

# Operating Systems Components

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# Operating System Components

## OS Components

- Shell
- Kernel



Fig. 1 : Operating System Components

# Operating System Services

An Operating System provides services to both the users and to the programs.

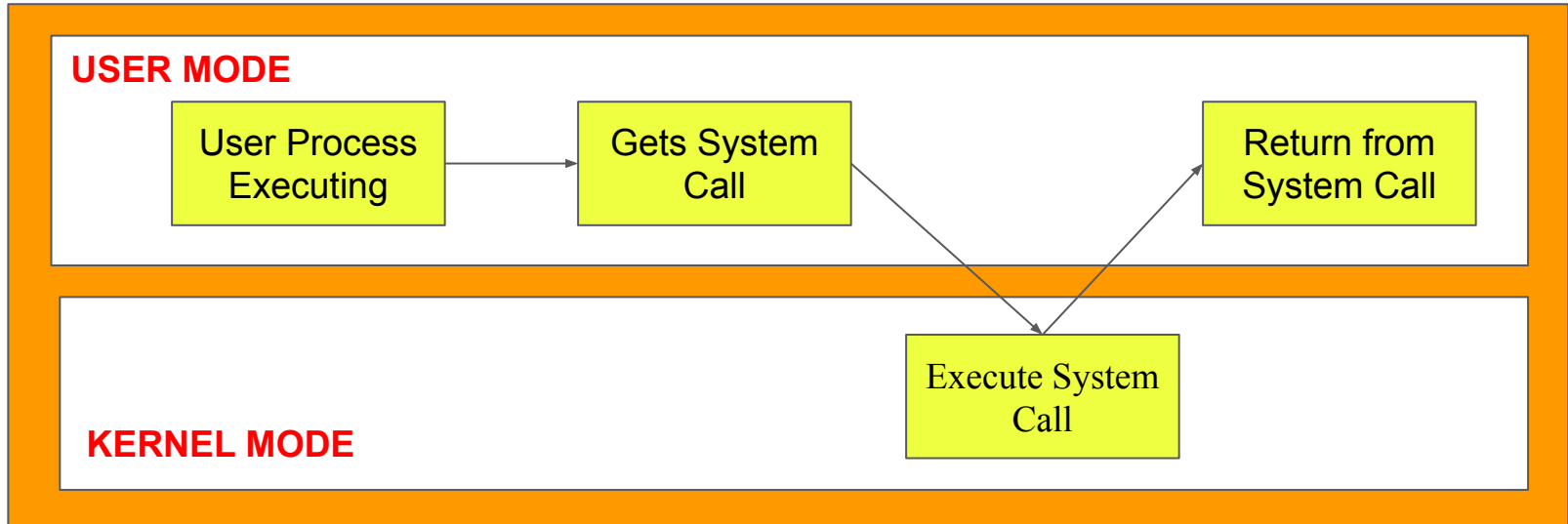
- It provides programs an environment to execute.
- It provides certain services to programs and to users of those programs.

