**Unity University**

**Computer Science Department**

**Worksheet on Operating system**

1. What is the main difference between multiprogramming and multitasking operating systems?
2. What is the importance of inter-process communication in computers? Discus the different models that operating systems follow.
3. Describe input/output bound process and CPU bound process.
4. What is process scheduling and in what condition does it is needed? And what is the main objective of process scheduling algorithms? Distinguish between job scheduling (long term scheduler) and CPU scheduling (short term scheduler).
5. What is virtual memory? And what is its main advantage?
6. Which of the following resource allocation graphs show:

* A cycle?
* Unsafe/safe state?
* Deadlock?

And draw the corresponding wait-for graph for each.

R**4**

R**1**

R**2**

R**3**

R**4**

R**1**

R**2**

R**3**

|  |  |  |
| --- | --- | --- |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |
|  | |  |

1. Based on the following information, answer the questions that follow:

Total processes: p0, p1, p2, p3, and p4

Total resource Types: A, B, and C

Freely available resources: A=3; B=3; C=2;

Snapshot of the system:

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | **Allocated:** | | | **Maximum Amount:** | | | **Need:** | | |
|  | **A** | **B** | **C** | **A** | **B** | **C** |  |  |  |
| P0 | 0 | 1 | 0 | 7 | 5 | 3 |  |  |  |
| P1 | 2 | 0 | 0 | 3 | 2 | 2 |  |  |  |
| P2 | 3 | 0 | 2 | 9 | 0 | 2 |  |  |  |
| P3 | 2 | 1 | 1 | 2 | 2 | 2 |  |  |  |
| P4 | 0 | 0 | 2 | 4 | 3 | 3 |  |  |  |

* Calculate the resource needs of all processes of each type.
* Is the above system in safe state? Why?
* Can request for (1, 0, 2) by P1 be granted?
* Can request for (3, 3, 0) by P4 be granted?
* Can request for (0, 2, 0) by P0 be granted?

1. Based on the following information of a system, answer the questions that come next using the banker’s algorithm:

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Processes: | Allocation: | | | | Maximum: | | | | Available: | | | |
| **A** | **B** | **C** | **D** | **A** | **B** | **C** | **D** | **A** | **B** | **C** | **D** |
| **P0** | 0 | 0 | 1 | 2 | 0 | 0 | 1 | 2 | 1 | 5 | 2 | 0 |
| **P1** | 1 | 0 | 0 | 0 | 1 | 7 | 5 | 0 |  |  |  |  |
| **P2** | 1 | 3 | 5 | 4 | 2 | 3 | 5 | 6 |  |  |  |  |
| **P3** | 0 | 6 | 3 | 2 | 0 | 6 | 5 | 2 |  |  |  |  |
| **P4** | 0 | 0 | 1 | 4 | 0 | 6 | 5 | 6 |  |  |  |  |

* Calculate the resource needs of the processes.
* Is the system in safe state?
* What if the following resource requests are made?
  + P1 requests (0, 4, 2, 0)
  + P2 requests (1, 4, 3, 1)
  + P3 requests (0, 4, 3, 1)

1. A system has four processes and five allocate-able resources. The current allocation and maximum needs are as follows:

|  |  |  |  |
| --- | --- | --- | --- |
|  | Allocated | Maximum | Available |
| Process 0  Process 1  Process 2  Process 3 | 1 0 2 1 1  2 0 1 1 0  1 1 0 1 0  1 1 1 1 0 | 1 1 2 1 3  2 2 2 1 0  2 1 3 1 0  1 1 2 2 1 | 0 0 x 1 1 |

What is the smallest value of x for which this is a safe state?

1. Write the difference between Internal and External fragmentation of disks.
2. Describe the following terms:

* Kernel
* System call
* Context switching
* CPU burst time
* Process burst time
* Input/ Output burst time
* Memory management
* Memory compaction
* MMU
* Logical/Process address space
* Virtual address
* Physical address space
* Symbolic address
* Swapping
* Pages
* Paging
* page tables
* Frame
* Contiguous file allocation
* Chained/Linked list file allocation
* Indexed file allocation
* Starvation
* Base and Limit registers

1. Define memory fragmentation and explain how internal and external memory fragmentations are created.
2. What are the various Page Replacement Algorithms used for Page Replacement? And when do the system uses them?
3. Explain the reason why API’s need to be used rather than direct system  
   call?
4. What is the advantage of multiprocessor systems over single processor system?
5. Differentiate Microkernel (microlithic) and Monolithic kernel against complexity, speed, types of services, and size.
6. What is multicore processor?
7. Define memory stall and how can it be created?
8. Explain bootstrapping.