



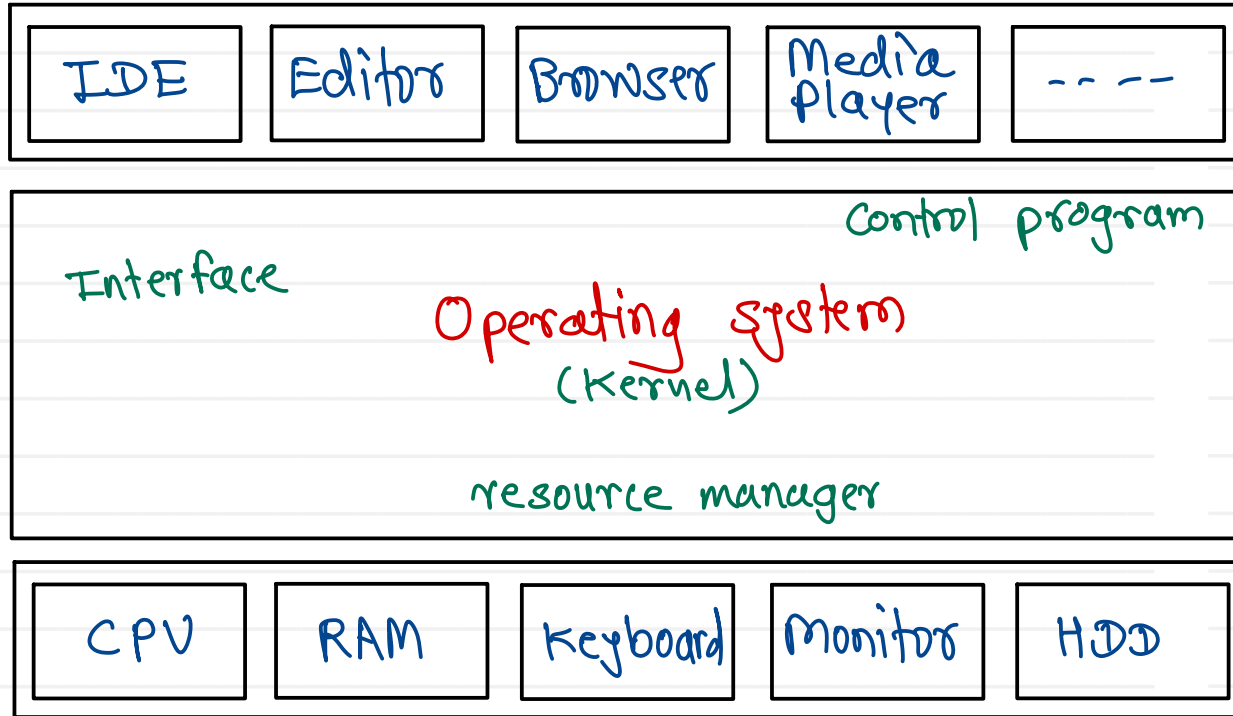
Sunbeam Institute of Information Technology
Pune and Karad

