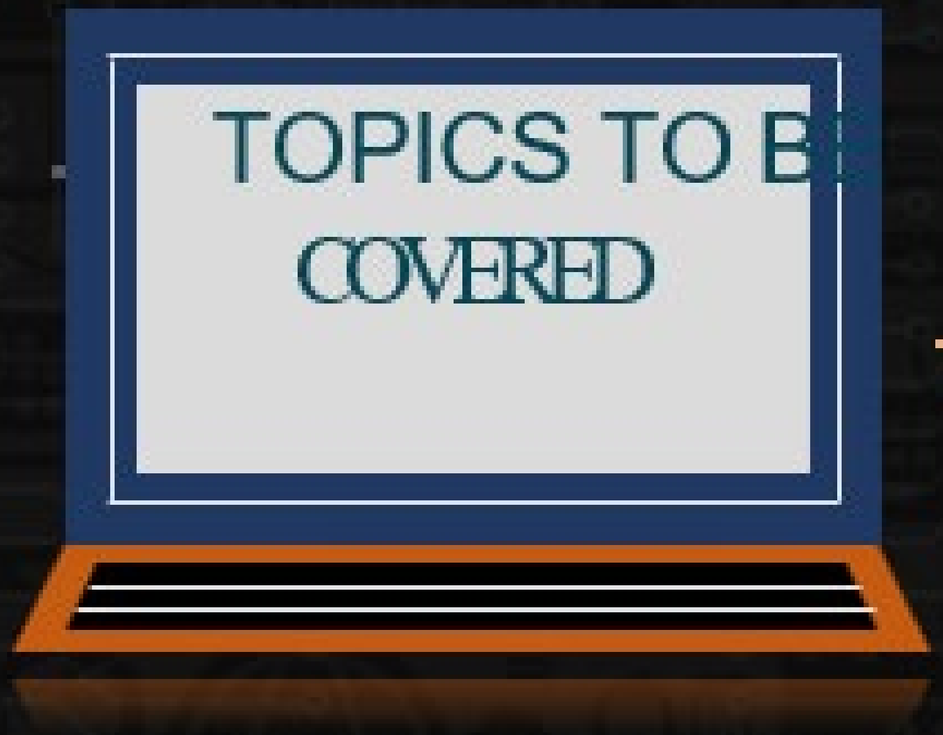
CS & IT ENGINEERING

OPERATING SYSTEMS

Process Management

Lecture No. 04

By- Dr. Khaleel Khan Sir



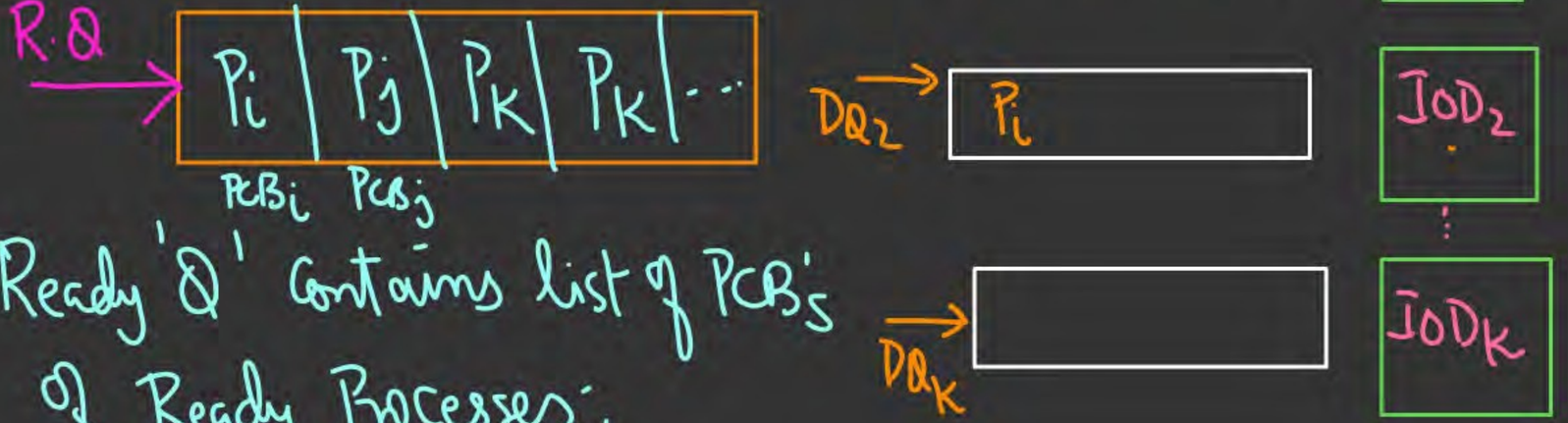
01 Content Switching

2. CPU Scheduling Criteria

3. Process Times

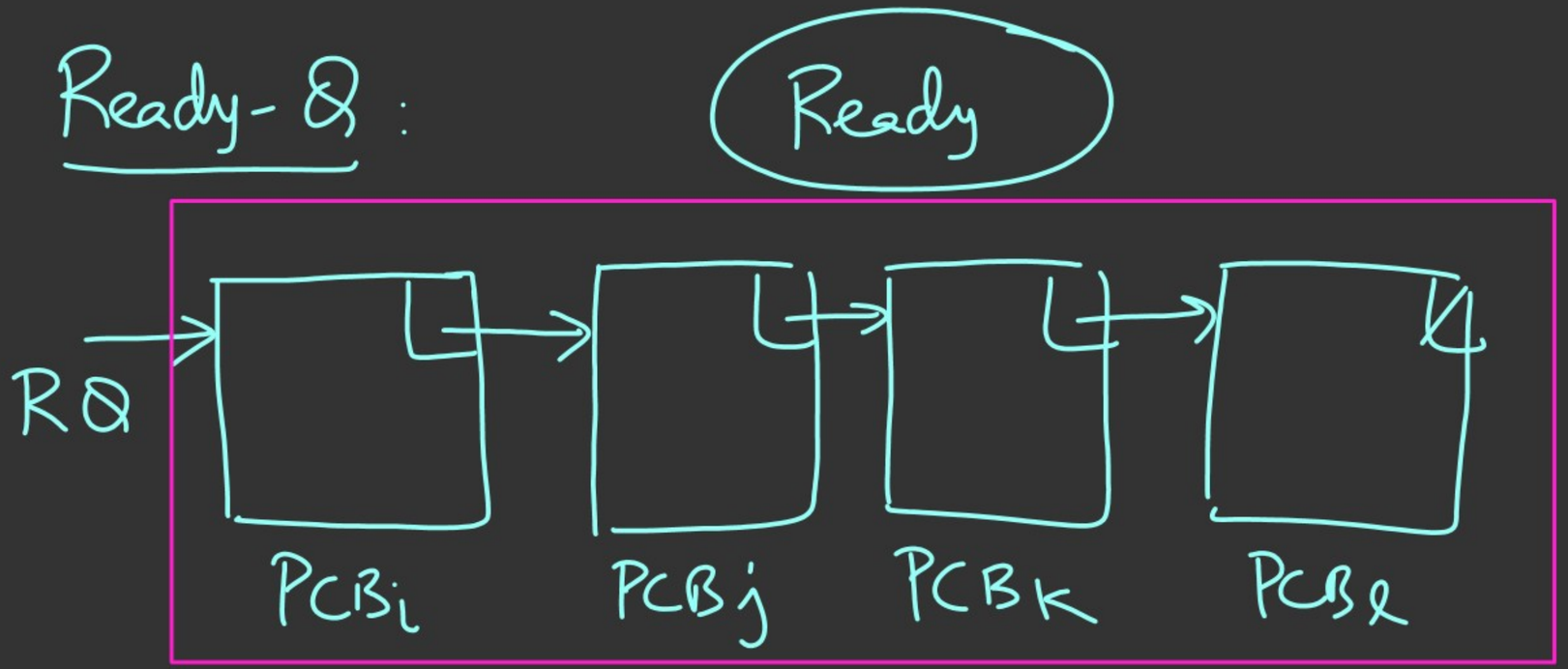
Scheduling Queues & State-Queuing Diagram

