CSC 139 Operating System Principles

10/23/2019 In-class Group Assignment

Assume we have nine tape drives. Consider whether or not the following states are *safe* or *unsafe*.

|  |  |  |
| --- | --- | --- |
| **State** | **Current Loan** | **Maximum Need** |
| Process A | 0 | 3 |
| Process B | 3 | 5 |
| Process C | 4 | 7 |

Again assume we have nine tape drives. Consider whether or not the following states are *safe* or *unsafe*.

|  |  |  |
| --- | --- | --- |
| **State** | **Current Loan** | **Maximum Need** |
| Process A | 5 | 7 |
| Process B | 2 | 5 |
| Process C | 1 | 3 |

Now return to the first example. Suppose that Process C requests one tape drive. If this request is granted, will we still be in a safe state?

|  |  |  |
| --- | --- | --- |
| **State** | **Current Loan** | **Maximum Need** |
| Process A | 0 | 3 |
| Process B | 3 | 5 |
| Process C | 5 | 7 |

"An unsafe state does not imply the existence of deadlock. What an unsafe state does imply is simply that some unfortunate sequence of events might lead to deadlock."

Assume we have the following resources:

* 5 tape drives
* 2 graphic displays
* 4 printers
* 3 disks

Consider we have already allocated these resources among four processes as demonstrated by the following matrix named **Allocation**.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Process Name** | **Tape Drives** | **Graphics** | **Printers** | **Disk Drives** |
| Process A | 2 | 0 | 1 | 1 |
| Process B | 0 | 1 | 0 | 0 |
| Process C | 1 | 0 | 1 | 1 |
| Process D | 1 | 1 | 0 | 1 |

We also need a matrix to show the number of each resource still needed for each process; we call this matrix **Need**.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Process Name** | **Tape Drives** | **Graphics** | **Printers** | **Disk Drives** |
| Process A | 1 | 1 | 0 | 0 |
| Process B | 0 | 1 | 1 | 2 |
| Process C | 3 | 1 | 0 | 0 |
| Process D | 0 | 0 | 1 | 0 |

Q1: Is the system in a safe state?

Q2: What is a safe sequence that assures this safe state, if it is safe?