Module - Concepts of Operating System

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End User



Appⁿ S/W

Computer H/W

- interface between end user & hardware

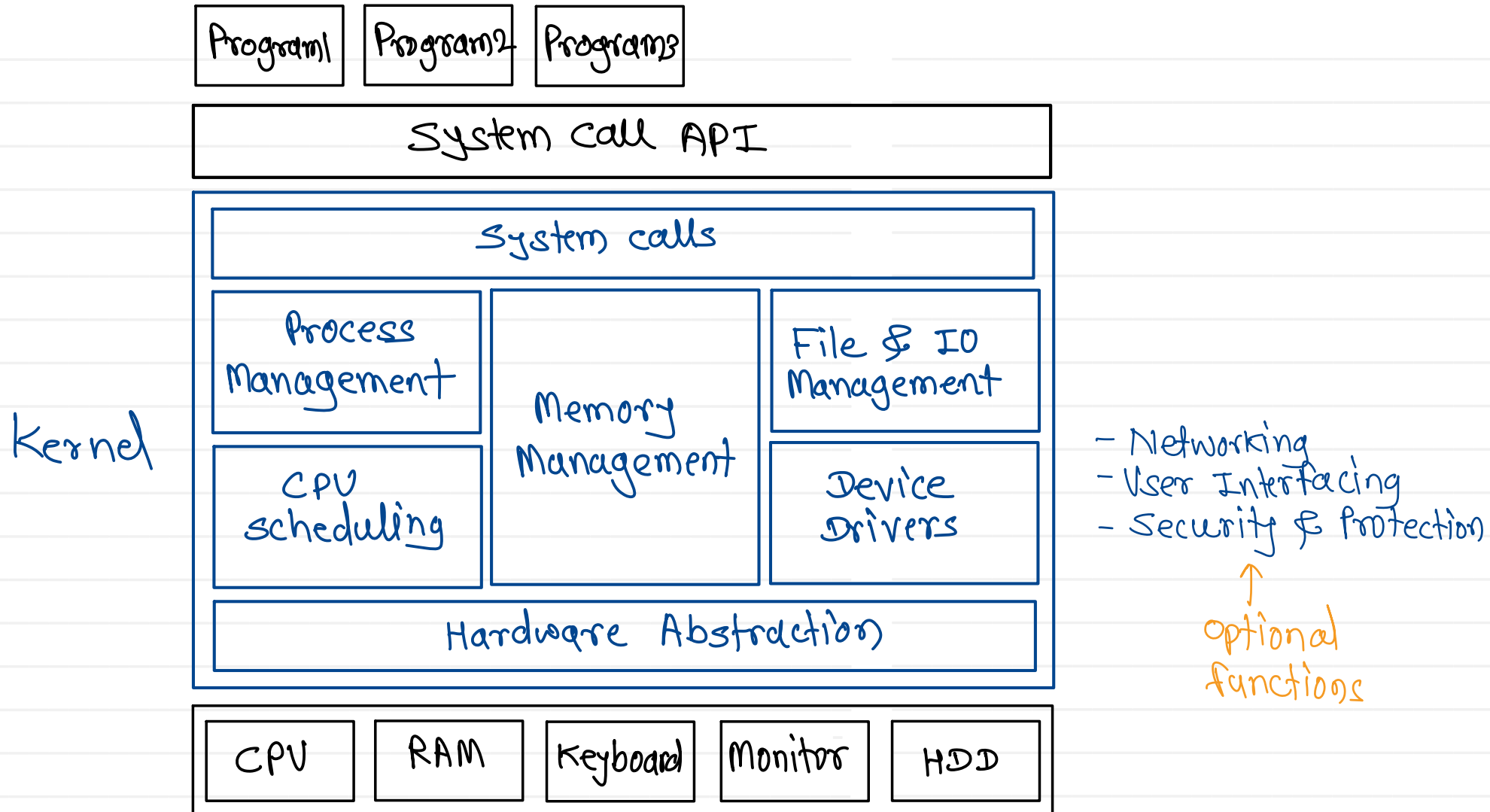
- interface between applⁿ softwares & hardware

- control program which controls execution of all programs running in system

- resource allocator/mgr which manages limited hardware resources

CD/DVD/ISO - Core OS + Applⁿ S/W + System Utilities (Kernel)