- In-Memory
  - 1) Ready Queue (RQ)
  - Block-Queue → Contain PCB's of those Processes that gets Blocked onto that Device;
- on-Disk
  - Job/Input &
  - Suspend &

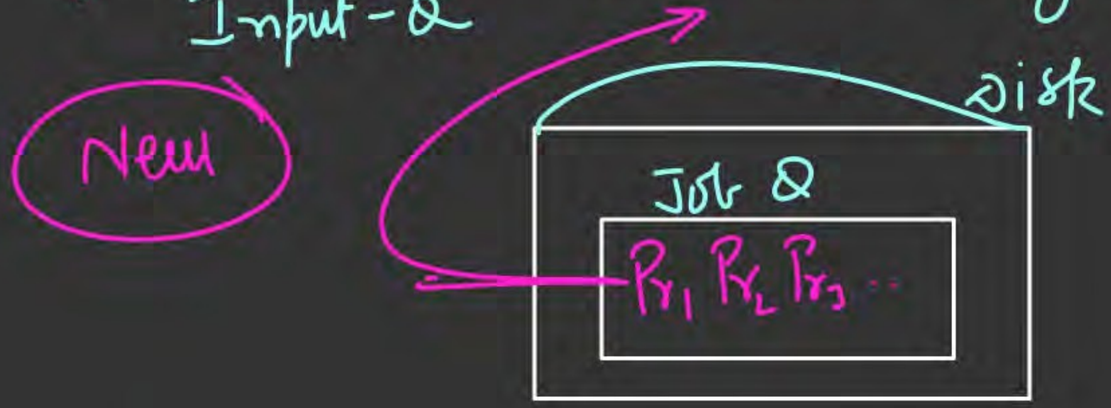


Ready 'Q' Contains list of PCB's of Ready Processes;

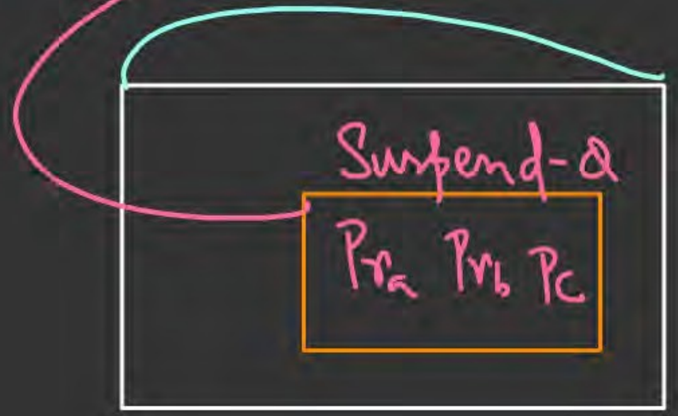
Ready-Q :

