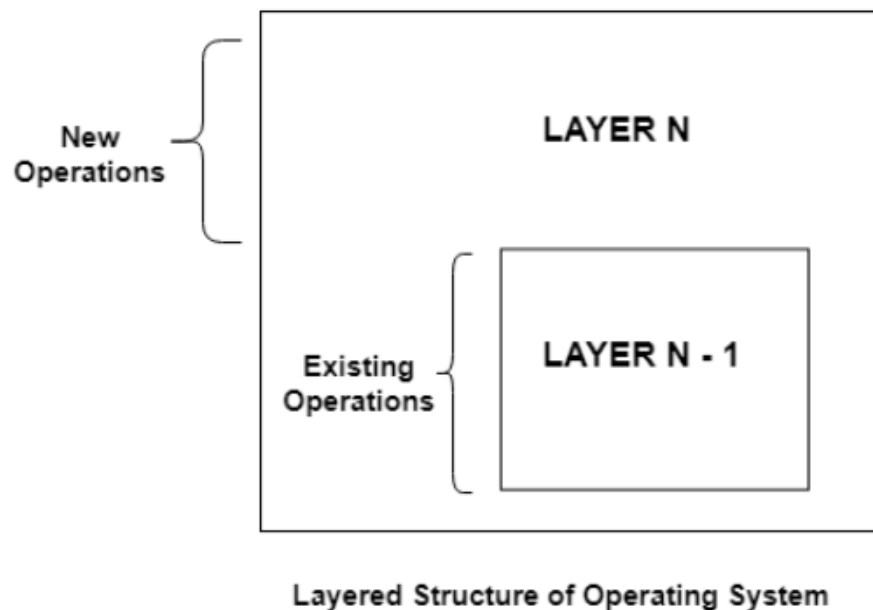
It is better that operating systems have a modular structure, unlike MS-DOS. That would lead to greater control over the computer system and its various

applications. The modular structure would also allow the programmers to hide information as required and implement internal routines as they see fit without changing the outer specifications.

2. LAYERED STRUCTURE

One way to achieve modularity in the operating system is the layered approach. In this, the bottom layer is the hardware and the topmost layer is the user interface.

An image demonstrating the layered approach is as follows –



3. MONOLITHIC STRUCTURE:

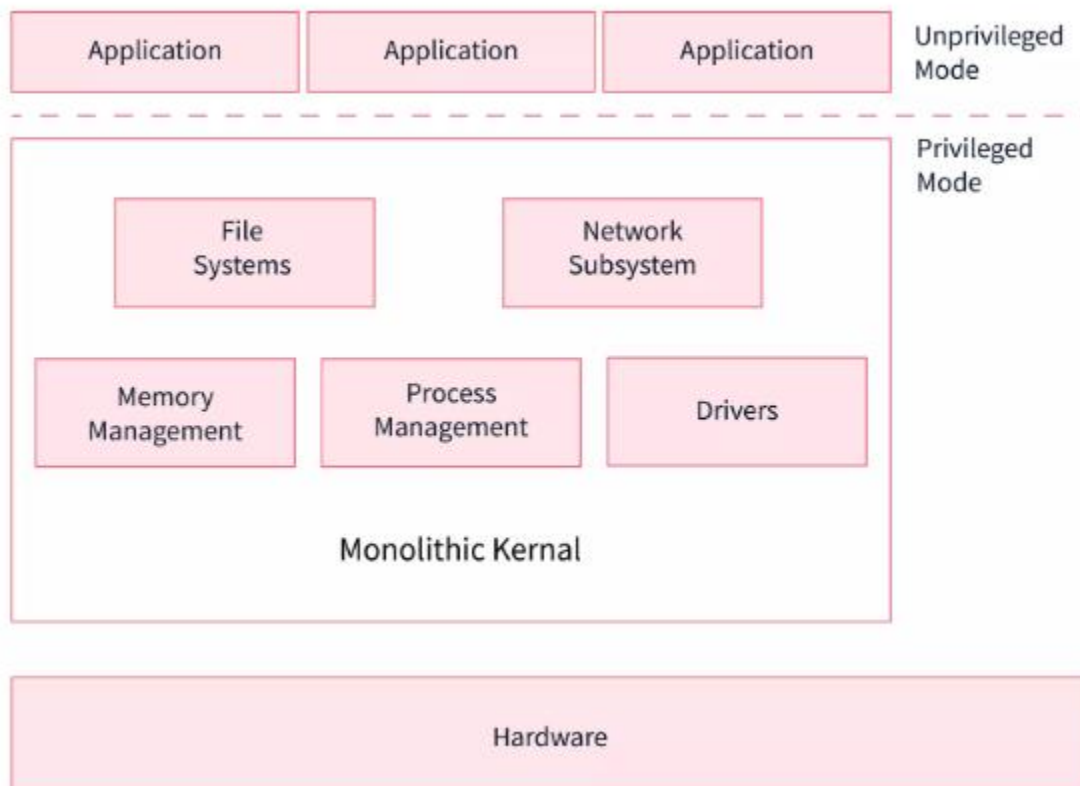
The Monolithic operating System in which the kernel acts as a manager by managing all things like file management, memory management, device management, and operational processes of the Operating System.