Linux kernel architecture



Program compilation steps

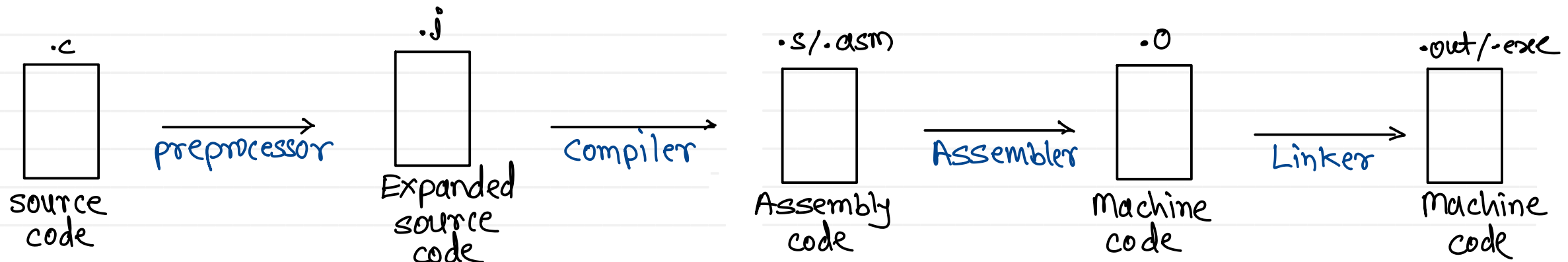
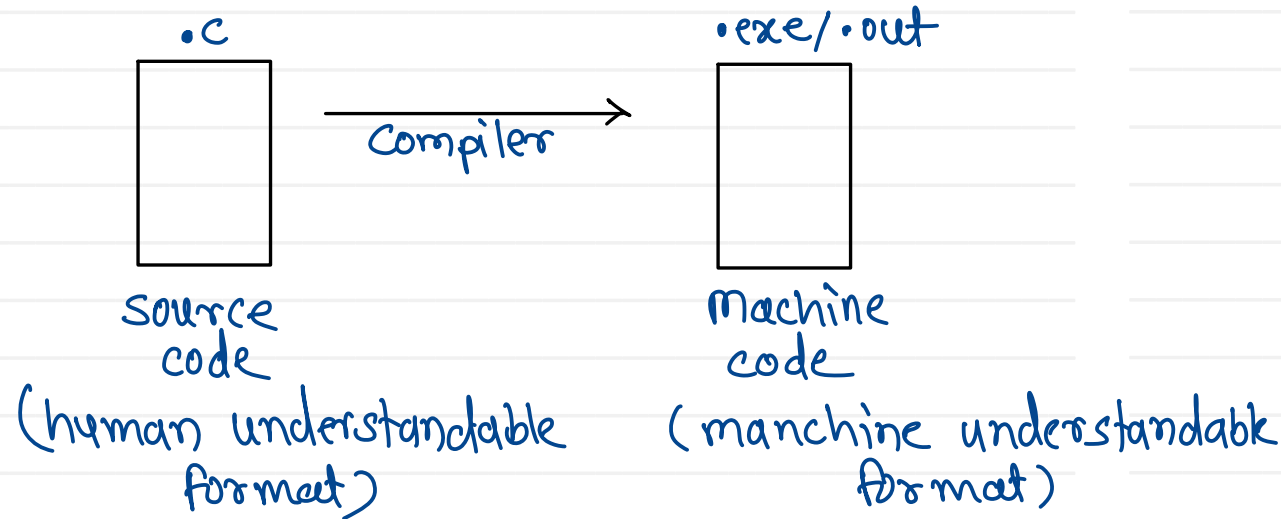
Process : Program in execution

Program : set of instructions to machine (CPU)

Toolchain : (gcc)

- set of tools which work on source code one by one to convert it into machine code.

1. Preprocessor (cpp)
2. Compiler (cc)
3. Assembler (as)
4. Linker (ld)
5. Debugger (gdb)
6. Utilities (make, objdump)



Program

• .exe / • .out

Executable Header
Text
Data
BSS
RO Data
Symbol table

- Magic number (2 or 4 bytes)
- identity to file format

Windows - .exe - Portable Executable - MZ
Linux - .out - Executable Linking Format - ELF

- info about program
 - type of program (CLI / GUI / library)
 - info about remaining sections of program (start, end, size)
- address of entry point function

- instructions of program in machine code format

- initialized static & global variables `int num1 = 10;`

- uninitialized static & global variables `int num2;`

- read only data (string constants)

