

Exercise walk-through

7.2

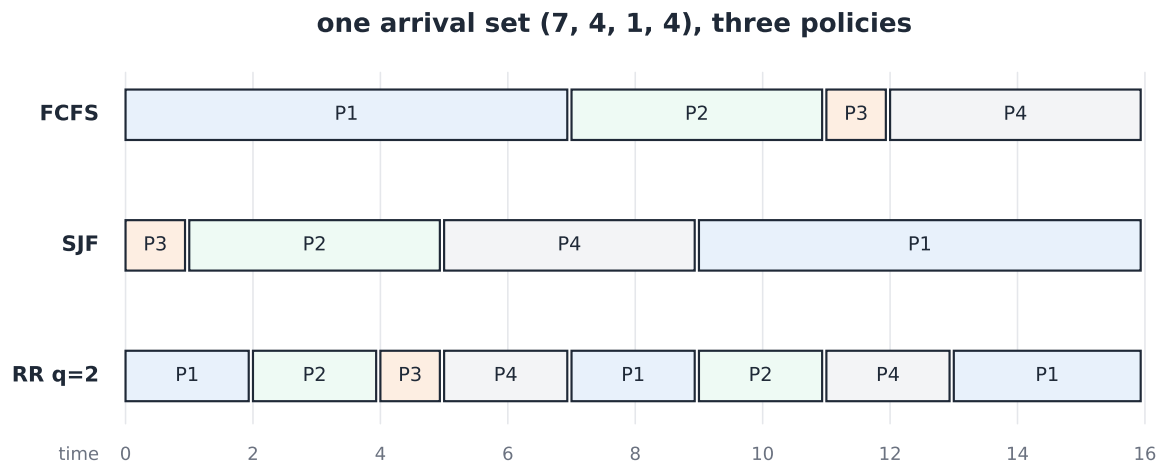
Scheduling

University Computer Science

Scheduling: the average is a policy choice

- 1 **Set** Bursts 7, 4, 1, 4 arriving at 0: **FCFS** finishes 7, 11, 12, 16 (average 11.5); **SJF** finishes 1, 5, 9, 16 (7.75).
- 2 **RR** Quantum 2 runs 9 segments: finishes 5, 11, 13, 16 - average 11.25, worst wait far lower than FCFS 11 for the 1-burst job.
- 3 **Quantum** 1 us switch in a 2 ms quantum wastes 0.05 percent; in a 20 us quantum, 5 percent - switches are work, not progress.

Scheduling Gantt timelines



average turnaround: FCFS 11.5 · SJF 7.75 · RR 11.25 — the average is a policy choice

One arrival set (7, 4, 1, 4), three policies, three timelines.

Exercises 2.1-2.3

2.1 Bursts 6, 3, 2 arriving at 0 under FCFS: give the finishes and the average turnaround. [3]

2.2 The same set under SJF: give the order and the average turnaround. [3]

2.3 A 1 μs switch in a 100 μs quantum wastes what percentage? [3]

Exercises 2.1-2.3

2.1 Bursts 6, 3, 2 arriving at 0 under FCFS: give the finishes and the average turnaround. [3]

2.1

- Finishes 6, 9, 11 ✓.
 - Turnarounds 6, 9, 11 – average $26/3 \approx 8.67$ ✓.
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2.2 The same set under SJF: give the order and the average turnaround. [3]

2.2

- SJF order: P3 (2), P2 (3), P1 (6) ✓.
 - Finishes 2, 5, 11; average $18/3 = 6$ ✓.
-

2.3 A 1 μ s switch in a 100 μ s quantum wastes what percentage? [3]

2.3

- $1/100 = 1\%$ ✓.

Exercise 3.1

3.1 Four jobs arrive at time 0 with bursts $P1 = 8$, $P2 = 4$, $P3 = 2$, $P4 = 4$.

Build the FCFS table (finishes, turnarounds, average) in arrival order. Build the SJF table and its average. Build the round-robin table with quantum 2 (give the first six segments of the trace), and state each policy's average turnaround. Name which job suffers most under FCFS and by how much its wait exceeds its SJF wait. [8]

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3.1

- FCFS finishes 8, 12, 14, 18; turnarounds the same (arrivals 0); average $52/4 = 13$ ✓.
- SJF order P3, P2, P4, P1: finishes 2, 6, 10, 18; average $36/4 = 9$ ✓.
- RR ($q = 2$) first segments: P1 P1 | P2 P2 | P3 | P4 P4 | P1 P1 | P2 P2 ✓.
- RR finishes P3 = 6, P2 = 12, P4 = 14, P1 = 18: average $50/4 = 12.5$ ✓.
- Sufferer: P3 (burst 2) waits 12 under FCFS against 0 under SJF – 12 more ✓.

Exercise 3.2

3.2 A switch costs $2\ \mu\text{s}$.

Compute the percentage of CPU spent switching under round robin with quanta of $50\ \mu\text{s}$, $500\ \mu\text{s}$, and $5\ \text{ms}$. State the quantum a system should avoid and why, in one line each. Compute how many switches the course RR trace (nine segments) implies, and its total switch cost. [7]

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3.2

- $2/50 = 4\%$; $2/500 = 0.4\%$; $2/5000 = 0.04\%$ ✓.
- Avoid the $50\ \mu\text{s}$ quantum: 4% of the CPU spent on switching is work that progresses nothing ✓.
- Nine segments imply 8 switches ✓.
- Total switch cost $8 \times 2\ \mu\text{s} = 16\ \mu\text{s}$ ✓.