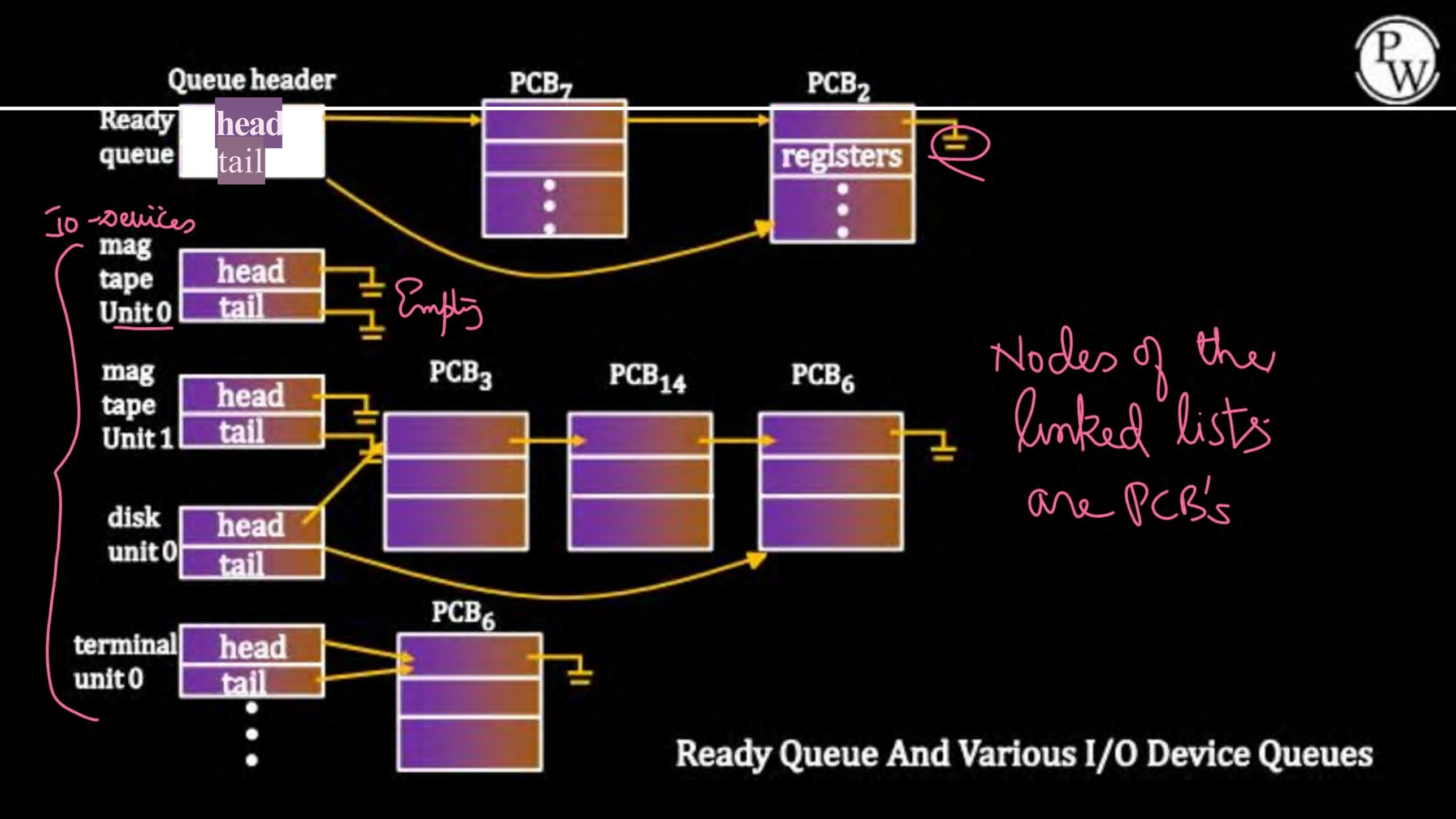


3) Job-Q / Input-Q : Contains Programs that are ready to be Loaded in Memory.



