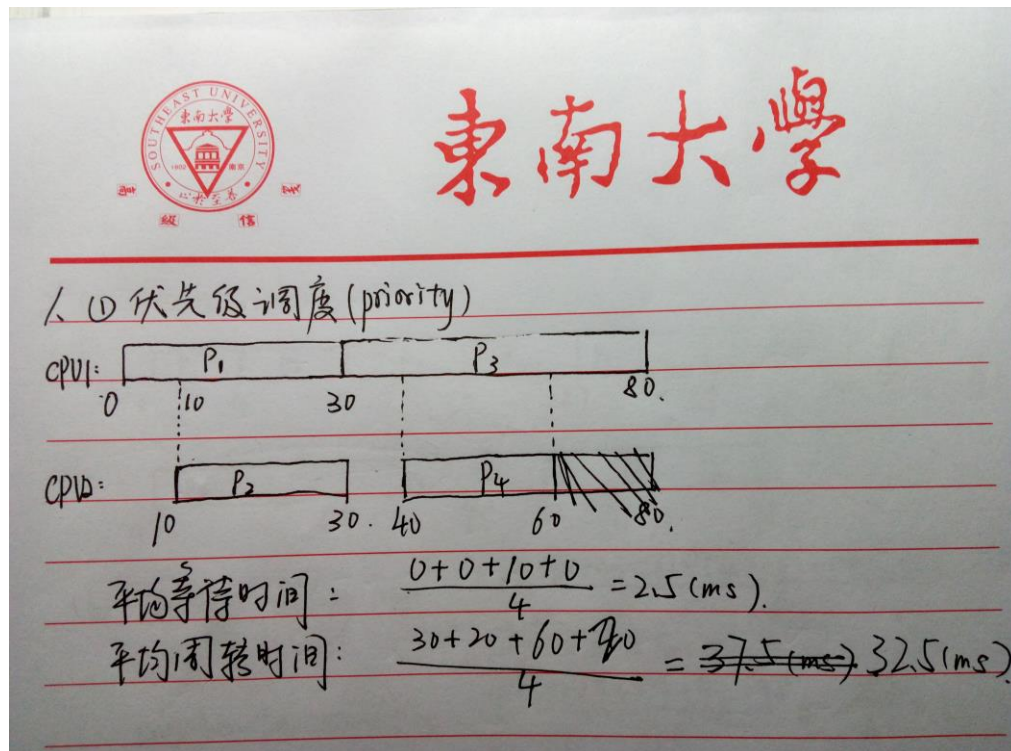


1. 假定有四个进程 (P1 - P4), 到达时刻分别是0、10、20和40, 优先级分别是1、2、3和4, 执行时间分别是30、20、50和20毫秒, 这些进程在一个双CPU机器上被调度执行, 系统中只有一个就绪队列 (ready queue), 假定上下文切换的开销为0。当分别采用以下可抢占调度算法时, 画出按每种调度算法调度的甘特图, 并计算其平均等待时间和平均周转时间。

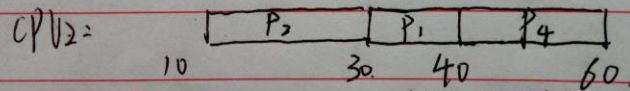
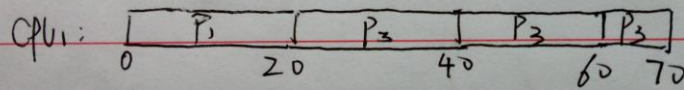
(i) 优先级 (Priority) 调度; (ii) 轮转(Round Robin)调度, 时间片为20ms; (iii) 最短作业优先 (Shortest Job First)。





東南大學

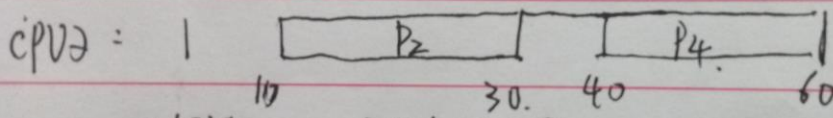
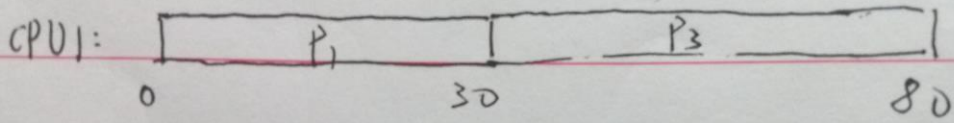
②. 轮转调度 (round Robin). slice time = 20ms.



平均等待时间 $\frac{10+0+0+0}{4} = 2.5ms$

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

③. 最短作业调度:



平均等待: $\frac{0+0+40+0}{4} = 2.5ms$

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

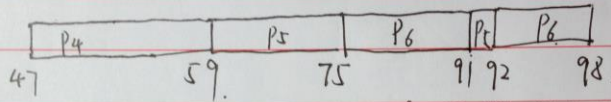
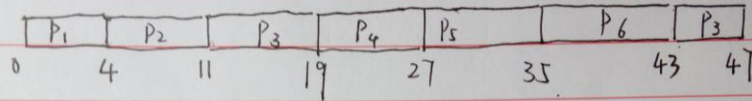
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2. Consider a **multi-level feedback** queue in a **single-CPU** system. The first level (queue 0) is given a **quantum of 8 ms**, the second one a **quantum of 16 ms**, the third is scheduled **FCFS**. Assume jobs **arrive all at time zero** with 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. (a) Gantt chart



(b) Average waiting time:
$$\frac{0+4+(11+43-19)+(47-8)+(91-8-16)+(92-8-16)}{6}$$

$$= \frac{213}{6} = 35.5 \text{ (ms)}$$

average turnaround time:
$$\frac{4+11+47+59+92+98}{6} = \frac{311}{6} = 51.8 \text{ (ms)}$$

(c) Average turnaround time
$$\frac{4+12+28+(59+7)+102+109}{6} = \frac{314}{6} = 52.3$$

$$\frac{4+12+53+(59+7)+102+109}{6} = \frac{346}{6}$$

$$= 57.7 \text{ (ms)}$$