Following are a few common services provided by an operating system -

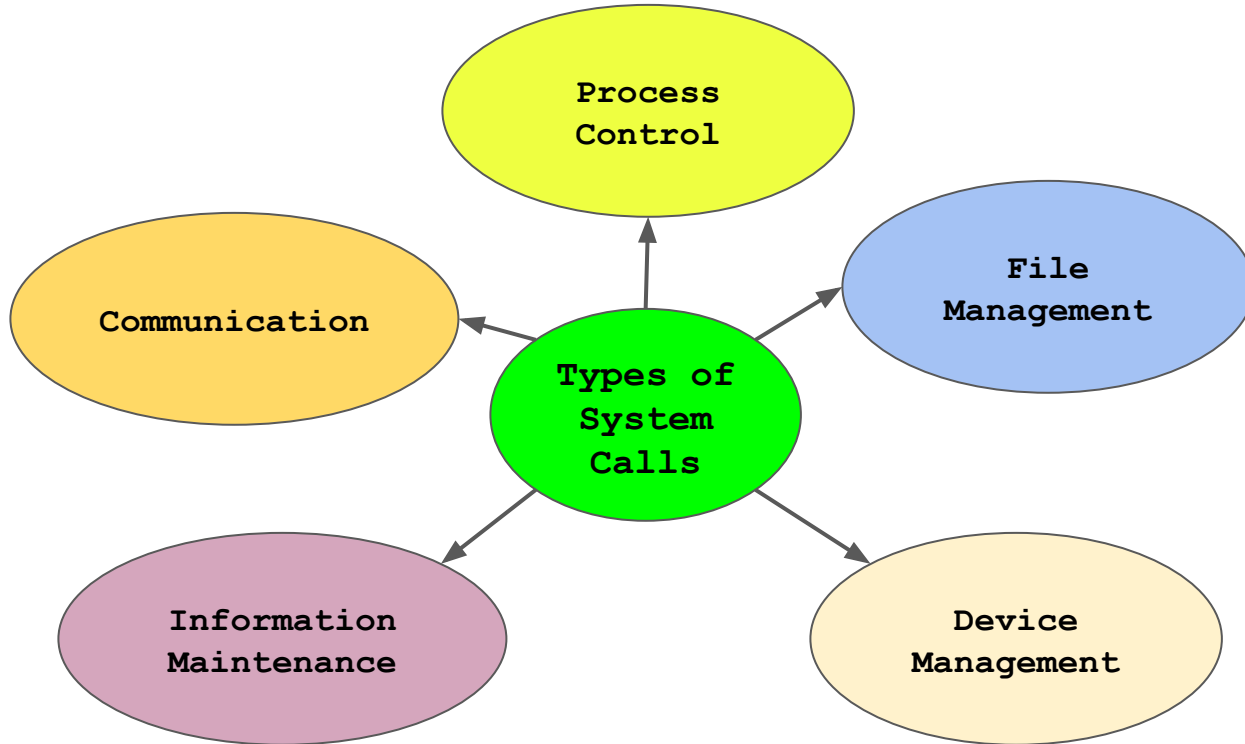
- User Interface
- Program Execution
- I/O Operations
- File System Manipulations
- Communication
- Error Detection
- Resource Allocation
- Accounting (History)
- Protection and Security

# System Calls

- The interface between a process and an operating system is provided by system calls.



# System Calls



# System Calls

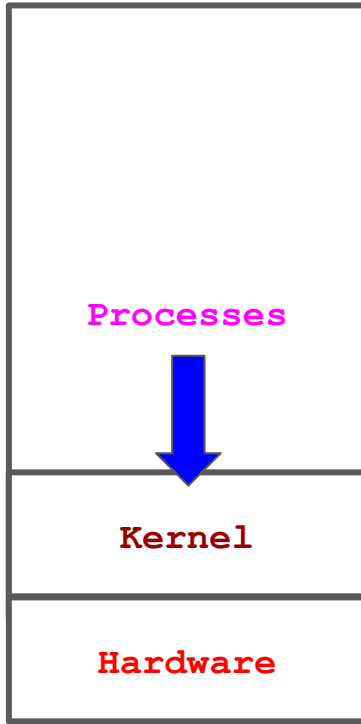
Types of System Calls	Windows	Linux
Process Control	CreateProcess(), ExitProcess() WaitForSingleObject()	fork(), exit(), wait()
File Management	CreateFile(), ReadFile(), WriteFile() CloseHandle()	open(), read(), write() close()
Device Management	SetConsoleMode(), ReadConsole(), WriteConsole()	ioctl(), read(), write()
Information Maintenance	GetCurrentProcessID(), SetTimer(), Sleep()	getpid(), alarm() sleep()
Communication	CreatePipe(), CreateFileMapping() MapViewOfFile()	pipe(), shmget(), mmap()

