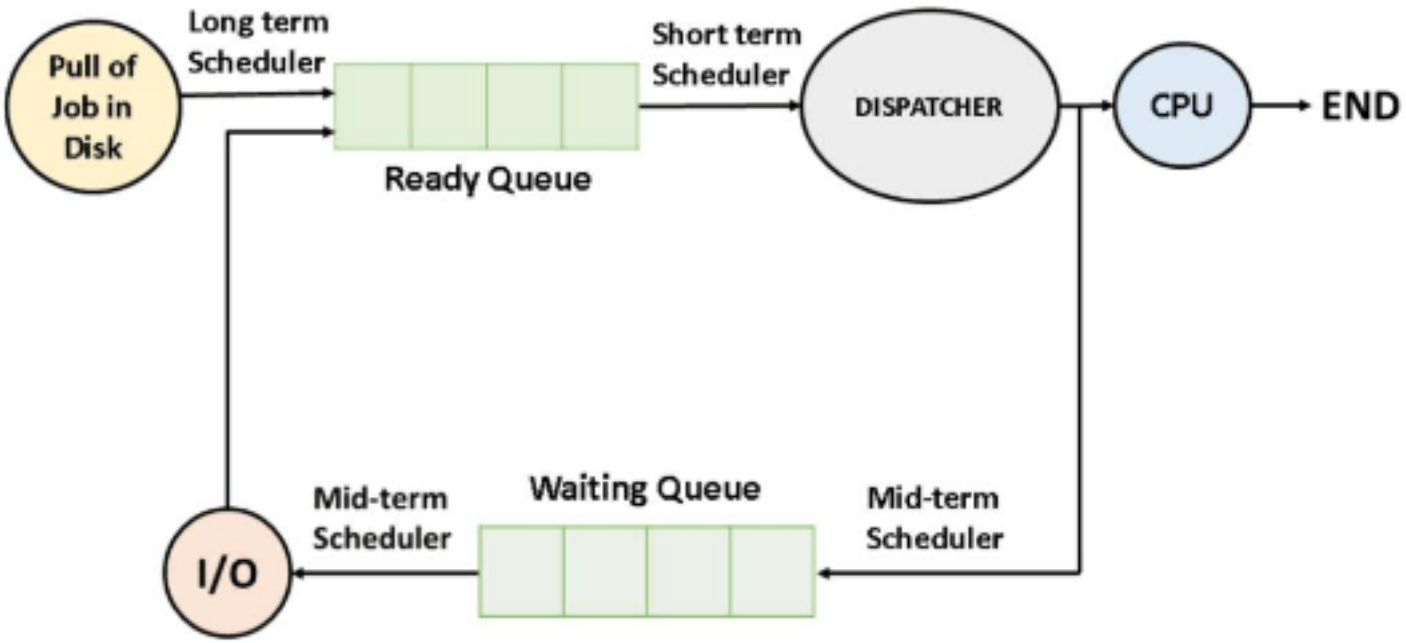
CPU Scheduling

J075 박상신

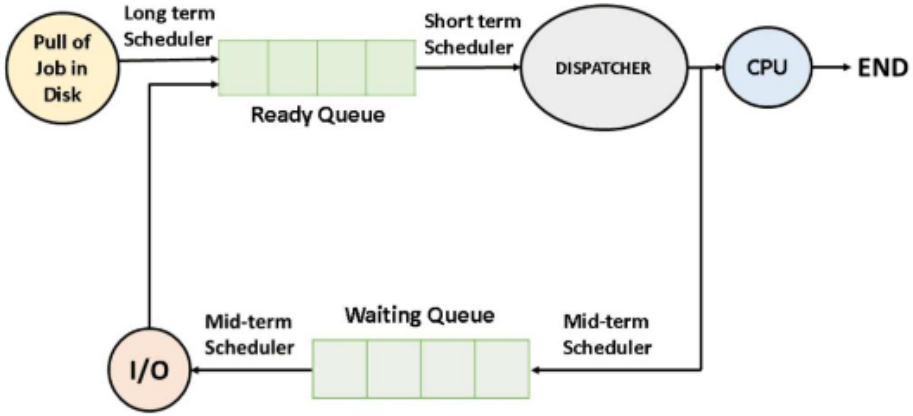
목차

CPU 스케쥴링이란


Pull of Job in Disk
Long term Scheduler
Ready Queue
Short term Scheduler
DISPATCHER
CPU
END
I/O
Mid-term Scheduler
Waiting Queue
Mid-term Scheduler

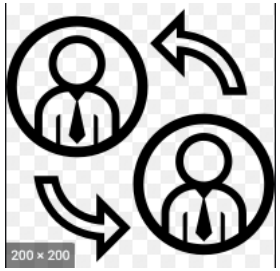
스케쥴링 기준

1. CPU utilization (이용률)
   CPU를 얼마나 많이 사용하는지
2. Throughput (처리량)
   작업이 얼마나 처리되는지
3. Turnaround time (총 처리시간)
   한 프로세스가 종료되기 까지 걸린 시간
4. Waiting time (대기시간)
   Ready Queue에서 대기한 시간
5. Response Time (응답 시간)