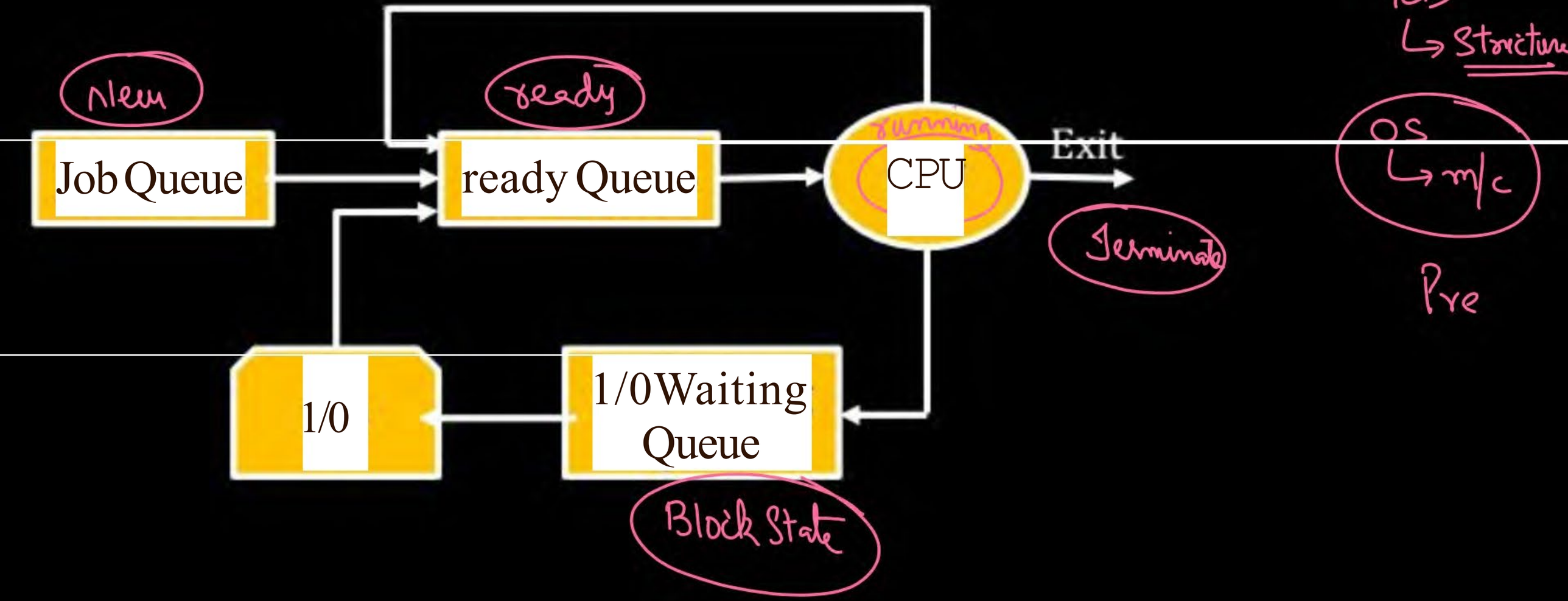
4) Suspend Q: List of Processes that get Suspended from Mem. onto disk;





