Cheatography

# os Cheat Sheet

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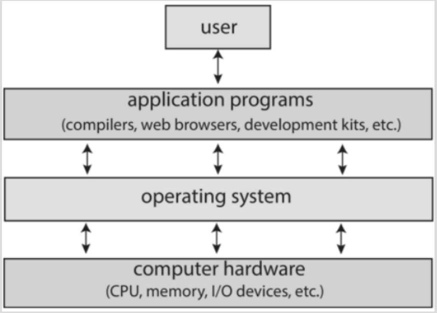
## lecture 1

computer system (layered architecture): consist of 4 components (user -> applicatoin program -> Operating system -> computer hardware) *Components communicate with their immediate neighbors only*

Roles of OS 1) Resource management: os = software that manage a computer's hardware 2) Serivices: act as interface application/user program <-> computer hardware

## computer system


user
application programs
(compilers, web browsers, development kits, etc.)
operating system
computer hardware
(CPU, memory, I/O devices, etc.)

## Hardware Organization

**Processor**: Controls the operation of the computer and performs its data processing functions. When there is only one processor, it is often referred to as the central processing unit (CPU).

**Main memory**: Stores data and programs, *volatile (lost power lost data)*

**I/O modules** (devices and controllers): Move data between the computer and its external environment.

**System bus**: for communication

## CPU core (1 CPU =1 calculation)

A processor might consist of one core or many cores.
• Core: The basic component unit of the CPU to execute instructions.
• One core is needed to execute an instruction per time.
If there are N cores, we can executes up to N instructions at a time (called parallelism).

## Running a computer create Process

Process = abstraction of executing a program (by the CPU)

*computer working because of a process*

## Storage Structure

Electrically erasable programmable read-only memory (**EEPROM**) stores a bootstrap program, which loads the operating system when the computer is turned on.
**Memory** (including registers, cache, main memory) stores the ongoing instructions (codes) and temporary data that the CPU is executing. *store processes* , [volatile]
**Secondary storage** : stores programs & data [nonvolatile]
**Tertiary storage** : refers to any special proposed storages e.x., CD-ROM, magnetic tape [nonvolatile]

## Hardware Interrupt/Polling

**Interrupts**: I/O Devices will signal the CPU. The CPU is free to do other work until signaled.
-> increasing CPU Utilization
**Polling(without interrupt)**: The CPU repeatedly asks devices if they are done. The CPU is tied to the polling loop.
-> waste CPU cycles
in comparison with using *Interrupts* finished earlier

## Multiprogramming and Multitasking

**Multitasking** [time-sharing]: CPU switches frequently from executing one process to executing another process,

**Multiprogramming**: maximize CPU utilization, keep the CPU busy at all times.

## Dual-mode

**Kernel mode**(0) -> run OS , can access to ALL hardware (completely control the computer))

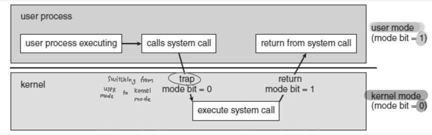
**User mode**(1) -> run application/user program, NOT allowed to access to hardware and system resources.

**trap** AKA. software interrupts =exception where the computer system switches from user mode -> kernel mode [systemcall]

**context switching**= CPU will switch executing from one process to another process

**timer interrupt**= Prevents user program to run forever.

## Dual-mode



## OS structure

**Simple**: most basic structur, Everything runs in kernel mode. ex. MS-DOS (in its early versions)supporting a single task/process

**Monolithic**: all OS services into a *single* kernel space ex. Linux
*pros*; communicate between components is fast -> efficient
Cons: Large kernel size.

## Q&A

How user program use hardware

> the app make privileged jobs -> create system call to OS in kernel -> OS do that job

## ???

Tedious mechanism =

System call = when the CPU executes an instruction related to privileged job

previlegde = make change on I/O devices

Not published yet.
Last updated 6th March, 2025.
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