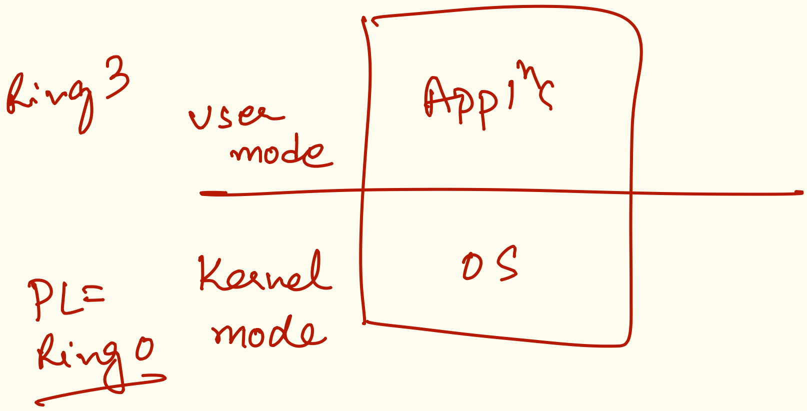
CS 744 Lecture 5

- Lab2 is available
- Labexam1 — 28th Aug. Wed.
  8:30 am — 11 am
  SL2

two main building blocks of OS design

(i) privileged levels of execution via the ISA.

- min. PL per instruction for correct execution.



(ii) interrupts

- world is non-deterministic
- IO is non-deterministic / non-scheduled.

