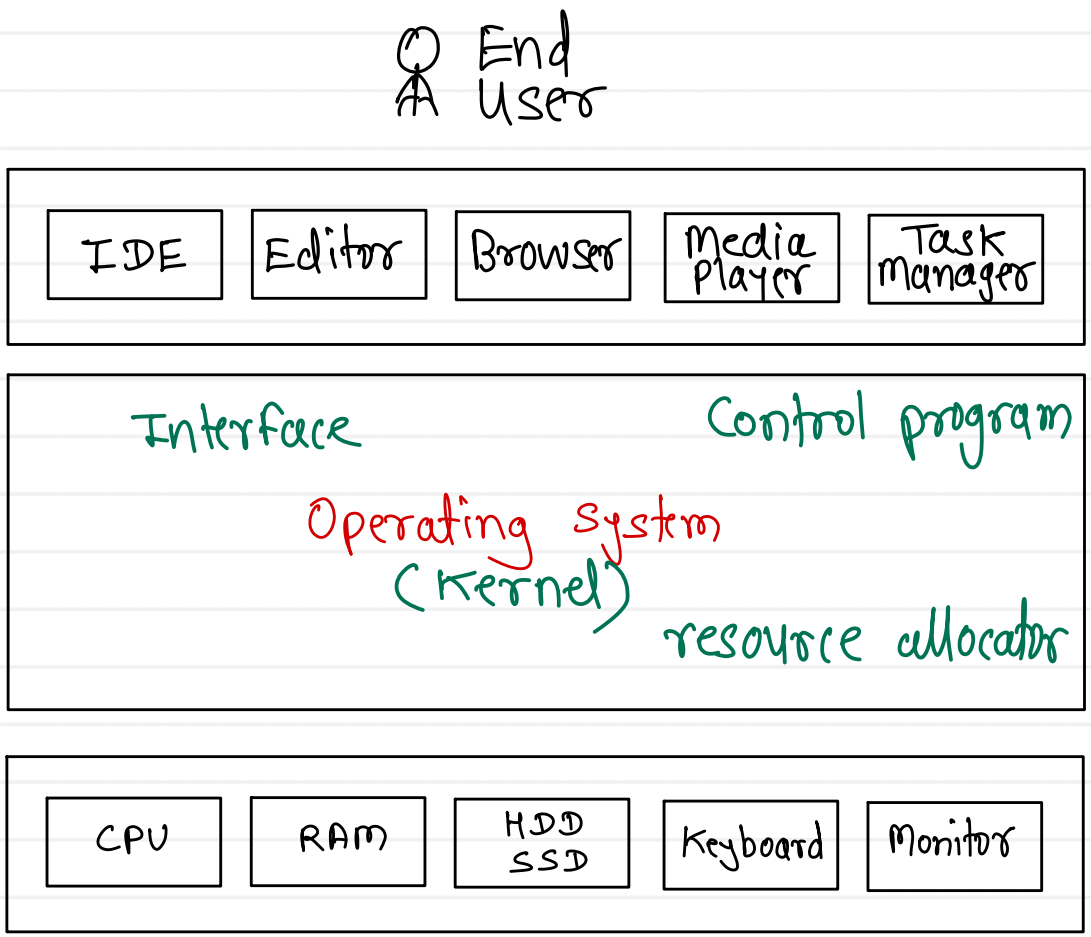
Sunbeam Institute of Information Technology
Pune and Karad

