HW5: Performance analysis I

Consider the process in figure 4.46.

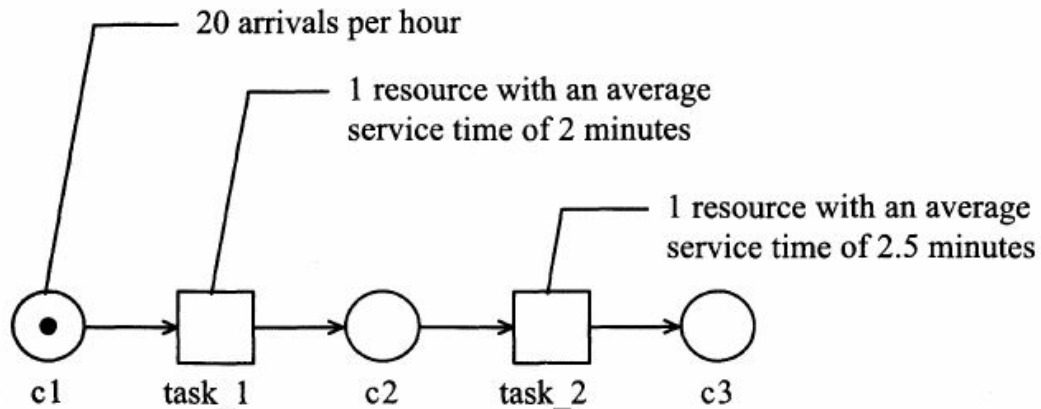

Figure 4.46
Process (1)

(a) Determine the following performance indicators:

• Occupation rate (utilization) for each resource,

对于Task_1：
每小时到达：20个任务
每小时可以处理：60/2 = 30个任务
Task_1的资源占有率：20/30 = 0.67

对于Task_2：
每小时到达：20个任务
每小时可以处理：60/2.5 = 24个任务
Task_2的资源占有率：20/24 = 0.83

• Average WIP (work in progress),

$\rho_{Task\_1}/(1- \rho_{Task\_1}) + \rho_{Task\_2}/(1- \rho_{Task\_2}) = 7$

• Average flow time (throughput time), and

对于Task_1：
2/30*60 + 2 = 6 min

对于Task_2：
5/24*60 + 2.5 = 15 min

总时间为：21 min

• Average waiting time for each task.

Task_1: 4 min
Task_2:12.5 min

Task 2 is a check task. The management thinks about a selective execution
of this task where only 25% of the cases are checked. The average
service time of this new task is 6 minutes.

(b) Determine the performance indicators again:

• Occupation rate (utilization) for each resource,

Task_1: 0.67
Task_2:

每小时达到：20个任务
每小时可处理：60/6 = 10个任务
Task_2资源利用率：10/20 = 0.5

- Average WIP (work in progress),

$\rho_{Task\_1}/(1-\rho_{Task\_1}) + \rho_{Task\_2}/(1-\rho_{Task\_2}) = 3$

- Average flow time (throughput time), and

$(1/10*60 + 6) * 0.25 + 6 = 9$ min

- Average waiting time for each task.

Task_1: 4 min

Task_2: 6 min

每小时达到：20个任务
每小时可处理：60/6 = 10个任务
Task_2资源利用率：10/20 = 0.5