

# MLFQ — Operating System

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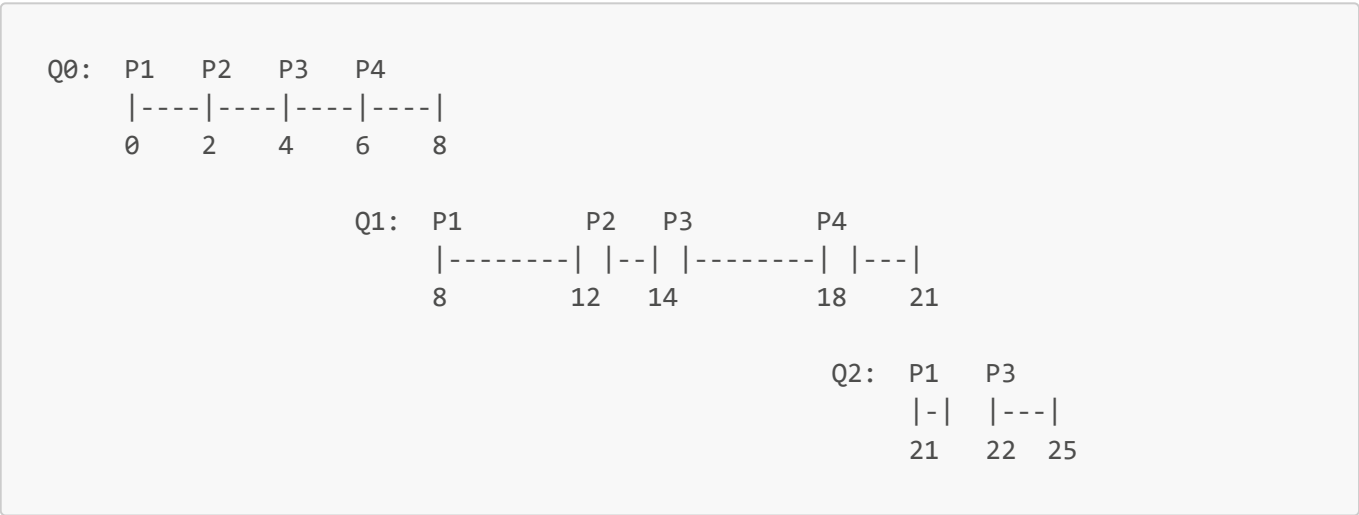
## Solution

### 1) Constructing Gantt Chart

#### Queue Configuration

- **Q0:** Round Robin, Time Quantum = 2
- **Q1:** Round Robin, Time Quantum = 4
- **Q2:** FCFS

#### Per-queue timeline



#### Gantt Chart (merged view):



### 2) Queue Transitions

- **P1:** Q0 → Q1 → Q2
- **P2:** Q0 → Q1
- **P3:** Q0 → Q1 → Q2
- **P4:** Q0 → Q1

### 3) Calculations

Let  $TAT = CT - \text{Arrival Time}$ ,  $WT = TAT - \text{Burst Time}$ .

Process	Arrival	Burst	Completion Time (CT)	Turnaround Time (TAT)	Waiting Time (WT)	Transitions
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Process	Arrival	Burst	Completion Time (CT)	Turnaround Time (TAT)	Waiting Time (WT)	Transitions
P1	0	7	22	22	15	Q0 → Q1 → Q2
P2	1	4	14	13	9	Q0 → Q1
P3	2	9	25	23	14	Q0 → Q1 → Q2
P4	3	5	21	18	13	Q0 → Q1

### Averages

- Average TAT =  $(22 + 13 + 23 + 18) / 4 = \mathbf{19.00}$
- Average WT =  $(15 + 9 + 14 + 13) / 4 = \mathbf{12.75}$

### 4) Promotions (wait > 10 time units)

- **None** — no process waited more than 10 time units in Q1 or Q2, so no promotion was triggered.

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