Module - Embedded Operating System

Trainer - Devendra Dhande

Email – devendra.dhande@sunbeaminfo.com

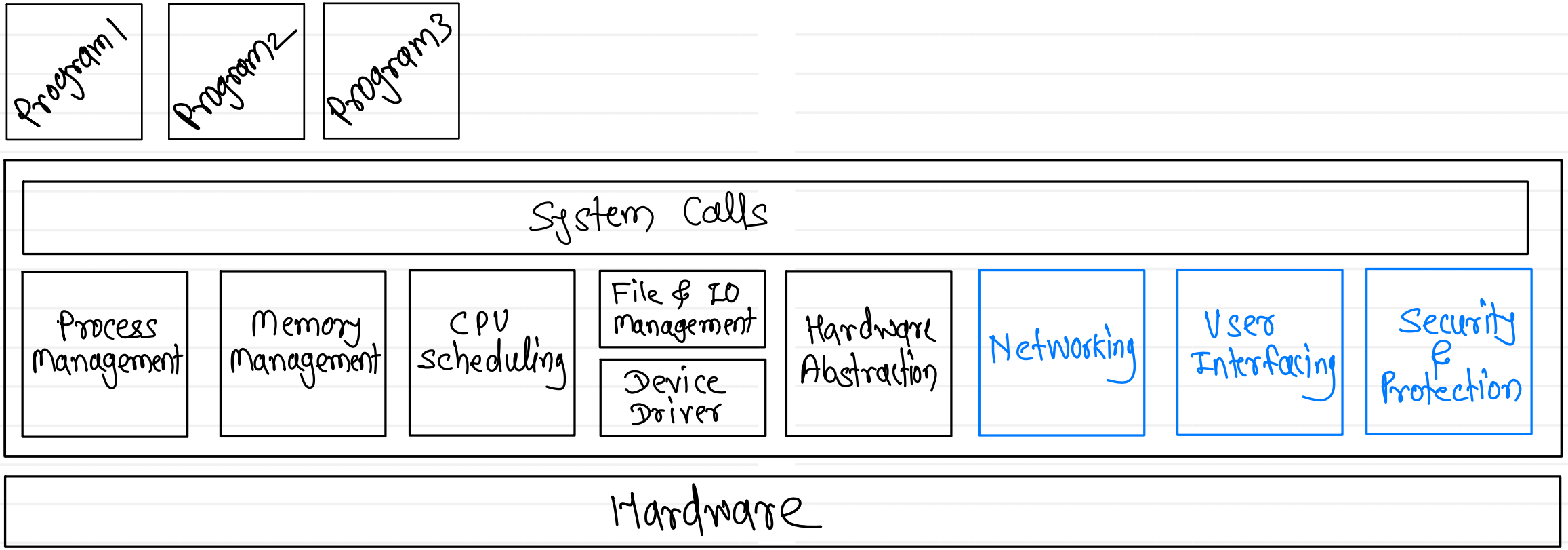
Operating system



- an interface betn end user and hardware
- an interface betn user applic-ations an hardware
- a control program which controls execution of user programs running into system.
- a resource manager/allocator which manages limited h/w resources.

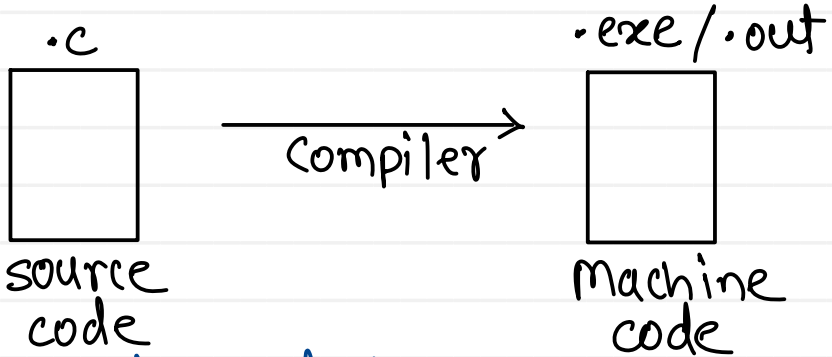
CD/DVD/ISO - core OS (Kernel) + User Applⁿ + System Utilities

Functions of operating system



Program

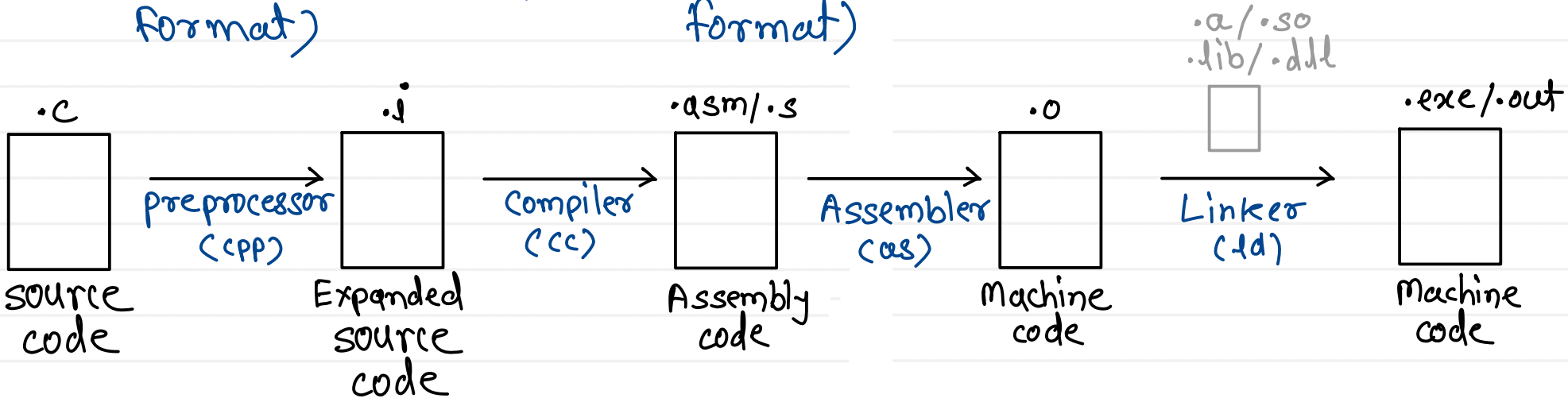
Process - program in execution
Program - set of instructions given to machine (CPU)



