CSE 330: Operating Systems

Class: 04 **Date:** 1/18

Spring 2018

Note Title

Protection

- memory — base/bound registers
- CPU — modes — priv
  - user
    - Intel 4 modes
    - mode switching → interrupts

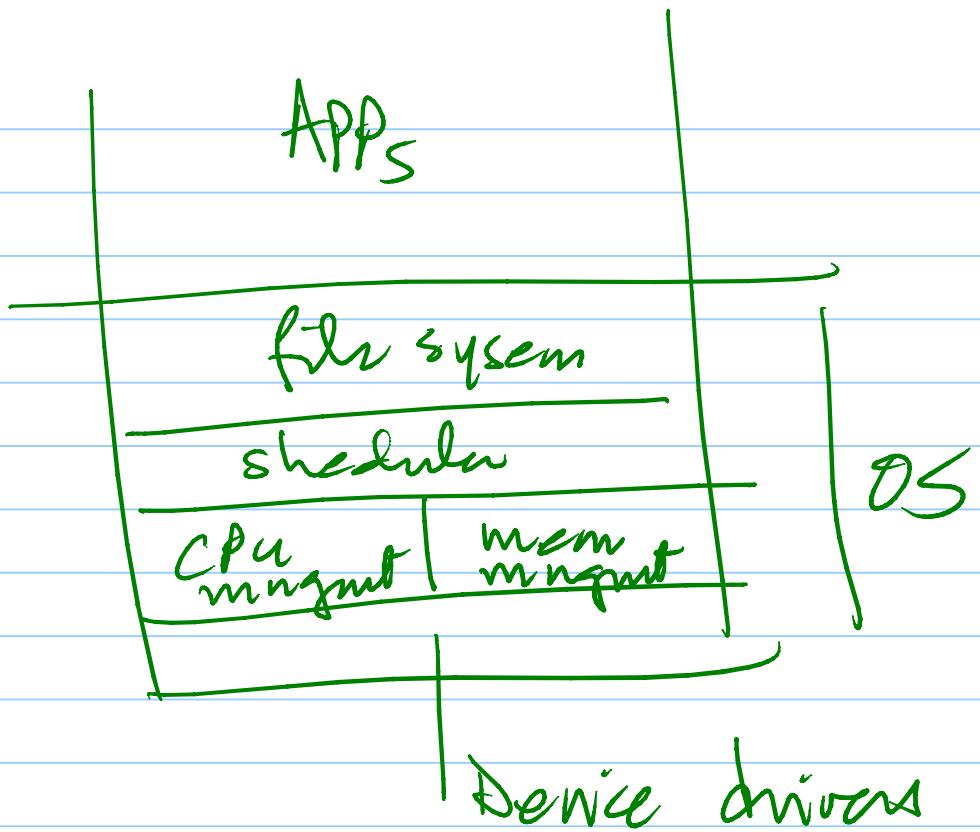
OS structures

- Interrupts / interrupt handlers
- Layers → [policy & mechanism]
- Modules
- device drivers