Ready Queue And Various I/O Device Queues

State - Queueing diagram

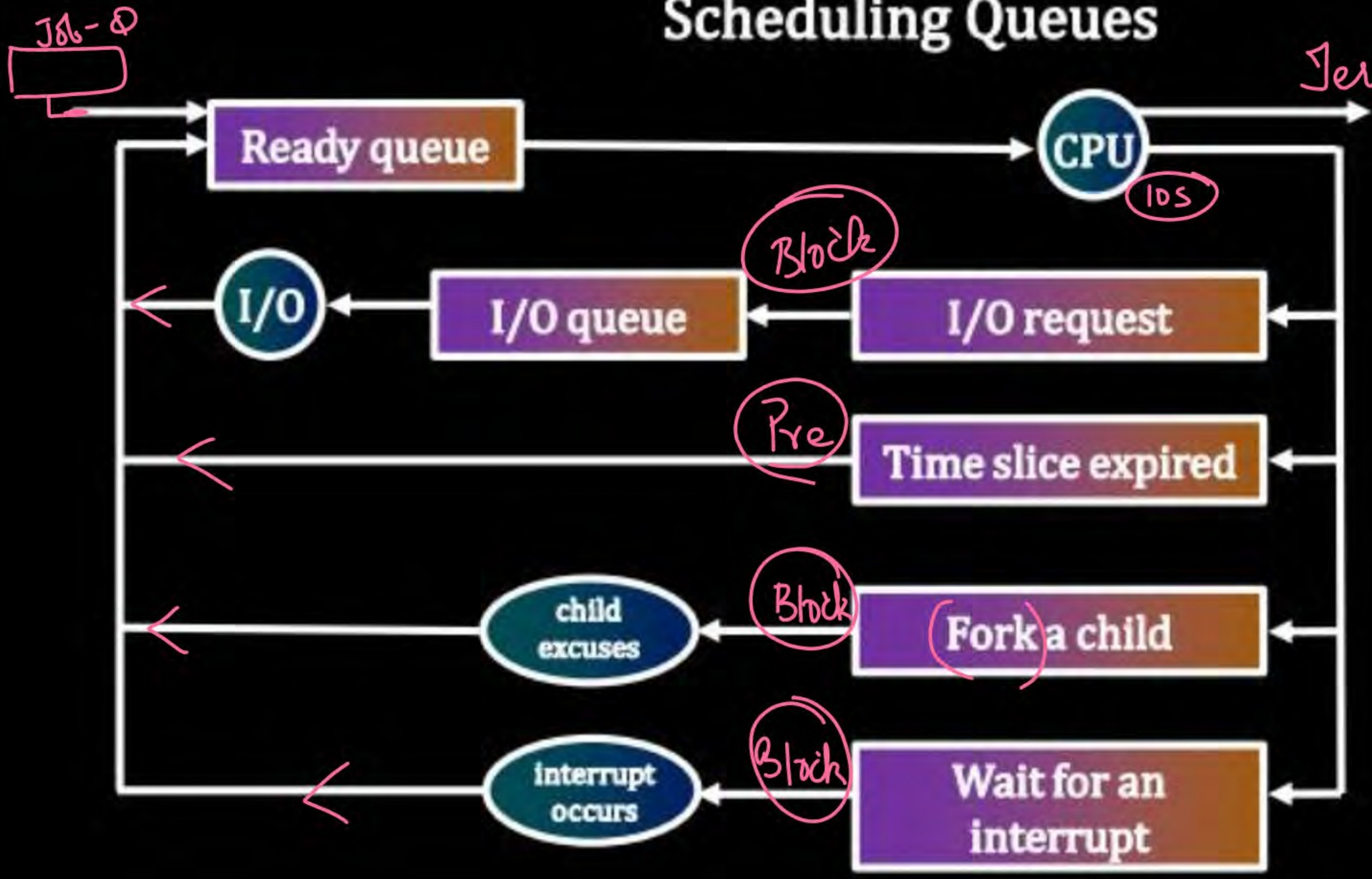


PCB
↳ Structure

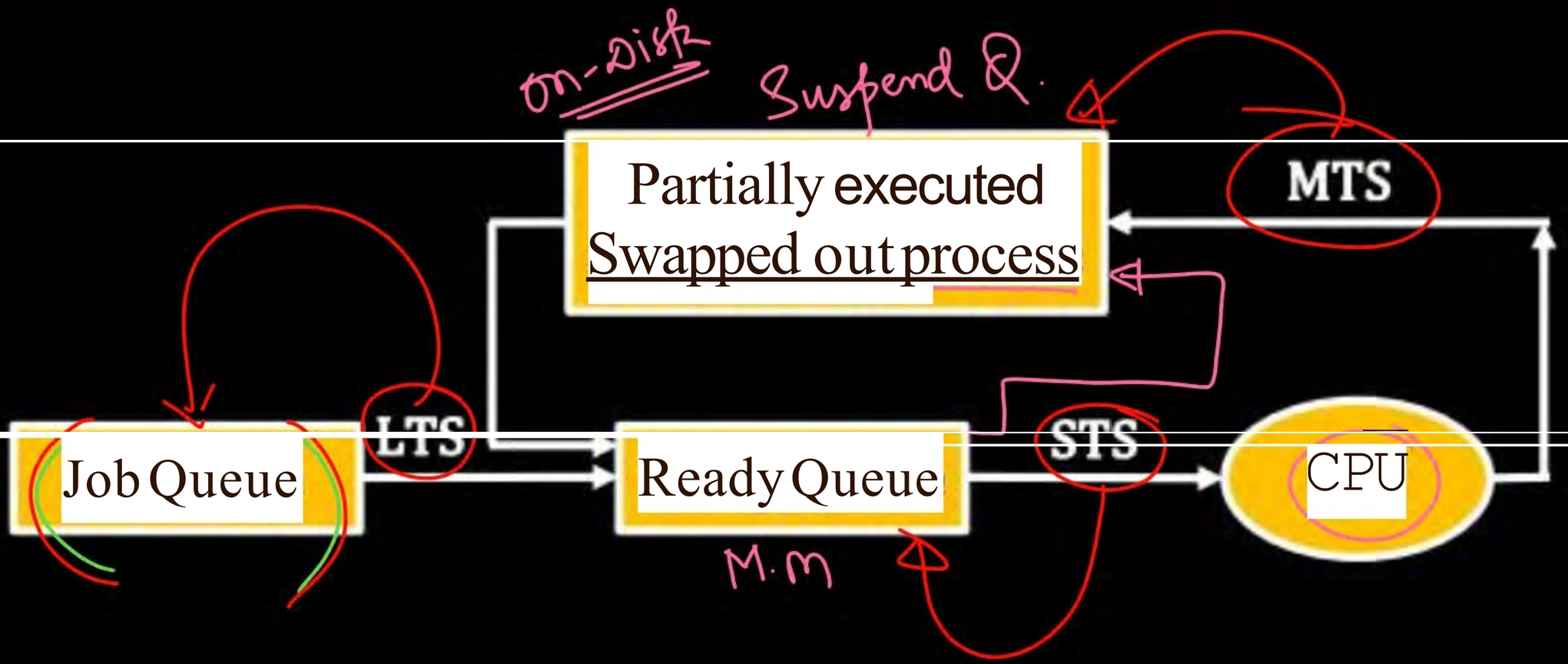
OS
↳ m/c

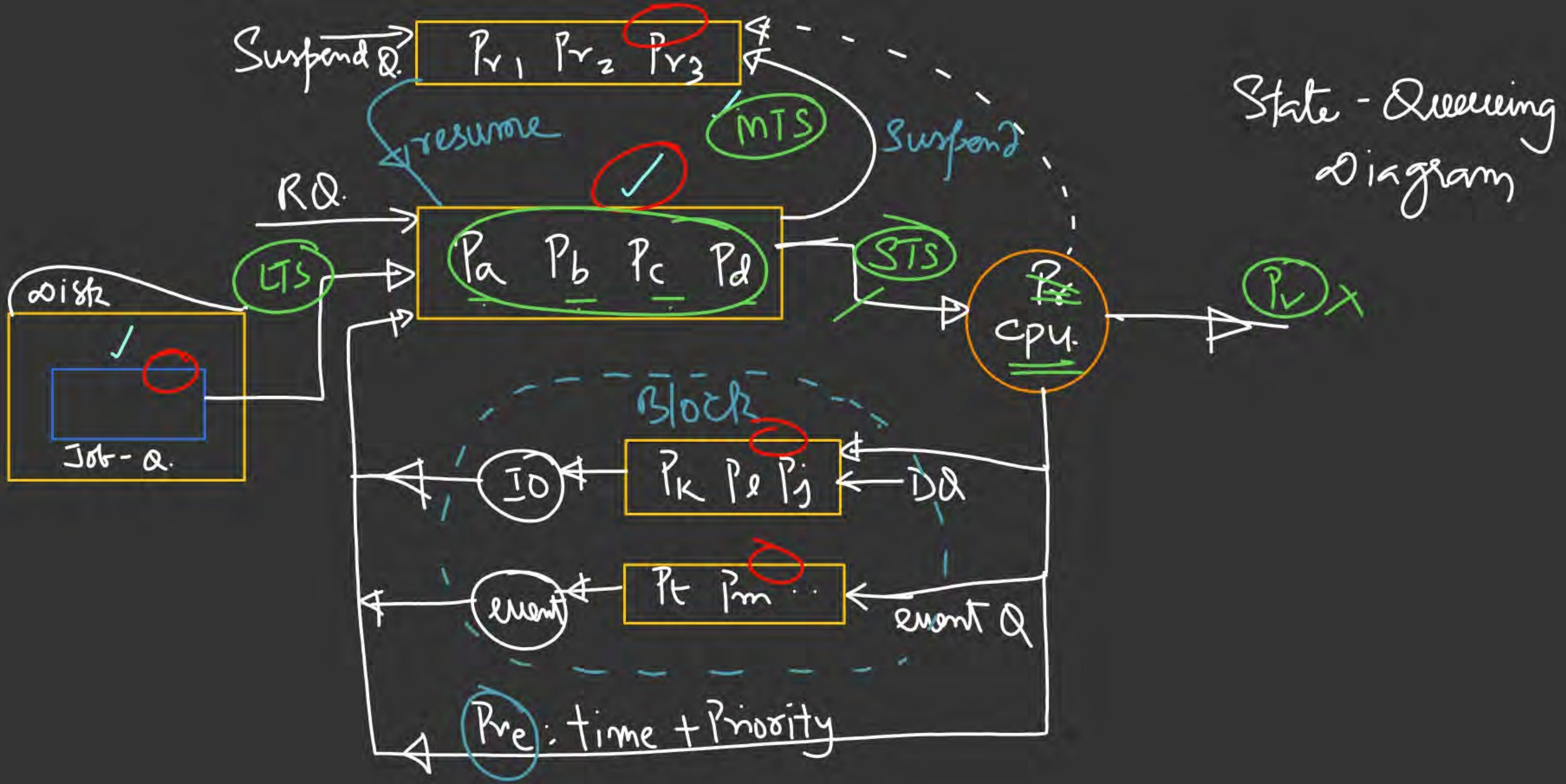
Pre

Scheduling Queues



fork();
↳ creates a child Process


on-disk
Suspend Q.
Partially executed
Swapped out process
MTS
LTS
Job Queue
Ready Queue
STS
CPU
M.M


State - Queueing diagram
Suspend Q.
Pr1 Pr2 Pr3
resume
MTS
Suspend
RQ.
Pa Pb Pc Pd
LTS
STS
disk
Job - Q.
CPU.
Pe
Block
IO
Pk Pl Pj
