1. Process States

A **process** is a program in execution. During its lifetime, it goes through different states.

Process States:

1. **New** – Process is being created.
2. **Ready** – Process is waiting for CPU allocation.
3. **Running** – Process is currently being executed by the CPU.
4. **Waiting / Blocked** – Process is waiting for I/O or some event.
5. **Terminated** – Process has finished execution.

Process State Diagram (text explanation):

New → Ready → Running → Terminated

↑ ↓

Waiting ←--

✅ 2. CPU Scheduling Algorithms

a) FCFS (First Come First Serve)

Concept:
Processes are executed in the order they arrive.

Example:

Process	Burst Time
P1	5
P2	3
P3	2

Execution Order: P1 → P2 → P3

Waiting Time:

- P1 = 0
- P2 = 5
- P3 = 8

Average Waiting Time:

$$(0 + 5 + 8)/3 = 4.33$$

b) SJF (Shortest Job First)

Non-Preemptive SJF

Concept:
Process with shortest burst time executes first.

Order: P3 → P2 → P1

Waiting Time:

- P3 = 0
- P2 = 2
- P1 = 5

Preemptive SJF (SRTF)

Concept:
CPU switches if a new process arrives with smaller remaining time.

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c) Priority Scheduling

Concept:
Process with highest priority executes first (lower number = higher priority).

Process	Burst	Priority
P1	4	2
P2	3	1
P3	5	3

Execution Order: P2 → P1 → P3

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d) Round Robin (RR)

Concept:
Each process gets a fixed **time quantum**.

Time Quantum = 2 ms

Process	Burst
P1	5
P2	4
P3	3

Execution Cycle:
P1 → P2 → P3 → P1 → P2 → P3 → P1

✅ 3. Comparison of Scheduling Algorithms

Algorithm	Turnaround Time	Waiting Time	Response Time
FCFS	High	High	Poor
SJF	Minimum	Minimum	Good
Priority	Medium	Medium	Depends on priority
Round Robin	Medium	Medium	Excellent