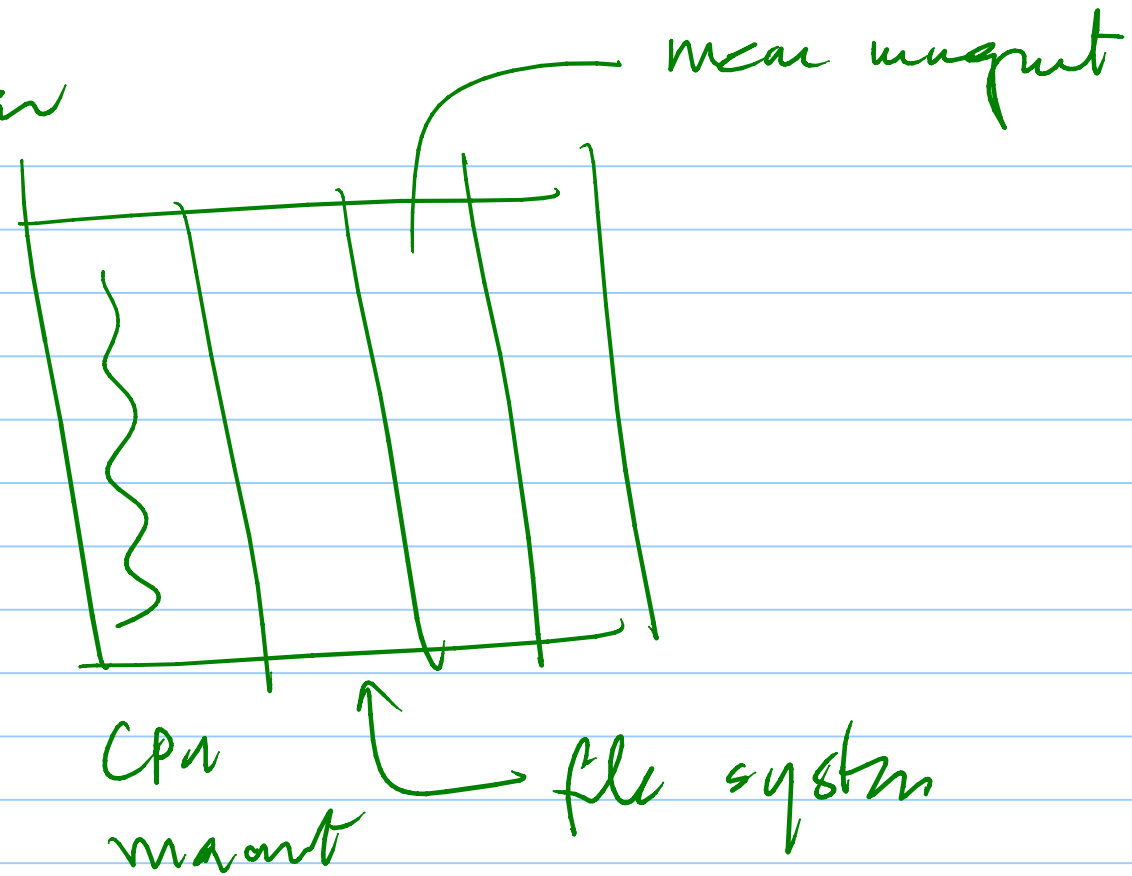
separating

+ system programs

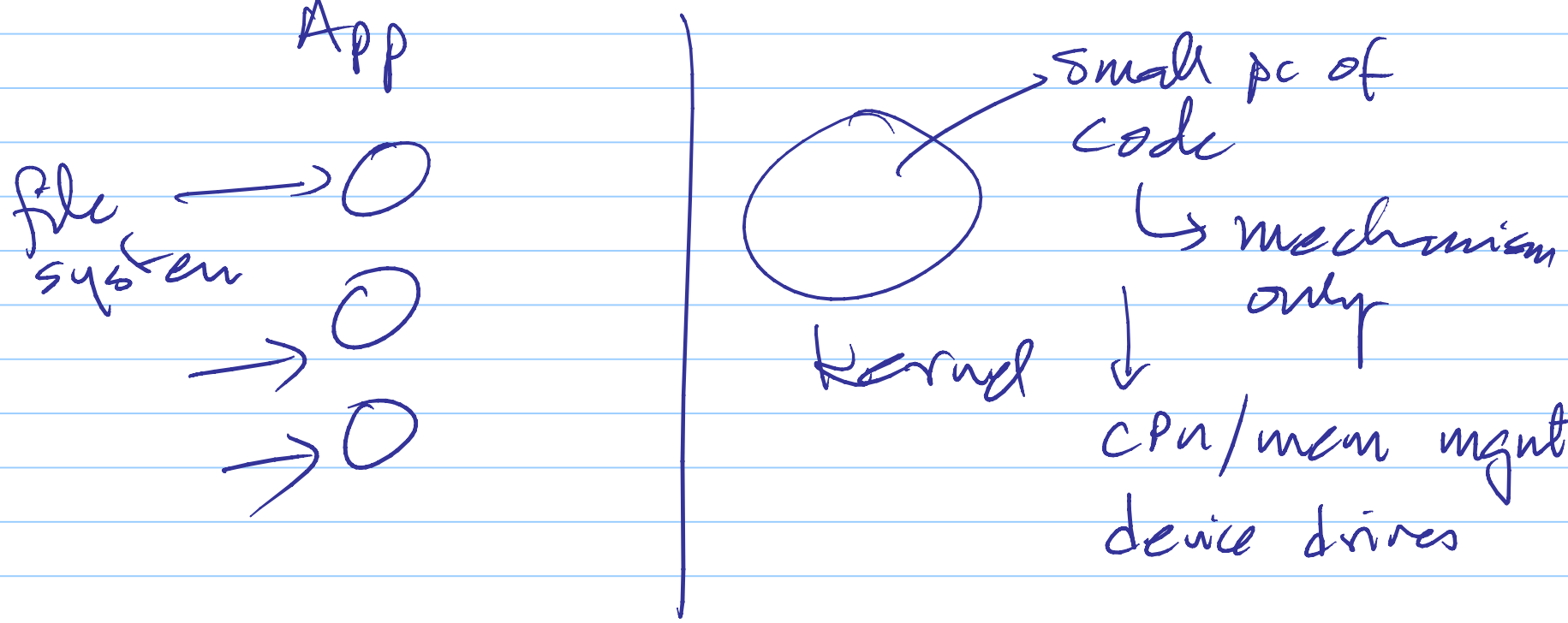
LAYERS


APPs
file sysem
shedulu
CPU mngmt
mem mngmt
OS
Device drivers

Modular



