


Operating Systems Concept

- ✍ What is an operating system?
- ✍ Operating system architecture
- ✍ Process concept
-  ✍ CPU scheduling
- ✍ Memory management
- ✍ File and I/O systems

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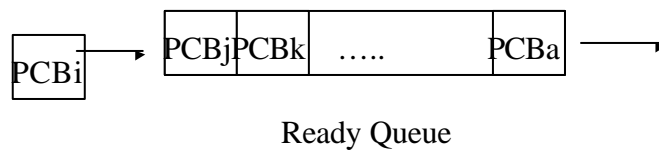
CPU Scheduling

- ✍ Scheduling Criteria
 - ✍ CPU Utilization
 - ✍ Throughput = Number-of-Completed-Processes / Sec
 - ✍ Turnaround Time
 - ✍ Completion time – Submission time
 - ✍ Waiting Time
 - ✍ Time spent in the ready queue
- ✍ Average vs Worst-Case vs Combination
 - ✍ variance

* “Operating system concept”, Silberschatz and Galvin, Addison Wesley, pp. 127-130.
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CPU Scheduling

First-In-First-Out (FIFO) Scheduling

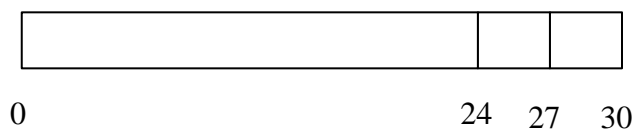


- Select the first process in the queue for execution!
- "Fair" but lengthy waiting for urgent processes! -> Shortest Job First??

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CPU Scheduling – FIFO

Processes	Burst CPU Time	Arrival Time
P1	24	0
P2	3	1
P3	3	1

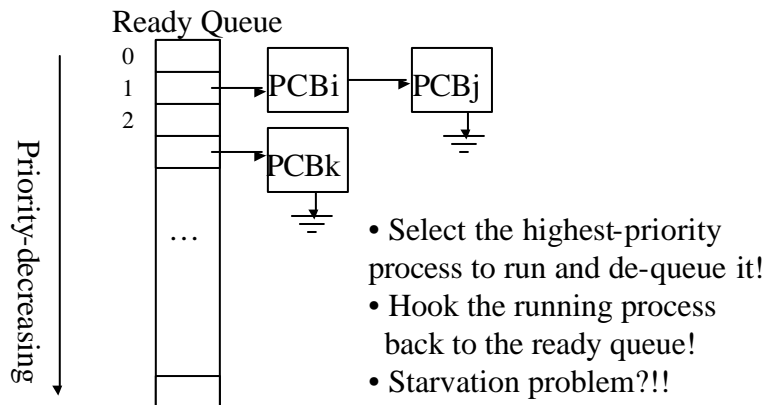


$$\text{Average Waiting Time} = (0 + 23 + 26) / 3$$

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CPU Scheduling

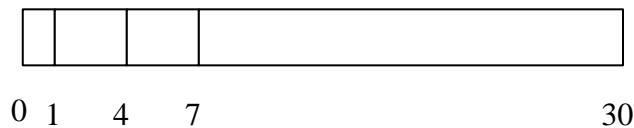
Priority-Driven Scheduling



* "Operating system concept", Silberschatz and Galvin, Addison Wesley, pp. 133-137.
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CPU Scheduling – Priority