The kernel is the heart of a computer operating system (OS). Kernel delivers basic services to all other elements of the System. It serves as the primary interface between the Operating System and the hardware.

In monolithic systems, kernels can directly access all the resources of the operating System like physical hardware, exp Keyboard, Mouse etc.

The monolithic kernel is another name for the monolithic operating system. Batch processing and time-sharing maximize the usability of a processor by multiprogramming. The monolithic kernel functions as a virtual machine by working on top of the Operating System and controlling all hardware components. This is an outdated operating system that was used in banks to accomplish minor activities such as batch processing and time-sharing, which enables many people at various terminals to access the Operating System.

A Diagram of the Monolithic structure is shown below



Advantages of Monolithic structure:

- It is simple to design and implement because all operations are managed by kernel only, and layering is not needed.

- As services such as memory management, file management, process scheduling, etc., are implemented in the same address space, the execution of the monolithic kernel is relatively fast as compared to normal systems. Using the same address saves time for address allocation for new processes and makes it faster.

Disadvantages of Monolithic structure:

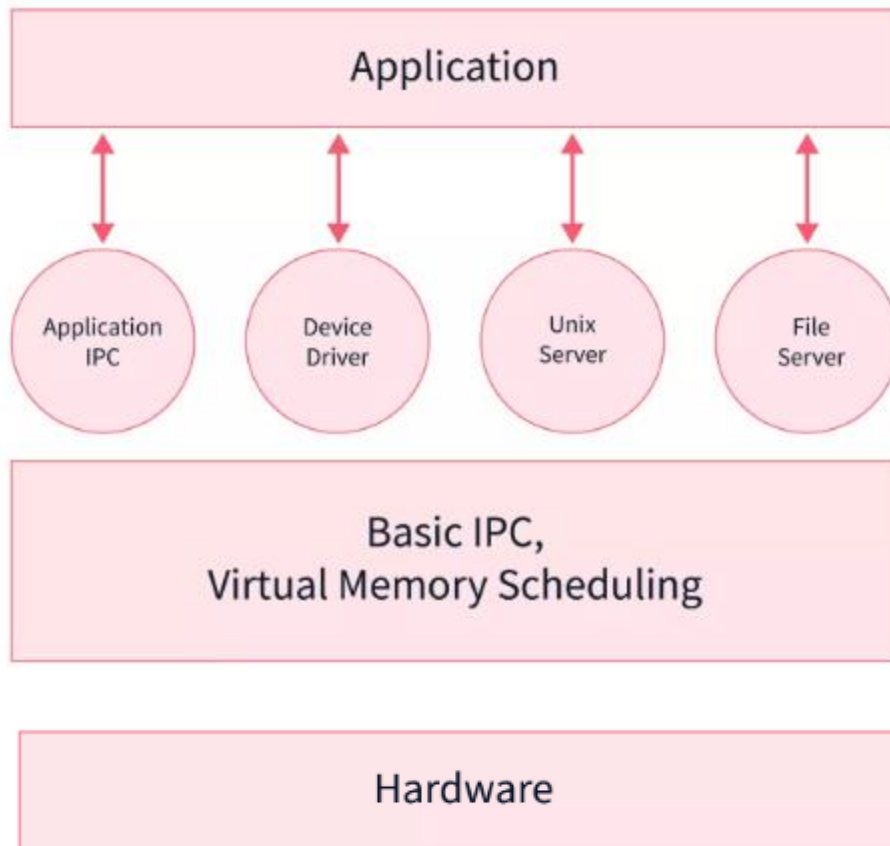
- If any service in the monolithic kernel fails, the entire System fails because, in address space, the services are connected to each other and affect each other.
- It is not flexible, and to introduce a new service

4 .MICRO-KERNEL

Micro-Kernel structure designs the Operating System by removing all non-essential components of the kernel. These non-essential components of kernels are implemented as systems and user programs. Hence these implemented systems are called as Micro-Kernels.

Each Micro-Kernel is made independently and is isolated from other Micro-Kernels. So this makes the system more secure and reliable. If any Micro-Kernel fails, then the remaining operating System remains untouched and works fine.

Microkernel Operating System



Advantages of Micro-kernel structure:

- It allows the operating system to be portable between platforms.
- As each Micro-Kernel is isolated, it is safe and trustworthy.
- Because Micro-Kernels are smaller, they can be successfully tested.
- If any component or Micro-Kernel fails, the remaining operating System is unaffected and continues to function normally.

Disadvantages of Micro-kernel structure:

- Increased inter-module communication reduces system performance.
- System is complex to be constructed.