microkernel systems



how does it work

→ power on

→ one process → CPU executing the bootloader

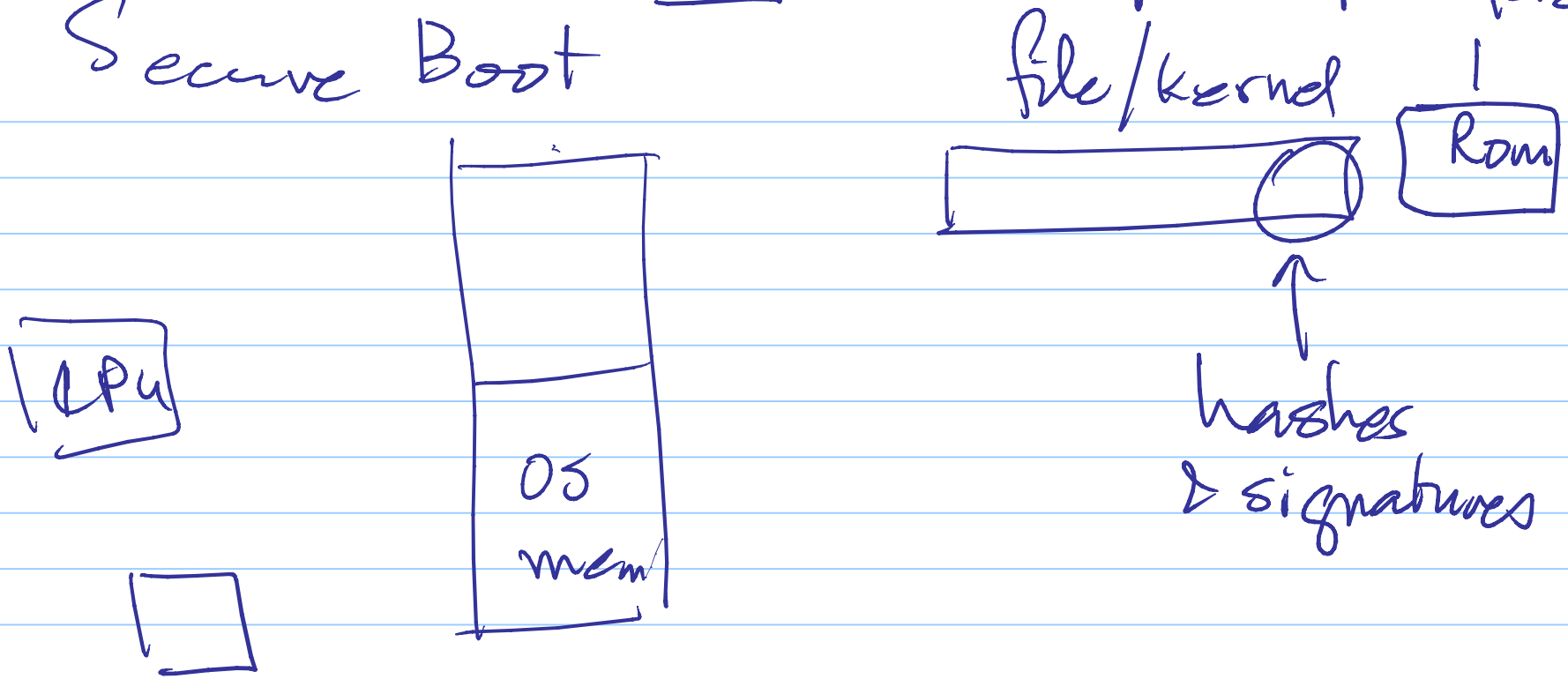
load OS kernel from disk

↳ normal boot

↳ secure boot

BIOS - Basic Input Output System