DQ
event
Pt Pm
event Q
Pre: time + Priority

Schedulers & Dispatcher

→ Scheduling means making a decision

→ Scheduler is a Component of O.S, that makes decisions;

(Frequency of Activations)

→ 1) Long Term Scheduler (LTS): operates on Job-Q.

→ 2) Short Term Scheduler (STS): operates on Ready-Q, to decide which Ready Process should run next;
CPU-Scheduler

→ 3) Medium Term Scheduler (MTS): operates on Suspend 'Q'
(Swapper)

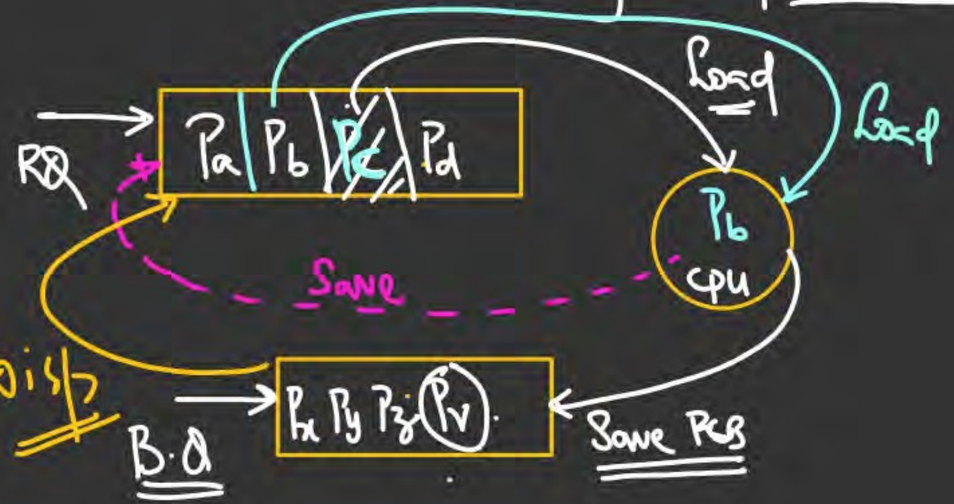
Q) Which Scheduler controls degree of M.Pr?