선점형 비선점형

20분



15초

1분

비선점형 단점 : 메일 하나 보내는데 너무 오래 기다림 (20분 15초)
선점형 단점 : 자리바꾸는 시간이 필요함 (30초)

스케쥴링 알고리즘 - FCFS

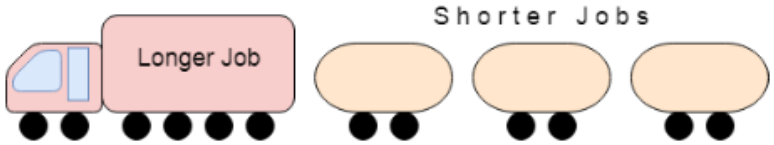
First-Come, First-Served (FCFS)

Process	Burst Time
P_1	24
P_2	3
P_3	3

- Suppose that the processes arrive in the order: P_1 , P_2 , P_3
  The Gantt Chart for the schedule is:

- Waiting time for P_1 = 0; P_2 = 24; P_3 = 27
- Average waiting time: (0 + 24 + 27)/3 = 17

The Convoy Effect, Visualized Starvation

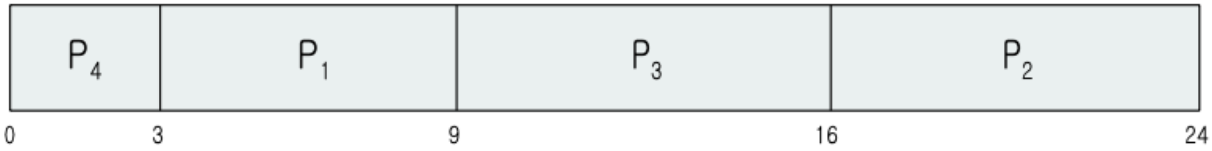


스케쥴링 알고리즘 - SJF

Shortest-Job-First (SJF)

Process	Burst Time
P_1	6
P_2	8
P_3	7
P_4	3

- **SJF scheduling chart**



- **Average waiting time = (3 + 16 + 9 + 0) / 4 = 7**

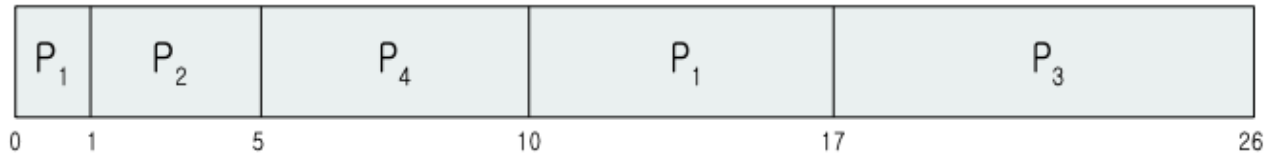
스케쥴링 알고리즘 - SRTF

Shortest-Remain-Time-First (SRTF)

- **Now we add the concepts of varying arrival times and preemption to the analysis**

Process	*Arrival* Time	Burst Time
P_1	0	8
P_2	1	4
P_3	2	9
P_4	3	5

- ***Preemptive* SJF Gantt Chart**



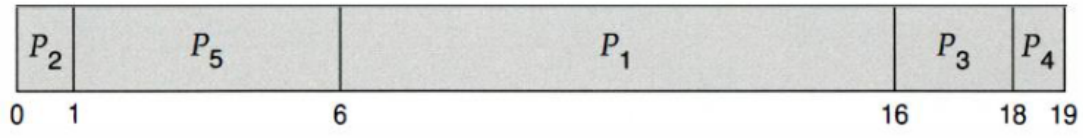
- **Average waiting time = [(10-1)+(1-1)+(17-2)+5-3)]/4 = 26/4 = 6.5 msec**

스케쥴링 알고리즘 – Priority 기반

Priority Scheduling

Process	Burst Time	Priority
P_1	10	3
P_2	1	1
P_3	2	4
P_4	1	5
P_5	5	2

- Priority scheduling Gantt Chart



- Average waiting time = 8.2 msec

문제 : Starvation
해결 : Aging : 시간이 지나면 우선순위를 높여준다.