(human understandable format)

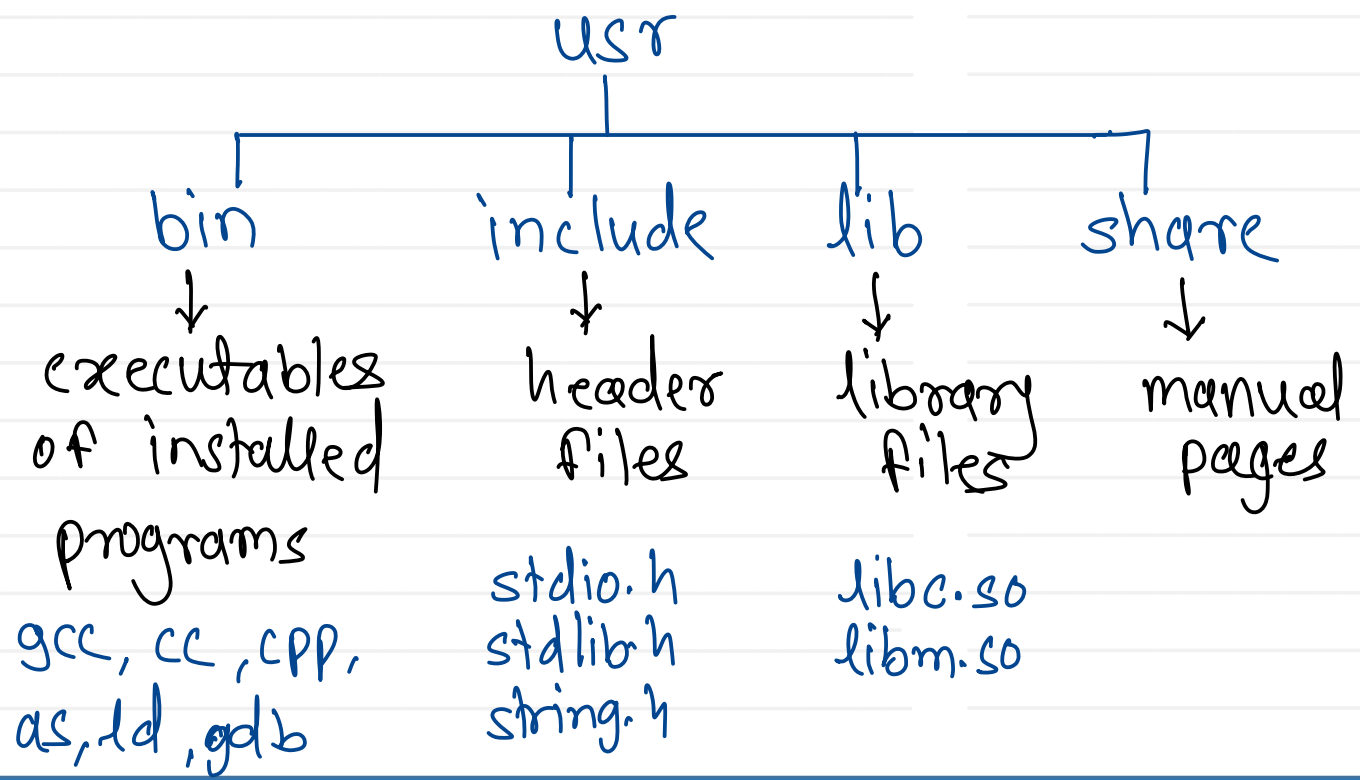
(Machine understandable format)