Ans: L.T.S

(No. of Processes registered with O.S)

Dispatcher: Carrying out activity of CONTEXT-SWITCHING

CONTEXT SWITCHING: is the activity of Loading and Saving the PCB's of Processes, during a process Switch on CPU;



Time Taken by Dispatcher to Load & Save the PCB's is known as

Content-switching Time

CPU-Scheduling ovh'd

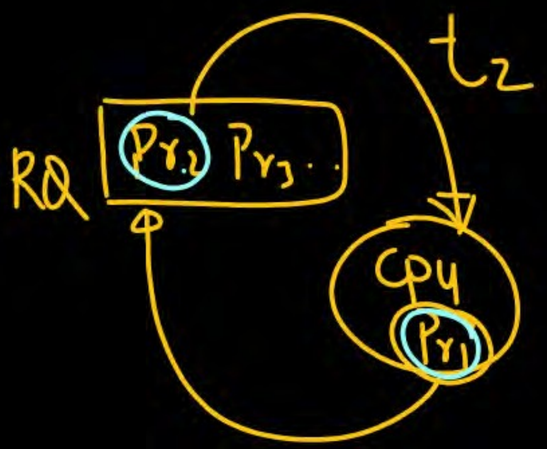
Dispatch Latency

Q.1

Let the time taken to switch between user and kernel modes of execution be t_1 while the time taken to switch between two user processes be t_2. Which of the following is **TRUE**?

Context-switch time = t_2

Mode shifting time = t_1



(A) $t_1 > t_2$

(B) $t_1 = t_2$

(C) $t_1 < t_2$ ✓

Process switching involves (includes) Mode shifting time

(D) Nothing can be said about the relation between t_1 and t_2

Q.2

Dispatch Latency is defined as:

A. The speed of dispatching a process from running to the ready state.

B. The time of dispatching a process from running to ready state and keeping the CPU idle.

C. The time to switch from one process to another on CPU

D. The time to Kill one Process and Load a new one from Disk.

LTS

Which of the following is an Invalid Process State Transitions?

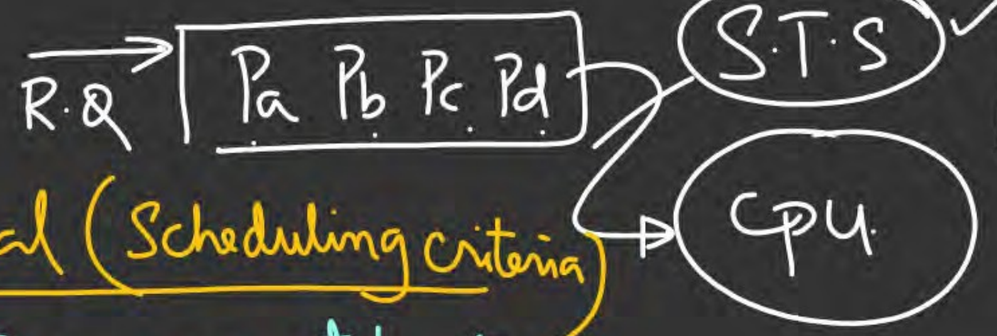
a) Ready → Running ✓
b) Running → Terminate ✓
c) Block → Ready ✓
d) Ready → Suspend ✓
e) Suspend → Running ✗
f) Block → Terminate ✗
g) Suspend → Ready ✓
h) Block → New ✗
(i) Suspend → Terminate ✗

CPU Scheduling

< Design & Implementation of S.T.S >

S.T.S

Function	Goal (Scheduling criteria)
(Select a process from R.Q to run onto CPU)	→ Max. CPU utilization ↳ Thruput → Minimize a) Waiting Time (WT) b) Turn-Around Time (TAT) c) Response Time (RT)



CPU Scheduler

Criteria

↓

Algorithm

(CPU-Scheduling Technique)

PROCESS TIMES:

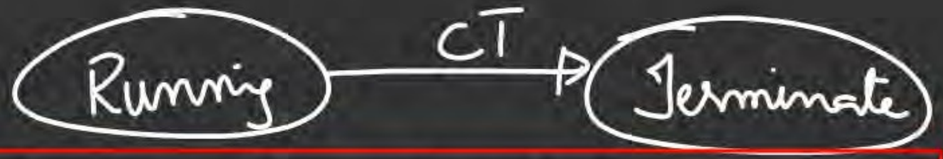
(i) Arrival_time (AT)

(ii) waiting_time (W.T)

(iii) Burst time (BT)

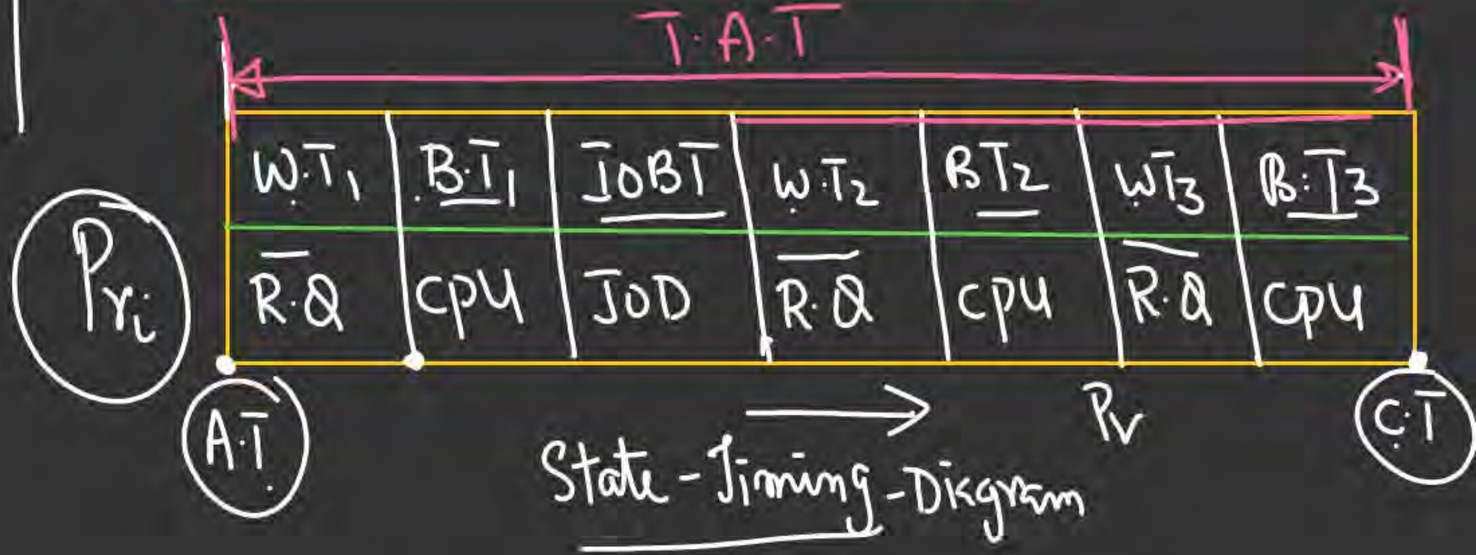
(iv) IOBT (IO-Burst-time)

