**有三类资源 A(17)、B(5)、C(20)。有 5 个进程 P1—P5。T0 时刻系统状态如下**

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  |  |  | 最大需求 | | |  |  |  |  |  |  |  | 已分配 | | | |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| P1 |  |  |  |  |  |  | 5 | 5 | 9 |  |  |  |  |  |  | 2 | 1 | | 2 |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| P2 |  |  |  |  |  |  | 5 | 3 | 6 |  |  |  |  |  |  | 4 | 0 | | 2 |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| P3 |  |  |  |  |  |  | 4 | 0 | 11 |  |  |  |  |  |  | 4 | 0 | | 5 |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| P4 |  |  |  |  |  |  | 4 | 2 | 5 |  |  |  |  |  |  | 2 | 0 | | 4 |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| P5 |  |  |  |  |  |  | 4 | 2 | 4 |  |  |  |  |  |  | 3 | 1 | | 4 |  |
|  |  | | |  |  | | | |  |  |  |  |  |  |  |  |  |  |  |  |
| **(1)T0 时刻是否为安全状态，给出安全系列。** | | | | | | | | | |  |  |  |  |  |  |  |  |  |  |  |
| **(2)T0 时刻，P2: Request(0,3,4)，能否分配，为什么？** | | | | | | | | | | | | |  |  |  |  |  |  |  |  |
| **(3)在(2)的基础上 P4：Request(2,0,1)，能否分配，为什么？** | | | | | | | | | | | | | |  |  |  |  |  |  |  |
| **(4)在(3)的基础上 P1：Request(0,2,0)，能否分配，为什么** | | | | | | | | | | | | | |  |  |  |  |  |  |  |
| **是安全状态，安全系列为{p3,p4,p5,p1,p2}** | | | | | | | | | |  |  |  |  |  |  |  |  |  |  |  |
| 1. |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  |  | | | |  |  | |  |  |  |  |  |  | | |  |  |  |  |  |
|  | 最大需求 | | | |  | 已分配 | |  |  | 需要 |  |  | 分配+工作 | | |  |  |  | Finish |  |
|  |  |  |  | |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| P4 | 2 | 3 | 3 | | 2 | 0 | 4 |  | 2 | 2 | 1 |  | 4 | 3 | 7 |  |  |  | True |  |
|  |  |  |  | |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| P2 | 4 | 3 | 7 | | 4 | 0 | 2 |  | 1 | 3 | 4 |  | 8 | 3 | 9 |  |  |  | True |  |
|  |  |  |  | |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| P3 | 8 | 3 | 9 | | 4 | 0 | 5 |  | 0 | 0 | 6 |  | 12 | 3 | 14 |  |  |  | True |  |
|  |  |  |  | |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| P5 | 12 | 3 | 14 | | 3 | 1 | 4 |  | 1 | 1 | 0 |  | 15 | 4 | 18 |  |  |  | True |  |
|  |  |  |  | |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| P1 | 15 | 4 | 18 | | 2 | 1 | 2 |  | 3 | 4 | 7 |  | 17 | 5 | 20 |  |  |  | True |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |

安全状态，安全系列为{p4,p2,p3,p5,p1}

**2.**P2 请求资源：p2 发出请求向量 Request (0,3,4)

Request (0,3,4) > Available (2,3,3)，资源不够不分配。

**3**

Request (2,0,1) < Available (2,3,3)

Request (2,0,1) < Need (2,2,1)

分配资源进行安全性检测,安全序列（p4,p2,p3,p5,p1）,系统仍处在安全状态所以可以把资源分配给 p4。

**4.**

Request (0,2,0) < Available (0,3,2)

Request (0,2,0) < Need (3,4,7)

为 p1 分配资源，可用资源向量变为（0，1，2）不能满足任意进程的需要，不能分配资源。