Toolchain : GCC ← frontend of all the tools
preprocessor : cpp
compiler : cc
Assembler : as
Linker : ld
Debugger : gdb



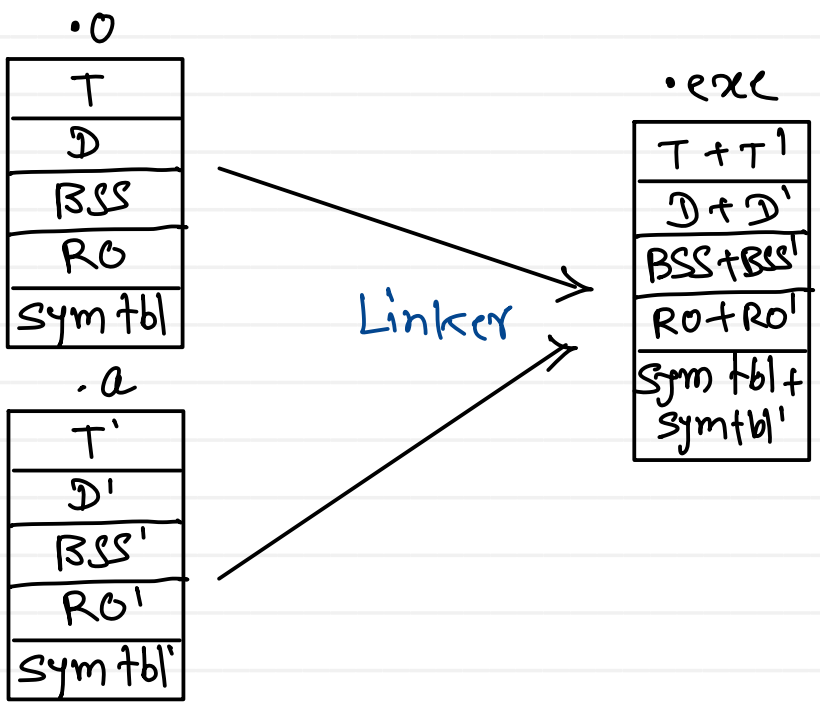
sudo apt-get install gcc

- all user installed programs are kept into usr director



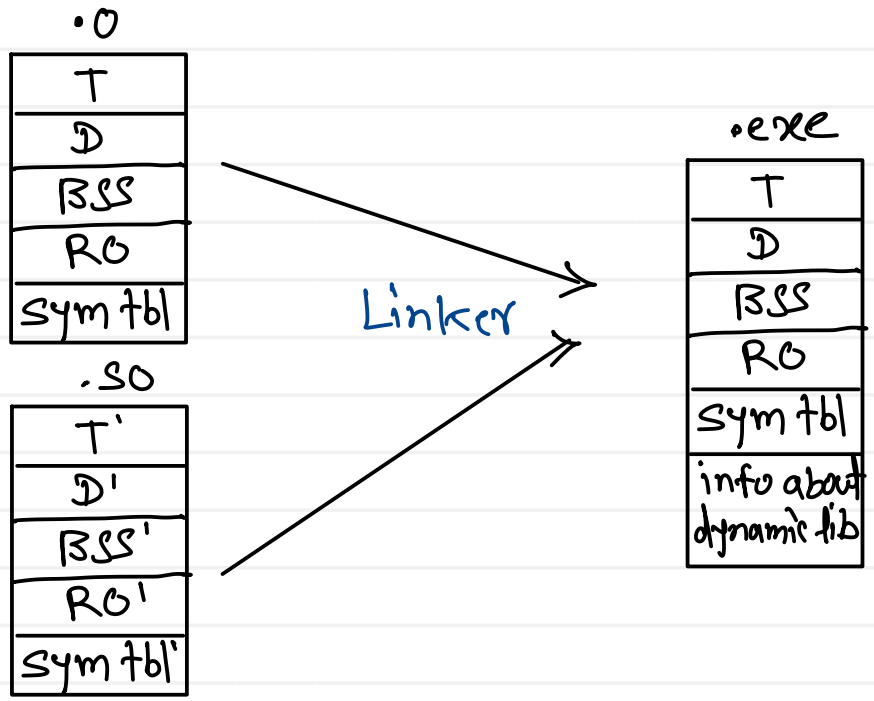
Static linking

- static libraries are added into executable file



Dynamic linking

- info about dynamic libraries is added into executable file



Program

magic number (2 or 4 bytes) (identity to file format)