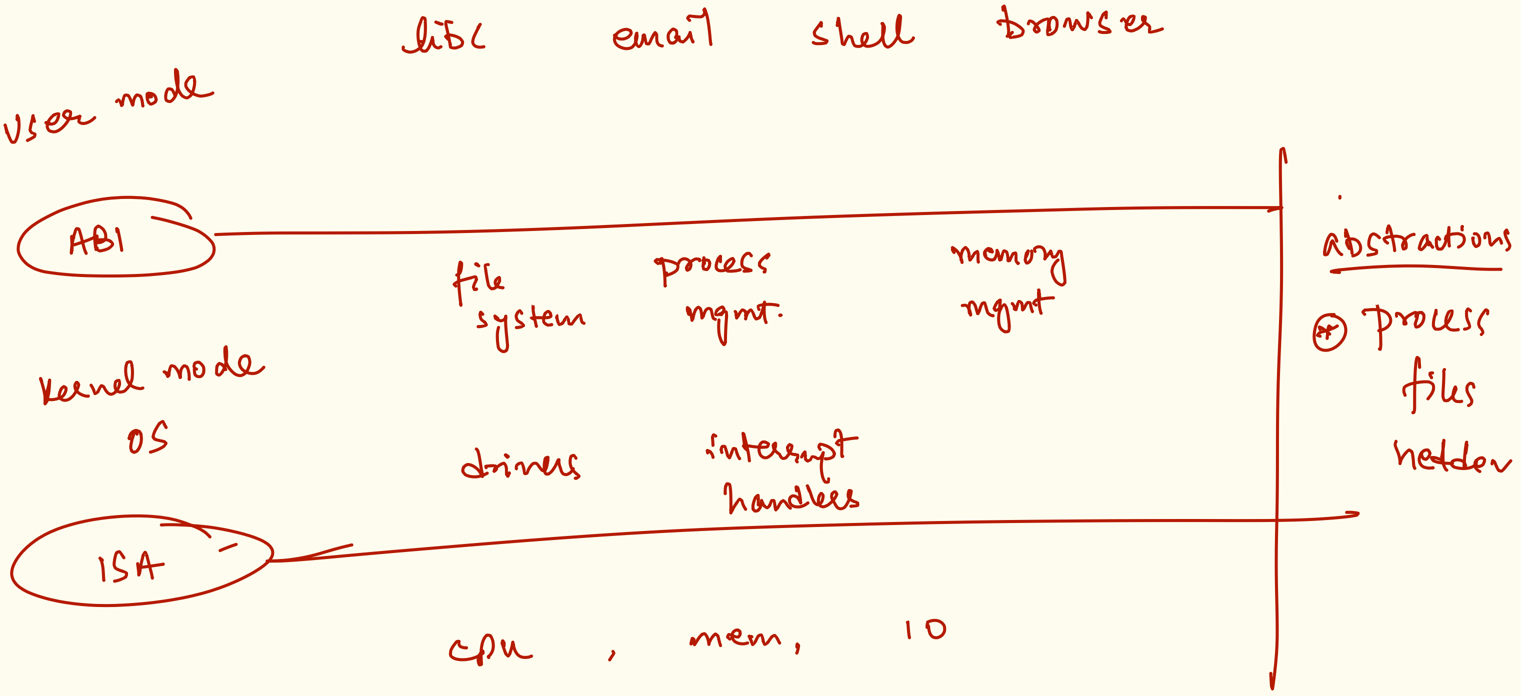
interrupts

- hardware — IO devices / device controllers.
- software
  - implicit — exceptions
    div. by zero
    seg fault
  - explicit
    - system calls

eg: x86
int 0x80

(*) interrupt delivery

- stopping of current seq. of instr. on CPU
- switch to Kernel mode
- handle interrupt
- schedule process / work



(#) the process abstraction.

(user-mode)

– program vs process

source code, shared libraries

↓ compilation/linking

– executable / binary

(*) – seq. of instructions of the ISA.

– format – ELF

- program in exeution
- instance of a program
- entity that can consume resources / OS functionality

~ program is set of instr. loaded in memory & pointed to by the PC.

(Q) how to invoke the stored-program (von Neumann model)

- where to load program in memory?
- when to execute on CPU?
- how long to execute on CPU?
- how to share the CPU?

~ process abstraction decouples program development and its execution.

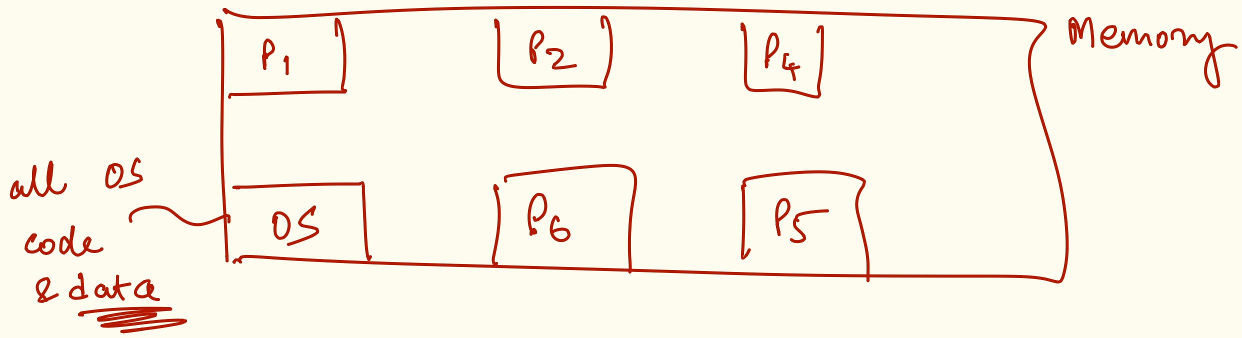
setup, scheduling, termination

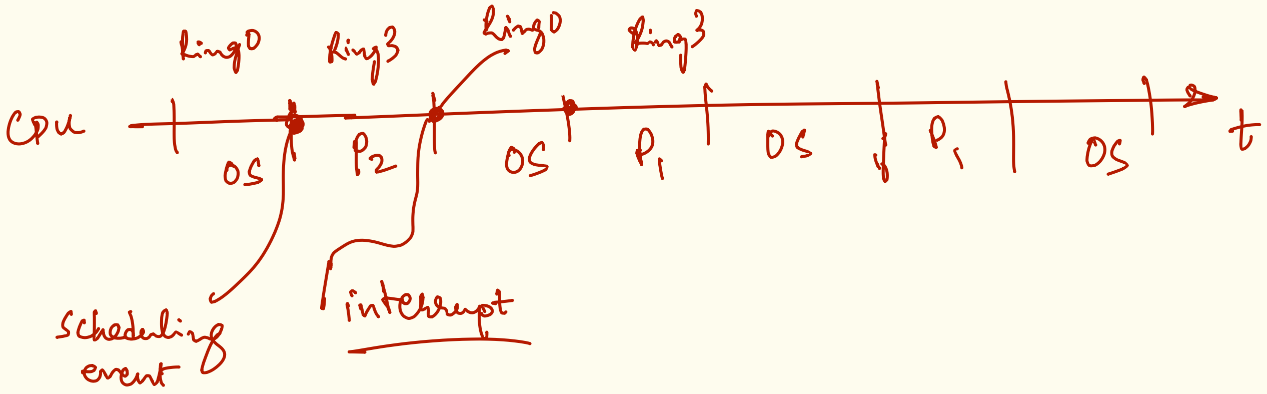
resource allocation,

(#) for every abstraction OS provides, the OS stores meta-data/information regarding the abstraction's implementation.

e.g: cab-hailing service

└ # cabs, #drivers, locations of cabs, traffic, billing...





