

What is a kernel ?

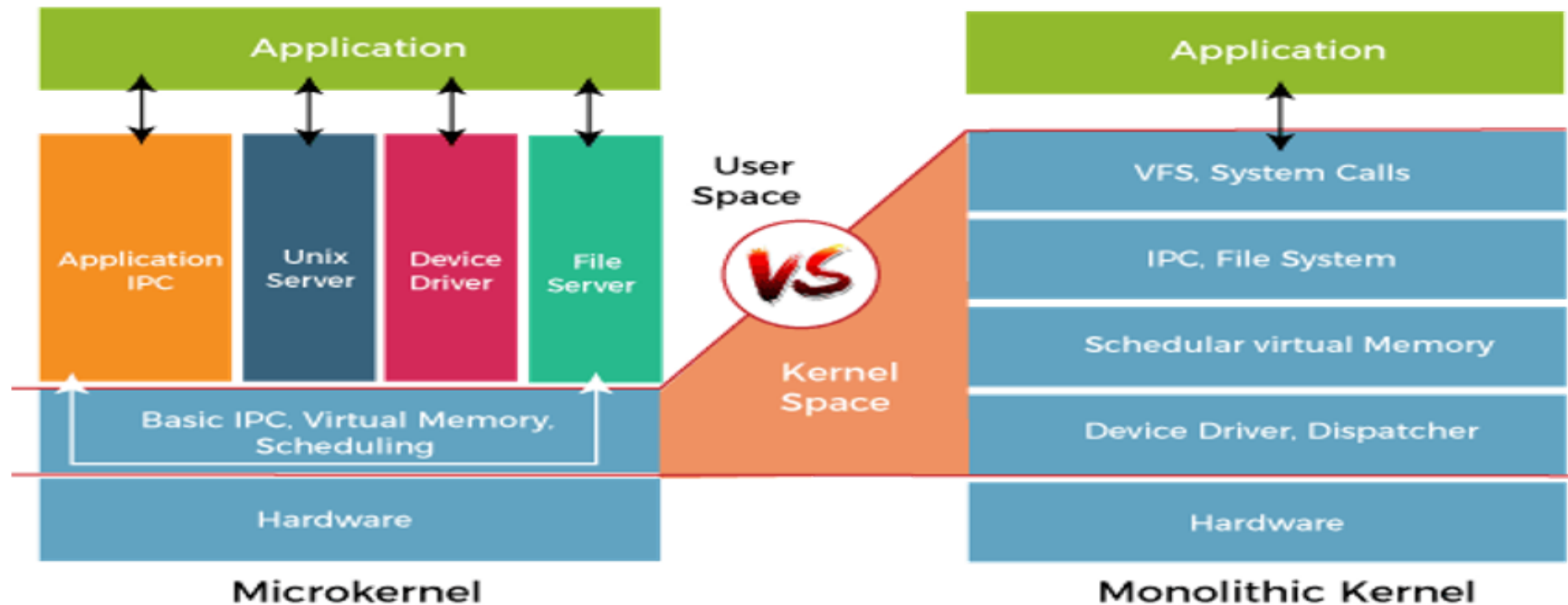
- The [kernel](#) is a computer program at the core of a computer's operating system and has complete control over everything in the system. It manages the operations of the computer and the hardware.

There are five types of kernels :

- A micro kernel, which only contains basic functionality;
- A monolithic kernel, which contains many device drivers.
- Hybrid Kernel
- Exokernel
- Nanokernel

1. Microkernel :kernel manages the operations of the computer,
 - In microkernel the user services and kernel services are implemented in different address space. The user services are kept in user address space, and kernel services are kept under kernel address space.

