Process & Process Scheduling.

* ## Process

A program in execution is called a process.

* ## Process State Diagram ✓ Imp

Process-State Transition model.

Schedule/Dispatch

created

New → Ready ⇄ Running — Completed → Terminated

TQ
Priority

Secondary memory

Suspend resume

I/O completed

Waiting/ Blocked

I/O request

suspend

Resume

TQ → Suspend Ready

Suspend wait

Secondary memory

Secondary memory

(Refer printed notes)

* **5 - State Process Model**

secondary
memory

Schedule/Dispatch

created

(New) ⟶ (Ready) (Running) completed

T.Q
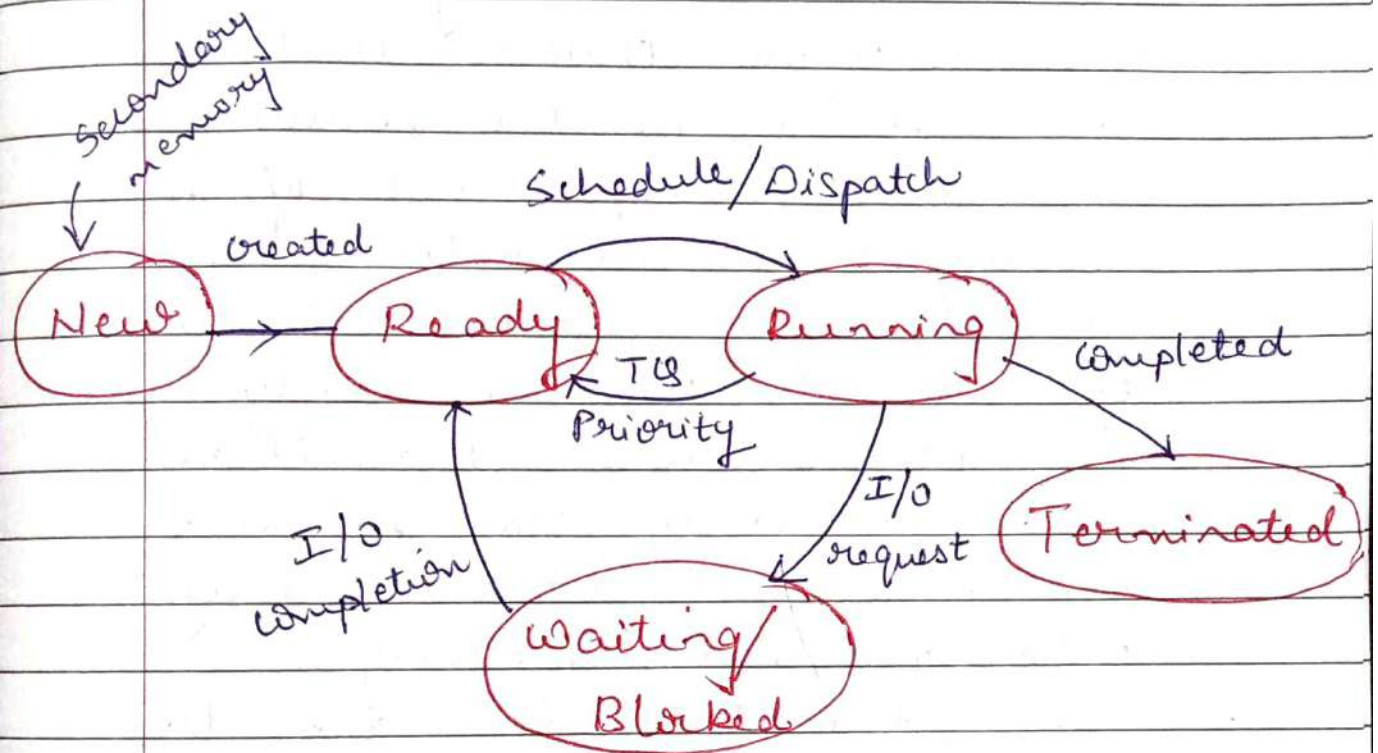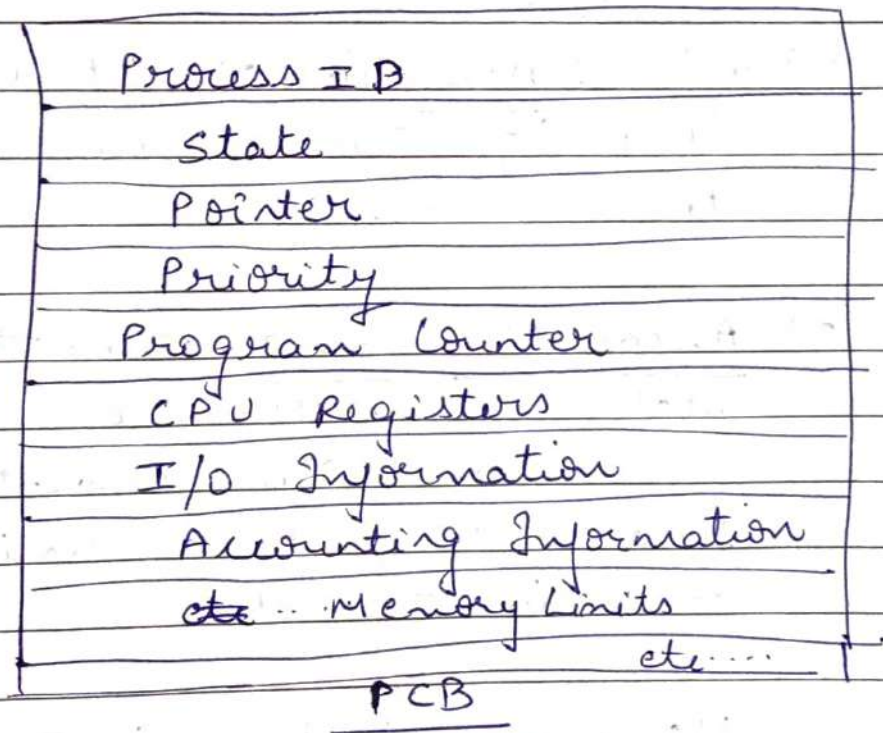Priority