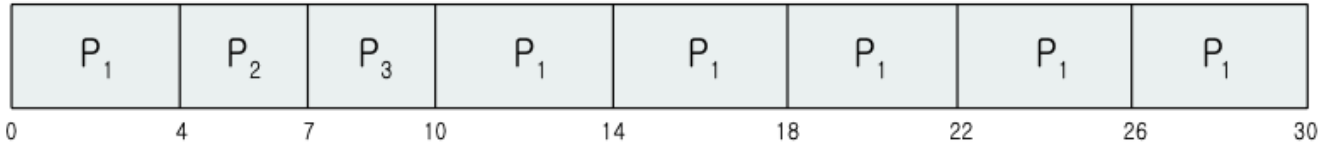
스케쥴링 알고리즘 – RR

Round Robin(RR)

Process	Burst Time
P_1	24
P_2	3
P_3	3

- **The Gantt chart is:**

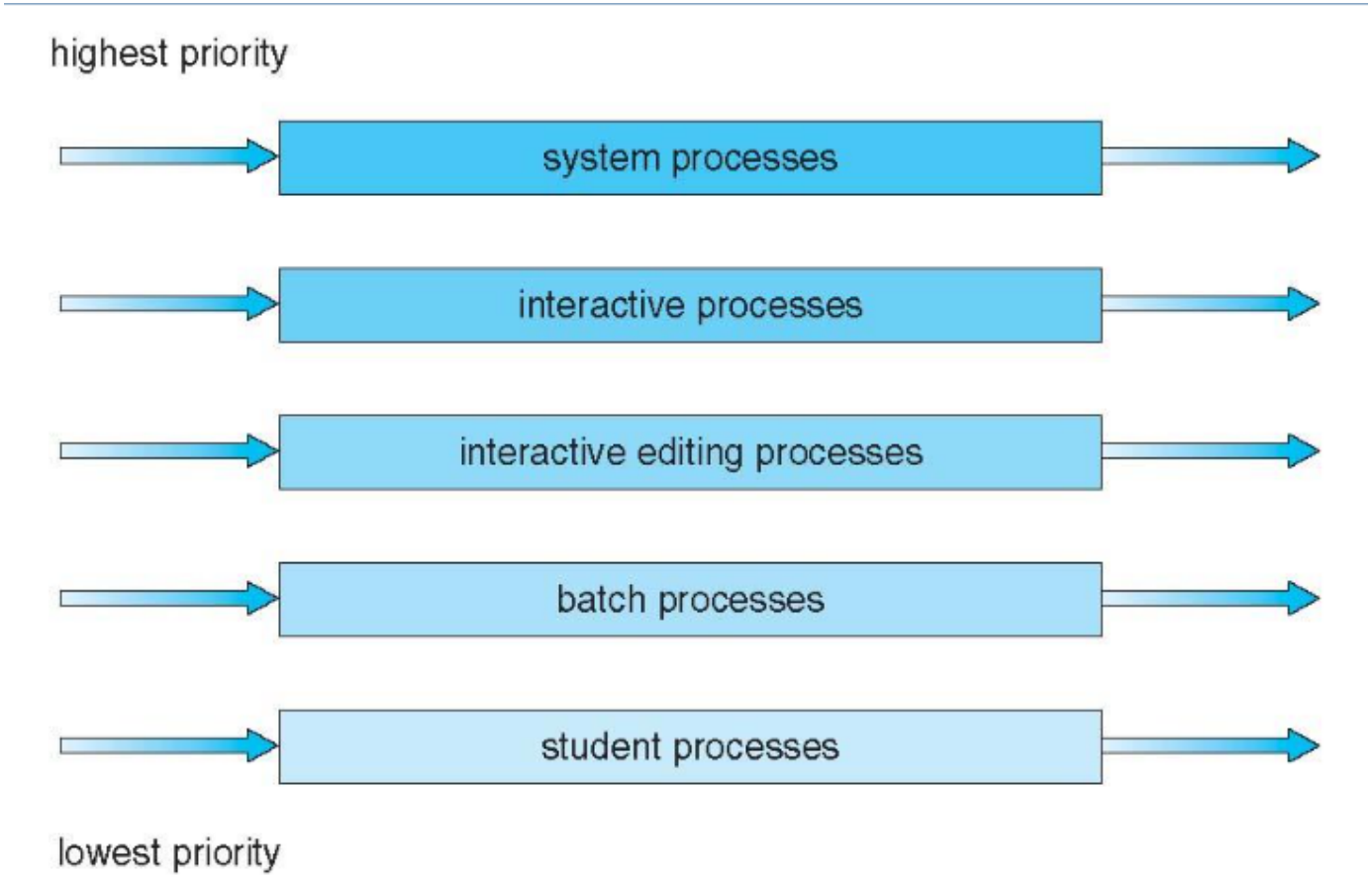
q(Time Quantum) = 4



- **Typically, higher average turnaround than SJF, but better *response***
- **q should be large compared to context switch time**
  - q가 매우 크면, FIFO와 동일하게 됨
  - q가 매우 작으면, overhead 많아짐
- **q usually 10ms to 100ms, context switch < 10 usec**

스케쥴링 알고리즘 – Multilevel Queue Scheduling

Multilevel Queue Scheduling



스케쥴링 알고리즘 – Multilevel Feedback Queue

Multilevel Feedback Queue