Processes	Burst CPU Time	Arrival Time	Priority
P1	24	0	3
P2	3	1	2
P3	3	1	1

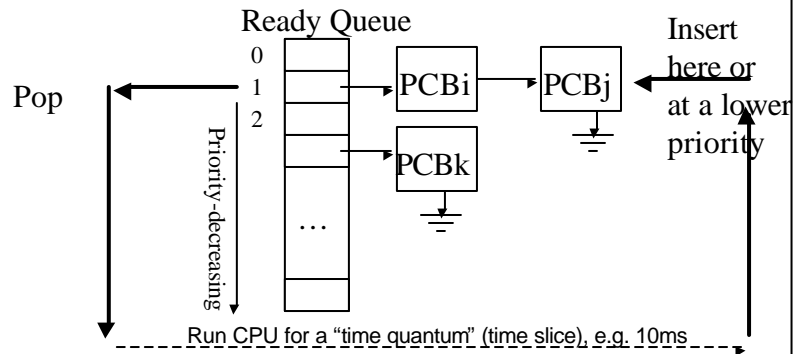


$$\text{Average Waiting Time} = (6 + 0 + 3) / 3$$

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CPU Scheduling

Round-Robin Priority-Driven Scheduling



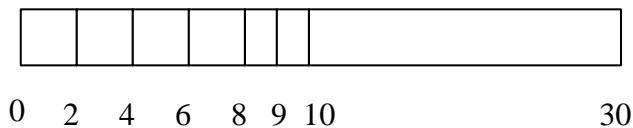
- ⌘ N processes, quantum = ?, (N * ?) cycle time!
- ⌘ How small ? should be? Any limitation?

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CPU Scheduling – RR

Processes	Burst CPU Time	Arrival Time	Priority
P1	24	0	1
P2	3	1	1
P3	3	1	1

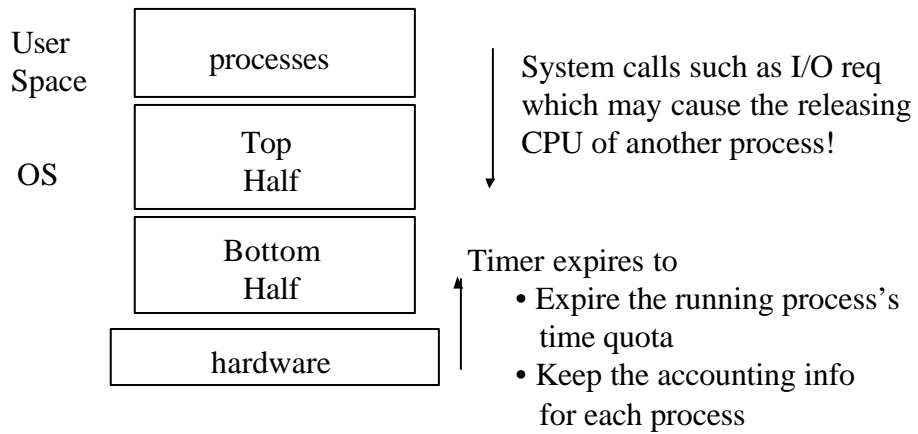
Quantum = 2



$$\text{Average Waiting Time} = (6 + 5 + 6) / 3$$

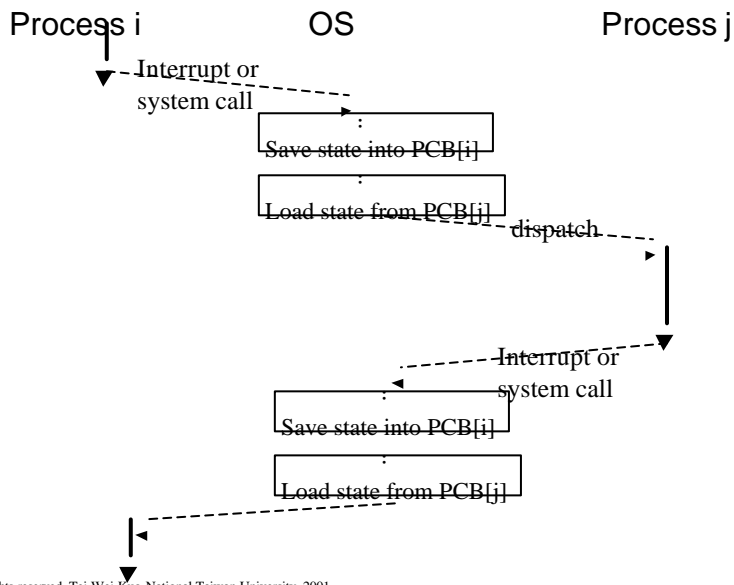
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CPU Scheduling



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Process Concept - Revisiting



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