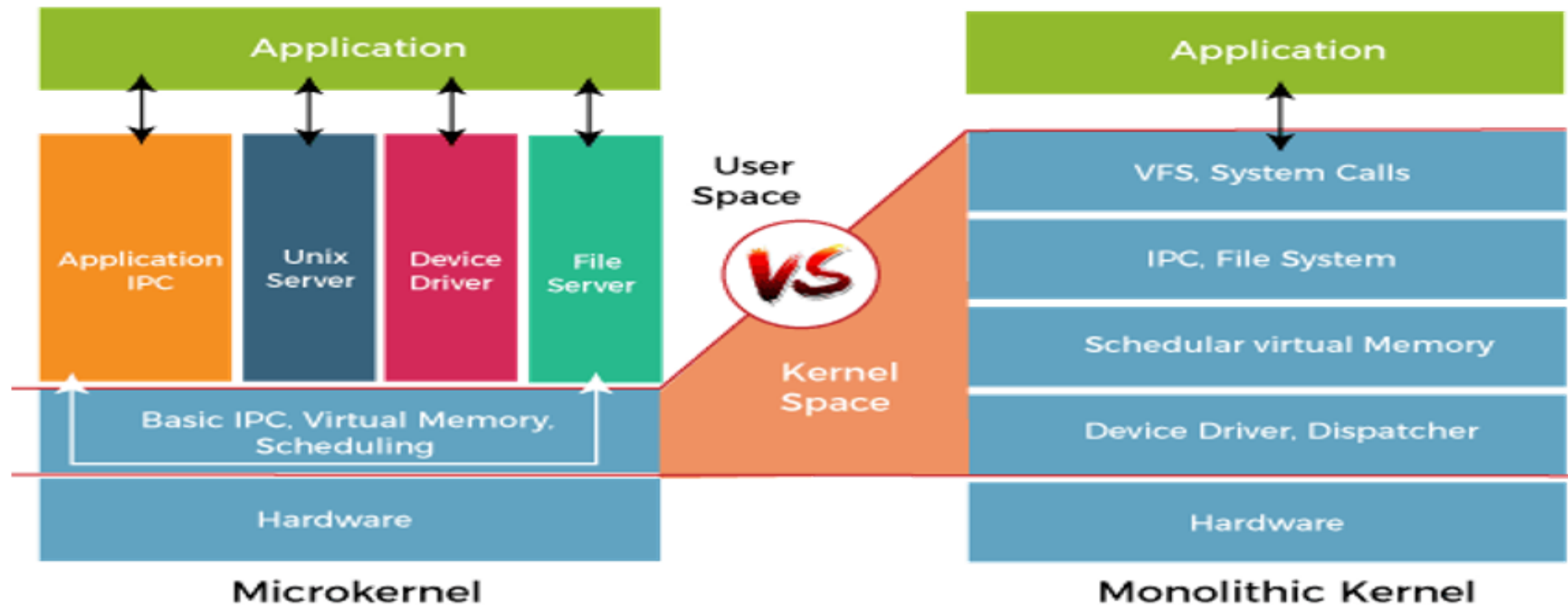
Microkernel Vs Monolithic kernel :