Secure Boot



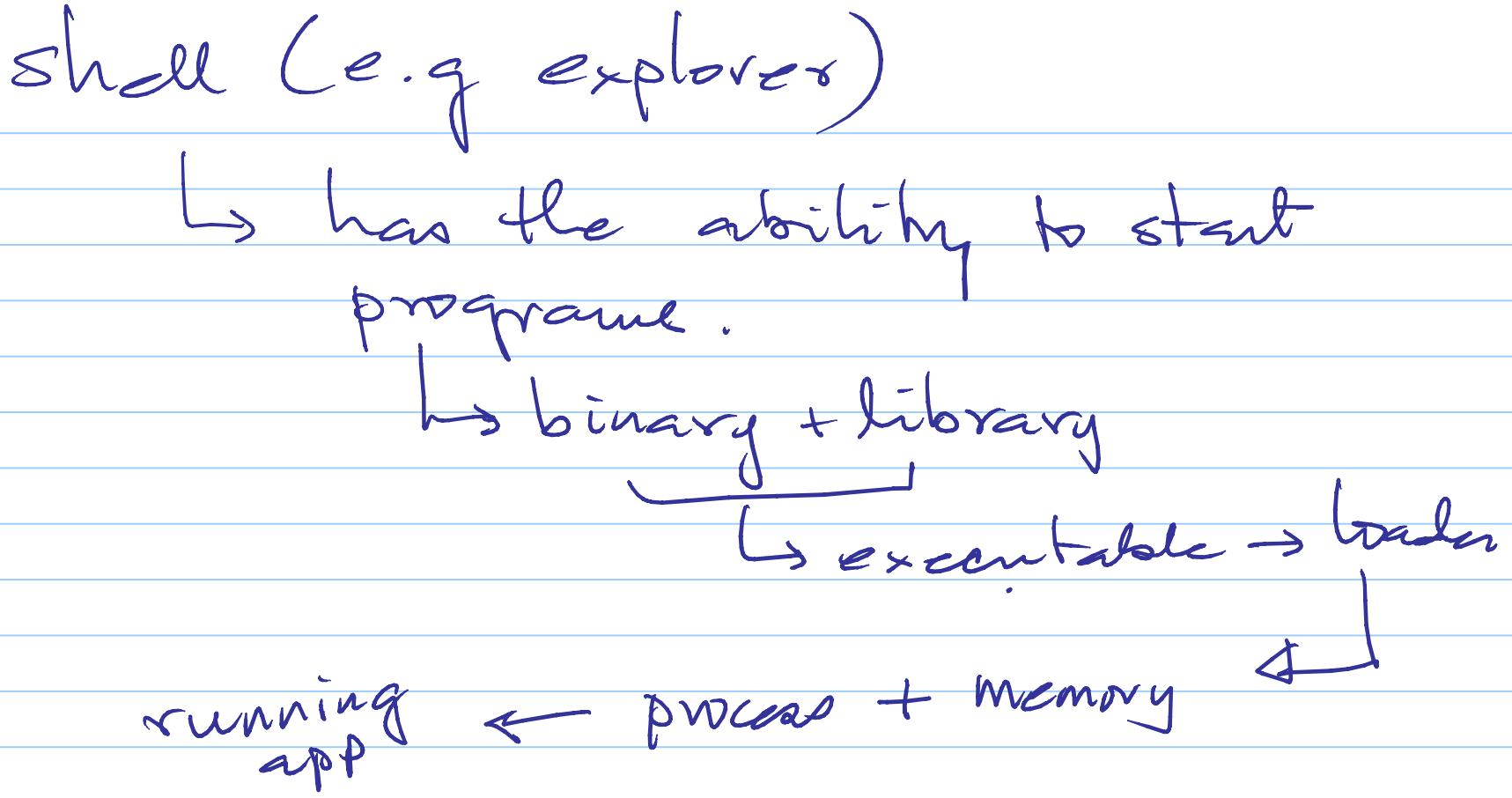
TPM - trusted prog module

initial "process" is converted to
a OS process + VM turned on

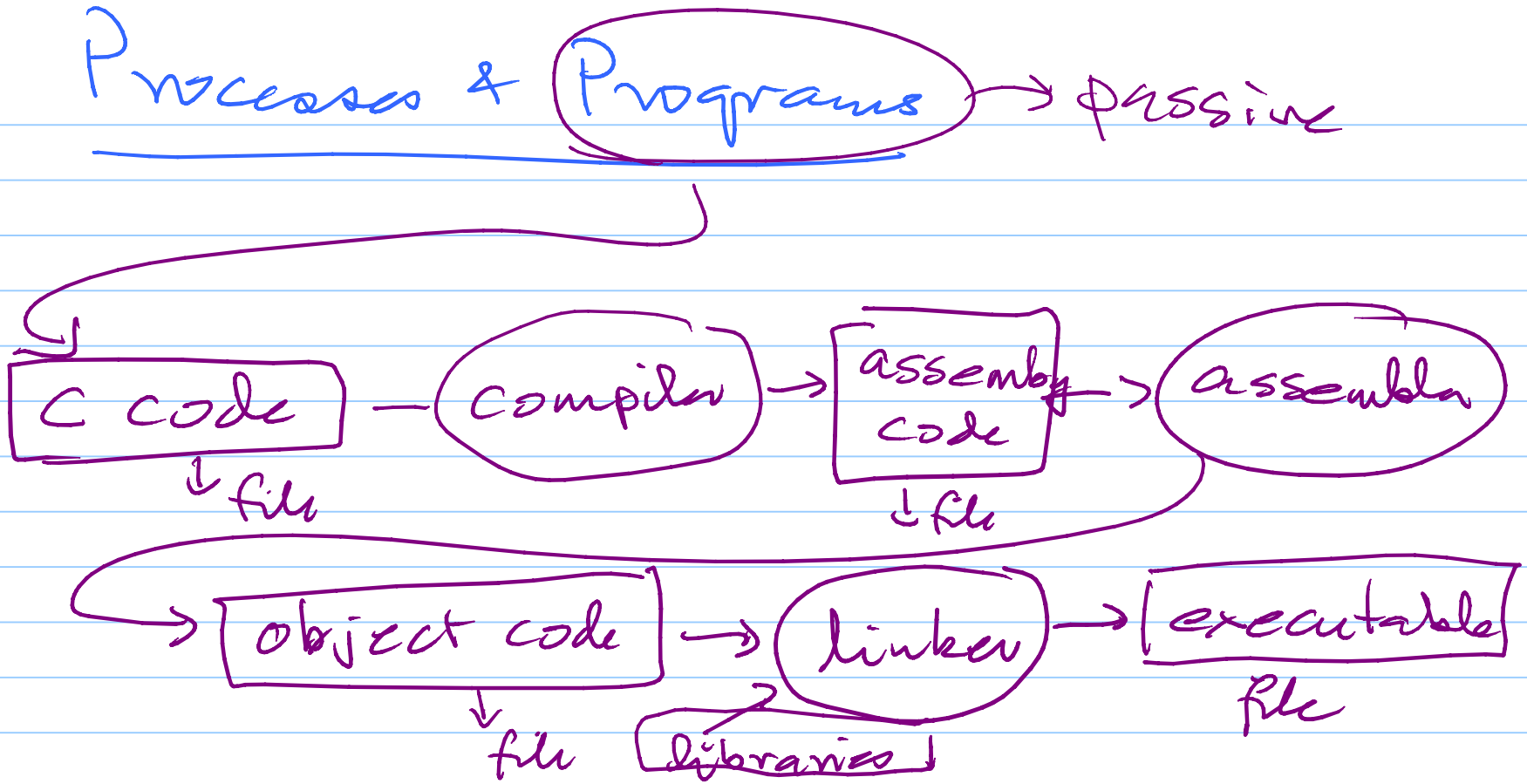
↓