# Virtual Machines

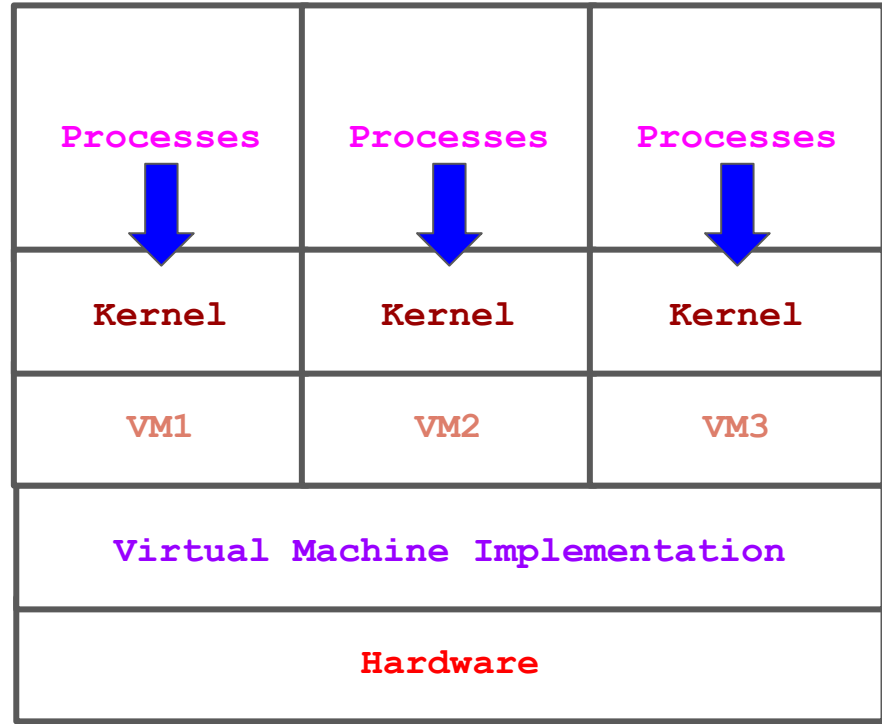
## What is a virtual machine?

- A Virtual Machine (VM) is a compute resource that uses software, instead of a physical computer to run programs and deploy apps.
- One or more virtual "guest" machines run on a physical "host" machine.

# Virtual Machines



(a) Non-Virtual Machine



(b) Virtual Machine



# Virtual Machines

## Advantages of virtual machines

- Virtual machines are easy to manage and maintain.
- VMs can run multiple operating system environments on a single physical computer, saving physical space, time and management costs.
- Virtual machines support legacy applications, reducing the cost of migrating to a new operating system.
- Example: Virtual Linux can run on Windows OS

# Virtual Machines

## Disadvantages of virtual machines:

- Running multiple virtual machines on one physical machine can result in unstable performance if infrastructure requirements are not met.
- Virtual machines are less efficient and run slower than a full physical computer. Most enterprises use a combination of physical and virtual infrastructure to balance the corresponding advantages and disadvantages.

# Boot Sequence

- **Booting:** Booting is a process of loading and initializing an OS.
- Boot sequence is the order in which a computer searches for nonvolatile data storage devices containing program code to load the operating system (OS).
- Typically, a Macintosh structure uses ROM and Windows uses BIOS to start the boot sequence.
- Once the instructions are found, the CPU takes control and loads the OS into system memory.
- The devices that are usually listed as boot order options in the BIOS settings are hard disks, floppy drives, optical drives, flash drives, etc.

# Boot Sequence

PhoenixBIOS Setup Utility							
Main	Advanced	Security	Boot	Exit			
CD-ROM Drive +Hard Drive +Removable Devices Network boot from Intel E1000				Item Specific Help			
				Keys used to view or configure devices: <Enter> expands or collapses devices with a + or - <Ctrl+Enter> expands all <+> and <-> moves the device up or down. <n> May move removable device between Hard Disk or Removable Disk <d> Remove a device that is not installed.			
F1	Help	↑↓	Select Item	-/+	Change Values	F9	Setup Defaults
Esc	Exit	↔	Select Menu	Enter	Select ► Sub-Menu	F10	Save and Exit