I/o
completion

I/o
request (Terminated)

(Waiting/
Blocked)

— **New** : New process is about to get created in secondary memory.

— **Ready** : The process is ready to get executed. The process is loaded into the main memory.

＃ The process is waiting for CPU to be assigned to it for execution.

— **Running** : The process is ~~assigned~~ chosen by a CPU & ~~its~~ it gets executed.

— **Waiting** : The process requests for I/o, it goes to waiting state. Once the I/o operation is completed, the process goes to ready state.

- Terminated : Process has completed its execution & it gets terminated

- suspend ready : Process that was initially in the ready state but was swapped out of main memory & placed onto secondary memory by scheduler is said to be in suspend ready state. The process will transition back to ready state whenever the process is again brought onto the main memory.

- Suspend wait : Similarly to suspend ready but uses the process which was performing I/o operation & lack of main memory caused them to move to secondary memory. When work is finished it may go to waiting/ blocked state or suspend ready state.

* **PCB** (Process Control Block)

Imp PCB is a data structure maintained by the O.S. for every process.

→ PCB is identified by PID (Process ID)

→ PCB keeps all the information needed to keep track of a process.

→ PCB is maintained for a process throughout its lifetime & deleted once process terminates.

PCB
Process ID
State
Pointer
Priority
Program Counter
CPU Registers
I/O Information
Accounting Information
~~etc~~ Memory Limits
etc...

PCB

1) Process ID → Unique identification for each process.

2) State → The process state may be in new, ready, running, waiting & terminated

P.T.O

3) <u>Pointer</u> → Pointer to a parent process.

4) <u>Priority</u> → Specifies priority of a process to schedule execution.

5) <u>Program Counter</u> → It is a pointer to the address of next instruction to be executed in the process.

6) <u>CPU Registers</u> → Many CPU registers are used by process during its execution.

7) <u>I/O Information</u> → It includes list of I/O devices allocated to a process.

8) <u>Accounting Information</u> → It is statistical information about the process such as amount of CPU time used, time limit, execution ID etc.

9) <u>Memory Limits</u> → It includes information about memory ~~mac~~ management et. This may include page tables, segment tables etc.