(v) Completion_time (CT):

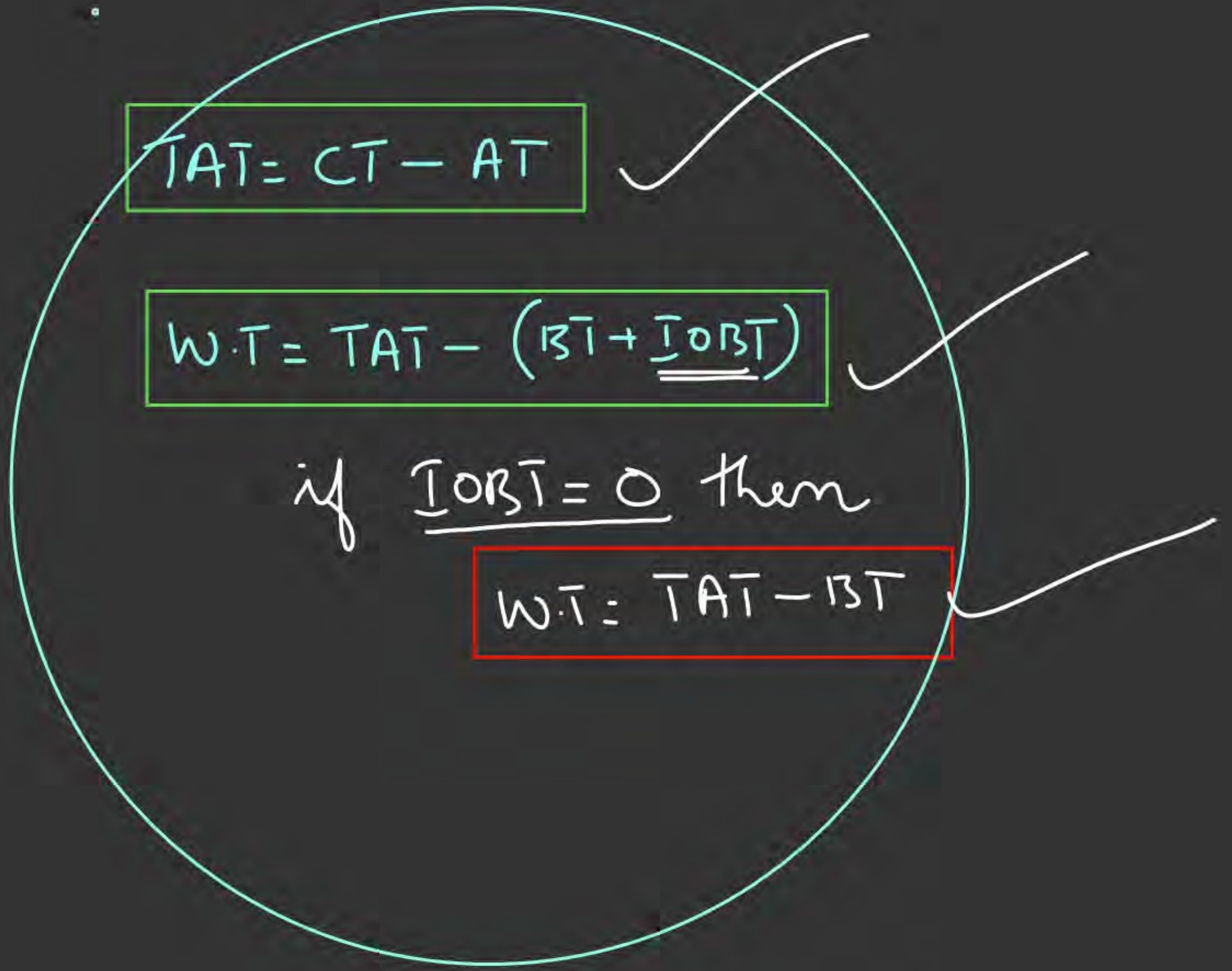


(vi) Turn-Around-time (TAT): CT - AT

(vii) $W.T = TAT - (B.T + IOBT)$



State-Timing-Diagram


TAT = CT − AT
W.T = TAT − (BT + IOBT)
if IOBT = 0 then
W.T = TAT − BT


THANK YOU
GW
SOLDIERS !