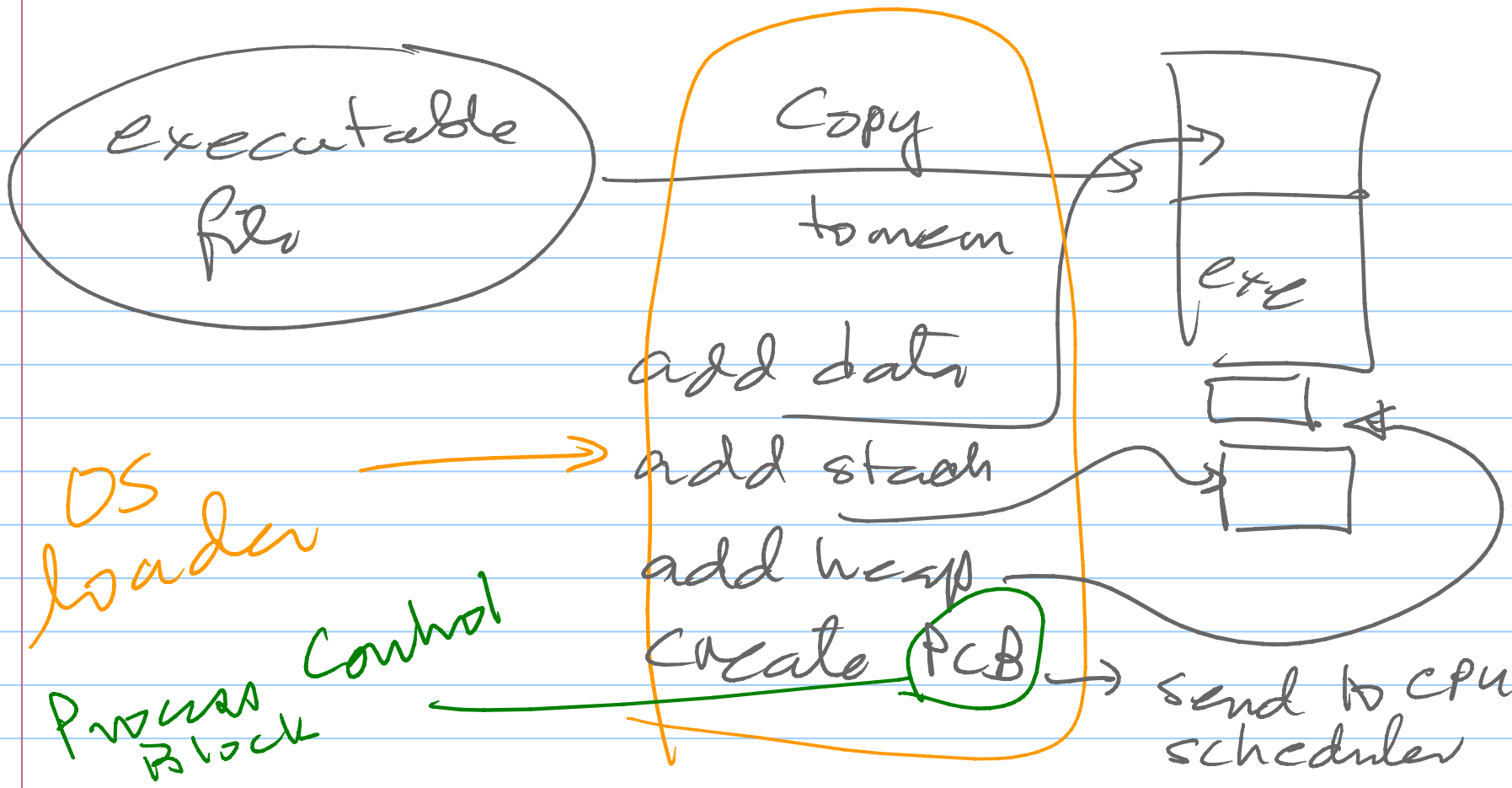
this process starts services, GUI,
shell → runs a script

↳ 'shell' or "user interface"


shell (e.g explorer)
has the ability to start programe.
binary + library
executable
loader
running app
process + memory

Processes & Programs → passive




executable file
Copy to mem
exe
add data
add stack
add heap
create PCB
send to CPU scheduler
OS loader
control
Process Block