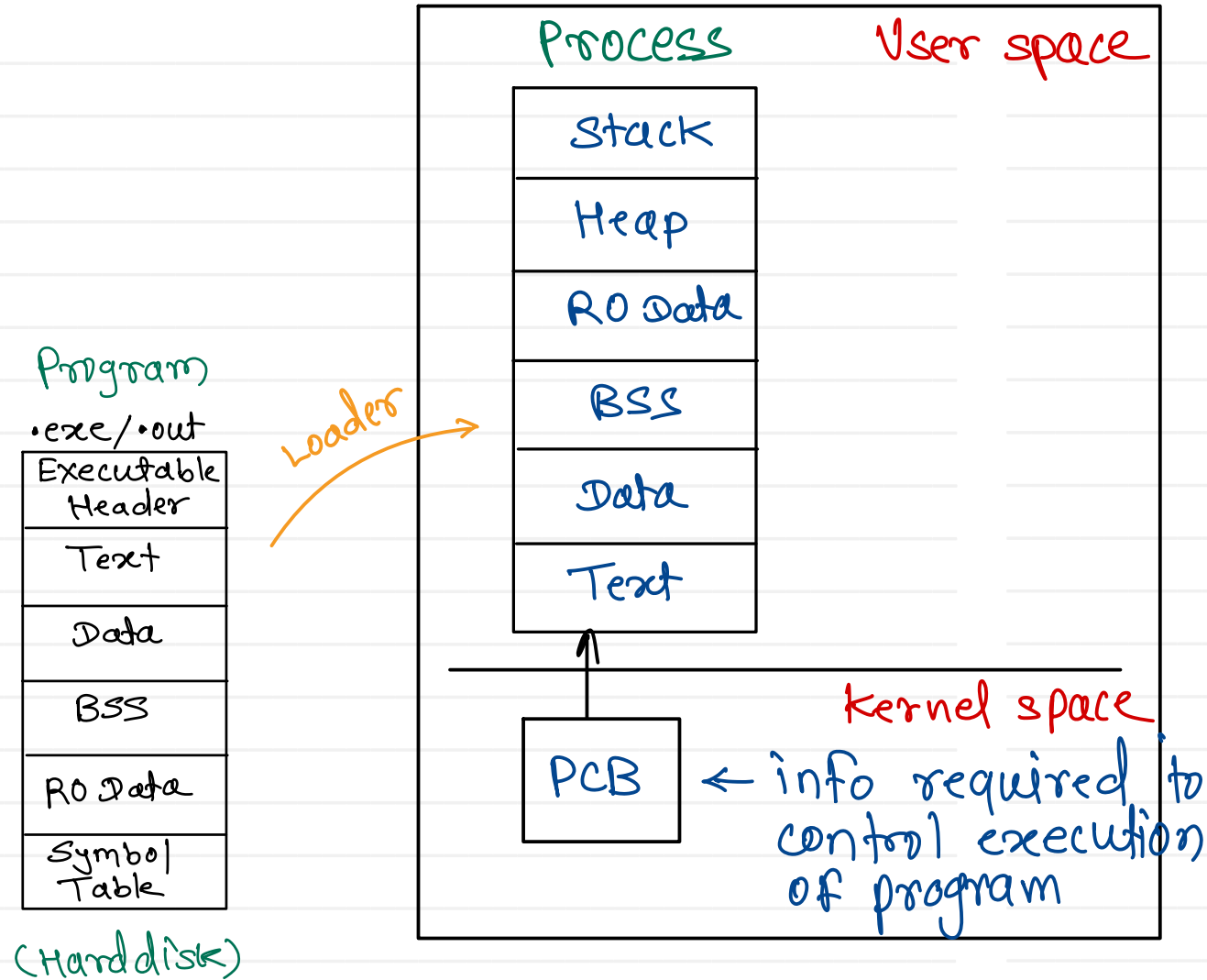
- info about symbols

symbols {

- variables - name, type, add^r, section, size
- functions - return type, name, add^r, no/type args

}

(sectioned binary)



Linux :

PCB - Process descriptor
`struct task_struct`
`(sched.h)`

1. pid, ppid
2. exit status
3. mem info (base, limit, segment/page table)
4. sched info (algo, prio, state...)
5. file info (opened files)
6. IPC info (signals
7. execution context
8. kernel stack