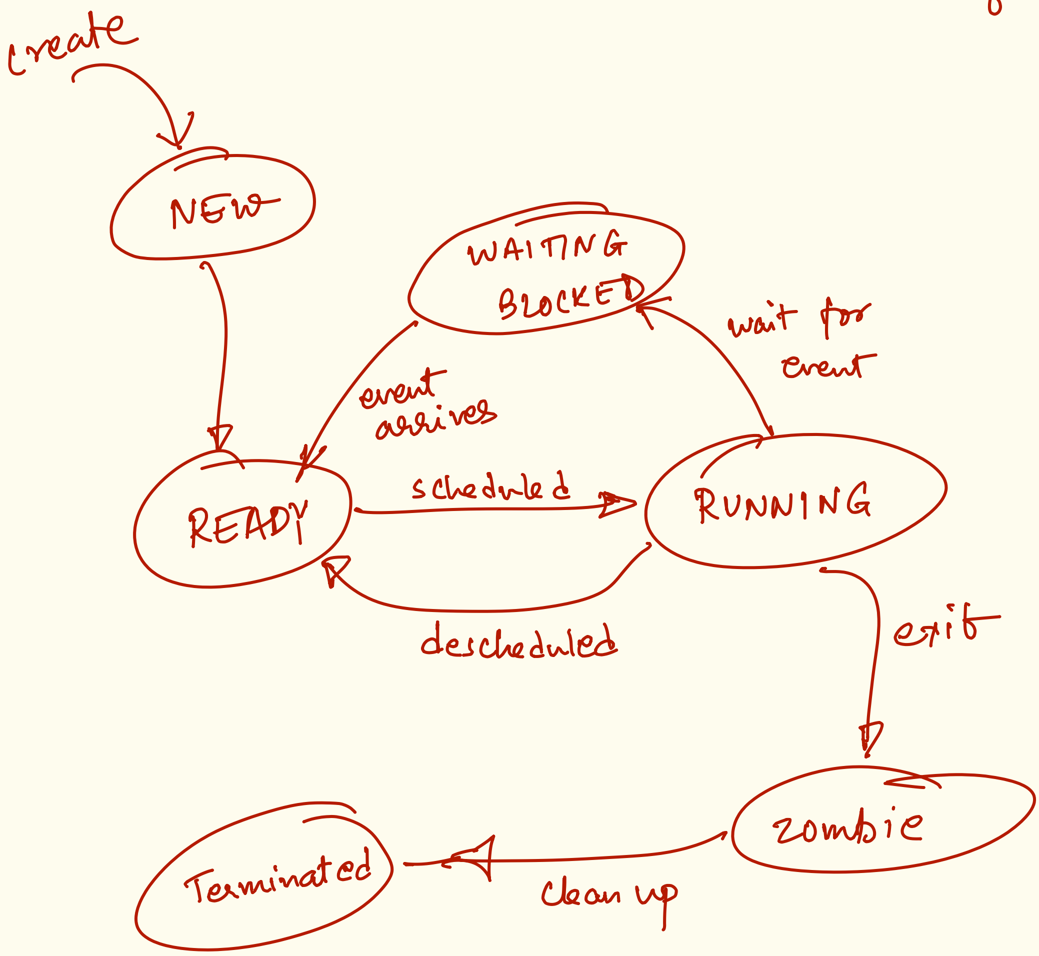
(*) metadata of process. / PCB — process control block.

- PC , state
- pid , ppid
- context ~ state/registers of the CPU due to instructions of the process.
- open files
- memory allocation regions
- signals

⊛ when a program is loaded / process is created will it always be executing?

- No!
- waiting for its turn (scheduling decision)
- waiting for an event (IO completion, lock to be free)
  (Blocked)
- done execution
- being setup

⊛ process state that captures current execution state of a process.



⊛ fork, exec, wait, waitpid