Process

↳ an activity
- its alive
- its not a program

Program → .c
→ .obj
→ .exe
→ meaning

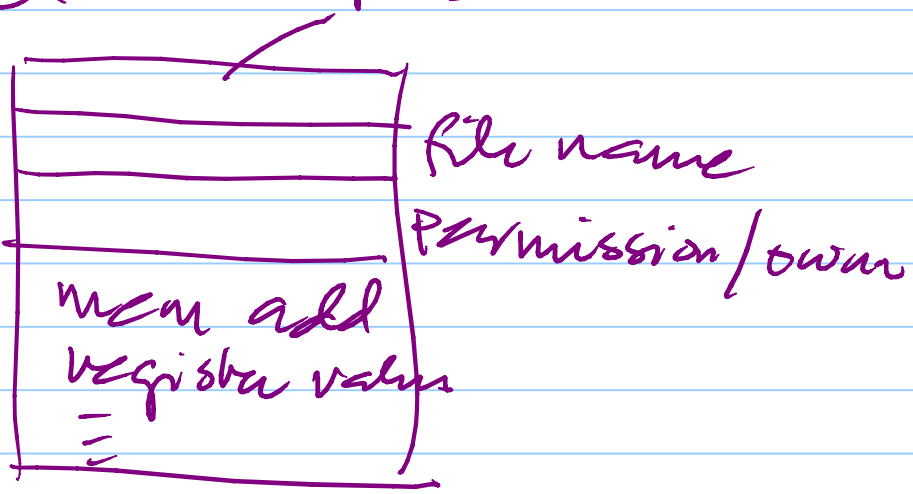
Programs and Processes → orthogonal

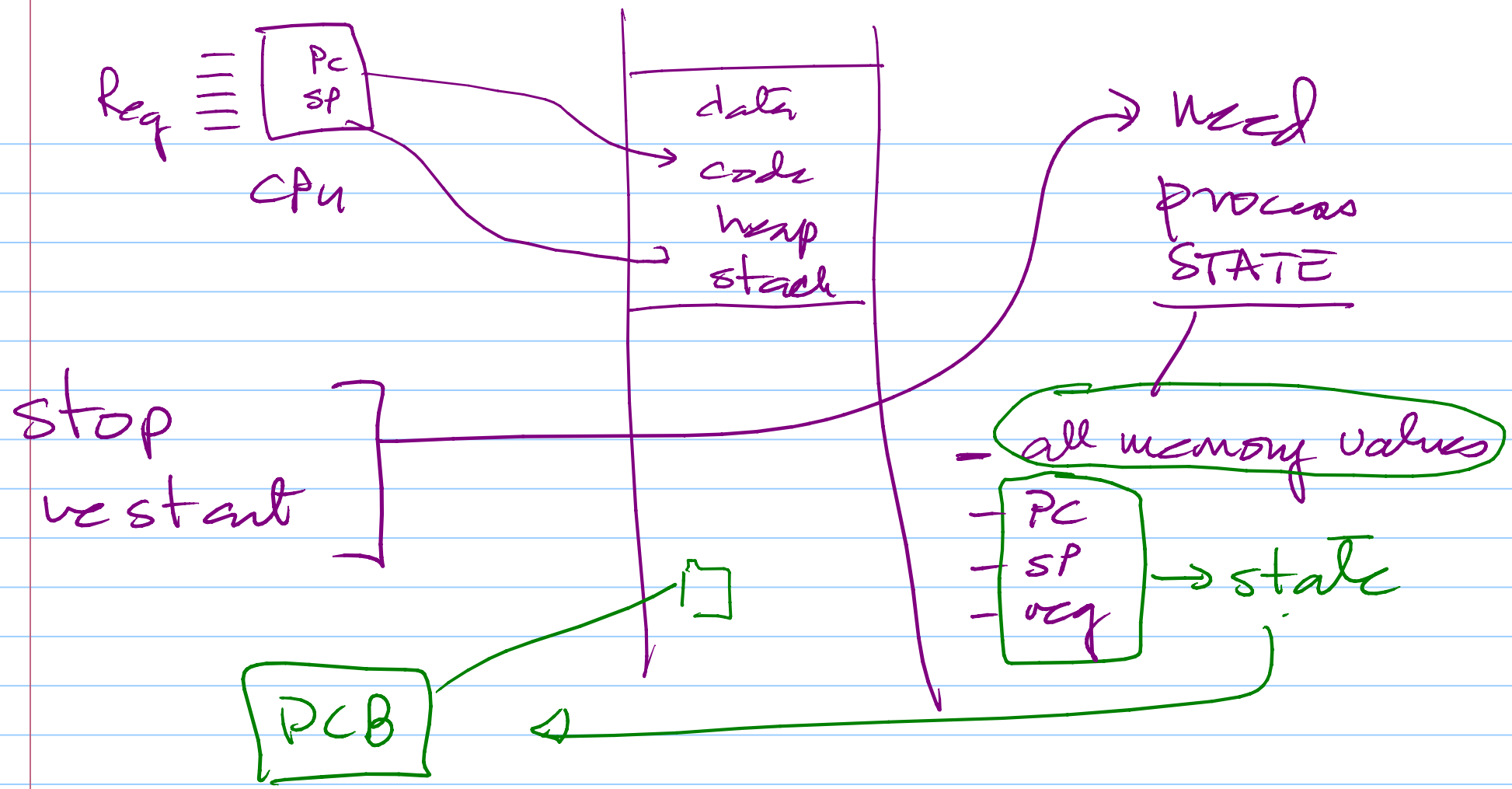
passive active

- a Program can be executed by multiple process [parallel or sequential]
- A process can execute multiple programs [sequential]

PCB

- process control block
- a data structure
  - in kernel
  - contains
  - one per process