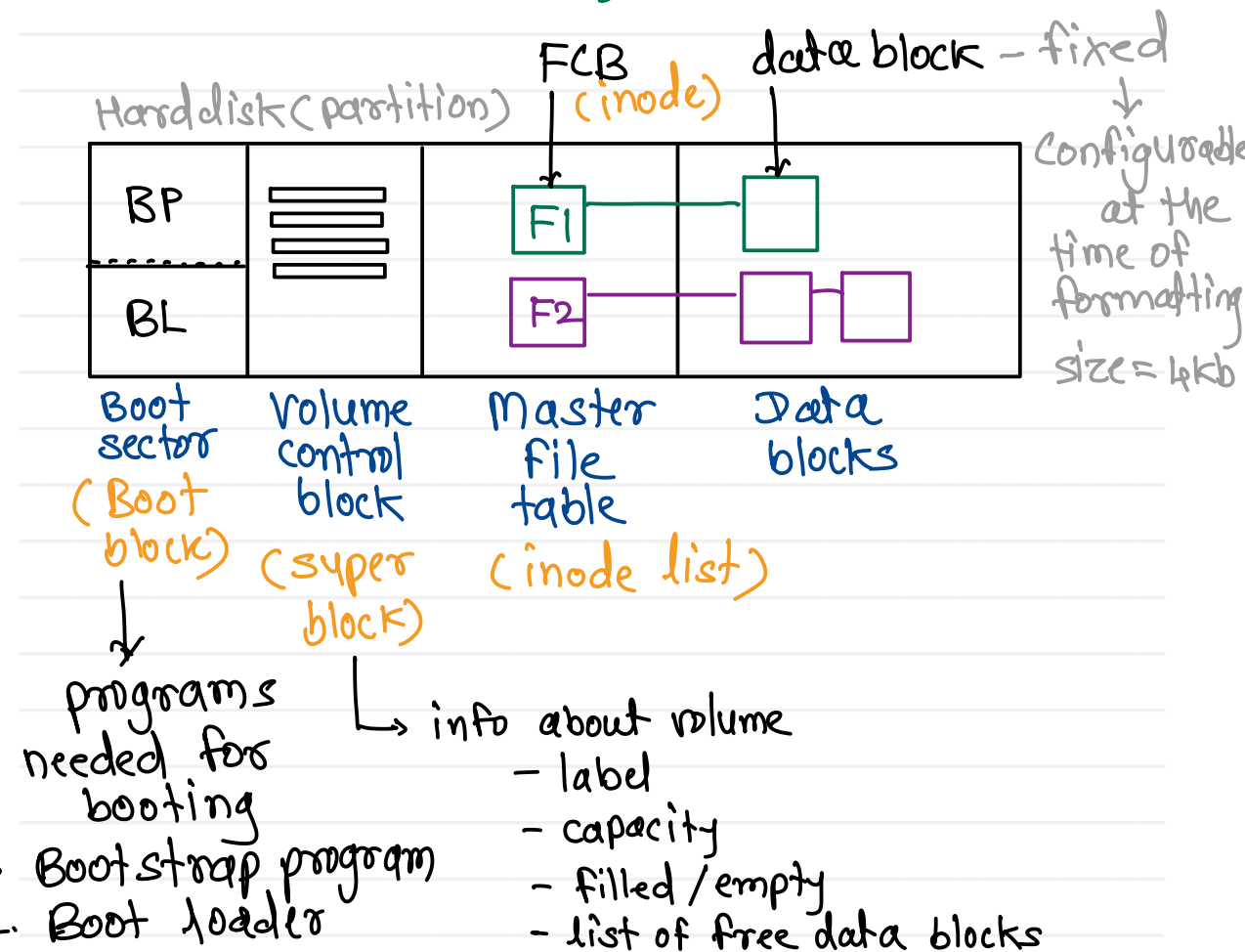
File : collection of data / information

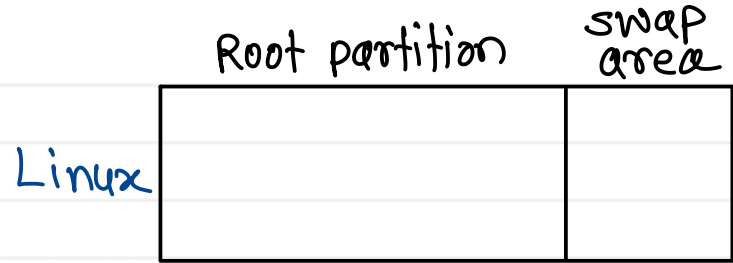
File : data + metadata

(actual content) ↓ data block
(info about file) ↓ File Control block (FCB)

- name, path
- size
- type
- user/owner, group
- timestamps
 - create, access, modify
- permissions
 - read, write, execute
 - user/group/others
- link count
- info about data blocks

File system : Organizing files on partitions



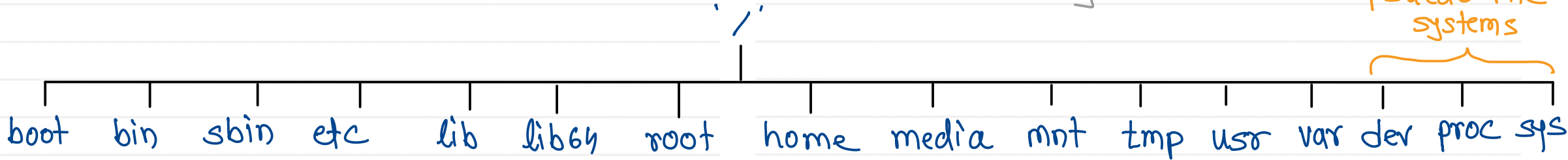


- Linux follows root file structure
- 'root' is denoted by '/'

↑
directory

file → file
folder → directory
Administrator → super user
admin → root

psuedo file systems



Absolute path :

- always starts with '/'

/home/sunbeam/Java/Assignments/assign01.pdf

devendra dac sunbeam bin lib include share

DBT CPP Java OSC