(Hard disk)

windows : .exe → Portable Executable (PE) → MZ

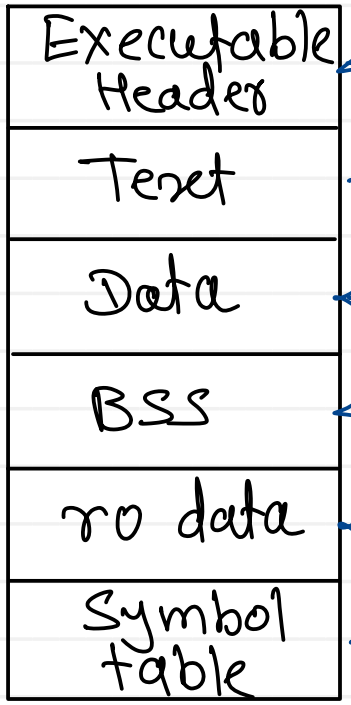
Linux : .out → Executable Linking Format (ELF) → 2.ELF

type of program → (CLI / GUI / library)

info about remaining sections (start, end, size)

address of entry point function (main)

.exe / .out



Text ← instructions of program in machine code format

Data ← static & global variable (initialized)

BSS ← static & global variable (uninitialized)

ro data ← read only data (string constants)

Symbol table ← info about symbols → functions (return type, name, address, no. of args, type of args)

