进程调度实验报告

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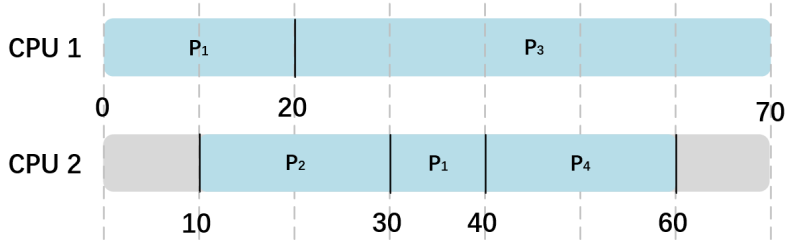
Q1

> 假定有四个进程 (P_1 - P_4)，到达时刻分别是 0、10、20 和 40，优先级分别是 1、2、3 和 4，执行时间分别是 30、20、50 和 20 毫秒， 这些进程在一个双CPU机器上被调度执行，系统中只有一个就绪队列（ready queue），假定上下文切换的开销为 0 。当分别采用以下可抢占调度算法时，画出按每种调度算法调度的甘特图，并计算其平均等待时间和平均周转时间。
>
> - 优先级（Priority）调度
> - 轮转(Round Robin)调度，时间片为 20ms
> - 最短作业优先 （Shortest Job First）

进程	到达时刻	优先级	执行时间
P_1	0	1	30
P_2	10	2	20
P_3	20	3	50
P_4	40	4	20

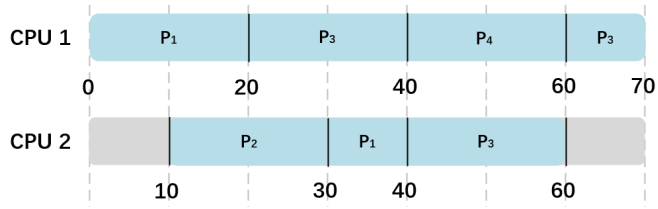
1.1 优先级调度



平均等待时间 $= \frac{10+0+0+0}{4} = 2.5\text{ms}$

平均周转时间 $= \frac{40+20+50+20}{4} = 32.5\text{ms}$

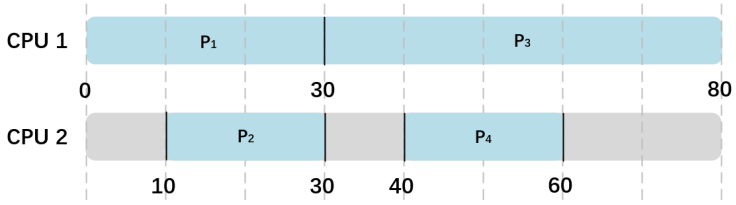
1.2 轮转调度



平均等待时间 $= \frac{10+0+0+0}{4} = 2.5\text{ms}$

平均周转时间 $= \frac{40+20+50+20}{4} = 32.5\text{ms}$

1.3 最短作业优先



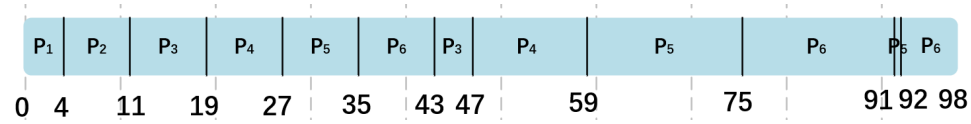
平均等待时间 $= \frac{0+0+10+0}{4} = 2.5\text{ms}$

平均周转时间 $= \frac{30+20+60+20}{4} = 32.5\text{ms}$

Q2

> Consider a multi-level feedback queue in a single-CPU system. The first level (queue 0) is given a quantum of 8 ms, the second one a quantum of 16 ms, the third is scheduled FCFS. Assume jobs arrive all at time zero with the following job times (in ms): 4, 7, 12, 20, 25 and 30, respectively. Assume the context switch overhead is zero unless otherwise stated.
>
> - Show the Gantt chart for this system.
> - Compute the average waiting and turnaround time.
> - Suppose the context switch overhead is 1 ms. Compute the average turnaround time.

2.1 Gantt chart



2.2 Average waiting and turnaround time

$$\text{Average Waiting Time} = \frac{0+4+35+39+67+68}{6} = 30.5\text{ms}$$

$$\text{Average Turnaround Time} = \frac{4+11+47+59+92+98}{6} = 51.83\text{ms}$$

2.3 Average turnaround time

$$\text{Average Turnaround Time} = \frac{4+12+53+66+102+109}{6} = 57.67\text{ms}$$