classwork homework Assignments

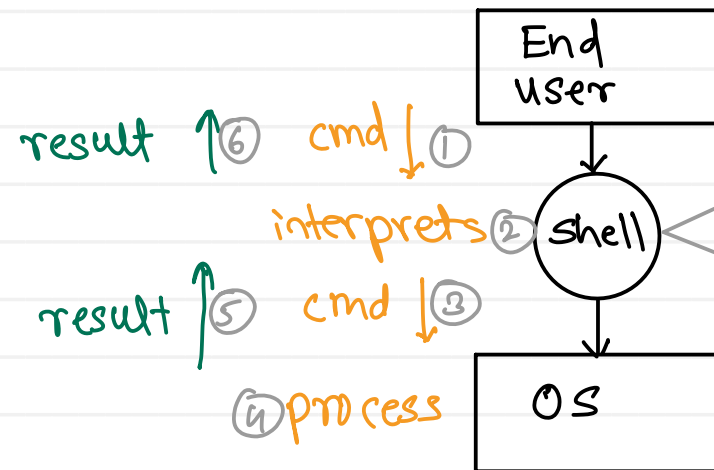
assign01.pdf assign02.pdf ...

Relative path :

- always starts wot present working directory

Java/Assignments/assign01.pdf

- user interfacing is achieved through one program which is called as "shell".
- Shell is an intermediate between end user & operating system.
- shell is a command interpreter



- in Vbuntu default shell is 'bash'

BASH - Bourne Again Shell

echo \$SHELL - will show default shell

chsh - to change default shell

CLI based shell (Command Line Interface)

Windows - cmd.exe, powershell.exe

Linux - bsh(sh), bash, csh, ksh, zsh

GUI based shell (Graphical User Interface)

Windows - explorer.exe

Linux - KDE (Kommman Desktop Env)

- GNOME

(GNU Network Object Model Env)



Thank you!!!

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