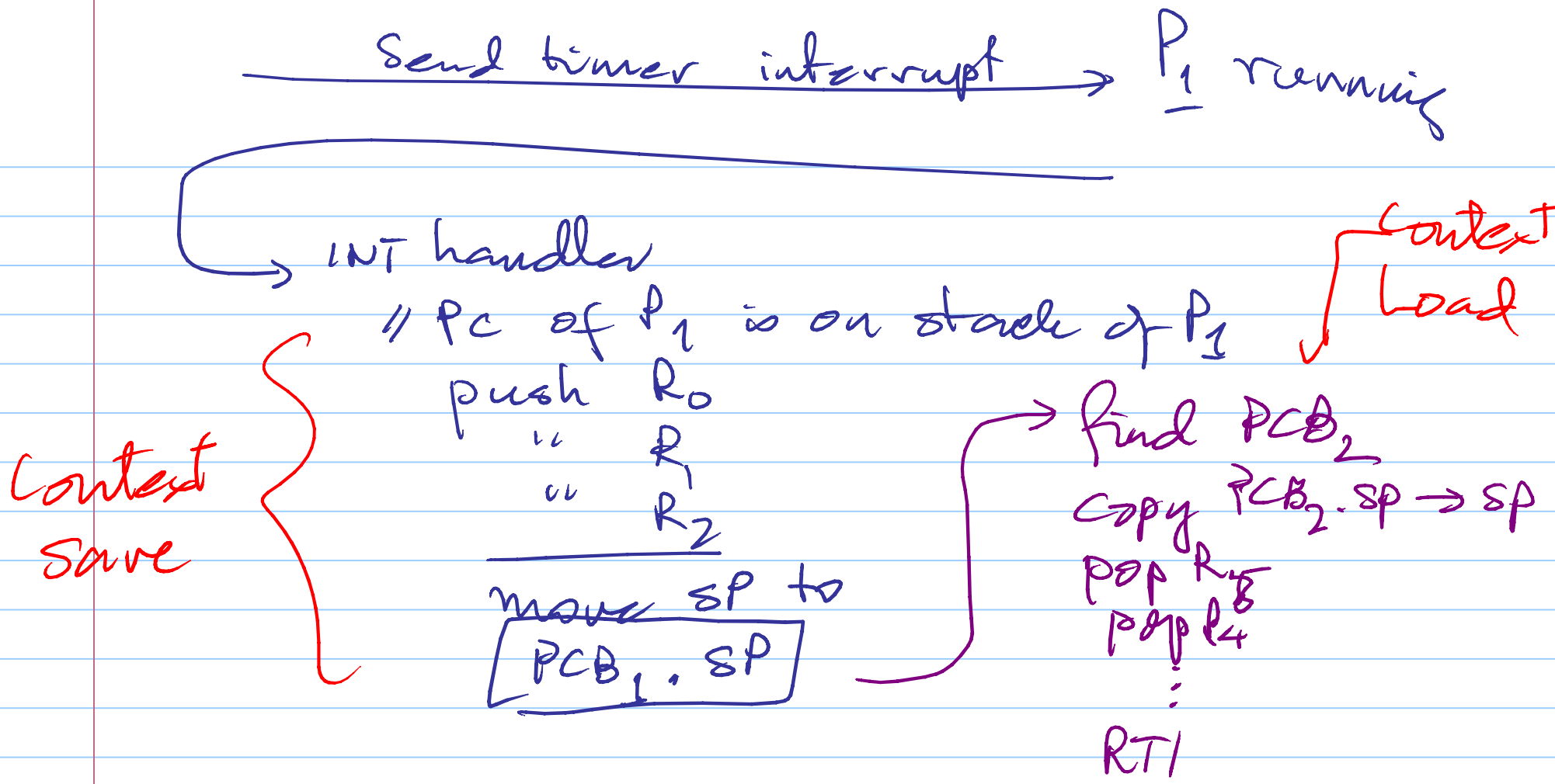

Reg
PC
SP
CPU
data
code
heap
stack
need
process
STATE
stop
restart
all memory values
PC
SP
reg
static
PCB

process context switching [from P_1 to P_2]

↑ state

↓

[save context of P_1 into PCB_1
load context of P_2 from PCB_2
run P2]


Send timer interrupt → P1 running
INT handler
// PC of P1 is on stack of P1
push R0
" R1
" R2
move SP to
PCB1.SP
Context Save
find PCB2
copy PCB2.SP → SP
pop R5
pop R4
RTI
Context Load