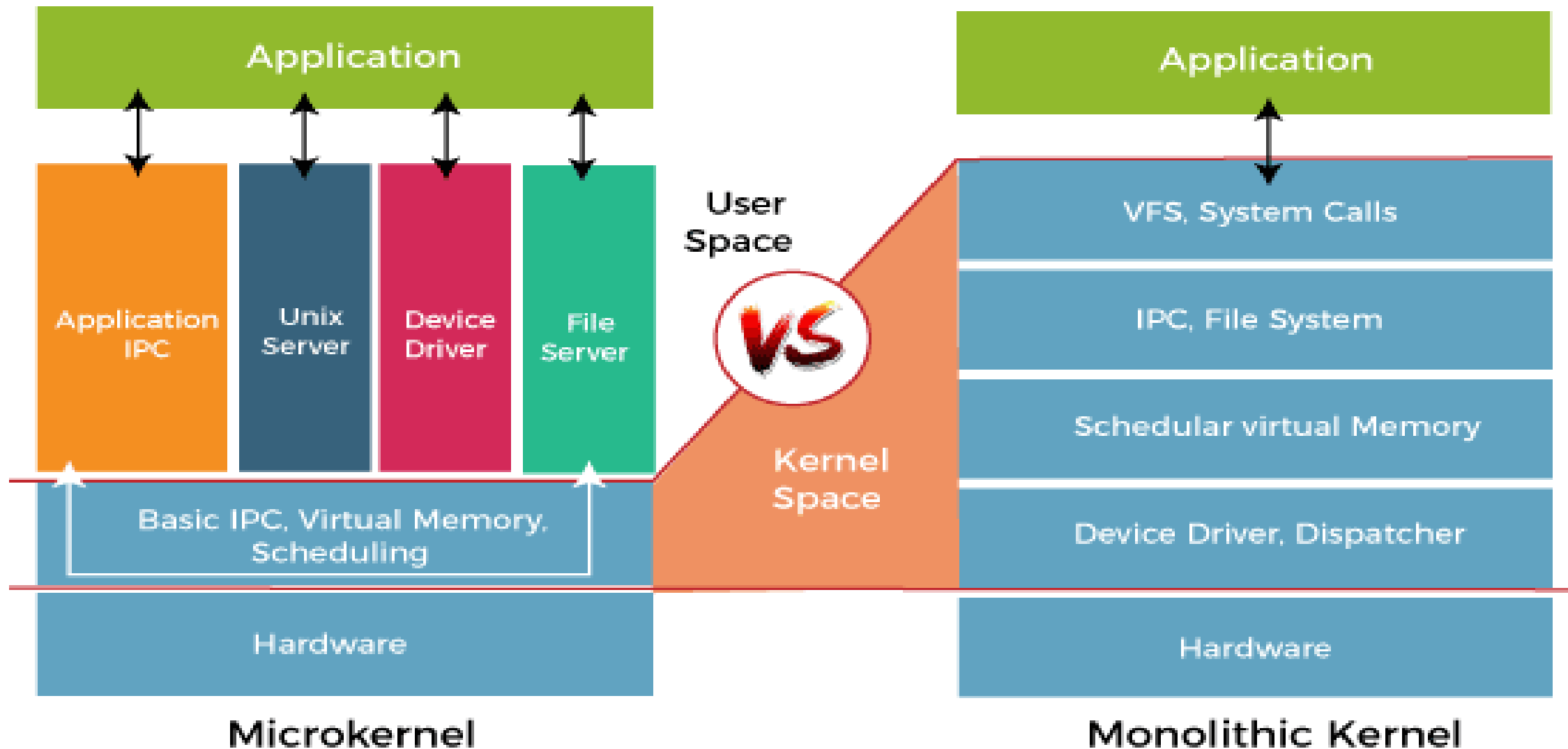
- 2. Monolithic kernel :

In Monolithic kernel, the entire operating system runs as a single program in kernel mode. The user services and kernel services are implemented in same address space.

Microkernel Vs Monolithic kernel :



Microkernel Vs Monolithic kernel :



Differences between Microkernel and Monolithic Kernel :

S. No.	Parameters	Microkernel	Monolithic kernel
1.	Address Space	In microkernel, user services and kernel services are kept in separate address space.	In monolithic kernel, both user services and kernel services are kept in the same address space.
2.	Design and Implementation	OS is complex to design.	OS is easy to design and implement.
3.	Size	Microkernel are smaller in size.	Monolithic kernel is larger than microkernel.
4.	Functionality	Easier to add new functionalities.	Difficult to add new functionalities.
5.	Coding	To design a microkernel, more code is required.	Less code when compared to microkernel
6.	Failure	Failure of one component does not effect the working of micro kernel.	Failure of one component in a monolithic kernel leads to the failure of the entire system.

7.	Processing Speed	Execution speed is low.	Execution speed is high.
8.	Debugging	Debugging is simple.	Debugging is difficult.
9.	Maintain	It is simple to maintain.	Extra time and resources are needed for maintenance.
10.	Example	Example : Mac OS X.	Example : Microsoft Windows 95.