

CSE 332 Midterm #2

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I. QUESTION (15 POINTS)

A computer with an 64-bit address uses a three-level page table. Virtual addresses are split into a 16-bit top-level page table field, and 16-bit second-level page table field, 16-bit third-level page table field, and an offset.

- What is the size of the address space?
- How large are the pages?
- How many pages are there in the virtual address space?

II. QUESTION (15 POINTS)

Assume 100% CPU bound jobs arrive into a multi-programming system in the pattern shown below.

Job Name	j1	j2	j3	j4	j5
Arrival Time	0	1	3	5	7
Execution Time	6	4	3	2	2

- Draw the Gantt chart for SJF scheduling.
- Draw the Gantt chart for FCFS scheduling.
- Draw the Gantt chart for Round Robin scheduling with a time quantum of 2.

III. QUESTION (15 POINTS)

Given memory partitions of 100K, 500K, 200K, 300K, and 600K (in order), how would

- First-fit
- Best-fit
- Worst-fit

algorithms place processes of 212K, 417K, 112K, and 426K (in order)?

IV. QUESTION (20 POINTS)

Consider the following implementations of a typical philosopher.

- ```
while (true){
 think for a while;
 pickup left fork;
 pickup right fork;
 eat for a while;
 put down left fork;
 put down right fork;
}
```
- ```
while (true){
    think for a while;
    pickup both forks at once;
    eat for a while;
    put down both forks at once;
}
```

Will deadlock occur? Explain. You should assume that each of the operations used are atomic.

V. QUESTION (15 POINTS)

Consider the two-dimensional array A:

```
int [][] A = new int[5][5];
```

in a paged memory system with pages containing 5 integers. Assume that A starts in the beginning page 1. Write appropriate Java codes using array A to get the following reference strings:

- 1 1 1 1 1 2 2 2 2 2 3 3 3 3 3 4 4 4 4 4 5 5 5 5 5
- 1 2 3 4 5 1 2 3 4 5 1 2 3 4 5 1 2 3 4 5 1 2 3 4 5
- 1 2 1 2 1 2 1 2 1 2 3 4 3 4 3 4 3 4 3 4 5 5 5 5 5

VI. QUESTION (20 POINTS)

If deadlock is controlled by the banker's algorithm, which of the following changes can be made safely, that is, without introducing the possibility of deadlock? Explain.

- Increase Available
- Decrease Available
- Increase Max for one process
- Decrease Max for one process