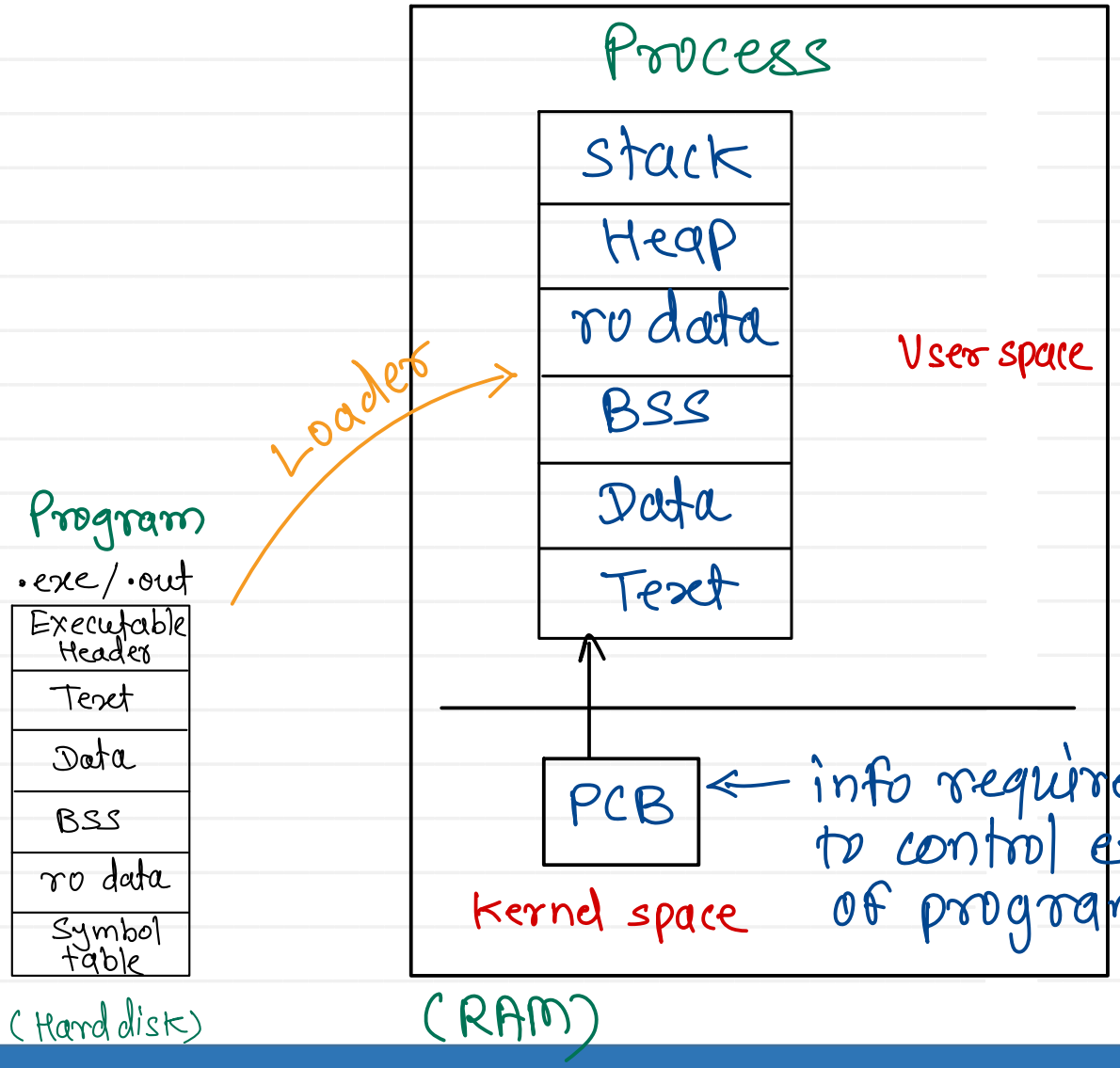
↓

variables (name, address, type, section, initial value)

(Executable file)

(sectioned binary)

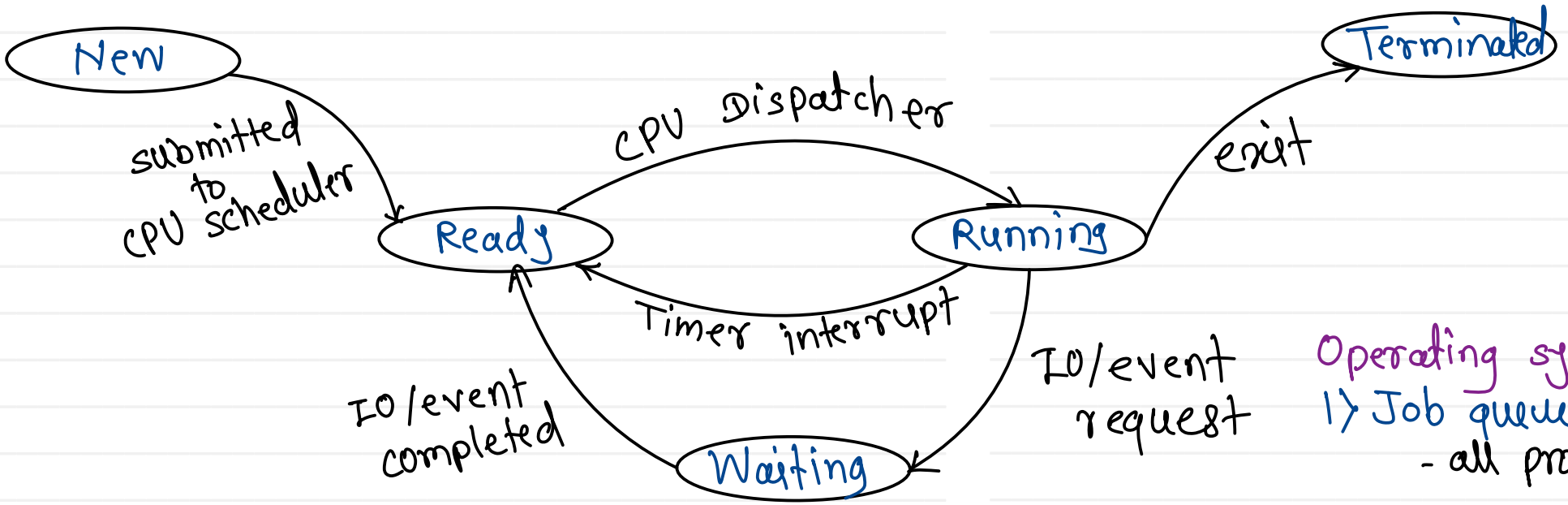
Process



PCB (Process Control block)
↓
Process descriptor
↓
struct task_struct (sched.h)

- pid, ppid
- exit status
- CPU sched info (state, pri, algo ....)
- mem info (limit/base, segment/page tbl)
- files info (opened file .....)
- IPC info (signals .....)
- execution context
- kernel stack

Process life cycle



Operating system data structures:

1) Job queue/process list:
   - all process of system

2) Ready queue:
   - processes which are ready to execute on CPU

3) Waiting queues:
   - processes waiting for IO/event to occur
   - waiting queues will be multipk

Thank you!!!

Devendra Dhande

devendra.dhande@sunbeaminfo.com